REMEDIAL WORK PLAN

AND

ALTERNATIVES ANALYSIS

Prepared for the

Haverstraw Harbors Site

NYSDEC Brownfields Program Site: C344060
NYSDEC Spill Files: 9811999, 0001146, and 0411778
Former MOSF: 3-1700

Located at

Dr. George W. Girling Drive
Village Of Haverstraw
Rockland County, New York

November 2007

ESI File: GH9964.42

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The undersigned has reviewed this Remedial Work Plan and Alternatives Analysis and certifies to Harbors Haverstraw, 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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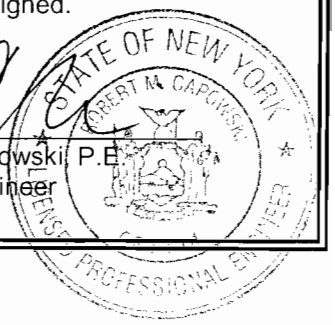

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1.0 INTRODUCTION

1.1 Purpose

Ecosystems Strategies, Inc. (ESI) has prepared this Remedial Work Plan and Alternatives Analysis (RWP) in order to summarize an analysis of potential remedial alternatives, and present a Work Plan for proposed environmental response actions, at the "Haverstraw Harbors Site" (hereafter referred to as the "Site") located on Dr. George W. Girling Drive ("Girling Drive"), in the Village of Haverstraw, Rockland County, New York. All work was performed in general conformance with New York State Department of Environmental Conservation (NYSDEC) Draft Division of Environmental Remediation -10, Technical Guidance for Site Investigation and Remediation (DER-10).

The Alternatives Analysis 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 Work Plan describes specific remedial response actions, which are proposed in order to meet the objectives determined through the alternatives analysis.

1.2 Site Information

1.2.1 Site Location and Description

The Site is comprised of the following contiguous properties located on Dr. George W. Girling Drive ("Girling Drive"), in the Village of Haverstraw, Rockland County, New York:

- The former Rockland Fuel Oil Company (Rockland Fuel) property, located at the southeastern portion of the Site;
- A portion of the former Keahon property, located at the northeastern portion of the Site; and,
- The Village of Haverstraw Department of Public Works ("DPW") properties, located at the western portion of the Site.

The Rockland Fuel and Keahon parcels are located at the eastern end of Girling Drive, along the western shoreline of the Hudson River. The DPW parcels are located on both the northern and southern sides of Girling Drive (the southern parcel also has frontage on West Street). Site Location Maps are provided as Figures 1 and 2, and an Existing Site Features Map is provided as Figure 3, in Appendix A.

The Rockland Fuel parcel contains a temporary sales office and paved parking areas, and the Keahon parcel contains a paved parking lot. The northern portion of the DPW parcel is utilized as a maintenance yard and contains two, small one-story brick pump houses, a salt/gravel shed, and two aboveground storage tanks (diesel fuel and gasoline) with a fuel pump. The southern portion of the parcel contains a one-story, metal garage utilized for vehicle maintenance activities, and a western landscaped area, which contains a 3,000-gallon underground storage tank (UST) supplying heating oil to the garage.

The Site is relatively level with the exception of the extreme western portion, which has a moderate downward slop to the east (surface elevations at the majority of the Site range from approximately 6 to 10 feet above mean sea level (msl). Groundwater has been measured in on-site monitoring wells at elevations ranging from 2 to 5 feet above msl and appears to be somewhat tidally influenced in eastern portions of the Site. Overall groundwater flow has been documented to be in an easterly direction, toward the Hudson River.

1.2.2 Site History/Completed Interim Remedial Measures

The Rockland Fuel parcel is the site of a former major oil storage facility (MOSF, PBS Facility ID: 3-1700), which contained fourteen aboveground storage tanks (ASTs) located within a secondary containment, and several on-site structures, including a fueling rack and vehicle maintenance area. ESI supervised the removal of all on-site ASTs and associated features, and a limited area of solvent contaminated soil, in 2003. The property was covered with imported soils prior to construction of the sales office, which has been equipped with a vapor barrier and a subslab depressurization system to prevent vapors from entering the occupied structure.

The Keahon parcel is the site of a former concrete manufacturer, which contained six petroleum ASTs and three fuel pumps, located within a concrete secondary containment on the northeastern portion of the Site (PBS Facility ID: 3-990485). The Volunteer removed all ASTs and structures from the property prior to installation of the parking lot.

An inactive 1,000-gallon UST was removed from the southwestern portion of the DPW parcel in January 2005. The northern DPW parcel site is the site of a former wastewater treatment plant; no interim remedial measures have been completed at this portion of the Site.

NYSDEC spill events were reported for the Keahon parcel (#9811999), Rockland Fuel parcel (#0001146), and Southern DPW parcel (#0411778) in December 1998, April 2000, and February 2005 (respectively), based on the presence of petroleum impacted soils.

1.2.3 Proposed Future Usage of the Site

The Site is proposed for redevelopment as multi-story residential structures, surrounded by at-grade parking areas and landscaped borders (all existing on-site buildings will be demolished). As discussed with the NYSDEC, vapor barriers and vapor extraction systems will be installed in all buildings to be constructed on-Site and post-construction vapor testing will be conducted as per applicable New York State Department of Health (NYSDOH) guidance.

It is the intent of the Site Owner to remediate the Site consistent with NYSDEC Remedial Program Restricted Use Soil Cleanup Objectives (SCOs), "Restricted-Residential" category (6 NYCRR Subpart 375, Table 375-6.8(b)).

1.3 Site Environmental Conditions

This section summarizes known and suspected Site Environmental conditions. The findings of previous environmental investigations performed to date are detailed in ESI's Site Investigation Report (SIR), which was performed according to the NYSDEC approved Remedial Investigation Workplan (RIWP).

1.3.1 Nature and Extent of Contamination

1.3.1.1 Soil

Field Evidence of Contamination

A total of 82 soil borings have been extended at the Site. Site soils consist of an upper layer of fill, which overlies native sands/silts and gray clay, or native clay alone (other than brick fragments, no significant quantities of debris are present). The native clay appears to form a continuous layer between approximately 5 to 15 feet below surface grade (bsg). Saturated soils were typically encountered above the clay layer, from 4 to 8 feet bsg.

Significant field evidence of petroleum contamination, including odors, staining, and/or the presence of limited lighter-than-water non-aqueous phase liquid (LNAPL) was encountered in the areas of the active spill events at the western end of the DPW garage (HGP-9, HGP-11, and

HGP-19) and at eastern areas in and near the former petroleum storage areas (HGP-25 to HGP-27, and HGP-29 to HGP-40). Impacted soils are well delineated in both area and depth.

Contamination in the spill areas was generally encountered below 4 feet bsg, in and near the saturated zone, and is confined by the clay layer. Limited, weathered LNAPL was observed in the vicinity of the garage at HGP-9 and HGP-19 and at the eastern margin of the Site at HGP-31, HGP-35, and HGP-40. No field evidence of contamination was found in the vicinity of the existing 3,000-gallon UST. Significant PID readings were limited to soils encountered at the eastern portion of the Site.

Slight staining and/or petroleum odors were observed in soils near the existing DPW aboveground storage tanks, and in a single boring from beneath the DPW garage; no other field evidence of contamination was noted in areas not affected by the spill events.

Documented Petroleum Contamination in Spill Areas

Significant contamination by BTEX and related compounds was detected in a sample from HHMW-10, collected during installation of monitoring well MW-7, near the western side of the sales office. Low levels of BTEX were found were found at HGP-14, near the DPW fuel tanks, suggesting prior surface releases of gasoline. Elevated total volatile organic compounds (VOCs), based on the presence of tentatively identified compounds (TICs), were detected in samples from HGP-25, HGP-37B to HGP-41, and HGP-50 collected at the eastern portion of the Site. No other significant VOC concentrations were found in any samples.

Significantly elevated polycyclic aromatic hydrocarbons (PAHs) were found in three samples from the spill area west of the garage (HGP-8, HGP-9, HGP-11, and HGP-19), and elevated total SVOCs were found at sample HGP-37B in the Rockland Fuel spill area.

Documented Contamination Unrelated to the Spill Events

Site soils have been extensively analyzed to document the presence or absence of VOCs, semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and pesticides.

With the exception of the petroleum impacts discussed above, no significant individual VOCs, including halogenated compounds, were detected at any location (low-level/trace individual VOCs not associated with petroleum were detected in several samples and low-level VOCs have been found in soil gas). Slightly elevated total VOCs were detected at HGP-22. Slightly elevated concentrations of PAHs were detected in several samples collected from areas that did not exhibit field evidence of contamination, suggesting hydrocarbon impacts from poor quality fill materials. Low-level PAH concentrations were found throughout the Site.

Slightly elevated concentrations of lead, and lead and mercury, were detected at HGP-20 and HHMW-7, respectively, and elevated concentrations of iron are present at multiple locations. No other significant metal concentrations were documented. PCBs were detected at HGP-1, located on the southern DPW parcel, at concentrations just under the guidance level (12 other samples also contained low PCB concentrations). Several soil samples contained very low or trace levels of pesticides (no herbicides were detected).

1.3.1.2 Groundwater

Fourteen groundwater wells are located on the Site. Groundwater was sampled in November 2006 and June 2007. Field evidence of petroleum contamination (odors, sheen, and/or elevated PID readings) was detected at HMW-5, HMW-7, HMW-9, and HMW-10, all of which are located on the eastern portion of the Site. No other significant evidence of contamination was noted.

Detectable concentrations of VOCs were documented in all monitoring wells except for HMW-1 and HMW-11, with relatively low-level exceedences in HMW-3, HMW-5 to HMW-8, HMW-10, HMW-13 (peak concentration 69 µg/L xylenes), and RMW-2. Contaminants are generally

restricted to gasoline constituents, primarily at the eastern portion, and concentrations were relatively consistent between the sampling rounds.

Elevated concentrations of trichloroethylene (TCE, peak concentration 69 µg/L) and its breakdown products (dichloroethylene [DCE] and vinyl chloride) were detected in HMW-8 during both sampling events; these compounds were not detected in any other wells and were not detected in soils. An elevated concentration of chlorobenzene (16 µg/L) was detected in HMW-13 and a slightly elevated concentration of dichlorodifluoromethane (5.3 µg/L) was detected in HMW-3.

Low-levels of multiple SVOCs (almost all PAHs) were detected in seven monitoring wells (HMW-4 through HMW-10). Elevated concentrations of total and dissolved TAL metals (primarily iron, manganese, and sodium) were detected in all wells. No significant dissolved concentrations of arsenic, cadmium, lead, or mercury were detected. Analyte concentrations were relatively consistent between the two sampling rounds. A slightly elevated level of PCBs (Aroclor 1242, 0.65 µg/L) was detected in HMW-6.

1.3.1.3 Surface Water

No evidence of contamination was observed in two water samples collected from the surface of the Hudson River. No VOCs or PAHs were detected in the samples.

1.3.1.4 Hudson River Sediments

Hudson River sediments were collected at the eastern portion of the Site (7 locations). The river bottom at the sampling locations generally ranged from 5 to 16 feet below the surface. Samples were collected from the upper 6 inches and from approximately 4 feet. Sediment consisted of loose silt and organic muck (in some locations with a thin bottom layer of sand, gravel, and debris) overlying relatively dry, gray native clay. Slight petroleum odors were noted at HRS-2, HRS-6 and HRS-7 at approximately 4 feet below the river bottom, and sheens were noted when samples of this material collected from HRS-2 and HRS-7 were mixed with water in a bucket. No other significant field evidence of contamination was noted.

Elevated concentrations of individual or total PAHs were detected in the deep samples from HRS-2, HRS-5, and HRS-7 (peak total SVOCs were detected in HRS-5(2') at approximately 200 parts per million [ppm]). Shallow samples at these locations did not contain elevated levels of PAHs. Slightly elevated concentrations of PCBs were detected at HRS-1 and HRS-3 (peak concentration 1.168 ppm). Slightly elevated concentrations of lead and/or mercury were detected at HRS-2 and HRS-7.

1.3.2 Contaminant Fate and Transport

No significant contaminants are present in surface soils and releases through movement of dust, runoff, and/or soil vapors are therefore likely to be minimal.

Subsurface soils in well-defined areas at the western and eastern portions of the Site contain overt field indications of petroleum contamination but only a few soil-sampling locations contain significantly elevated concentrations of VOCs and/or SVOCs. Residual petroleum constituents in these soils are likely to have undergone *in situ* degradation/volatilization, and to consist of degraded, heavier weight compounds, which are relatively immobile. Significant petroleum impacts to groundwater are primarily limited to lighter compounds typically associated with gasoline; given the presence of a substantial confining subsurface layer of clay, and the easterly direction of groundwater flow, petroleum compounds in Site groundwater are likely to be slowly moving into the Hudson River at very low concentrations (no significant surface-water impacts have been documented). Low-level PAH and metal concentrations found in Site soils are likely to be relatively non-mobile.

PAH contamination is present in portions of on-site Hudson River sediments. Documented contamination is present at approximately the four-foot depth. Direct impacts to humans are not anticipated to exist as direct contact is unlikely. Indirect impacts are minimal, restricted to incidental consumption of aquatic life, which in turn has consumed organisms which had been in contact with these PAHs.

Low-level PCB contamination is present in on-site Hudson River sediments; given the absence of any significant PCB concentrations in Site soils, however, this contamination is not likely to be related to Site historical activities. Fate and transport of this material will be addressed by existing Federal and State remedial programs related to overall Hudson River cleanup.

1.3.3 Exposure Assessment

An exposure assessment was conducted to qualitatively assess the potential impacts of the existing Site on human health and the environment. For the human health component of the assessment, both current and future use scenarios were considered.

The primary contaminants present on the Site are low-level petroleum compounds in localized subsurface soils and groundwater, and PAHs in river sediment. There are currently no ongoing exposures to these contaminants. Contaminated soils are covered by relatively thick non-impacted upper soils, asphalt pavement, and/or buildings, which significantly reduces the likelihood of direct contact with contaminated soil. Exposure to contaminated groundwater is not occurring, as there are no supply wells located in the contaminated areas and the surrounding area is served by a public water supply, which is regularly tested to ensure that it meets state and federal drinking water standards. The temporary sales office is equipped with a subsurface depressurization system, which intercepts any subslab hydrocarbon vapors.

Direct contact or inhalation of contaminated soils/sediment, soil vapors, or dust generated during future soil excavation or sediment dredging are the most likely exposure pathways. Ingestion of contaminated media is another possible exposure pathway (ingestion of contaminated water is not a reasonable route of exposure as the Site is served by central water). On-site workers (or trespassers) present during future remediation and/or development activities are the most likely receptor population. The implementation of a Health and Safety Plan (HASP), incorporating a Community Health and Safety Plan and community air-monitoring plan, would mitigate possible impacts to any potential receptor populations. Any Site-specific remedial designs that involve soil disturbance will require monitoring and mitigation plans to address potential dust generation and increased contaminant migration.

Ecological exposures are likely to be limited to the movement of groundwater contaminated by VOCs into the Hudson River, and releases of PAHs from sediments. Given the low level of existing groundwater contamination and the volume and flow of the Hudson River, no significant exposures to VOCs are likely. Human exposure to sediment is not likely, as it is overlain with uncontaminated silt. Indirect exposure is possible, but not likely, from ingestion of benthic aquatic life which has ingested microorganism from the silt layer.

There is a potential for people and/or the environment to be exposed to contaminated media in the future if Site conditions change. The selection of an appropriate remedy should include the objective of minimizing or eliminating these potential exposure pathways.

2.0 REMEDIAL ALTERNATIVES ANALYSIS

Section 2.0 of this 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).

A detailed discussion of the methodology by which the remedial technologies and remedial alternatives will be evaluated (Section 2.1), and a detailed discussion of the criteria used in the evaluation process (Section 2.2), are discussed 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 guidance documents, community input, and risk-based assessments. These criteria are also a function of known recognized environmental conditions (RECs) on the 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 likely to be successful at achieving each individual criterion (Section 2.4.3). This comparative process is 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 remedial program procedures.

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. The Site is proposed for use as a residential development (see Section 1.2.3).

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. residential 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 active remediation is petroleum contaminated soil (PCS); petroleum impacts to on-site groundwater are expected to be addressed indirectly through soil remediation efforts.

Based on the Site's proposed future use (residential development), it is the objective of remedial activities to eliminate, to the extent practical, the potential for direct human or wildlife exposure to known petroleum contamination in on-site media. 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 is being sought in conjunction with existing NYSDEC initiatives in the Hudson River and 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. 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 included in this RWP are derived from NYSDEC Remedial Program Soil Cleanup Objectives (SCOs) for Unrestricted and "Restricted Residential" 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.

3. Short-term Effectiveness Short-term effectiveness is measured relative to the level of protection afforded to the community during remediation activities. In addition, other impacts to the environment are assessed, as well as the time necessary to implement alternatives.

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 for residential 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. Feasibility 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.

2.2.3 Determination of Costs

Finally, consideration is given to the costs associated with each potential remedial alternative (cost estimates for remedial alternatives are provided in Appendix B). 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 in NYSDEC guidance documents on 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

2.3.1 Identification of Possible Remedial Alternatives

This Section identifies a wide range of reasonable remedial options including excavation and removal. A summary of remedial options is provided in Table 1. 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 1: Summary of Alternative Technologies Subject to Screening

Alternative	Benefits	Deficiencies
No Further Action (Section 2.3.2.1)	Easily implemented Minimal additional costs	No short- or long-term effectiveness Not protective of human health or the environment
In Situ PCS Remediation -Restricted Use- (Section 2.3.2.2)	Protective of human health and the environment Long- & short-term effectiveness	Moderately difficult to implement Moderate to high cost Potential extended treatment time Some limitations on Site use
In Situ PCS Remediation/ Partial Source Removal -Restricted Use- (Section 2.3.2.3)	Protective of human health and the environment Long- & short-term effectiveness	Moderately difficult to implement Moderate to high cost Potential extended treatment time Some limitations on Site use
PCS Source Removal -Restricted Use- (Section 2.3.2.4)	Uncomplicated implementation Protective of human health and the environment Long- & short-term effectiveness	Moderate to high cost Some limitations on Site use
Full Soil Removal -Unrestricted Use- (Section 2.3.2.5)	Protective of human health and the environment Long- & short-term effectiveness No Site use restrictions	Potentially difficult to implement High cost

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 3.0.

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.

Feasibility

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 RWP, an estimate of $30,000 is provided to maintain the current vapor extraction system in one one-site building (see Appendix B).

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 of the No Further Action Alternative

The No Further Action Alternative is not considered to be protective of human health and the environment in either the short or long term. The potential will exist for contact by future Site users with hydrocarbon- and/or PCB -contaminated soils/sediment, 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 In Situ PCS Remediation Alternative - Restricted Use

Description

The In Situ PCS Remediation Alternative would involve:

- Demolition of all existing structures;
- Excavation of soil as required for the construction of new structures;
- Implementing in-situ remediation technologies in areas of gross PCS contamination for the purpose of eliminating petroleum hydrocarbon source areas (e.g., LNAPL);
- Covering the Site with a protective barrier layer to prevent exposures to low-level contamination remaining on the Site: and,
- Implementation of a Site Management Plan to ensure the long-term effectiveness of these response actions, including provisions for groundwater monitoring, periodic inspections and contingency plans for soil management.

In-situ remediation is accomplished using one or more physical, chemical, or biological processes, including both proven, well-accepted methods and innovative techniques, and may involve simultaneous treatment of multiple media. Examples of in situ treatment technologies are bioremediation, chemical oxidation, and soil-vapor extraction. Given the low-levels of groundwater contamination, treatment technologies are likely to be selected only for the remediation of PCS. It is anticipated that as much as 10,000 – 17,000 cubic yards of soil may need to be treated in situ in order to remediate areas of gross contamination. Other soils throughout the Site, which contain low-level concentrations of hydrocarbons and metals, or low-level field indications of petroleum contamination (e.g., low odors), would not be directly treated and would be placed under a protective barrier layer to prevent exposures. Use of the Site would be restricted by the need to implement institutional controls (deed restrictions) and requirements for maintaining installed engineering controls (the barrier layer).

Feasibility

Implementation of the In Situ PCS Remediation Alternative is considered to be relatively easy to moderately difficult, depending on the selected specific methodology. Most technologies require use of simple, well-known methods (e.g., installation of wells, soil depressurization systems), but could require novel design features. Difficulties could also be encountered during installation or operations/maintenance, based on the functional needs of the current on-site facilities, and conflicts with construction activities during future Site development. Additional issues are the potential creation of fugitive odors and, as a result, public opposition.

Cost

The costs associated with this alternative include: Site-specific design; possible proof-of-concept and field trials; implementation, monitoring, and maintenance of the in-situ remediation technology; and installation of a barrier layer. Professional and laboratory costs associated with the testing of in-situ remediation system will also be incurred. Total costs for the In Situ PCS Remediation Alternative are estimated at $1,144,000 (see Appendix B).

Effectiveness

This alternative is effective for protecting human health and the environment, but may be subject to failure (i.e. may not meet performance design goals) based on encountered field conditions or other unforeseeable circumstances. This alternative may impact the possibilities for future Site development, based on the operational requirements of the selected technology.

2.3.2.3 In Situ PCS Remediation / Partial Source Removal Alternative - Restricted Use

The In Situ PCS Remediation / Partial Source Removal Alternative would involve:

- Demolition of all existing structures;
- Excavation of soil as required for the construction of new structures;
- Partial removal of grossly contaminated PCS;
- Use of in-situ remediation technologies in remaining areas of gross PCS contamination;
- Covering the Site with a protective barrier layer to prevent exposures to low-level contamination remaining on the Site: and,
- Implementation of a Site Management Plan to ensure the long-term effectiveness of these response actions, including provisions for groundwater monitoring, periodic inspections and contingency plans for soil management.

General considerations for In-situ remediation are presented in Section 2.3.2.2, above. Removal of PCS would be limited to those areas containing the most significant petroleum impacts, in order to limit the areas subject to in situ remediation, and thus potentially decrease the remediation time frame, or otherwise limit potential difficulties associated with treating heavily contaminated media.

It is anticipated that as much as 5,000 – 12,000 cubic yards of PCS may need to be treated in situ in order to remediate areas of gross contamination, and that as much as 5,000 cubic yards of soil of grossly impacted PCS may warrant removal from the surface to the upper layer of the native subsurface clay. Material will be excavated until all contaminated Site soils are removed and clean end points are encountered.

Other soils throughout the Site, which contain low-level concentrations of hydrocarbons and metals, or low-level field indications of petroleum contamination (e.g., low odors), would not be directly treated or removed, and would be placed under a protective barrier layer to prevent exposures. Use of the Site would be restricted by the need to implement institutional controls (deed restrictions) and requirements for maintaining installed engineering controls (the barrier layer).

Feasibility

The In Situ PCS Remediation / Partial Source Removal Alternative is likely to be easier to implement than the In Situ PCS Remediation Alternative, based on the proposed removal of grossly impacted material (i.e. the remediation technology will handle less significantly contaminated media). Soil removal is likely to pose only limited difficulties, based on the potential need to excavate material in the proximity of the groundwater table. Excavated soils and imported clean fill will be transported via trucks. Access to the Site is not restricted.

Cost

The costs associated with this alternative include: the excavation, removal and proper disposal of contaminated soils; back-fill of excavated areas; Site-specific design, field trials, implementation, monitoring and maintenance of the in-situ remediation technology; and installation of a barrier layer. Professional and laboratory costs associated with the testing of in-situ remediation system will also be incurred. Total costs for the In Situ PCS Remediation Alternative are estimated at $1,952,500 (see Appendix B).

Effectiveness

This alternative is effective for protecting human health and the environment, but may be subject to failure (i.e. may not meet performance design goals) based on encountered field conditions or other unforeseeable circumstances. This alternative may impact the possibilities for future Site development, based on the operational requirements of the selected technology.

2.3.2.4 PCS Source Removal Alternative - Restricted Use

Description

The PCS Source Removal - Restricted Use Alternative would involve:

- Demolition of all existing structures;
- Excavation of soil as required for the construction of new structures;
- Removal of all grossly contaminated PCS;
- Covering the Site with a protective barrier layer to prevent exposures to low-level contamination remaining on the Site: and,
- Implementation of a Site Management Plan to ensure the long-term effectiveness of these response actions, including provisions for groundwater monitoring, periodic inspections and contingency plans for soil management.

It is anticipated that as much as 5,000 cubic yards of soil may need to be removed in order to remove gross petroleum contamination and areas of significantly elevated contaminant concentrations. If necessary, additional material will be excavated until all grossly impacted PCS is removed. Other soils throughout the Site, which contain low-level concentrations of hydrocarbons and metals, or low-level field indications of petroleum contamination (e.g., low

odors), would not be removed and would be placed under a protective barrier layer to prevent exposures. Use of the Site would be restricted by the need to implement institutional controls (deed restrictions) and requirements for maintaining installed engineering controls (the barrier layer).

Feasibility

The PCS Source Removal Alternative is considered to be relatively simple to implement. Soil removal is likely to pose only limited difficulties, based on the potential need to excavate material in the proximity of the groundwater table. Excavated soils and imported clean fill will be transported via trucks. Access to the Site is not restricted. Soil excavation is likely to be implemented during the construction phase of the project using relatively simple technology.

Cost

The costs associated with this alternative include: the excavation, removal and proper disposal of contaminated soils; back-fill of excavated areas; and installation of a barrier layer. Professional and laboratory costs associated with the testing of excavation end points will also be incurred. Total costs for the PCS Source Removal Alternative are $1,413,500 (see Appendix B).

Effectiveness

This alternative is effective for protecting human health and the environment and is not likely to significantly limit possibilities for future Site development.

2.3.2.5 Full Soil Removal Alternative - Unrestricted Use

Description

The Full Soil Removal - Unrestricted Use Alternative would involve:

- Demolition of all existing structures,
- Excavation of soil as required for the construction of new structures, and
- Removal of all additional Site soils, known or suspected to contain hydrocarbon and/or metals contamination above NYSDEC Remedial Program (Part 375) "unrestricted use" Soil Cleanup Objectives (SCOs).

It is anticipated that as much as 25,000 – 40,000 cubic yards of soil, including the majority of the soils on the eastern portion of the Site, will be removed based on the presence of both well-defined areas of grossly impacted PCS and widespread, low-level hydrocarbon and metal contamination throughout the entire Site. Soils are likely to require removal from the surface to the upper layer of the native subsurface clay. Material will be excavated until all contaminated Site soils are removed and clean end points are encountered. The installation of a barrier layer and the implementation of a Site Management Plan are not required for this Alternative.

Feasibility

The Full Soil Removal - Unrestricted Use Alternative is considered to be moderately difficult to implement. Soil removal is likely to be complex due to the potential large volume of soils to be excavated and the potential need to excavate material in the proximity of the groundwater table. Excavated soils and imported clean fill will be transported via trucks. Access to the Site is not restricted.

Cost

The costs associated with this alternative include the excavation, removal, and proper disposal of contaminated soils, and the importation and handling of any needed fill materials. Professional and laboratory costs associated with the testing of excavation end points will also be incurred. Total costs for the Full Soil Removal - Unrestricted Use Alternative are estimated at $6,450,000 (see Appendix B).

Effectiveness

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

2.3.3 Preliminary Comparative Analysis of Alternatives

The No Further Action Alternative is not consistent with the goals of the NYSDEC Brownfields program, as it would not permit the re-use of the Site as planned by the Applicant (mixed-use waterfront development). Furthermore, this Alternative does not meet the criteria of public acceptance and long-term protection of public health and the environment. Therefore, the No Further Action Alternative is not considered to be an appropriate remedial strategy for this Site.

The In Situ PCS Remediation, In Situ PCS Remediation / Partial Source Removal, PCS Source Removal, and Full Soil Removal Alternative, which include treatment and/or 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 elevated contaminant concentrations/grossly impacted media are likely to be reduced to acceptable levels or be removed, there will be more flexibility in future Site use.

NYSDEC regulations (Subpart 375-1.8(c)) specify that removal and/or treatment is the most preferable source removal and control measure to be utilized at Remedial Program sites. The Volunteer has indicated a willingness to achieve this goal, but has also indicated a concern for limiting uncertainties related to the remedial process and a desire to have a well-defined work schedule. The Volunteer is prepared to implement soil removal measures as the selected alternative, rather than incorporating any in situ treatment, which is potentially less expensive than soil removal but could carry the risk of significant time delays and possible unsatisfactory results. Given these conditions, no further analysis of the In Situ PCS Remediation and In Situ PCS Remediation / Partial Source Removal Alternatives is presented.

The PCS Source Removal and Full Soil Removal 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 PCS Source Removal and Full Soil Removal Alternatives. A detailed analysis is not warranted for the No Further Action Alternative, and is not provided for the In Situ PCS Remediation and In Situ PCS Remediation / Partial Source Removal Alternatives.

2.4.1 Common Elements and Considerations

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

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.

A utility "mark-out" will be required. 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.

2.4.2 Detailed Analysis of Remedial Alternatives

2.4.2.1 Full Soil Removal - Unrestricted Use Alternative

Description

The Full Soil Removal - Unrestricted Use Alternative would include establishing and securing site borders and utilities (Section 2.4.1, above) and the following tasks:

Site Clearing

All on-site structures 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.

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

Following construction excavation, any additional soils considered to be "contaminant source areas" (i.e. overtly impacted soils and soils with significant confirmed contamination) will be further excavated until clean end points are encountered, consistent with NYSDEC Remedial Program goals.

All Site soils exceeding Unrestricted Use SCOs will be excavated and removed. Depth of excavation will be determined by location-specific depth of contamination to a maximum depth of 20 feet. All soils will be excavated and disposed of in accordance with applicable regulations. *In Situ* soil sampling will be conducted according to NYSDEC approved protocols prior to and during soil excavation to characterize soils for off-site disposal, and confirmatory endpoint sampling will be conducted to document the integrity of remaining soils. In total, an estimated maximum volume of 40,000 cubic yards of petroleum contaminated soil would be subject to removal in order to achieve unrestricted use status. All soils removed as a regulated waste would need to be replaced with certified clean fill.

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 a Workplan to be prepared specific to the Site conditions. The NYSDEC will approve the Workplan prior to the start of any remedial activities.

Implementation Schedule

It is estimated that the time necessary to design and conduct demolition and soil removal would be eight 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 six 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 - Unrestricted Use 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) will serve to minimize potential short-term impacts to the surrounding community from increased vehicle traffic and noise.

Long Term Effectiveness: The Full Soil Removal - Unrestricted Use 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.

Feasibility: Removing all on Site contaminated soils is likely to be moderately 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 (groundwater management will be necessary).

Supervision of demolition personnel during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils 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.

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.

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 - Unrestricted Use Alternative will eliminate all contaminated on-site material.

Community Acceptance: Community acceptance will be evaluated based upon the responses received during the forty-five day comment period for the Remedial Work Plan.

Cost

The costs associated with the Full Soil Removal - Unrestricted Use Alternative would be costs resulting from the demolition of on-site structures, removal of all contaminated soils, 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 - Unrestricted Use Alternative are estimated at a present value of $6,450,000.

2.4.2.2 PCS Source Removal - Restricted Use Alternative

Description

The PCS Source Removal - Restricted Use Alternative would include establishing and securing site borders and utilities (Section 2.4.1, above) and the following tasks:

Site Clearing

All on-site structures 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.

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

Following construction excavation, any soils considered to be contaminant source areas (i.e. overtly impacted soils and soils with significant confirmed contamination) will be further excavated until clean end points are encountered, consistent with NYSDEC Remedial Program goals.

All contaminant source areas (grossly impacted soil), and soils exceeding Restricted Use SCOs, will be excavated and removed. Depth of excavation will be determined by location-specific depth of contamination to a maximum depth of 20 feet. All soils will be excavated and disposed of in accordance with applicable regulations. In Situ soil sampling will be conducted according to NYSDEC approved protocols prior to and during soil excavation to characterize soils for off-site disposal, and confirmatory endpoint sampling will be conducted to document the integrity of remaining soils. In total, an estimated maximum volume of 5,000 cubic yards of grossly contaminated soils would be removed and a commensurate volume of certified clean soil used to replace this waste.

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 a Workplan to be prepared specific to the Site conditions. The NYSDEC will approve the Workplan prior to the start of any remedial activities.

Installation of Barrier Layer

All areas having remaining soil contaminants at concentrations above the Unrestricted Use SCOs or which contain low-level field indications of petroleum impacts, and which are not covered by proposed new structures or other impermeable areas (e.g., asphalt), 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 20,000 cubic yards of material will be needed. The barrier layer will be maintained and be periodically inspected, and its use as an engineering control will be properly recorded in applicable public documents.

Implementation of Site Management Plan

The Site Management Plan (SMP) will consist of a groundwater monitoring plan, a soil management plan detailing activities necessary for any soils excavated in the future and an inspection schedule to assess the integrity of the barrier layer. Further, the SMP will contain a description of activities necessary to maintain and operate any subslab depressurization system installed in future on-Site structures.

Implementation Schedule

It is estimated that the time necessary to design and conduct demolition and soil removal would be four 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 two 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 PCS Source Removal - Restricted Use 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 grossly impacted sources of contamination and significantly contaminated soil, 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) will serve to minimize potential short-term impacts to the surrounding community from increased vehicle traffic and noise.

Long Term Effectiveness: The PCS Source Removal - Restricted Use Alternative would remove the significant on-site sources of contamination and substantially 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 substantially eliminated.

Feasibility: This Alternative is considered to be relatively simple to implement given that the areas of gross contamination have been well defined; soil removal may pose limited difficulties, however, based on the potential need to excavate material in the proximity of the groundwater table (groundwater management will be necessary).

Supervision of demolition personnel during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils 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.

Compliance with Standards, Criteria and Guidance Values: This alternative removes known sources of contamination (grossly impacted soils) and associated significantly contaminated soil from the Site. Post-remedial conditions would meet or exceed cleanup requirements for Restricted Use sites.

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. No significant impacts are likely from low-level contamination remaining beneath the barrier layer.

Reduction in Toxicity, Mobility and Volume: The PCS Source Removal - Restricted Use Alternative will eliminate all significantly contaminated on-site material and significantly reduce the potential mobility of any remaining contaminants.

Community Acceptance: Community acceptance will be evaluated based upon the responses received during the forty-five day comment period for the Remedial Work Plan.

Cost

The costs associated with the PCS Source Removal - Restricted Use Alternative would be costs resulting from the demolition of on-site structures, removal of a sufficient volume of contaminated soil, the replacement of excavated soil with clean fill, and the installation of a barrier layer. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total costs for the Full Soil Removal - Restricted Use Alternative are estimated at a present value of $1,090,000.

2.4.3 Comparative Analysis of Alternatives

In this Section, the strengths and weaknesses of the Full Soil Excavation - Unrestricted Use and PCS Source Removal - Restricted Use Alternatives are assessed relative to the No Further Action Alternative, for each analysis criteria.

2.4.3.1 Short-Term Effectiveness

The Full Soil Removal and PCS Source Removal Alternatives are considered to be effective in the short term in protecting human health and the environment. The No Further Action Alternative is 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 Excavation – Unrestricted Use Alternative is considered to be the best alternative with regard to long-term effectiveness (this Alternative is marginally better than the PCS Source Removal Alternative). Both the Full Soil Removal and PCS Source Removal Alternatives are protective of human health and the environment in the long-term by eliminating on-site contaminants. The Full Soil Excavation will result in the most flexibility in future Site uses; however, limitations imposed by the PCS Source Removal Alternative are minimal.

The No Further Action Alternative affords the least long-term effectiveness. Changes in Site usage and conditions over time could result in increased exposures.

2.4.3.3 Feasibility

The No Further Action Alternative is the most easily implemented option. The Full Soil Removal and PCS Source Removal Alternatives are considered to be somewhat difficult to implement.

2.4.3.4 Reduction of Toxicity, Mobility, and Volume

The Full Soil Removal and PCS Source Removal 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 reduces the volume of contaminated material on-site through natural degradation; this reduction, however, is uncontrolled and unpredictable, and maximizes the potential for long-term contaminant mobility.

2.4.3.5 Compliance with Standards, Criteria, and Guidance Values

The Full Soil Excavation Alternative best complies with established SCGs, by eliminating soil materials containing contamination above "unrestricted use" regulatory thresholds. The PCS Source Removal Alternative is also likely to comply with SCGs by leading to the removal of all significantly contaminated "source" soils, and the covering of any remaining contaminants with a protective barrier layer. SCGs for these conditions are likely to be relatively more permissive.

The No Further Action Alternative does not meet basic SCGs.

2.4.3.6 Overall Protection of Human Health and the Environment

The Full Soil Excavation Alternative best protects human health and the environment (this Alternative is only marginally better than the PCS Source Removal 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 Workplan will mitigate these concerns. The No Further Action 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 the 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 PCS Source Removal Alternatives are likely to have the highest level of community acceptance. Given that these Alternatives would result in no significant contamination left on-site, these alternatives are the most likely ones to be accepted.

It is anticipated that the No Further Action 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 contaminated dust and water leaving the Site, and 2) concerns for the safety of residents, especially children, that may be accidentally exposed to Site contaminants.

2.4.4 Recommendation of Preferred Alternative

The recommended remedial alternative for this Site is the PCS Source Removal - Restricted Use Alternative, for the following reasons:

1. Based on available environmental data, it is very likely that this alternative will lead to the removal/remediation of all significant on-site contamination; any remaining contamination is likely to be minimal and will be deeply buried beneath a barrier layer (structure foundations, pavement, and/or imported clean soils). 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.

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

3. This alternative is technically feasible without extraordinary measures or costs, minimizes the risk of project delays potentially associated with in situ treatments, and can be efficiently integrated into the residential development planning process.

4. Although the Full Soil Excavation Alternative has the same favorable outcomes as the PCS Source Removal Alternative, costs and feasibility constraints associated with the PCS Source Removal Alternative are likely to be somewhat less than the Full Soil Excavation Alternative.

3.0 REMEDIAL WORK PLAN

This Remedial Work Plan (RWP) is to be conducted to address known and suspected environmental conditions on the Site, as detailed in ESI's Site Investigation Report (a summary of 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 (PCS Source Removal Alternative), which calls for removal of grossly contaminated soil during construction excavation activities and the installation of a protective barrier layer in any areas of remaining low-level contamination. A Proposed Site Remediation Map depicting relevant Site features, conditions of concern, and areas of proposed remedial activities, is provided in Appendix A. All proposed work will be conducted according to a site specific Health and Safety Plan (HASP), provided as Appendix C.

For the purpose of the work detailed in this RWP, the "Volunteer" is defined as Harbors Haverstraw, LLC, 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 E.

3.1 Scope of Work

Construction plans for the development of the site include the construction of residential buildings and associated roadways and parking areas. This RWP addresses remedial actions to be integrated with both pre-construction excavation of the Site and the importation of soils to adjust final grades where needed.

1. Excavation and off-site disposal of soils, which are grossly contaminated or contain significantly elevated concentrations of hydrocarbons and/or metals. These materials are likely to be managed as a non-hazardous, solid waste. The need for pre-treatment of soils is not anticipated at this time.

2. The volume of significantly contaminated soils is estimated at 5,000 cubic yards, based on existing data. Soils will be characterized in situ, as warranted, in order to assure that the sequence of removal can be integrated into site development. Confirmatory endpoint samples will be collected to document the effectiveness of contaminant removal activities and the integrity of post-excavation soils.

3. The installation of clean soils for use as a barrier layer (where needed) will be accomplished during building construction activities.

The implementation schedule is detailed in Section 3.5, below. The objective is to integrate site remediation into site construction.

3.2 Overview of Proposed Remediation Services

The following remedial services are proposed, consistent with the selection of the PCS Source Removal Alternative:

- Removal of grossly contaminated soils (Section 3.4.1);
- Installation of a barrier layer (Section 3.4.2);
- Installation of vapor interceptor systems within future on-site structures (Section 3.4.3);
- Installation and periodic sampling of monitoring wells to document groundwater quality (Section 3.4.4); and,
- Submission of a Final Engineering Report (FER) to the Volunteer and NYSDEC (Section 3.4.4).

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 two weeks prior to the initiation of any of the on-site work and during the course of the fieldwork if deemed necessary by on-site personnel. 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 and will receive weekly construction summary reports. Adequate notice of these meetings will be provided to the NYSDEC.

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 Quality Assurance / Quality Control

Equipment

Prior to the initiation of fieldwork, all field equipment to be used during the work will be properly decontaminated in accordance with NYSDEC guidelines, and all field instruments will be properly calibrated in accordance with procedures set forth by the equipment manufacturer(s). Unless otherwise specified, a MiniRAE 2000 (Model PGM 7600) photo-ionization detector (PID) will be used for the screening of organic vapors. The PID is calibrated to read parts per million calibration gas equivalents (ppm-cge) of isobutylene. 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 applicable NYSDEC guidelines 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 FER (Section 2.3.7). Category B deliverables, as defined in the analytical services protocol (ASP), will be submitted for confirmatory and final delineation samples. In addition, a Data Usability Summary Report (DUSR) 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 will be based on NYSDEC Remedial Program Restricted Use Soil Cleanup Objectives (SCOs), "Restricted-Residential" category, as provided in 6 NYCRR Subpart 375, Table 375-6.8(b), and (as warranted) on NYSDEC Technical and Administrative Guidance Memorandum #4046 (TAGM 4046), including subsequent NYSDEC memoranda.

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).

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 E. 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). All necessary insurance certificates will be secured from subcontractors by the Volunteer.

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) will be reviewed with site personnel and appropriate sub-contractors prior to the initiation of fieldwork. 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 C.

3.3.6 Community Air Monitoring Plan

The NYSDOH Generic Community Air Monitoring Plan (CAMP, Appendix D) will be initiated during all ground intrusive activities, and during any other fieldwork that is reasonably likely to generate significant dust or vapors. The implementation of this Plan will document the presence or absence of VOCs and dust in the air surrounding the work zone, which may migrate off-site due to fieldwork activities. This plan provides guidance on the need for implementing more stringent dust and emission controls based on air quality data.

Ameliorative procedures may include reducing the surface area of contaminated soil being disturbed at one time, watering exposed soils to reduce fugitive odors, or stopping excavation activities. Dust suppression activities will be conducted during construction activities that will disturb on-site soils, including misting, reduction in soil movement, or cessation of excavation.

3.3.7 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). Construction activities not related to site remediation may occur on weekends and holidays.

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 Excavation of Contaminated Soils

Previous investigations have documented the presence of two distinct soil areas, and a portion of on-site Hudson River sediments, exhibiting evidence of gross petroleum impacts, and several smaller soil areas with low-level hydrocarbon and/or metals contamination. The total volume of significant, grossly impacted soils is estimated to be 5,000 cubic yards. These contaminated soils will be removed from the Site in accordance with applicable NYSDEC regulations. All appropriate disposal documentation will be maintained by the Volunteer for inclusion in the FER. The location of known contaminated soils subject to the removal procedures detailed below is provided on the Proposed Site Remediation Map, Appendix A.

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, in accordance with NYSDEC Solid Waste regulations. Any subsurface debris encountered during the excavation of on-site soils will be disposed of in a manner consistent with applicable Part 360 regulations. Appropriate regulatory agencies will be notified prior to removal of the existing DPW underground storage tank, or any other USTs encountered during excavation, 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. [Note: test pits will be extended in the vicinity of the existing DPW vehicle fuel tanks and pumps, and waste oil AST, which are located in an area of known groundwater contamination, in order to ensure that all grossly contaminated soils are identified.]

2. Excavation is anticipated to extend to a maximum of 10 feet below surface grade for construction purposes; however, excavation will extend further, as warranted, in order to remove any soils considered to be contaminant source areas (i.e. grossly contaminant material), consistent with NYSDEC Remedial Program goals. Excavation of soils exhibiting significant field evidence of contamination will be conducted in a manner consistent with field conditions and technical observations from field personnel. Soils not indicating significant field evidence of contamination will be segregated, stockpiled, sampled, and analyzed to verify their integrity prior to final disposition. Groundwater entering excavations will be assumed to be contaminated with low-level petroleum compounds and will be managed accordingly. Handling and disposition of this water will be made in consultation with NYSDEC personnel (based on known groundwater quality, water entering excavations is expected to be filtered through activated carbon and discharge into the municipal wastewater system).

3. Field screening and confirmatory sampling will be conducted (as appropriate) for both in situ soils prior to excavation and at remaining, post-excavation soils. Confirmatory sampling will be conducted according to DER-10, Section 5.4, "Remedial action performance compliance". Samples will be placed in laboratory-supplied glassware using decontaminated 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 and analyses for confirmatory samples will be based on the requirements specified in DER-10, including Target Compound List (TCL) VOCs plus 10 (USEPA Method 8260), TCL SVOCs plus 20 (Method 8270), and Target Analyte List (TAL) Metals.

The number of post-excavation soil samples will be determined in the field based on the size and dimensions of the excavation (sample frequency is specified in DER-10, Section 5.4). In general, wall samples are expected to be collected from a depth consistent with the depth of previously identified contamination and 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. 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.

5. 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. Copies of the licenses of all haulers selected for this project will be provided to the NYSDEC prior to the initiation of soil removal.

6. 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 FER.

7. 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.

3.4.2 Installation of Barrier Layer

A cover of clean soil will be placed as a barrier layer at all areas that contain low-level concentrations of hydrocarbons and metals, or low-level field indications of petroleum contamination, which remain on the Site following excavation of grossly impacted materials. A barrier layer will not be required in any areas where impacted soils have been sufficiently excavated during the course of the soil remediation services described above (see Proposed Site Remediation Map in Appendix A).

The OSC will be responsible for securing a source of certified clean soil for the owner. Any imported materials to be used as backfill under the clean-soil cover must meet the SCOs for Protection of Public Health, "Restricted Residential" Use, as specified in 6 NYCRR Part 375, Table 375-6.8(b).

A marker layer consisting of an easily identifiable, non-biodegradable layer such as high visible porous plastic mesh will first be placed on all areas that are targeted for the placement of the barrier layer. After the marker layer has been appropriately placed, a minimum of 24 inches of certified clean soil material will be placed on the site in the designated areas. Soil material will be placed and compacted in lifts not exceeding 12 inches compacted depth. For all covered areas having exposed soils, the final layer of soil will contain sufficient organic matter to permit re-vegetation. This final layer may be replaced with topsoil in areas where final landscaping has been determined. All finished grades that receive topsoil shall be raked smooth, seeded and mulched, and water periodically as necessary to insure proper stabilization of soil areas.

The 24-inch soil barrier layer may also be substituted by any of the following:

- asphalt or concrete
- geocomposite liner (GCL)
- on-site buildings

The specific thickness of each of these alternative materials will be dependent on ultimate Site development plans but will not be less than 3". The determination to utilize substitute materials will be made based on design considerations but will not be considered approved until written approval from the NYSDEC is received. A grading and cover plan illustrating the locations of structures, parking areas, landscaping and clean fill or equivalent substitute as well as the depth to contaminated soil will be provided to the NYSDEC after site development plans have been finalized. It will be the responsibility of the Volunteer to provide adequate justification for any and all proposed substitutes.

3.4.3 Post-Construction Soil Vapor Mitigation

All proposed structures will be designed to anticipate the presence of low-grade soil vapors, and the Volunteer will equip all future buildings with a vapor barrier and subslab depressurization system (SDS) capable of operating either passively or actively, as required, to eliminate potential vapor migration. In consultation with the NYSDEC and NYSDOH, a post-construction protocol will be developed for the evaluation of potential soil-vapor intrusion into on-site structures, and confirmatory air-quality testing will be conducted. This approach allows for the cost-effective collection of data without undue constraint on final Site design. A model protocol is presented below.

3.4.3.1 System Installation

The vapor barrier will consist of a minimum 10 mil plastic liner (or equivalent), properly sealed at the interior joints, underlain by a highly porous substrate (e.g., gravel) containing four-inch slotted PVC piping. All penetration through the plastic liner will be sealed. The PVC piping will be connected to vertical pipes extending above the roofline. Provision will be made for the connection of low-grade vacuum pumps to each vertical pipe to ensure the maintenance of vacuum under the building (if required). Discharge points will be properly located above the roofline to minimize the likelihood of air emissions deleteriously affecting indoor air quality via roof-mounted air intakes. The precise system design will be developed following remedial activities in order to account for actual post-excavation soil conditions.

3.4.3.2 System Start-up

System start-up and initial testing will occur after the concrete basement floors have been poured. The following steps will be taken for system start-up:

1. The system will be visually inspected and documentation of system conditions will be maintained in field logbooks.

2. Extraction wells will be connected to vacuum pumps that will be connected to carbon filtration. The system will be operated for a minimum of 12 hours prior to data and sample collection.

3. Air samples will be collected before and after carbon filtration at each extraction point for VOCs using 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. Vacuum data (as measured in inches of water) will be collected from the monitoring points. Sufficient vacuum will be achieved if levels greater than 0.02 inches of water are measured at each monitor well. Vacuum at levels below 0.02 inches may necessitate the installation and connection of another extraction well.

3.4.3.3 Documentation of System Effectiveness

The SDS will be monitored for five (5) calendar days with sufficient monitoring of vacuum at all monitoring points, as well as documentation of emissions. At the end of this 5-day monitoring period, one (1) air sample will be collected from the sampling port prior to any air treatment and submitted to the laboratory for VOC analysis using USEPA Method TO-15. The Volunteer will provide all data to the NYSDEC and will secure any required permits.

System effectiveness will be achieved if field data document continued maintenance of vacuum at levels specified in Section 3.4.3.2, above.

3.4.3.4 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 building(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 and will include analyses for VOCs previously detected in the on-site soil.

Collecting and analyzing three air samples will 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. All sample locations will be shown on a site map to be provided to the NYSDEC in the FER.

Internal air quality will be determined by collecting and analyzing three air samples at locations inside the building. Samples will be analyzed for volatile organic compounds using USEPA Method TO-15.

3.4.4 Groundwater Monitoring

No uses of on-site groundwater will be allowed following Site development and no direct groundwater remediation is proposed in this RWP. Existing data indicate only low-level VOC contamination of groundwater, which is likely to significantly diminish following the removal of PCS source areas. Metals contamination of groundwater is not present at levels warranting a response action. Quarterly groundwater sampling will be conducted, both during and after site development activities, to document groundwater quality. 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.

For budgetary and development planning purposes, it is estimated that four monitoring wells will be installed to document post-remediation groundwater quality.

3.4.4.1 Monitoring Well Development

Any new monitoring wells will be developed with a properly decontaminated mechanical pump and dedicated polyethylene tubing in order to clear fine-grained material that may have settled around the well screen and to enhance the natural hydraulic connection between the well screen and the surrounding soils. Prior to development, the monitoring well casing will be opened and the well column immediately screened with a PID to document the presence of any volatile organic vapors. Water removed from the monitoring well will be visually inspected for indications of petroleum contamination. Well water removed in the course of development will be containerized (disposal of collected groundwater will be based on the results of laboratory analysis).

Well development will begin at the top of the saturated portion of the screening to prevent clogging of the pump within the casing. The pump will be raised and lowered one to two feet within various portions of the screened interval to force water back and forth through the screen. Repeated surging and pumping at intervals of less than five feet will be performed to the bottom of the screen until the discharged water appears clear. Upon completion, the pump assembly will be removed while the pump is still running to avoid discharge of purged water back into the well. The well will be considered developed when turbidity is determined to be less than 50 NTUs.

3.4.4.2 Groundwater Well Sampling

Groundwater samples will be collected prior to the start of remedial activities, at the completion of PCS source removal, and at subsequent quarterly intervals until such monitoring is deemed unnecessary by the NYSDEC. Provided below is a description of the proposed sampling protocol. All relevant data will be recorded in field logbooks:

1. Basic climatological data (e.g., temperature, precipitation, etc.) will be noted;

2. The protective casing on the well will be unlocked and the air in the wellhead will be screened for organic vapors using the PID;

3. The well's static water level will be measured to the nearest 0.01 foot relative to the top of the PVC casing using a decontaminated water level meter;

4. The volume of standing water in the well will be calculated (using well diameter, total well depth, and the measured depth of the standing water) to determine the amount of water to be purged from the well prior to sampling;

5. The well will be purged a minimum of three well volumes using a properly decontaminated mechanical pump and dedicated polyethylene tubing, or by hand using dedicated, disposable bailers. The purged volumes will be calculated by discharging the well water into a container of known volume. Purged water will be containerized, as necessary. The time at the beginning and the end of purging, and all observations (e.g., turbidity, odor, presence of a sheen, etc.) will be recorded;

6. The presumed least contaminated monitoring well will be sampled first, and sampling shall progress from the least contaminated monitoring well to the most contaminated well. Groundwater samples will be collected from the well using a dedicated, disposal bailer in accordance with procedures outlined according to NYSDEC protocol. During sample collection, the bailer will not touch the ground or any object except for the well casing);

7. Any sampling of groundwater for metals analysis will occur when low turbidity conditions are attained (i.e., turbidity less than 50 NTUs) in the well water. If high turbidity conditions are encountered, the well will be redeveloped in order to reach acceptable turbidity conditions, and/or both unfiltered and filtered groundwater samples will be collected and analyzed for total and dissolved metals, respectively;

8. Groundwater samples will be placed in appropriately sized and preserved laboratory supplied glassware, and will be stored and transported at cold temperatures, following proper chain of custody procedures;

9. The protective cap on the well will be replaced and locked. The field sampling crew will move to the next most contaminated well and the process will be repeated.

3.4.4.3 Analysis of Groundwater Samples

Groundwater samples will be submitted for laboratory analysis of VOCs (USEPA Method 8260 plus MTBE) and PAHs (USEPA Method 8270). Additional analyses may be requested by the NYSDEC, as warranted.

3.4.4.4 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 logs for use in generating a Direction of Groundwater Flow Map in the FER (Section 3.4.5).

3.4.5 Documentation of Site Remediation

At the completion of all services detailed in this RWP, a Final Engineering Report (FER) will be prepared. This FER will include, at a minimum, results of any laboratory analyses generated during activities described in this RWP, waste transport/disposal manifests from all soil excavation and disposal activities, proof of vapor barrier and VES installation (e.g., photographs, field notes) and documentation of VES effectiveness, and maps illustrating Site closure activities. This FER will be signed, certified and stamped by a Professional Engineer licensed to practice in the State of New York and will affirmatively document that all remedial measures described in the RWP have been properly implemented.

The FER will be submitted to the NYSDEC for review and approval.

3.4.6 Development of Site Management Plan

Following approval of the FER, a Site Management Plan (SMP) will be developed for the Site. The purpose of the SMP is to provide a detailed description of the procedures to be followed in order to properly manage residual contamination left in place following completion of the remedial action, including operation and maintenance of engineering controls, monitoring of ongoing environmental conditions, and compliance with institutional controls and applicable state regulations.

3.5 Project Schedule

The following schedule is anticipated for implementing the actions detailed in this RWP:

MONTHS	ACTION	DELIVERABLES
0 – 3	Soil Excavation/Removal	Weekly Status Memos on remedial actions (includes summary laboratory data)
2 – 3	Installation of Barrier Layer	Status Memo on completion
3 – 12	Building Construction (includes installation of SDS)	Monthly Status Memo
	Project Closure	Final Engineering Report

APPENDIX A

Figures

Source: U.S. Department of the Interior Geological Survey Topographic Map of the Haverstraw, NY Quadrangle, dated 1967 (photorevised 1979)

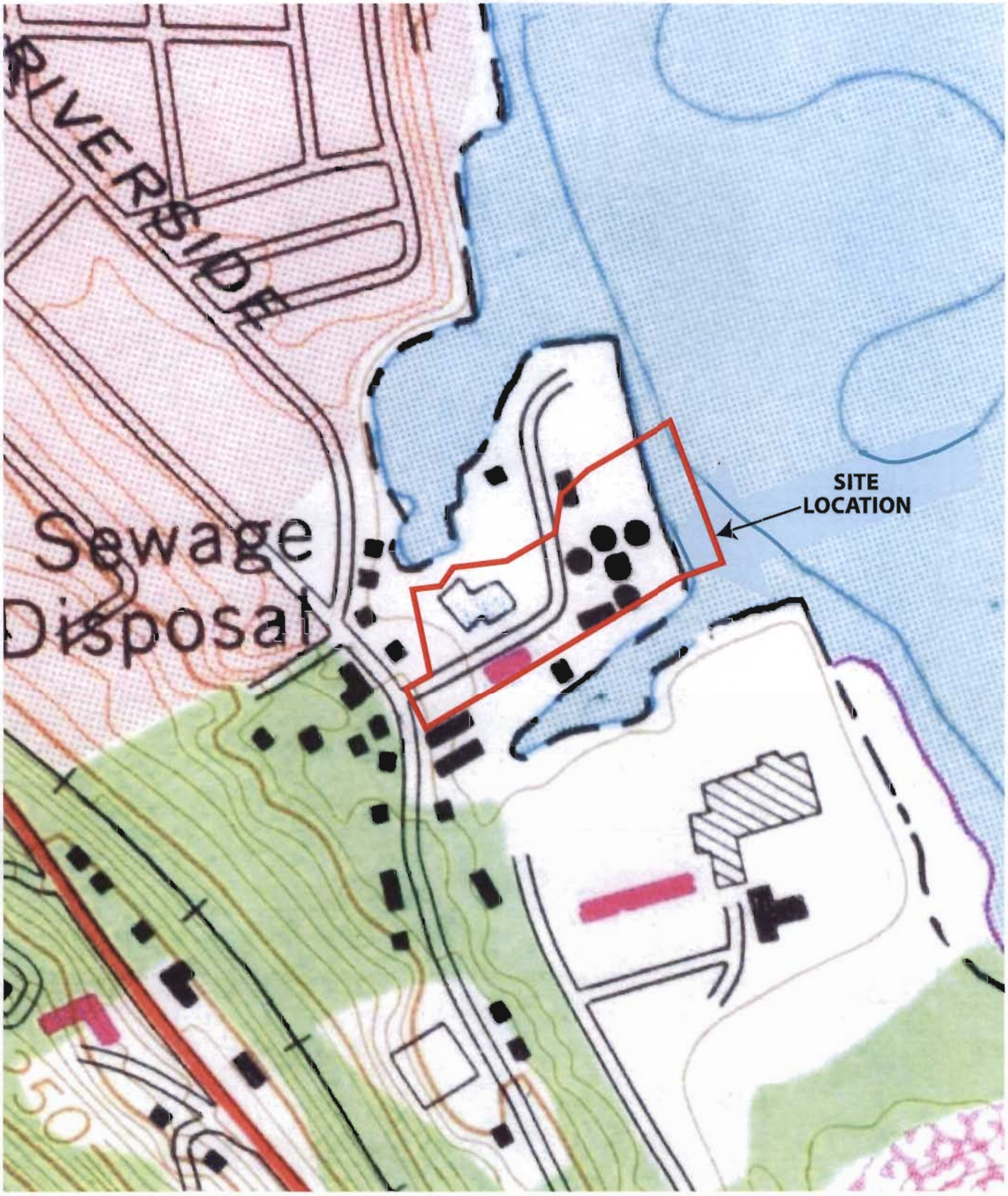
Figure 1 - Site Location Map – Overview
Haverstraw Harbors Site – BCP Site ID C344606
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

N

ESI File: GH9964.42

Date: November 2007

Appendix A



Source: U.S. Department of Interior Geological Survey Topographic Map of the Haverstraw, NY Quadrangle, dated 1967 (photorevised 1979)

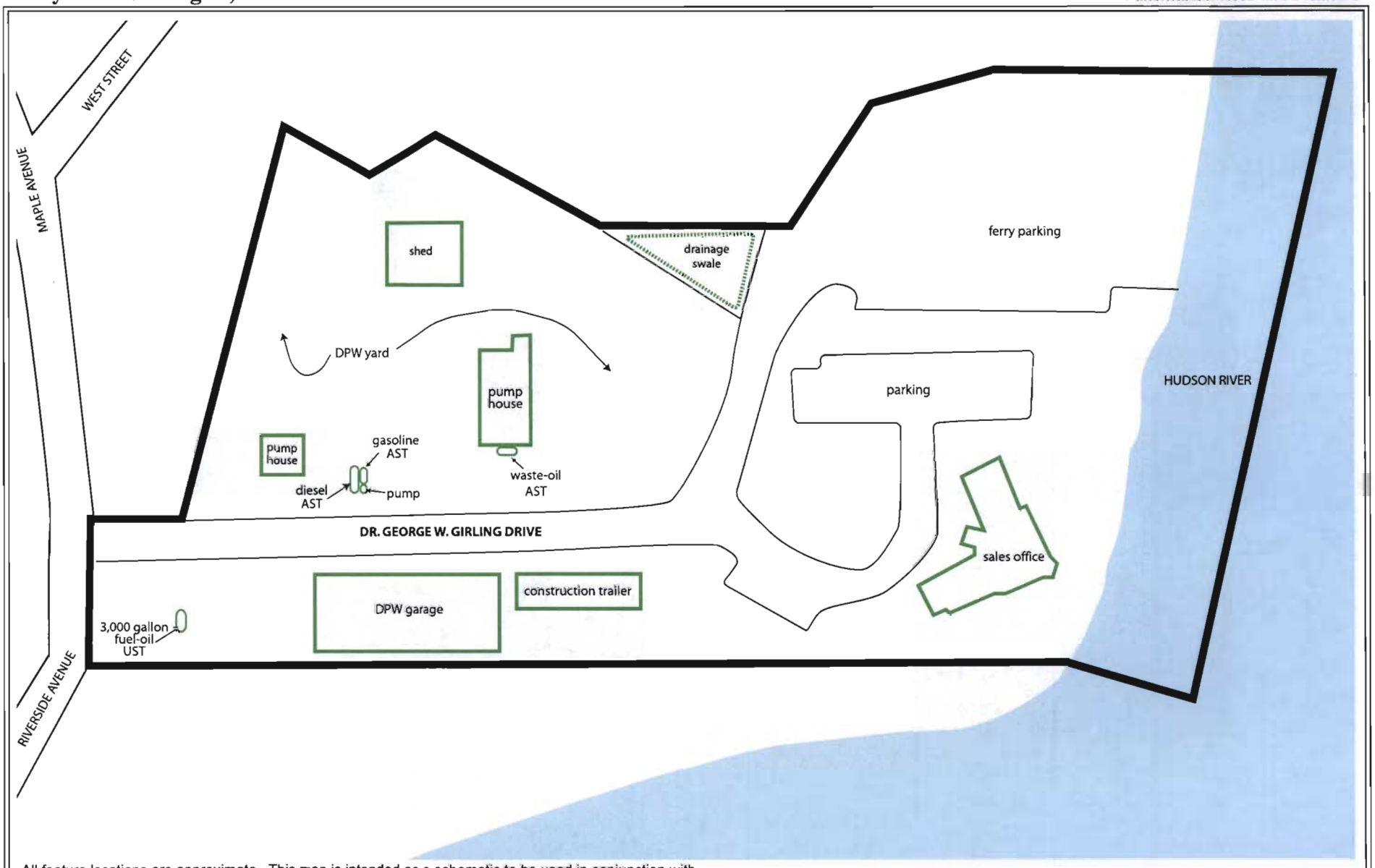
Figure 2 - Site Location Map - Detail
Haverstraw Harbors Site - BCP Site ID C344060
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

N

ESI File: GH9964.42

November 2007

Appendix A



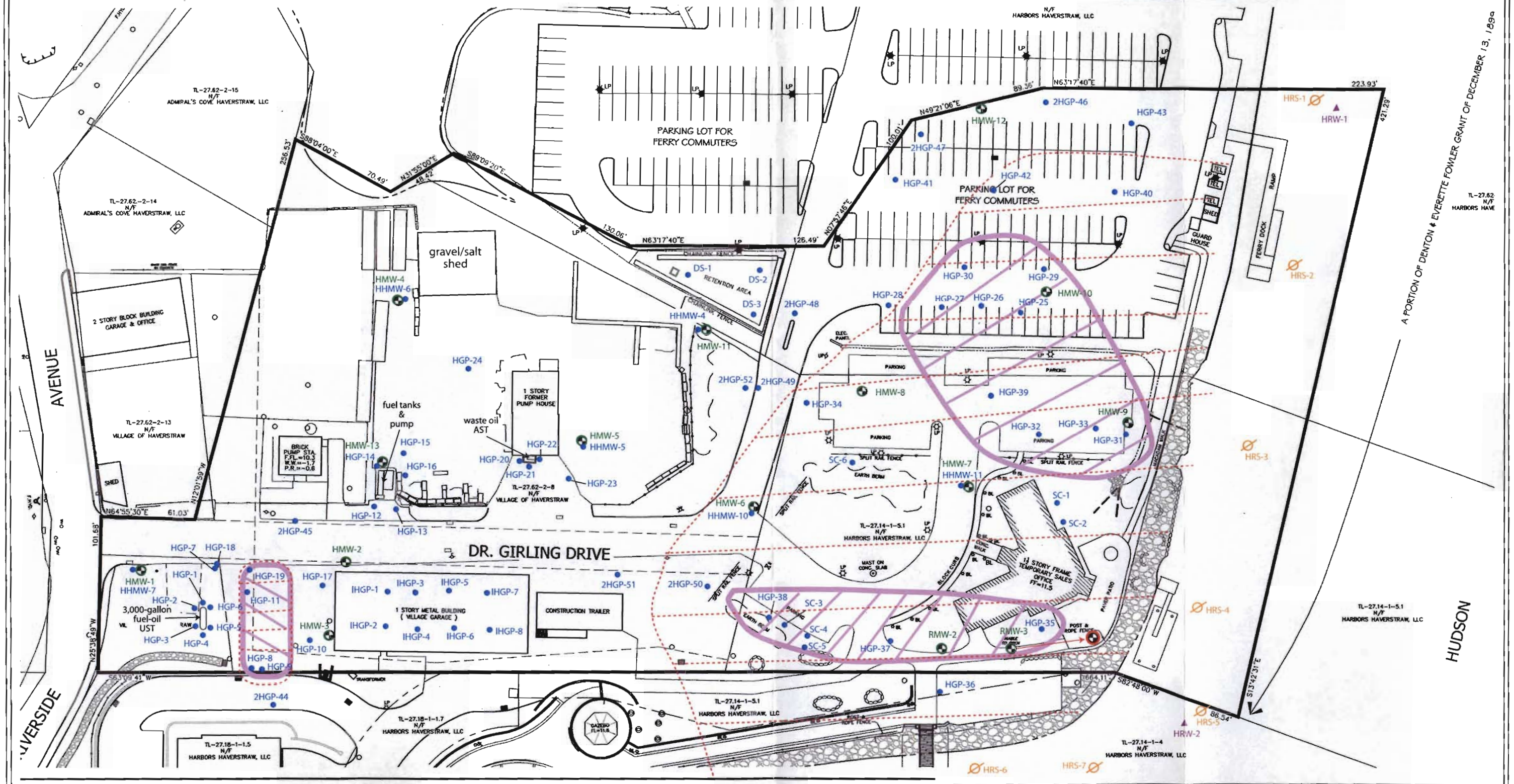
All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 3 - Existing Site Features Map

Haverstraw Harbors Site - BCP Site ID C344060
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

N

ESI File: GH9964.42
November 2007
Scale: 1" = 80' (approximately)
Appendix A



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Legend:
- monitoring well location
- monitoring well (to be relocated)
- soil boring location
- sediment sample location
- water sample location
- area of impacted soil
- area of significant petroleum contamination (proposed areas of soil removal)

Figure 4 - Proposed Site Remediation Map

Haverstraw Harbors Site - BCP Site ID C344606
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

ESI File: GH9964.42	
Scale: 1" = 60' (approximately)	
November 2007	Appendix A
Ecosystems Strategies, Inc.	

APPENDIX B

Cost Estimates for Remedial Alternatives

Alternative: No Action

Site Security:	None
Operation of VES:	$30,000

Alternative: In-Situ PCS Remediation

Demolition	$50,000
Remediation of PCS Soils	
Treatment ($40/yd)	$400,000
Inst. Of Equipment	$50,000
Oversight/Documentation	$50,000
Laboratory Analysis	$30,000
Groundwater Monitoring	
Installation	$10,000
Sampling/Documentation (5 yrs)	$30,000
Laboratory Charges (5 yrs)	$20,000
Barrier Layer	$400,000
Subtotal	$1,040,000
Contingency (10%)	$104,000
TOTAL	$1,144,000

Alternative: Source Removal/In-Situ PCS Remediation

Demolition	$50,000
Removal of Source Soils	
Excavation, T&D ($70/ton)	$525,000
Oversight/Documentation	$50,000
Replacement Soil (5,000 yd3)	$100,000
Treatment of Remaining Soil	
Treatment Costs	$480,000
Inst. of Inj. Wells	$40,000
Documentation/Oversight	$40,000
Laboratory Analysis	$30,000
Groundwater Monitoring	
Well Installation	$10,000
Sampling/Documentation (5 yrs)	$30,000
Laboratory Charges (5 yrs)	$20,000
Barrier Layer ($20/yd)	$400,000
Subtotal	$1,775,000
Contingency (10%)	$177,500
TOTAL	$1,952,500

Alternative: PCS Source Removal

Demolition	$50,000
Soil Removal	
Excavation, T&D ($70/ton)	$525,000
Oversight/Documentation	$50,000
Replacement Soils	$100,000
Groundwater Monitoring	
Well Installation	$10,000
Sampling/Documentation (5 yrs)	$30,000
Laboratory Charges (5 yrs)	$20,000
SSDS	
Material/Installation	$50,000
Testing/Documentation	$20,000
Indoor Air Quality (post-construction)	$30,000
Barrier Layer	$400,000
Subtotal	$1,285,000
Contingency (10%)	$128,500
TOTAL	$1,413,500

Alternative: Full Soil Removal

Remediation	$50,000
Soil Removal	
Excavation, T&D ($70/ton)	$4,200,000
Oversight/Documentation	$200,000
Replacement Soils ($20/$yd^3$)	$2,000,000
TOTAL	$6,450,000

APPENDIX C

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR

SITE REMEDIATION

(INCORPORATING COMMUNITY HEALTH AND SAFETY PLAN)

Haverstraw Harbors Site

Dr. George W. Girling Drive
Village Of Haverstraw
Rockland County, New York

NYSDEC Brownfields Cleanup Program Site ID: C344060
NYSDEC Spill Files: 9811999, 0001146, and 0411778

November 2007

ESI File: GH9964.42

Appendix C of the Remedial Work Plan and Alternatives Analysis

Prepared By

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

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose

This Health and Safety Plan for Site Remediation (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 "Haverstraw Harbors" property located at Dr. George W. Girling Drive, Village of Haverstraw, Rockland County, New York.

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. 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 Safety and Health Officer (SSHO) in matters of health and safety. The on-site project supervisor(s) are responsible for enforcement and implementation of this HASP.

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 this 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 and designated subcontractors to ESI.

1.2 Site Location and Description

The Site as defined in this HASP is the Haverstraw Harbors Property - Site "B", located at Dr. George W. Girling Drive in the Village of Haverstraw. 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 in the Attachments of this HASP.

1.3 Work Activities

Environmental remediation activities are detailed in the Remedial Work Plan and Alternatives Analysis (RWP) dated November 2007. The specific tasks detailed in the RWP are wholly incorporated by reference into this HASP. The RWP was prepared as a requirement of the Developers participation in the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP), subsequent to preparation of a Site Investigation Report, and describes tasks required to adequately remediate documented on-site environmental conditions. Existing contamination primarily consists of petroleum impacted soils and sediment, petroleum impacted groundwater, and limited areas of metals contamination.

The Scope of Work includes:

- Excavation of grossly impacted, petroleum contaminated soils (PCS), using heavy equipment;
- Installation of subslab depressurization systems beneath new residential structures, and soil vapor and/or air-quality testing ;
- Installation of a barrier layer of clean soil (or the equivalent); and,
- Installation of new groundwater monitoring wells, as warranted, and sampling of existing wells.

2.0 HEALTH AND SAFETY HAZARDS

2.1 Hazard Overview for On-site Personnel

The potential exists for the presence of elevated levels of petroleum hydrocarbons and metals in on-site soils and elevated levels of petroleum hydrocarbons in groundwater. The possibility exists for on-site personnel to have contact with contaminated soils, groundwater, and vapor during site investigative work. Contact with contaminated substances may present a skin contact, inhalation, and/or ingestion hazard. These potential hazards are addressed in Sections 3.0 through 11.0, below.

2.2 Potential Hazards to the Public from Fieldwork Activities

The potential exists for the public to be exposed to identified 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 (presented in Sections 3.0 through 11, below, and in the Community Air Monitoring Plan) are anticipated to minimize any potential off-site impacts from contaminant migration, noise, and traffic hazards.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of protection identified for the services specified in the 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 SSHO may recommend revisions to these levels based on an assessment of actual exposures.

The level of protective clothing and equipment selected for this project is Level D. Workers will wear Level D protective clothing including, but not limited to, a hard hat, steel-toed boots, latex gloves (when handling soils and/or groundwater), and safety goggles (when decontaminating equipment). Personal protective equipment (PPE) will be worn at all times, as designated by this HASP. The requirement for the use of PPE by official on-site visitors shall be determined by the SSHO. 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 will begin when PID readings above specified limits are measured, or as otherwise required by the SSHO (see Section 5.0, below).

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 SSHO 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

Precautions will be taken during dry weather (e.g., wetting or covering exposed soils) to avoid generating and breathing dust-generated from soils. A PID and P-5 Digital Dust Indicator (or equivalent equipment) will be used to monitor potential contaminant levels. Response to the monitoring will be in accordance with the action levels provided in Section 5.0.

5.0 MONITORING AND ACTION LEVELS

Concentrations of petroleum hydrocarbons and metals in the air are expected to be below the OSHA Permissible Exposure Limits (PELs). A Community Air Monitoring Plan (CAMP) will be implemented for all fieldwork (a copy of the CAMP is provided as an appendix to the RWP). Air monitoring will be conducted for VOCs and dust. Monitoring will be conducted at all times that fieldwork activities which are likely to generate emissions are occurring. PID readings consistently in excess of 5 ppm, and dust levels in excess of 150 ug/m3 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.

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.

6.0 SITE ACCESS AND CONTROL

Site control procedures will be established to reduce the possibility of worker/visitor contact with compounds present in the soil, 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 SSHO. 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).

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 SSHO will establish noise reduction procedures (as appropriate to the Site and the work) to meet these requirements.

8.0 PERSONNEL TRAINING

Work zones that will accomplish the general objective stated above will be established by the Project Manager and the SSHO. Site access will be monitored by the SSHO, who will maintain a log-in sheet for personnel that will include, at the minimum, personnel on the Site, their arrival and departure times, and their destination on the Site. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910). Personnel exiting the work zone(s) will be decontaminated prior to exiting the Site.

Site-specific training will be provided to each employee. Personnel will be briefed by the SSHO as to the potential hazards to be encountered. Topics will include:

- 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, and care of the body, eye, hand, and foot protection being worn, with the limitations of each;
- Decontamination procedures for personnel, their personal protective equipment, and other equipment used on the Site;
- 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 DECONTAMINATION

The SSHO will establish a decontamination system and decontamination procedures (appropriate to the Site and the work) that will prevent potentially hazardous materials from leaving the Site. Trucks will be brushed to remove materials adhering to their surfaces. 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 in the work zone.

10.0 EMERGENCY RESPONSE

10.1 Notification of Site Emergencies

In the event of an emergency, the SSHO 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).

Table 1 in this HASP contains Emergency Response Telephone Numbers, and immediately following is a map detailing the directions to the nearest hospital emergency room. This information will be maintained at the work Site by the SSHO. 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 available.

10.2 Responsibilities

Prior to the initiation of on-site work activities, the SSHO 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 SSHO 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 SSHO 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 SSHO will contact the appropriate emergency response personnel for recommended medical diagnosis and, if necessary, treatment. The SSHO will determine whether and at what levels exposure actually occurred, the cause of such exposure, and the means to prevent similar incidents from occurring.

10.3 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 SSHO will be notified and will respond according to the severity of the incident. The SSHO 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 SSHO 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.

10.4 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.

10.5 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.

10.6 Site Security and Control

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

10.7 Emergency Evacuation

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

10.8 Resuming Work

A determination that it is safe to return to work will be made by the SSHO 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.

10.9 Fire Fighting Procedures

A fire extinguisher will be available in the work zone during 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 SSHO will be responsible for directing notification, response, and follow-up actions and for contacting ambulance and fire department personnel.

10.10 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.

10.11 Emergency Equipment

The following on-site equipment for safety and emergency response will be maintained in the on-site vehicle of the SSHO:

- Fire extinguisher;
- First-aid kit; and,
- Extra copy of this Health and Safety Plan.

11.0 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.

11.1 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.

11.2 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 personal protective equipment (PPE), including, as warranted, respirators, Tyvek suits and/or gloves. Air monitoring for VOCs will be conducted in accordance with the HASP and the Community Air Monitoring Plan (RWP appendices E and F).

11.3 Additional Safety Practices

The following are important safety precautions which will be enforced during this investigation:

- Medicine and alcohol can aggravate the effect of exposure to certain compounds. Controlled substances and alcoholic beverages will not be consumed during investigation 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 is prohibited except in areas designated by the SSHO.
- 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.

11.4 Daily Log Contents

The SSHO 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.

12.0 TABLE AND FIGURES

Table 1: Emergency Response Telephone Numbers

Emergency Agencies	Phone Numbers
EMERGENCY	**911**
Nyack Hospital 160 N. Midland Avenue, Nyack	**(845) 434-2345 - Emergency Room**
Haverstraw Police Department	**(845) 429-5711 or 911**
Haverstraw Fire Department	**(845) 429-5444 or 911**
Village of Haverstraw Town Hall	(845) 429-0300
United Water New York	(845) 623-1500
Haverstraw Municipal Sewer	(845) 429-5715

Figure 1: Directions to Hospital

Exit the work site using **Dr. Girling Drive**.

Turn Left (southeast) onto **West Street/Riverside Avenue,** continue straight onto **Short Clove Road**.

Turn Left (South) onto **US Route 9W, continue south into Upper Nyack**.

Turn Left (East) onto **6th Avenue**.

Turn Right (Southwest) onto **North Midland Avenue**.

Hospital is located on Right at 160 North Midland Avenue (see Map on next page).

Figure 2: Map to Hospital (overview)

Zoomed in Map to Hospital (1 of 6)

Zoomed in Map to Hospital (2 of 6)

Zoomed in Map to Hospital (3 of 6)

Zoomed in Map to Hospital (4 of 6)

Zoomed in Map to Hospital (5 of 6)

Zoomed in Map to Hospital (6 of 6)

Source: U.S. Department of the Interior Geological Survey Topographic Map of the Haverstraw, NY Quadrangle, dated 1967 (photorevised 1979)

Site Location Map – Overview

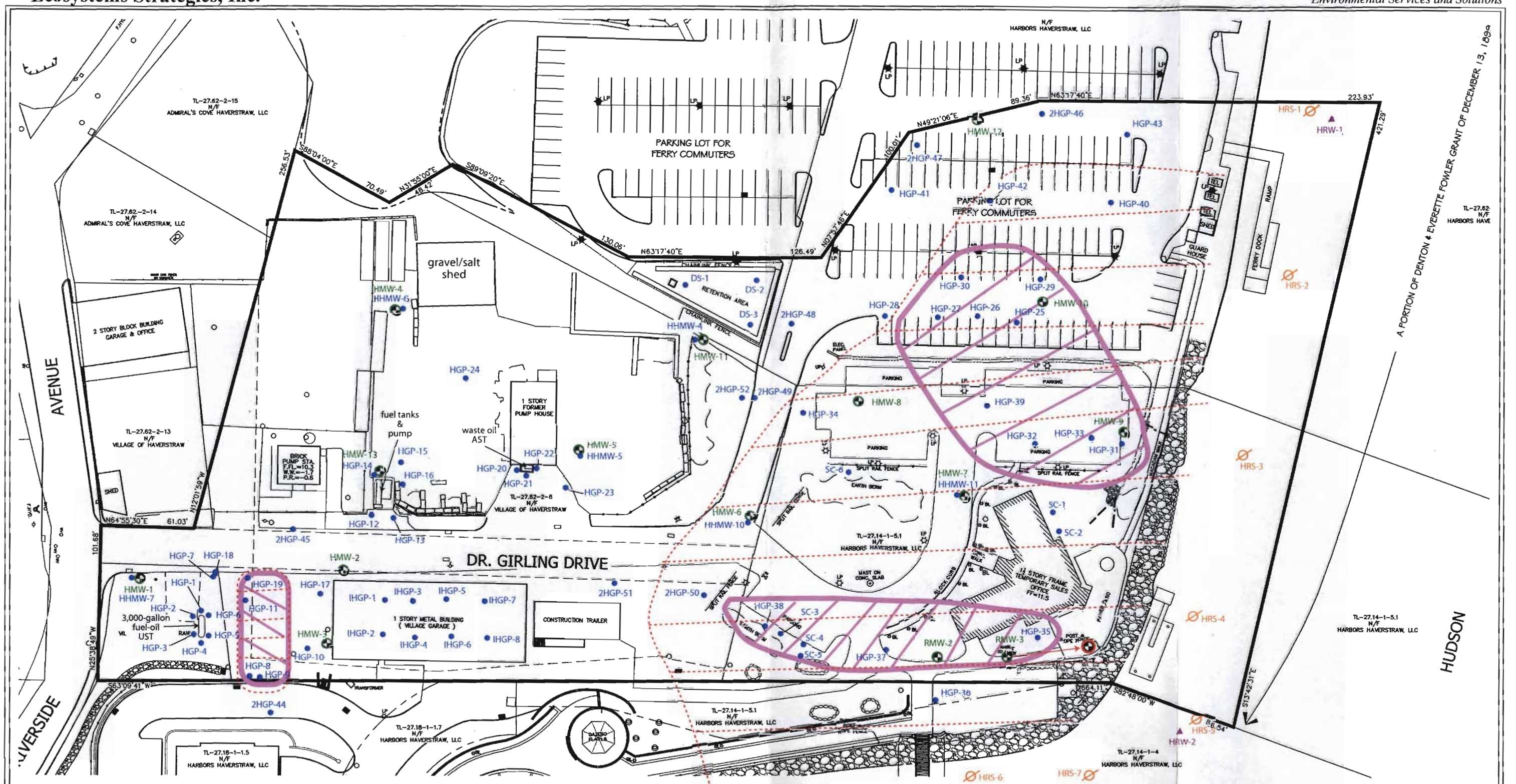
Haverstraw Harbors Site
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

N

ESI File: GH9964.42

Date: November 2007

Attachment



Legend:
- monitoring well location
- monitoring well (to be relocated)
- soil boring location
- sediment sample location
- water sample location
- area of impacted soil
- area of significant petroleum contamination (proposed areas of soil removal)

N

Proposed Fieldwork Map

Haverstraw Harbors Site - BCP Site ID C344606
Dr. George W. Girling Drive
Village of Haverstraw
Rockland County, New York

ESI File: GH9964.42	
Scale: 1" = 60' (approximately)	
November 2007	Attachment
Ecosystems Strategies, Inc.	

APPENDIX D

Community Air Monitoring Plan

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.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

APPENDIX E

Resumes of Key Environmental Personnel

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,, Poughkeepsie, New York 1991 to Present
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

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.

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.

Select Projects

Scenic Hudson Land Trust, Inc., Beacon Waterfront Project, Beacon, NY

ESI conducted soil and groundwater investigations on a former MOSF and adjacent scrapyard. Projects involved soil remediation of both petroleum and PCB-contaminated soils and long-term groundwater monitoring. Both projects were classified as Voluntary Clean-Up projects by the NYSDEC and closure status was attained.

Sakmann Restaurant Corporation Site, Fort Montgomery, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations for former filling station and automotive repair garage contaminated by solvent and waste-oil discharges to an on-site drywell.

Designed and implemented a sampling plan for soils impacted by chlorinated hydrocarbons, petroleum, and metals. Created Workplan (in coordination with the NYSDEC Voluntary Cleanup Program) for remediation of on-site contamination and long-term sampling of on-site groundwater monitoring wells.

Staten Island Marina Site, Staten Island, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigation for an active marine facility engaged in boat painting and engine maintenance activities. Coordinated the delineation of metals contamination over a three-acre area and analyzed potential impacts from on-site fill materials. Submitted remedial and budgetary analysis in support of regulatory agency approval for conversion of boatyard into a public park.

Octagon House Development Site, Roosevelt Island, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations at the former site of a large, urban hospital. Interpreted the results of geotechnical studies, extended test pits, and conducted extensive soil sampling, to document subsurface soil conditions n support of clients application to the U.S. Housing and Urban Development Agency (HUD). Created Workplan (in coordination with the NYCDEP Office of Environmental Planning and Assessment) for site-wide remediation of contaminated soils and secured NYCDEP approval for site remediation as required by HUD.

Camp Glen Gray Boy Scout Facility, Mahwah, NJ

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations at an approximately 800-acre campground containing numerous structures. Documented subsurface soil conditions at the locations of aboveground and underground storage tanks, and delineated lead contamination at a former firing range. Assisted in design and implementation of remediation plans for removal of petroleum and lead contaminated soils, and obtained NJDEP approvals.

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