Remedial Action Work Plan

330 Maple Road Site
Amherst, New York
BCP Site No. C915207

August 2008
Revised February 2009

0105-002-201

Prepared For:

Benderson Development Company, LLC

Prepared By:

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AMHERST, NEW YORK
BCP SITE NO. C915207

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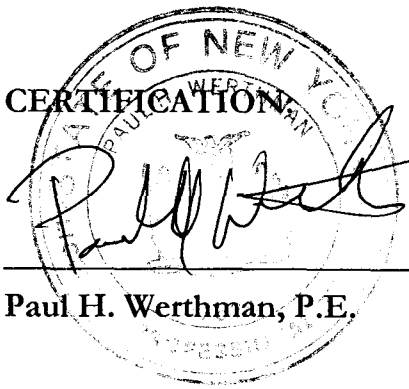
CERTIFICATION:



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Amherst, New York

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1.0 INTRODUCTION

Benderson Development Company, LLC (Benderson), has elected to pursue cleanup and redevelopment of a portion of the 330 Maple Road property, located at 330 Maple Road, Amherst, New York (see Figures 1 and 2), under the New York State Brownfield Cleanup Program (BCP) and has entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) (BCP Site No. C915207).

This document presents the scope of work and procedures for completion of planned remedial activities on the property. The remedial activities will be completed by remedial construction contractors under contract to Benderson with construction management by Benderson and engineering oversight by Benchmark Environmental Engineering & Science, PLLC (Benchmark). The work will be completed in general accordance with NYSDEC DER-10 guidelines (Ref. 1) and the BCA.

1.1 Site Background

The subject property is a 31.6-acre parcel owned by Benderson Development Company, LLC (see Figure 1). The Site presently consists of an outdoor shooting range, a two-story clubhouse, a gravel parking lots and otherwise fallow land. The shooting range consists of ten trap houses and three sheds used to store targets and supplies. The property is currently unoccupied, and available records indicate that the only known site operator at 330 Maple Road has been the Buffalo Gun Club, present from approximately 1943 until 2006. The parcel was apparently undeveloped prior to 1943.

Based on preliminary environmental investigations completed at the site in 2006, approximately 26 acres of the 31.6-acre redevelopment parcel were identified as contaminated as a result of historic Site use. As such, that 26-acre portion of the greater 31.6-acre parcel is defined as the brownfield redevelopment site (Site) within the context of the BCA (see Figure 2).

1.2 Environmental History

1.2.1 March 2005– Phase I Environmental Site Assessment

A Phase I Environmental Site Assessment (ESA) was performed for the subject property by Great Lakes Environmental & Safety Consultants, Inc. in March 2005 (Ref. 2).

The Phase I ESA indicated that the primary concern is potential lead contamination from shooting (gun) range activities, which cover a significant portion of the property. The former indoor gun range located in the basement was also of concern.

1.2.2 April 2005 – Limited Phase II Site Investigation

In April 2005, Great Lakes Environmental & Safety Consultants, Inc. (GLESC) performed limited Phase II environmental investigations at the property (Ref. 3). Due to the nature of the shooting activities, the Phase II investigations focused on sampling for lead and semi-volatile organic compounds (SVOCs) in surface and subsurface soil, and in the basement of the clubhouse. A total of 19 soil samples were collected for analysis of lead; one of the samples was analyzed for STARS List SVOCs. The Phase II investigation indicated that soils contained concentrations of lead significantly above typical background levels at commercial/industrial sites. The Phase II report also indicated that an area of approximately 1,000-ft. by 70-ft. was covered with spent clay pigeon fragments (shooting targets). Groundwater was not addressed during that investigation.

1.2.3 May 2006 – Supplemental Phase II Site Investigation Findings

In May 2006, Benchmark performed a supplemental soil investigation on behalf of Benderson (Ref. 4) focusing on collecting near-surface (i.e., 0-6 inches below ground surface) soil samples across the entire parcel to better delineate the areal extent of previously identified lead impact on-site. Forty-one soil samples were collected and analyzed for total lead concentrations and one sample was analyzed for toxicity characteristic leaching procedure (TCLP) for lead. The findings of that investigation indicate that the majority of the near-surface soils across the Site have been impacted by lead. Lead concentrations in soil up to 98,000 parts per million (ppm) were reported. A sample collected from the area of the active shooting range had a TCLP concentration of 50.2 milligrams per liter (mg/L), which exceeds the regulatory threshold for hazardous waste toxicity characteristic for lead of 5 mg/L. A duplicate sample from that area was sieved to remove the lead shot present in the sample and analyzed for TCLP to evaluate whether removal of lead shot would result in a TCLP lead concentration below 5 mg/L. The TCLP lead result for the sieved sample was 11.5 mg/L. These findings established that some of the soils on-site will either require treatment (including soils with lead shot removed) to render them non-hazardous or be handled and disposed off-site at a permitted hazardous waste landfill.

1.2.4 November 2006 – BCP Remedial Investigation

In November 2006 through February 2007, Benchmark performed Remedial Investigation activities at the 330 Maple Road site to evaluate the vertical and horizontal extent of impacts across the Site. Four hundred and twenty-nine (429) 50-ft.-by-50-ft. grids from A-1 to M-33 were utilized across the Site. The sampling focused on collecting soil samples 0 to 4 feet below ground surface (fbgs), with samples being collected from the following depth intervals: 0-0.5 fbgs, 0.5-1 fbgs, 1-2 fbgs, 2-3 fbgs, and 3-4 fbgs. The findings of the investigation show that lead-impacted soil is widespread across the site with the highest concentrations observed in the 0-0.5 fbgs depth interval in the area north of the shooting lanes. The areal extent of lead-impacted soil decreased significantly with depth, such that lead concentrations above the residential SCOs were not observed beyond 2 fbgs. PAHs were also detected in soils above residential SCOs, with the areal extent of PAH-impacted soil limited to the area directly north of the shooting lanes; PAH-impacts also decreased significantly with depth, such that PAH concentrations above residential SCOs were not observed beyond 2 fbgs. The distribution of lead and PAHs in soil at the Site is illustrated on Figure 3.

TCLP lead analysis revealed that some (six of eleven samples) of the lead-impacted soils exceeded TCLP hazardous waste characteristic threshold concentration of 5 mg/L, indicating the need to treat the characteristic hazardous lead-impacted soil prior to disposal as a non-hazardous waste; or, dispose of the soil exceeding the TCLP threshold as a hazardous waste. No linear correlation appears to exist between total and TCLP lead concentrations.

Groundwater samples collected during the RI indicated no significant groundwater impact, with the exception of one total lead exceedance in MW-3. As the soluble lead concentration in groundwater from MW-3 is below the groundwater quality standard of 25 micrograms per liter (ug/L), this is considered a localized impact that may have resulted from well construction.

1.3 Primary Constituents of Concern (COCs)

Based on the RI data, the only Constituents of Concern (COCs) are lead and PAHs in soil.

1.4 Remedial Action Objectives

The remedial actions for the 330 Maple Road Site must satisfy Remedial Action Objectives (RAOs). Remedial Action Objectives are site-specific statements that convey the goals for minimizing substantial risks to public health and the environment. For the 330 Maple Road Site, appropriate RAOs have been defined by the NYSDEC as:

- Removal of soil impacted with COCs above NYSDEC Part 375 SCOs for residential use;
- Treatment of characteristic hazardous lead-impacted soil to render non-hazardous;
- Disposal of impacted soils at a NYSDEC approved disposal facility; and,
- If needed, preparation of a Site Management Plan (SMP) that includes an Environmental Easement filed in Erie County.

Based on the findings of the RI, remedial activities are planned to address elevated concentrations of lead and PAHs in shallow on-Site soils. In general, remedial activities will include excavation and disposal of non-hazardous lead- and PAH-impacted soil and treatment, excavation and disposal of characteristic hazardous lead-impacted soils. Soil cleanup objectives employed during remediation will be NYSDEC Part 375 residential SCOs. Details of the planned remedial action are presented in Section 2.0.

1.5 Summary of Alternatives Analysis Report (AAR)

Based on findings of the investigations described above, an Alternative Analysis Report was prepared to evaluate potential remedial approaches for the Site. Remedial approaches that were evaluated included:

- Alternative #1- No Action;
- Alternative #2- Excavation of Lead and PAH-Impacted Soil with Off-Site Disposal as Solid and/or Hazardous Waste and Off-Site Disposal of PAH-Impacted Soils as Non-Hazardous Waste;
- Alternative #3- Excavation and Off-Site Disposal of Non-Hazardous Lead-Impacted and PAH-Impacted Soils and In-Situ Treatment, Excavation and Off-Site Disposal of Characteristic Hazardous Lead-Impacted Soils;
- Alternative #4- Excavation and Off-Site Disposal of Non-Hazardous Lead-Impacted and PAH-Impacted Soils and Excavation, Ex-Situ Treatment and Off-Site Disposal of Characteristic Hazardous Lead-Impacted Soils.

Alternatives #3 and #4 were selected as the most applicable remedial approaches that satisfy the RAOs. Alternative #4 requires a higher level of effort to implement due to additional soil handling requirements and may result in potentially greater fugitive emissions during implementation and potentially longer implementation schedule; therefore, the selected remedy for this Site is Alternative #3. The AAR report is presented in Appendix A.

1.6 Project Organization and Responsibilities

Benderson has entered into a BCA as a non-responsible party (volunteer) per ECL§27-1405. The remedial activities will be completed by remedial construction contractors under contract to Benderson with construction management by Benderson and engineering oversight by Benchmark. The NYSDEC Division of Environmental Remediation will monitor the activities to verify that the work is performed in accordance with the BCA, the approved Remedial Action Work Plan and NYSDEC DER-10 guidance.

2.0 CLEANUP APPROACH

2.1 Purpose and Scope

This section of the Remedial Action Work Plan describes the planned removal and off-Site disposal of PAH-impacted soil and the planned treatment and/or removal and disposal of lead-impacted soil. The primary tasks of the planned remedial work will include:

- pre-excavation hazardous waste characterization sampling of shallow lead-impacted soils;
- excavation of non-hazardous PAH and lead-impacted soil;
- on-site treatment of soil exhibiting hazardous waste characteristics for lead to render it non-hazardous;
- excavation of treated lead-impacted soil rendered non-hazardous; and,
- off-site transportation and disposal of non-hazardous lead and PAH-impacted soil at a permitted solid waste disposal facility.

This Work Plan also addresses the following tasks:

- pre-mobilization tasks;
- health, safety, and community air monitoring procedures;
- Dust, stormwater, and erosion control measures required for minimizing potential releases of soils outside the work zone during construction;
- equipment decontamination requirements;
- post-treatment verification sampling;
- remedial action documentation;
- implementation scheduling; and,

- if needed, a post-remedial action Site Management Plan.

2.2 Pre-Mobilization Tasks

2.2.1 Public Information and Outreach

A fact sheet containing information about the planned remedial work will be direct-mailed by Benderson to those individuals on the Brownfield Site Contact List, including property owners and residents adjacent to the project site, environmental groups, local political representatives, and interested regulatory agencies. Furthermore, a copy of this Work Plan will be made available for public review at the NYSDEC Region 9 office and the Amherst Public Library Williamsville Branch.

2.2.2 Pre-Excavation Survey and Underground Utilities Location

An approximate 50-foot x 50-foot square grid was established across the BCP Site during the RI. Prior to initiating excavation or treatment of impacted soil, the elevation within each grid will be surveyed prior to commencement of excavation activities. The pre-excavation grid elevations, in conjunction with post-excavation elevations, will be used to document excavation boundaries and quantities.

The remediation contractor will contact underground facilities protection organization (DigSafely, New York) to locate utility lines within the work area.

2.2.3 Health and Safety Plan Development

A Site-Specific Health and Safety Plan (HASP) will be prepared and enforced by the remediation contractor in accordance with the requirements of 29 CFR 1910.120. The HASP will cover all on-site remediation activities. Benchmark will be responsible for site control and for the health and safety of its authorized site workers. Benchmark's HASP is provided for informational purposes in Appendix B. The remediation contractor will be required to develop a HASP as or more stringent than Benchmark's HASP.

2.3 Remedial Activities

2.3.1 Mobilization and Site Preparation

The remediation contractor's field operations at the Site will commence with mobilization, which will include mobilizing equipment and materials to the Site; setting up and connecting temporary utilities at the field trailer (or setting up within the existing building on-Site, if available); and, erecting safety fencing and other temporary controls identified in Section 2.3.2.

The soil removal activities will begin with clearing any loose debris and trash located on the surface of the property, to be disposed separately from impacted soil. Concrete walks will be removed and transported to a materials recycling facility.

2.3.2 Facilities and Controls

An existing two-store club house currently exists on-Site and will be utilized as the project's on-Site field office during remedial activities. Subsequent to completion of remedial activities, the building will be demolished prior to site redevelopment. If the existing building is unavailable, a temporary construction field trailer and portable toilets may be used during the remedial work.

Temporary controls will be employed for protection against off-site migration of soil and safety hazards during construction. These will include safety fencing, dust suppression, and erosion control as further described below.

2.3.2.1 Access Controls

Temporary safety construction fencing (i.e., 3-foot high orange plastic or 6-foot chain link) will be placed around the outer perimeter of work area(s) to distinguish the work zone and discourage trespassing. The fencing will not be removed until the excavation work is complete.

As a requirement of the Program, a sign will be placed in along Maple Road to identify the Site as a BCP Site.

2.3.2.2 Dust Monitoring and Controls

A Community Air Monitoring Plan (CAMP), as more fully described in Section 3.1, will be implemented during Site excavation work. If community air monitoring indicates the need for dust suppression, the remediation contractor will apply a water spray across the excavation(s), treatment and surrounding areas and on-Site haul roads as necessary to mitigate airborne dust formation and migration. Potable water will either be obtained from a Town hydrant or provided by the on-Site water service, if available. Other dust suppression techniques that may be used to supplement the water spray include:

- Hauling materials in properly tarped containers or vehicles.
- Restricting vehicle speeds on-site.
- Hydro-seeding of final grades.
- Application of solidification materials (e.g., portland cement) as a slurry.

2.3.2.3 Erosion and Sedimentation Control

Provisions will be made for erosion and sedimentation control at the work perimeter during remediation activities. Continuous silt fencing will be installed prior to the initiation of excavation activities and will remain on the Site perimeter until the excavation activities are complete. A Master Erosion Control Plan has been prepared and incorporated as Appendix C to this Work Plan. This Master Erosion Control Plan includes provisions for silt fencing, hay baling, mulching, and other measures as warranted.

2.3.3 Waste-Characterization Sampling

2.3.3.1 Target Debris Characterization

Shooting target debris covers an area of approximately 1,000-ft. by 70-ft. north of the trap shooting lanes. The material is not known to be composed of hazardous or regulated substances. However, as the target debris will not be re-used on-Site during future development, the materials will be tested in accordance with a permitted solid waste disposal facility's waste characterization protocols for disposal.

2.3.3.2 Lead-Impacted Soil Characterization

Based on the RI sample data, it is estimated that lead is present above the residential SCO in approximately 13,200 CY of surface and sub-surface soil on-Site (see Table 2 and Figure 3). Samples impacted with VLS are assumed to exceed the residential SCO and are included in that estimated volume.

TCLP lead sampling conducted during the RI indicates that some of the lead-impacted soils exceeded TCLP hazardous waste characteristic threshold concentration of 5 mg/L, indicating the need to treat the characteristic hazardous lead-impacted soil prior to off-Site disposal as a non-hazardous waste. TCLP sampling will be conducted at sample grids where lead is present in concentrations above the residential SCO to determine whether the soil within those grids can be disposed of as non-hazardous waste, or if soil treatment is necessary prior to disposal as non-hazardous waste. TCLP sampling will not be conducted in sample grids with evidence of VLS; these sample grids are assumed to require treatment to render them non-hazardous.

For those sample grids that require treatment by addition of soil amendments based on the initial TCLP sampling results, TCLP lead samples will also be collected subsequent to treatment to confirm TCLP lead concentrations are below 5 mg/L prior to removal and off-Site transport to a permitted commercial solid waste landfill. Samples will be analyzed in accordance with USEPA SW-846 methodology.

2.3.3.3 PAH-Impacted Soil Characterization

Based on the RI sample data, it is estimated that PAHs are present above their respective residential SCOs in approximately 8,100 CY of surface and sub-surface soils on-Site. However, approximately 1,500 CY of these soils are impacted with PAHs and lead (see Table 3 and Figure 3). Soils impacted with PAHs and lead will be treated as lead-impacted soils and will require pre-excavation TCLP testing as described in Section 2.3.3.2 above.

To confirm that the soil impacted only by PAHs is acceptable for disposal at a permitted solid waste disposal facility, samples will be collected from the PAH-impacted area and analyzed for waste profile characterization parameters as required by the solid waste disposal facility.

2.3.4 Excavation and Off-Site Disposal of Target Debris

The shooting target debris will be excavated and transported off-Site for disposal in a permitted commercial solid waste landfill. Post-removal verification sampling will not be completed as soil beneath the target debris will require characterization and removal.

2.3.5 Excavation and Off-Site Disposal of Non-Hazardous Lead and PAH-Impacted Soil

The soils impacted with PAHs only and lead-impacted soils that do not require treatment will be excavated and transported off-Site for disposal in commercial solid waste landfill. Excavation depth of these soils is anticipated to range between 0.5 and 2.0 fbgs as there were no samples collected during the RI that exceeded residential SCOs for lead or PAHs beyond 2.0 fbgs. Excavated materials will be directly loaded into dump trailers located near the excavation area. If disposal transport truck scheduling necessitates stockpiling of excavated soil, the stockpiles will be covered with plastic tarp and ballast during non-working hours.

2.3.6 Treatment, Excavation and Off-Site Disposal of Lead-Impacted Soil Exhibiting Hazardous Characteristics

Bench-scale testing completed during the RI indicated that an addition of approximately 5% Portland Cement successfully treated lead-impacted soil, including samples impacted with VLS, to TCLP lead concentrations below 5 mg/L. Therefore, the sample grids with evidence of VLS and the sample grids where waste characterization sampling indicate TCLP lead concentrations above 5 mg/L will be treated with Portland Cement to render them non-hazardous.

The planned method for soil treatment is in-situ mechanical mixing using conventional land farming of approximately 5% Portland Cement, added as a slurry in a manner to ensure even distribution to the designated treatment area and minimize fugitive dust. Mechanical mixing will be accomplished using a four-wheel drive tractor equipped with a harrow plow and/or disk to turn the soil, mix in the additives and reduce "clod" size. After an approximate 24-hour period, a composite sample, consisting of four individual grab samples, will be collected from each treated grid and analyzed for TCLP lead to confirm

reduction below the 5 mg/L TCLP limit has been achieved. The results of that testing will be provided to the solid waste landfill to obtain disposal approval.

Upon successful treatment and landfill approval, the soils will be excavated and transported off-Site for disposal in commercial solid waste landfill. Excavation depth of these soils is anticipated to range between 0.5 and 2.0 fbgs (see Figure 4). Once treated, the excavated materials will be handled in the same manner to the other non-hazardous soil at the Site.

2.3.7 Verification Sampling

The sampling and analysis completed during the RI fully delineated the lateral and vertical extent of VLS, lead-impacted soil and PAH-impacted soil across the entire Site in depth intervals of 0-0.5 fbgs, 0.5-1.0 fbgs, 1-2 fbgs and 2-3 fbgs. No soil samples contained COCs at concentrations above residential SCOs beyond the 1-2 fbgs interval. As all grids in the 0-0.5 fbgs and 0.5-1.0 fbgs intervals that exceed residential SCOs, as illustrated on Figure 3, will be excavated, treated (as appropriate) and removed from the Site, post-excavation samples will not be required. However, for the grids that are impacted from 1-2 fbgs, treatment and/or excavations may be completed in one or two 6-inch lifts (i.e., 1-1.5 fbgs, then 1.5-2.0 fbgs, if necessary) to minimize potential for unnecessarily removing soil that meet residential SCOs. For these grids, post-excavation verification samples will be completed at approximately 1.5 fbgs. If those verification samples indicate an exceedance of residential SCOs at that depth, excavations will be completed to 2 fbgs.

For those grids that may require post-excavation verification samples as described above, the verification samples will be collected from the bottom of each excavated sample grid. Verification samples will consist of one composite sample, comprised of four grab samples, from each excavated grid area. A portion of each discrete grid grab sample will be archived for potential future analytical analysis; in the event that the composite verification sample results exceeds 125 mg/kg, each of the individual grab samples will be analyzed to determine if a hot spot (i.e., an area with lead concentration above 400 mg/kg) exists within that grid.

Verification samples will be analyzed for total lead (in lead-impacted grids) and/or PAHs (in PAH-impacted grids) using USEPA SW-846 Methodology with an equivalent Category B (Level IV) deliverables package to facilitate data evaluation by a third-party

validation expert. Lateral and vertical excavation will continue as described above until the SCOs are met, or NYSDEC agrees that no further excavation is required.

Quality Assurance (QA) samples will be collected to support the verification sample data evaluation. The QA samples will include a minimum of one matrix spike, one matrix spike duplicate, and one blind duplicate per 20 verification samples. Dedicated equipment will be used to avoid the need for equipment blanks.

2.3.8 Off-Site Disposal

All soil removed from the Site will be loaded into dump trailers or trucks for transport to an off-site NYSDEC Part 360 permitted sanitary disposal facility.

2.3.9 Lead Recovery

If deemed cost-effective to do so, consideration may be given to recovering some of the lead shot that is present within the soil at the Site. If this task is completed, it would be completed prior to any soil treatment and/or excavation activities and would be focused in the area of the highest concentration of VLS only, generally located in the northeast portion of the BCP Site, north of the trap shooting lanes. Completion of this task will not alter the selected and planned remedial measures otherwise described in this Work Plan.

2.3.10 Off-Site Berm

Benderson has entered into a BCA as a non-responsible party (volunteer) per ECL§27-1405, and is only responsible for remedial activities within the approved BCP Site boundaries. However, Benderson has agreed with the Town of Amherst to address potential lead contamination related to the off-Site berm, which is located on the Town's property along the northern Site boundary. The potential remedial activities related to the off-Site lead contamination will be completed in a similar manner to the on-Site lead contamination as described above in Sections 2.3.3.2 and 2.3.5 through 2.3.9.

2.3.11 Post-Remedial Grading

At the conclusion of remedial activities, the Site will be graded in such a way to reduce potential nuisance issues related to an open excavation, such as standing water and potential for mosquito or other vector breeding areas.

2.4 Site Management Plan

Based on 6 NYCRR Part 375-3.8, those Sites cleaned up to Residential SCOs may not be required to prepare a Site Management Plan (SMP), which describes site-specific Institutional Controls and/or Engineering Controls (IC/EC) as a component of the final remedy.

The cleanup goals for the 330 Maple Road Site are Residential SCOs, and if achieved will not be required to develop a SMP. In the event that Residential SCOs are not achieved, a SMP will be prepared consistent with NYSDEC BCP requirements. Components of the SMP would include:

- an Operation, Monitoring and Maintenance (OM&M) Plan that ensures protection of the environment and human health during redevelopment and subsequent to remedial activities. The OM&M Plan will include provisions for annual Site inspection and certification that the Site is utilized for the intended purposes; and,
- an Environmental Easement filed with Erie County.

3.0 REMEDIAL ACTIVITIES SUPPORT DOCUMENTS

3.1 Community Air Monitoring

Real-time community air monitoring will be performed during remedial activities at the Site. A Community Air Monitoring Plan is included with Benchmark's HASP. Particulate monitoring will be performed along the downwind perimeter of the work area during subgrade excavation, grading and soil/fill handling activities in accordance with this plan. This plan is consistent with the requirements for community air monitoring at remediation sites as established by the NYSDOH and NYSDEC. Accordingly, it follows procedures and practices outlined under NYSDOH's Generic Community Air Monitoring Plan (dated June 20, 2000) and NYSDEC Technical Assistance and Guidance Memorandum (TAGM) 4031: Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites.

3.2 Health and Safety Protocols

Benchmark has prepared a Site-Specific Health and Safety Plan (HASP) for use by our employees in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120. The HASP, provided in Appendix B, includes the following site-specific information:

- A hazard assessment.
- Training requirements.
- Definition of exclusion, contaminant reduction, and other work zones.
- Monitoring procedures for site operations.
- Safety procedures.
- Personal protective clothing and equipment requirements for various field operations.
- Disposal and decontamination procedures.

The HASP also includes a contingency plan that addresses potential site-specific emergencies, and a Community Air Monitoring Plan that describes required particulate monitoring to protect the neighboring community during intrusive site remediation activities.

Health and safety activities will be monitored throughout the remedial field activities. A member of the field team will be designated to serve as the on-site Health and Safety

Officer throughout the field program. This person will report directly to the Project Manager and the Corporate Health and Safety Coordinator. The HASP will be subject to revision as necessary, based on new information that is discovered during the field investigation and/or remedial activities.

3.3 Citizen Participation Activities

NYSDEC will coordinate and lead community relations throughout the course of the project. Benchmark will support NYSDEC's community relations activities, as necessary. A Citizen Participation (CP) Plan has been prepared by Benchmark and approved by NYSDEC. A copy of the CP Plan has been placed in Amherst Town Library Williamsville Branch, which is the designated project repository. The NYSDEC, with input from Benchmark and Benderson, will issue project fact sheets to keep the public informed of remedial activities.

4.0 REPORTING

4.1 Remedial Activities Reporting

Benchmark will be on-site on a full-time basis during the soil removal and/or treatment measures to monitor remedial actions and document remedial activities. Such monitoring and documentation will include: construction stake-out, surveying, and record drawings; daily reports of activities; community air monitoring results; pre-excavation, post-treatment verification, and post-excavation sampling and analysis; and, progress photographs and sketches.

4.1.1 Construction Monitoring

Standard daily reporting procedures will include preparation of a daily report and, when appropriate, problem identification and corrective measures reports. Appendix D contains sample project documentation forms. Information that may be included on the daily report form includes:

- Processes and locations of construction under way.
- Equipment and personnel working in the area, including subcontractors.
- Number and type of truckloads of soil/fill removed from the site.
- Approximate sampling locations (sketches) or GPS (Trimble) coordinates and sample designations for pre-excavation characterization, post-treatment and post-excavation verification.
- Amount and type of treatment chemicals applied and related treatment activities.
- Grid locations and depths being treated and/or excavated.

The completed reports will be available on-Site and will be submitted to the NYSDEC as part of the Final Engineering Report. The NYSDEC will be promptly notified of problems requiring modifications to this Work Plan prior to proceeding or completion of the construction item.

Photo documentation of the remedial activities will be prepared by a field representative throughout the duration of the project as necessary to convey typical work activities and whenever changed conditions or special circumstances arise.

4.2 Final Engineering Report

A Final Engineering Report (FER) will be prepared at the conclusion of remedial activities. The FER report will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Remediation:

- Introduction and background.
- A Site or area planimetric map showing the parcel(s) remediated, including significant site features.
- A Site map showing the lateral limits of any excavations.
- Tabular summaries of unit quantities including: volume of soil treated/excavated; disposition of excavated soil.
- Planimetric map showing location of all verification and other sampling locations with sample identification labels/codes.
- Tabular comparison of verification and other sample analytical results to SCOs. An explanation shall be provided for any results exceeding acceptance criteria.
- Documentation on the disposition of impacted soil removed from the Site.
- A pre- and post-remediation topographic survey and associated calculation of soil volumes treated and/or excavated.
- Copies of daily inspection reports and, if applicable, problem identification and corrective measure reports.
- Photo documentation of remedial activities.
- Text describing the remedial activities performed; a description of any deviations from the Work Plan and associated corrective measures taken; and other pertinent information necessary to document that the site activities were carried out in accordance with this Work Plan.

In addition, Benchmark will subcontract for third party data review of post-excavation verification data by a qualified, independent data validation expert. Specifically, a Data Usability Summary Report (DUSR) will be prepared, with appropriate data qualifiers

added to the results. The DUSR will follow NYSDEC format per the Department's September 1997 DUSR guidelines and draft DER-10 guidance. The DUSR and any necessary qualifications to the data will be appended to the FER.

4.3 Site Management Plan

As described in Section 2.4, a SMP may be needed. If a SMP is needed, it will include an OM&M Plan and an Environmental Easement, and will be submitted concurrently with the Final Engineering Report.

5.0 PROJECT SCHEDULE

The anticipated project schedule for the major tasks to be performed during implementation of the Remedial Action Work Plan is included as Figure 4. Major tasks are planned as follows:

- *May 2009*- Mobilize to the Site and collect pre-excavation characterization sampling.
- *July 2009*- Complete remedial fieldwork
- *October 2009*- Submit Final Engineering Report

6.0 REFERENCES

1. United States Department of Agriculture, Soil Conservation Service. *Soil Survey of Erie County, New York.* October 1972.

2. Great Lakes Environmental & Safety Consultants, Inc. *Phase I Environmental Site Assessment (ESA) for the Buffalo Shooting Club, 330 Maple Road, Williamsville, New York.* March 2005.

3. Great Lakes Environmental & Safety Consultants, Inc. *Phase II Environmental Site Assessment (ESA) for the Buffalo Shooting Club, 330 Maple Road, Williamsville, New York.* May 2005.

4. Benchmark Environmental Engineering and Science, PLLC. *Supplemental Phase II Investigation Findings, 330 Maple Road, Williamsville, New York.* May 18, 2006.

5. Benchmark Environmental Engineering and Science, PLLC. *Remedial Investigation Report, 330 Maple Road, Williamsville, New York.* October 2007. Revised January 2008.

6. New York State Department of Environmental Conservation. *Draft DER-10; Technical Guidance for Site Investigation and Remediation.* December 2002.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 1

Part 375 Residential Soil Cleanup Objectives (SCOs)
for Lead and Polycyclic Aromatic Hydrocarbons (PAHs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Parameter	Residential SCOs (ppm) [1]
Total Lead - mg/kg	
Lead	**400**
Polyaromatic Hydrocarbons (PAHs) - mg/kg	
Acenaphthene	**100**
Acenaphthylene	**100**
Anthracene	**100**
Benzo(a)anthracene	**1**
Benzo(b)fluoranthene	**1**
Benzo(k)fluoranthene	**1**
Benzo(g,h,i)perylene	**100**
Benzo(a)pyrene	**1**
Chrysene	**1**
Dibenzo(a,h)anthracene	**0.33**
Fluoranthene	**100**
Fluorene	**100**
Indeno(1,2,3-cd)pyrene	**0.5**
Naphthalene	**100**
Phenanthrene	**100**
Pyrene	**100**
Total PAHs	**NA**

Notes:
1. Values per NYSDEC Part 375 Soil Cleanup Objectives (December 2006).

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
A1	95.1*	92.7*	10.8 E*		
A2	25.4 E	9.9 E			
A3	54.3 E	12.8 E			
A4	51.4 E	30.2 E			
A5	391 E	48.3 E			
A6	95.7 E	18.8 E			
A7	64.4 E	23.6 E			
A8	59.8 E	16.5 E			
A9	51.5 E	22.9 E			
A10	158 E	41.1 E			
A11	68 E	40.6			
A12	142	11.4			
A14	191	38.6			
A15	40.9	17.7			
A16	112	45			
A17	95.9	31.3			
A18	102	32.2			
A19	96.5	12			
A20	141	13.3			
A21	130	47			
A22	63.8	11.6			
A23	23.3	11.1			
A24	14.6	16.9			
A25	12.5*	19.7*			
A26	33*	11.3*			
A27	17.7*	16.4*			
A28	39.9*	19.5*			
A29	84*	13.3*			
A30	62.1*	13.7*			
A31	73.2*	26.3*			
A32	14.8*	14.1 E			
A33	45.5 E	13.5 E			
B1	16.2*	11.6*			
B2	39.3	10.1			
B3	68.8	26.9			
B4	59.7	22.5			
B5	80.9	36.3			11.3
B6	107	30.6			
B7	52	19.5			
B8	91.8	48.8			
B9	18.5 E*	19.3 E*			
B10	VLS	33.6	20.1		
B11	639	77.7	68.3 E*	15.6EN	
B12	43.3	20.0			
B13	677	33.5			
B14	222	25.6			
B15	845	18.8			
B16	202	53.1			
B17	154	32.6			
B18	83.1	35.3			
B19	215	22.0			
B20	161	25.0			
B21	110	8.7			
B22	77.5	14.2			

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
B23	9.7	13.6			
B24	15.2*	17.6*			
B25	14.6*	15.5*			
B26	24.2	23.8			
B27	15.9	11.1			
B28	31.2	11.8			
B29	37.5	16.1			
B30	71.4	20.3			
B31	22.7	15.0			
B32	42.9	15.3			
B33	16.3	16.9			
C1	48.8*	10.9*			
C2	144	18.3			
C3	33.8*	15.9*			
C4	75.3*	8.8*			
C5	43.5*	10.4*			
C6	21.5*	7.5*			
C7	82.5*	43.5*			
C8	88.6*	24*			
C9	190*	15.1*			
C10	240*	40.6*			
C11	151*	23.9*			
C12	224*	32.3*			
C13	24.9*	13.6*			
C14	235*	31.1*			
C15	172*	94.9*	215 E*	11.9EN	
C16	191*	39.4*			
C17	18*	110*	40.8 E*		
C18	33.8*	81.4*	16.7 E*		
C19	90.3*	145*	17.1 E*		
C20	87.6*	146*	11.3 E*		
C21	318*	203*	13.7 E*		
C22	81.5*	30.2*			
C23	111	143	8.7 E*		
C24	136	15.4			
C25 (1)	96.3				
C26	997	16.9			
C27	365	17.8			
C28 (1)	59.4				
C29	40.9	19.4			
C30 (1)	68.8				
C31	18.6	10.9			
C32 (1)	63.4				
C33	18.9	18.4			
D1 (1)	68.5				
D2	13.7	14.9			
D3	167	16.2			
D4	VLS	13.6	13.3		
D5	158	17.3			
D6	76.3	14.2			
D7	21.7	12.8	12.9		
D8	315	16.3			
D9	148	134	15.7 E*		
D10	453	22.7			
D11	VLS	VLS	11.6	12.3	
D12	VLS	30	12.0		
D13	147	11.8			
D14	1190	36.9			

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
D15	VLS	VLS	20.0	11.3	
D16	105	133	12.3 E*		
D17	483	13.7			
D18	90.3	14.9			
D19	197	20			
D20	10.2*	14.5*			
D21	64.2*	13.8*			
D22	69600*	18*			
D23	230	34.3			
D24	925	137	9.9 E*		
D25	956	36.6			
D26	236*	37.2*			
D27	85.5*	22.8*			
D28	309*	11.3*			
D29	176*	15.5*			
D30	79.6*	21.5*			
D31	89500*	12.8*			
D32	921*	18*			
D33	94.2*	19.3*			
E1	173*	11.4*			
E2	36.1	13.7			
E3	43*	8.8*			
E4	22.8*	8.4*			
E5	93.6*	11.9*			
E6	44.1*	18.4*			
E7	76*	33.9*			
E8	981*	20.8			
E9	842	8.0			
E10	363	24.2			
E11	33600*	72.8*	34.5 E*		
E12	396*	28.3*			
E13	381*	72.3*	23.6 E*		
E14	783*	36.4*			
E15	295*	18.9*			
E16	142*	44.8*			
E17	42.3*	11.9*			
E18	136*	10.4*			
E19	48.3*	10.3*			
E20	29.6*	13.3*			
E21	17.8*	15.3*			
E22	46.6*	8.7*			
E23	1390	24.3			
E24	580*	11.3*			
E25 (1)	141*				
E26	115*	30.1*			
E27	101*	32.5*			
E28 (2)	98000	19.1	15.4		
E29	99.2	13.2			
E30	30.4	16.3			
E31	2810*	35.2*			
E32	140*	18.4*			
E33	813*	12.7*			
F1 (1)	34.4				
F2	152	14.5			
F3	116	14.2			
F4	143	18.0			
F5	574	17.9			
F6	550	16.5			

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
F7	986	21.9			
F8	823	19.5			
F9	VLS	84.7 N*	12.1		
F10	VLS	15.6	14.3		
F11	VLS	11.6	10.7		
F12	453	31.3			
F13	598	12.8			
F14	VLS	34.3	11.7		
F15	41000	407	13.5 E*		
F16	525	17.6			
F17	72.1	30.0			
F18	337	14.1			
F19	VLS	14.0	16.7		
F20	129	17.4			
F21	VLS	VLS	17.5	11.9	
F22	VLS	VLS	17.4	10.6	
F23	VLS	16.1	16.0		
F24	1400	47.6			
F25	VLS	18.8	16.0		
F26	VLS	17.3	14.2		
F27	VLS	22.5	16.7		
F28 (2)	1030	10.1	12.3		
F29	VLS	12.6	13.5		
F30 (2)	1700*	36.6	13.6		
F31	131	22.0			
F32	70.2	9.5			
F33	202	13.5			
G1	76*	18.3*			
G2	92.8	15.1			
G3	499	10.6			
G4	494	16.3			
G5	VLS	14.2	15.5		
G6	VLS	36.0	19.9		
G7	VLS	21.8	20.6		
G8	VLS	11.3			9.6
G9	VLS	29.0	14.1		
G10	VLS	9.6	8.2		
G11	VLS	25.1	9.5		
G12	VLS	31.9	15.9		
G13	VLS	22.2	15.5		
G14	VLS	VLS	10.6	11.3	
G15	VLS	21.0	11.6		
G16	VLS	48.6	11.6		
G17	445	34.0			
G18 (2)	84400	59.9	16.4		
G19	186	10.3			
G20 (1)	135				
G21	67.4	9.1			
G22 (1)	204				
G23	2720	20.8			
G24 (2)	784	14.1	9.2		
G25 (1)	233				
G26	136*	11.1*			
G27	VLS	11.1	11.4		
G28	638	105	15.9 E*		
G29	545*	12.4			
G30	VLS	26.9*	11*		
G31	1960	18.7			

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
G32 (2)	**773**	15.7	9.6		
G33	23.9	8.4			
H1	193*	37.8*			
H2	**VLS**	17.8	12.8		
H3	104	16.7			
H4	**3220**	16.4			
H5	245	14.0			
H6	**VLS**	54.5	12.5		
H7	**VLS**	28.6	13.0		
H8	**VLS**	15.6	12.5		
H9	**VLS**	25.2	17.9		
H10	**VLS**	22.4	15.0		
H11	**VLS**	12.4	13.8		
H12	**VLS**	17.4	12.4		
H13 (2)	**73800**		18.3		
H14	**VLS**	125	19.5		
H15	**VLS**	78.4	10.0		
H16	324	22.3			
H17	**VLS**	10.9	9.3		
H18	359	39.0			
H19	**2120**	12.6			
H20	**2530**	13.8			
H21	**1690 N***	15.3*			
H22	**669***	81.3*	11.5 E*		
H23	142*	22.1*			
H24		16.6 N*			
H25	74.6	29.8			
H26	42.6 N*	15.6			
H27	19.4 N*	12.1 N*			
H28	**2990***	14.9*			
H29 (1)	65.9*				
H30	**913***	12.9*			
H31	357*	9.6*			
H32	**588***	11*			
H33	23.9*	12.2*			
I1 (2)	**1020**	8.9*	12.5*		
I2	**VLS**	16.3	14.5		
I3	**VLS**	13.7	18.2		
I4	**VLS**	19.0	12.3		
I5	105	73.2	39.9 E*		
I6	**VLS**	86.9	39.5		
I7	**VLS**	31.2	12.8		
I8	**VLS**	11.5	11.3		
I9	**VLS**	19.4	10.9		
I10	**VLS**	**VLS**	15.9	16.7	
I11	**VLS**	**VLS**	23.3	10.5	
I12	**VLS**	19.4	11.7		
I13	**VLS**	**VLS**	13.8	8.8	
I14	**VLS**	**VLS**	18.1	67.9	8.5 E*
I15	**VLS**	**VLS**	13.6	15.4	
I16	**VLS**	21.3	21.8		
I17	**VLS**		13.1		
I18	**1350**	21.6			
I19	46.1	18.0			
I20	**VLS**	60.7	13.2		
I21	**VLS**	12.8 N*	15.2 N*		
I22 (2)	**2680**	18.6 N*	11.4 N*		
I23	**VLS**	16.4 N*	11.2 N*		

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
I24	VLS	11.8 N*	16.4 N*		
I25 (1)	179				
I26	VLS	19.3 N*	14 N*		
I27	VLS	11.7 N*	14.7 N*		
I28 (1)	25.2				
I29	74 N*	16.2 N*			
I30	**29500 N***	11.8 N*			
I31	148 N*	19.6 N*			
I32	161*	11.6*			
I33	13*	9.8*			
J1	VLS	32.7*	11.8*		
J2	VLS	VLS	16.3	8.8	
J3	VLS	10.1	10.5		
J4	VLS	17.2	13.4		
J5	VLS	29.7	27.5		
J6	VLS	39.1	22.0		
J7	VLS	59.8	14.0		
J8	VLS	29.2	19.5		
J9	VLS	VLS	13.9	9.6	
J10	VLS	VLS	VLS	15.8	8.9
J11	VLS	VLS	13.7	12.3	
J12	VLS	VLS	**404**	13.8	
J13	VLS	VLS	VLS	10.1	9.6
J14	VLS	VLS	15.1	28.3	
J15	VLS	38.5	10.9		
J16	VLS	VLS	35.8	10.7	
J17	VLS	VLS	11.1	10.8	
J19 (2)	**3070**	26.7	16.0		
J20 (2)	**2380**	19.5	24.2		
J21	VLS	14.1*	14.7*		
J22	54*	18.5*			
J23	VLS	14.9*	12.5*		
J24 (2)	**1980**	77.3*			
J25	VLS	14.2	15.4		
J26	VLS	32.3	10.8		
J27	28.2	71.8*	11.7 E*		
J28	50.7*	91.8*	13.4 E*		
J29	174*	12.9*			
J30	53.1*	24.7*			
J31	125*	7.9*			
J32 (2)	**488**	9.9*	9.1*		
J33	63.8*	14.8*			
K1	VLS	114*	11.8*		
K2 (1)	149				
K3	VLS	18	18.3		
K4	VLS	14.8	9.2		
K5	VLS	13.3	22.0		
K6	VLS	12.2	11.2		
K7	VLS	18.6	8.7		
K8	VLS	**1200**	14.0		
K9	VLS	VLS	11.9	226	8.5
K10	VLS	VLS	47.0	12.1	
K11	VLS	VLS	**4590**	13.4	
K12	VLS	VLS	18.7	13.6	
K13	VLS	**2400**	16.9		
K14	VLS	VLS	18.9	11.6	
K15	VLS	VLS	VLS	15.2	11.4
K16	VLS	28.4	15.0		

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
K19	VLS	VLS	42.1*	10.6*	
K20	VLS	28.6*	13.1*		
K21	533*	1460*			
K22	VLS	203*	13.4*		
K23	VLS	49.3*	9.7*		
K24	VLS	180*	14*		
K25 (1)	269				
K26	193*	64.8*	112	11.1EN	
K27	VLS	19.3*	15.6*		
K28	30.3	16.4*			
K29 (1)	143				
K30	108	26.5			
K31	16.6	10.8			
K32	227*	30.7*			
K33	50.3*	16.7*			
L1 (2)	846	89.6*	36.5*		
L2	VLS	198	30.2		
L3	VLS	31.1	19.1		
L4	VLS	15.4	24.3		
L5	VLS	24.7	18.8		
L6	VLS	26.9	57.7		
L7	VLS	49.1	15.7		
L8	VLS	21.3	14.9		
L9	VLS	VLS	23.6	19.9	
L10	VLS	VLS	14.8	17.2	
L11	VLS	VLS	VLS	17.3	16.1
L12	VLS	VLS	15.7	20.3	
L13	VLS	VLS	47.1	45.8	
L14	VLS	VLS	13.8	13.1	
L15	VLS	140	24.2		
L16	VLS	17.4	23.6		
L19	VLS	4760*	24 E*		
L20	VLS	20.1 E*	15.4 E*		
L21	VLS	65.6 E*	22.2 E*		
L22	402 E*	19.5 E*			
L23	101 E*	485 E*	24.2		
L24	17.5 E*	22.2 E*			
L25	57800*	22.6*			
L26	56.4*	64.3*	12.7		
L27	960*	16.7*			
L28 (1)	226				
L29	18.8*	13.9*			
L30	127 E*	13.9 E*			
L31	39.5 E*	21.3 E*			
L32	33 E*	11.7 E*			
L33	63.5 E*	12.4 E*			
M1	276*	17.1*			
M2	11,200	38.4			
M3	32.0	15.5			
M4	VLS	20.1	12.8		
M5	VLS	VLS	45.9	16.4	
M6	VLS	35.7	46.1		
M7	VLS	22.8	15.1		
M8	VLS	48.7	11.9		
M9	VLS	VLS	42.4	12.7	
M10	VLS	68.7	14.1		
M11	VLS	VLS	VLS	9.5	11.8
M12	VLS	2350	22.1		

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

ON-SITE SURFACE AND SUBSURFACE SOIL
TOTAL LEAD vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Sample Grid	Sample Interval (fbgs)				
	0 - 0.5	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0
Total Lead (mg/kg)					
M13	VLS	VLS	VLS	17.4	10.9
M14	VLS	VLS	19.1	10.4	
M15	VLS	VLS	VLS	14.3	12.8
M16	VLS	VLS	VLS	13.2	10.3
M19	VLS	357*	155*	15.9	
M20	57.7*	114*	53.7		
M21	VLS	87.4*	114*	24.2	
M22	VLS	41.9*	26*		
M23	189*	35.5*			
M24	144*	41.5*			
M25	38.1*	62.9*			
M26	197*	73.6*	11.9		
M27	65.9*	20.7*			
M28	167*	45.8*			
M29	29.9*	22*			
M30	57.5*	23.5*			
M31	7.8*	10.4*			
M32	15.8*	9.8*			
M33	27.7*	6.9*			

Notes:

(1) Samples were collected and analyzed during the Supplemental Lead Sampling Event on May 9, 2006; A 0.5-1 fbgs sample was not collected during the RI unless the May 2006 result exceeded 400 ppm.

(2) Samples were collected and analyzed during the Supplemental Lead Sampling Event on May 9, 2006. Interval 0.5-1 fbgs was sampled during the RI since the result exceeded 400 ppm.

Definitions:

VLS = Visible lead shot (assumed lead concentrations exceeds Part 375 Residential SCOs)
N = Spike sample recovery is not within quality control limits.
E = Value estimated or not reported due to the presence of interferences.
* = Spike or duplicate analysis is not within the quality control limits.
BOLD = Analytical result exceeds NYSDEC Part 375 Residential SCO of 400 ppm.

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TABLE 3

ON-SITE SURFACE AND SUBSURFACE SOIL
POLYCYCLIC AROMATIC HYDROCARBON vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Parameter	A3-1	A3-2	A5-1	A5-2	A7-1	A7-2	A16-2	A18-1	A18-2	A20-1	A20-2	Blind Dup	A22-1	A22-2	A24-1	A24-2	Residential SCOs (ppm) [2]
Polyaromatic Hydrocarbons (PAHs) - mg/kg																	
Acenaphthene	ND	ND	1.4 J	0.051 J	ND	0.017 J	0.026 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Acenaphthylene	ND	ND	ND	ND	ND	0.007 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Anthracene	ND	ND	2.1	0.077 J	ND	0.026 J	0.05 J	ND	0.015 J	ND	ND	ND	1.4 J	ND	ND	ND	100
Benzo(a)anthracene	0.031 J	ND	**9.9**	0.38	0.011 J	0.19 J	0.24 J	**1.3 J**	0.12 J	0.78 J	0.043 J	0.93 J	**15 J**	0.093 J	ND	ND	1
Benzo(b)fluoranthene	0.066 J	ND	**20 D**	0.58	0.022 J	0.34 J	0.48 J	**1.3 J**	0.19 J	0.99 J	0.091 J	0.7 J	**10 J**	0.085 J	ND	ND	1
Benzo(k)fluoranthene	ND	ND	ND	0.17 J	ND	ND	ND	ND	0.07 J	0.29 J	ND	ND	ND	0.03 J	ND	ND	1
Benzo(g,h,i)perylene	0.036 J	ND	7.8	0.38	0.015 J	0.13 J	0.12 J	1.1 J	0.064 J	0.8 J	0.056 J	0.72 J	14 J	0.11 J	ND	ND	100
Benzo(a)pyrene	0.042 J	ND	**13**	0.53	0.016 J	0.25	0.3 J	**1.4 J**	0.14 J	0.93 J	0.061 J	**1 J**	**21 J**	0.099 J	ND	ND	1
Chrysene	0.043 J	ND	**9.6**	0.40	0.014 J	0.24	0.23 J	**2.4 J**	0.13 J	**1 J**	0.052 J	**1.8 J**	**23 J**	0.16 J	ND	ND	1
Dibenzo(a,h)anthracene	0.01 J	ND	**2.8**	0.1 J	ND	0.04 J	0.045 J	**0.34 J**	0.02 J	0.21 J	0.016 J	0.31 J	**3.8 J**	0.024 J	ND	ND	0.33
Fluoranthene	0.05 J	ND	14	0.55	0.016 J	0.23	0.31 J	0.67 J	0.17 J	0.8 J	0.069 J	0.23 J	4.6 J	0.068 J	ND	ND	100
Fluorene	ND	ND	0.87 J	0.03	ND	0.01 J	0.019 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Indeno(1,2,3-cd)pyrene	0.034 J	ND	**8.2**	0.37	0.014 J	0.12 J	0.14 J	**0.62 J**	0.066 J	**0.62 J**	0.048 J	0.33 J	**5.1 J**	0.064 J	ND	ND	0.5
Naphthalene	ND	ND	0.23 J	0.014 J	ND	ND	0.03 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Phenanthrene	0.027 J	ND	8.6	0.33	0.01 J	0.12	0.16 J	0.31 J	0.066 J	0.4 J	0.04 J	0.15 J	6.3 J	0.052 J	ND	ND	100
Pyrene	0.045 J	ND	11	0.44	0.014 J	0.18	0.21 J	0.92 J	0.12 J	0.9 J	0.069 J	0.45 J	17 J	0.09 J	ND	ND	100
Total PAHs	***0.384***	--	***110***	***4.41***	***0.132***	***1.9***	***2.36***	***10.4***	***1.17***	***7.72***	***0.545***	***6.62***	***121***	***0.875***	--	--	

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Residential Soil Cleanup Objectives (December 2006).

Definitions:
ND = Parameter not detected above laboratory detection limit.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
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TABLE 3

ON-SITE SURFACE AND SUBSURFACE SOIL
POLYCYCLIC AROMATIC HYDROCARBON vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Parameter	C4-1	C4-2	C6-1	C6-2	C8-1	C8-2	C8-3	C10-1	C10-2	C12-1	C12-2	C14-1	C14-2	C16-1	C16-2	C16-3	C18-1	C18-2	C18-3	C20-1	C20-2	C20-3	C22-1	C22-2	C22-3	C24-1	C24-2	Residential SCOs (ppm) [2]
Polyaromatic Hydrocarbons (PAHs) - mg/kg																												
Acenaphthene	ND	ND	ND	ND	0.1 J	0.11 J	ND	4.5	ND	0.16 J	ND	0.046 J	ND	15	0.035 J	0.02 J	0.15 J	14	ND	0.66 J	8.8	0.044 J	7.7	0.76 J	ND	ND	ND	100
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Anthracene	0.014 J	ND	ND	ND	0.14 J	0.13 J	ND	12	ND	0.17 J	0.01 J	0.045 J	ND	14	0.047 J	0.036 J	0.35 J	18	ND	1 J	15	0.045 J	13	1.3 J	ND	ND	ND	100
Benzo(a)anthracene	0.097 J	ND	ND	0.058 J	**1.6**	**2.4**	ND	**47 D**	0.06 J	**1.6**	0.096 J	0.89	0.024 J	**70 D**	**1.6**	0.21 J	**12**	**110 D**	0.1 J	**23**	**73 D**	0.34 J	**89 D**	**14**	0.057 J	0.054 J	ND	1
Benzo(b)fluoranthene	0.16 J	ND	ND	0.13 J	**2.9**	**2.6 D**	ND	**83 D**	0.12 J	**2.9**	0.19 J	**1.6**	0.036 J	**110 D**	**1.8**	0.35 J	**6.7**	**180 D**	0.12 J	**24**	**130 D**	0.52	**110 D**	**28 D**	0.086 J	0.085 J	0.013 J	1
Benzo(k)fluoranthene	0.049 J	ND	ND	ND	0.88	**1.2**	ND	ND	ND	**1.1**	0.059 J	0.6	0.021 J	ND	ND	0.12 J	**2.2 J**	ND	0.036 J	ND	ND	0.2 J	ND	**7.3**	0.03 J	0.028 J	ND	1
Benzo(g,h,i)perylene	0.056 J	ND	0.066 J	0.037 J	0.73	1.1	ND	25 D	0.034 J	0.92	0.11 J	0.43	0.036 J	34 DJ	0.79	0.15 J	4.2	50 D	0.064 J	10	36 DJ	0.23 J	32	7.6	0.046 J	0.036 J	ND	100
Benzo(a)pyrene	0.14 J	ND	ND	0.078 J	**2**	**3**	ND	**68 D**	0.074 J	**2.4**	0.15 J	**1.1**	0.034 J	**99 D**	**1.6**	0.28 J	**11**	**150 D**	0.13 J	**31**	**100 D**	0.46	**120 D**	**22 D**	0.083 J	0.065 J	ND	1
Chrysene	0.11 J	ND	ND	0.056 J	**1.6**	**2.8**	ND	**49 D**	0.064 J	**1.7**	0.1 J	0.98	0.023 J	**72 D**	**2.4**	0.21 J	**21**	**130 D**	0.14 J	**40 D**	**77 D**	0.37 J	**100 D**	**14**	0.069 J	0.062 J	ND	1
Dibenzo(a,h)anthracene	0.018 J	ND	ND	0.012 J	0.25 J	**0.39 J**	ND	**12**	0.012 J	0.29 J	0.022 J	0.15 J	ND	**14**	0.24 J	0.056 J	**1.5 J**	**25**	0.031 J	**4.8**	**17**	0.1 J	**12**	**2.2**	0.015 J	0.014 J	ND	0.33
Fluoranthene	0.13 J	ND	ND	0.073 J	2.0	3.1	ND	71 D	0.079 J	2.1	0.12 J	1.0	0.023 J	96 D	0.8	0.29 J	1.8 J	**140 D**	0.068 J	7.7	**110 D**	0.42	95 D	17 D	0.074 J	0.076 J	0.014 J	100
Fluorene	ND	ND	ND	ND	0.063 J	0.034 J	ND	4.7	ND	0.063 J	ND	0.018 J	ND	5.4	0.017 J	0.011 J	0.11 J	8.6	ND	0.36 J	7.2	0.018 J	5.8	0.58 J	ND	ND	ND	100
Indeno(1,2,3-cd)pyrene	0.063 J	ND	0.035 J	0.035 J	0.85	**1.3**	ND	**27 D**	0.035 J	**1.0**	0.084 J	**0.5**	0.026 J	**35 DJ**	**0.5**	0.21 J	**1.8 J**	**51 D**	**0.71 J**	**5**	**40 D**	0.32 J	**31**	**7.7**	0.051 J	0.046 J	ND	0.5
Naphthalene	ND	ND	ND	ND	0.023 J	0.018 J	ND	0.7 J	ND	0.039 J	ND	0.012 J	ND	3.4 J	0.014 J	ND	ND	3.4 J	ND	0.18 J	1.10	0.011 J	1.5 J	0.14 J	ND	ND	ND	100
Phenanthrene	0.074 J	ND	ND	0.035 J	0.7	0.6	ND	39 D	0.034 J	0.78	0.047 J	0.2 J	0.011 J	50 D	0.22 J	0.14 J	1.8 J	69 D	0.037 J	4.8	57 D	0.2 J	57 D	5.4	0.048 J	0.029 J	ND	100
Pyrene	0.11 J	ND	ND	0.092 J	2.6	1.3 DJ	ND	49 D	0.058 J	2.5	0.16 J	1.2	0.029 J	77 D	1.2	0.24 J	7.2	**110 D**	0.94 J	18	76 D	0.37 J	92 D	16	0.071 J	0.063 J	0.012 J	100
Total PAHs	***1.02***	***--***	***0.101***	***0.606***	***16.4***	***20.1***	***--***	***492***	***0.570***	***17.7***	***1.15***	***8.77***	***0.263***	***696***	***11.3***	***2.3***	***71.8***	***1060***	***2.4***	***171***	***749***	***3.6***	***767***	***144***	***0.63***	***0.56***	***0.04***	

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Residential Soil Cleanup Objectives (December 2006).

Definitions:
ND = Parameter not detected above laboratory detection limit.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
D = All compounds were identified in an analysis at the secondary dilution factor.

BOLD = Analytical result exceed NYSDEC Part 375 Residential SCOs

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TABLE 3

ON-SITE SURFACE AND SUBSURFACE SOIL
POLYCYCLIC AROMATIC HYDROCARBON vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Parameter	E2-1	E2-2	E4-1	E4-2	E6-1	E6-2	E6-3	E8-1	E8-2	E8-2 DL	E8-3	E10-1	E10-2	E10-3	E12-1	E12-2	E12-3	E14-1	E14-2	E14-3	E16-1	E16-2	E16-3	E18-1	E18-2	E20-1	E20-2	E22-1	E22-2	E24-1	E24-2	Residential SCOs (ppm)[2]
Polyaromatic Hydrocarbons (PAHs) - mg/kg																																
Acenaphthene	0.03 J	ND	0.13 J	ND	8.2 J	0.28 J	0.027 J	ND	0.43	0.44 DJ	ND	20 J	0.36 J	ND	19 J	0.049 J	0.079 J	17 J	1.10	0.11	21 J	0.44 J	0.07 J	7.90	ND	0.93 J	0.035 J	ND	ND	0.061 J	ND	100
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
Anthracene	0.044 J	ND	0.16 J	ND	8.5 J	0.46	0.043 J	ND	0.61	0.63 DJ	ND	24 J	0.52 J	ND	22 J	0.053 J	0.094 J	27 J	1.4 J	0.18 J	24 J	0.56 J	0.14 J	12	ND	1.1 J	0.061 J	ND	ND	0.034 J	ND	100
Benzo(a)anthracene	0.2 J	ND	0.94	0.014 J	**80 J**	**2.1**	0.2 J	**71 J**	**2.9**	**2.8 D**	0.075 J	**190**	**5.4**	0.18 J	**130**	**1.2**	0.58	**220**	**7.3**	**1**	**160**	**6.8 J**	**1.3**	**39 D**	0.059 J	**6.4**	0.41 J	0.033 J	ND	0.19 J	ND	1
Benzo(b)fluoranthene	0.31 J	0.012 J	**1.6**	0.024 J	**82 J**	**2.9**	0.34 J	**50 J**	**4.4 E**	**4.2 D**	0.1 J	**270**	**6.7**	0.11 J	**160**	**1.7**	0.95	**290**	**12**	**1.7**	**200**	**10**	**1.8**	**52 D**	0.094 J	**11**	0.86	0.041 J	ND	0.35 J	ND	1
Benzo(k)fluoranthene	0.12 J	ND	0.48	ND	**25 J**	0.74	**0.12 J**	ND	**1.2**	**1.4 D**	0.03 J	ND	**2.5 J**	0.022 J	**60 J**	0.46	0.31 J	**88**	**2.7 J**	0.45	**56 J**	**2.5 J**	0.46	ND	0.028 J	3.5	ND	0.016 J	ND	0.11	ND	1
Benzo(g,h,i)perylene	0.12 J	ND	0.42 J	0.01 J	24 J	1.5	0.16 J	44 J	1.9 J	2.1 D	0.049 J	**150 J**	3.6 J	0.072 J	86	0.72	0.45	**120**	5.6	0.8	94	4.2 J	0.65	16	0.095 J	2.9	0.21 J	0.017 J	ND	0.14 J	ND	100
Benzo(a)pyrene	0.26 J	0.011 J	**1.3**	0.017 J	**94**	**2.6**	0.31 J	**85 J**	**3.9 E**	**3.8 D**	0.097 J	**240**	**6.8**	0.22 J	**150**	**1.4**	0.84	**240**	**10**	**1.4**	**190**	**8.3**	**1.3**	**53 D**	0.075 J	**9**	0.52	0.034 J	ND	0.3 J	ND	1
Chrysene	0.2 J	ND	0.95	0.015 J	**130**	**2.0**	0.22 J	**130 J**	**3.2**	**3 D**	0.095 J	**250**	**7**	0.32 J	**140**	**1.4**	0.65	**240**	**7.4**	**1**	**170**	**7.8 J**	**1.3**	**43 D**	0.06 J	**6.5**	0.46	0.033 J	ND	0.2 J	ND	1
Dibenzo(a,h)anthracene	0.045 J	ND	0.16 J	ND	**10 J**	**0.57**	0.065 J	**15 J**	**0.8**	**0.69 DJ**	0.023 J	**41 J**	**1.1 J**	0.042 J	**26 J**	0.21 J	0.18 J	**40 J**	**1.6 J**	0.31 J	**29 J**	**1.3 J**	0.27 J	**6.1**	0.011 J	**1.1 J**	0.073 J	ND	ND	0.062 J	ND	0.33
Fluoranthene	0.31 J	ND	1.4	0.016 J	56 J	3.1	0.32 J	12 J	4.3 E	4.4 D	0.067 J	**160**	4.8	0.033 J	**170**	1	0.74	**260**	10	1.4	**190**	8.7	1.7	54 D	0.074 J	9.4	0.56	0.041 J	ND	0.28 J	ND	100
Fluorene	0.023 J	ND	0.06 J	ND	3 J	0.2 J	0.016 J	ND	0.29	0.31 J	ND	10 J	0.2 J	ND	10 J	0.024 J	0.04 J	12 J	0.62 J	0.074 J	12 J	0.25 J	0.051 J	4.7	ND	0.44 J	0.027 J	ND	ND	0.015 J	ND	100
Indeno(1,2,3-cd)pyrene	0.18 J	ND	**0.55**	ND	**22 J**	**1.7**	0.23 J	**18 J**	**2.4**	**2.4 D**	0.055 J	**110 J**	**3.4 J**	0.039 J	**88**	**0.72**	**0.64**	**140**	**6.1**	**1.1**	**93**	**4.9 J**	**0.95**	**18**	0.039 J	**4**	0.25 J	0.019 J	ND	0.2 J	ND	0.5
Naphthalene	ND	ND	0.018 J	ND	ND	0.038 J	ND	ND	0.067	0.07 DJ	ND	5.4 J	ND	ND	5 J	0.012 J	0.018 J	5.6 J	0.15 J	0.018 J	7.6 J	ND	0.015 J	1.7 J	ND	0.14 J	ND	ND	ND	ND	ND	100
Phenanthrene	0.19 J	ND	0.73	ND	35 J	2	0.18 J	12 J	2.9	2.8 D	0.033 J	**110 J**	2.3 J	0.031 J	98	0.26 J	0.4 J	**110**	6.3	0.75	**110**	3 J	0.63	40 D	0.041 J	4.6	0.27 J	0.026 J	ND	0.14 J	ND	100
Pyrene	0.26 J	ND	0.94	0.013 J	56 J	2.4	0.26 J	43 J	3.2	3.6 D	0.061 J	**210**	5	0.097 J	**160**	0.96	0.71	**230**	8.8	1.2	**170**	8.5	1.4	62 D	0.066 J	7.9	0.48	0.04 J	ND	0.22 J	ND	100
Total PAHs	***2.29***	***0.02***	***9.84***	***0.109***	***634***	***22.6***	***2.5***	***480***	***32.5***	***32.7***	***0.69***	***1790***	***49.7***	***1.2***	***1324***	***10.2***	***6.7***	***2042***	***81.1***	***11.5***	***1529***	***67.3***	***12.0***	***410***	***0.64***	***68.9***	***4.22***	***0.30***	--	***2.3***	--	

Notes:
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2. Values per NYSDEC Part 375 Residential Soil Cleanup Objectives (December 2006).

Definitions:
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TABLE 3

ON-SITE SURFACE AND SUBSURFACE SOIL
POLYCYCLIC AROMATIC HYDROCARBON vs. RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCOs)

Remedial Work Plan
330 Maple Road Site
Benderson Development Company

Parameter	G2-1	G2-2	G4-1	G4-2	G6-2	G8-2	G10-2	G12-2	G14-3	G16-2	G18-2	G21-1	G21-2	Residential SCOs (ppm) [2]
Polyaromatic Hydrocarbons (PAHs) - mg/kg														
Acenaphthene	ND	ND	0.068 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Anthracene	ND	ND	0.12 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Benzo(a)anthracene	0.052 J	0.016 J	0.66	ND	0.018 J	ND	ND	0.032 J	ND	ND	ND	0.052 J	ND	**1**
Benzo(b)fluoranthene	0.095 J	0.035 J	**1.5**	0.012 J	0.013 J	ND	ND	0.047 J	ND	0.014 J	ND	0.085 J	ND	**1**
Benzo(k)fluoranthene	0.031 J	ND	ND	ND	ND	ND	ND	0.018	ND	ND	ND	0.028 J	ND	**1**
Benzo(g,h,i)perylene	0.04 J	0.012 J	0.5 J	ND	ND	ND	ND	0.018 J	ND	ND	ND	0.042 J	ND	**100**
Benzo(a)pyrene	0.07 J	0.019 J	0.91	ND	0.023 J	ND	ND	0.038 J	ND	ND	ND	0.067 J	ND	**1**
Chrysene	0.054 J	0.016 J	0.7	ND	0.024 J	ND	ND	0.033 J	ND	ND	ND	0.06 J	ND	**1**
Dibenzo(a,h)anthracene	0.015 J	ND	0.19 J	ND	ND	ND	ND	ND	ND	ND	ND	0.017 J	ND	**0.33**
Fluoranthene	0.097 J	0.028 J	0.99	ND	ND	ND	ND	0.052 J	ND	0.012 J	ND	0.077 J	ND	**100**
Fluorene	ND	ND	0.046 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Indeno(1,2,3-cd)pyrene	0.057 J	0.017 J	**0.69**	ND	ND	ND	ND	0.028 J	ND	ND	ND	0.05 J	ND	**0.5**
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Phenanthrene	0.046 J	0.014 J	0.53	ND	ND	ND	ND	0.034 J	ND	ND	ND	0.037 J	ND	**100**
Pyrene	0.072 J	0.021 J	0.77	ND	0.022 J	ND	ND	0.041 J	ND	0.011 J	ND	0.061 J	ND	**100**
Total PAHs	***0.63***	***0.18***	***7.67***	***0.01***	***0.1***	--	--	***0.34***	--	***0.04***	--	***0.6***	--	

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Residential Soil Cleanup Objectives (December 2006).

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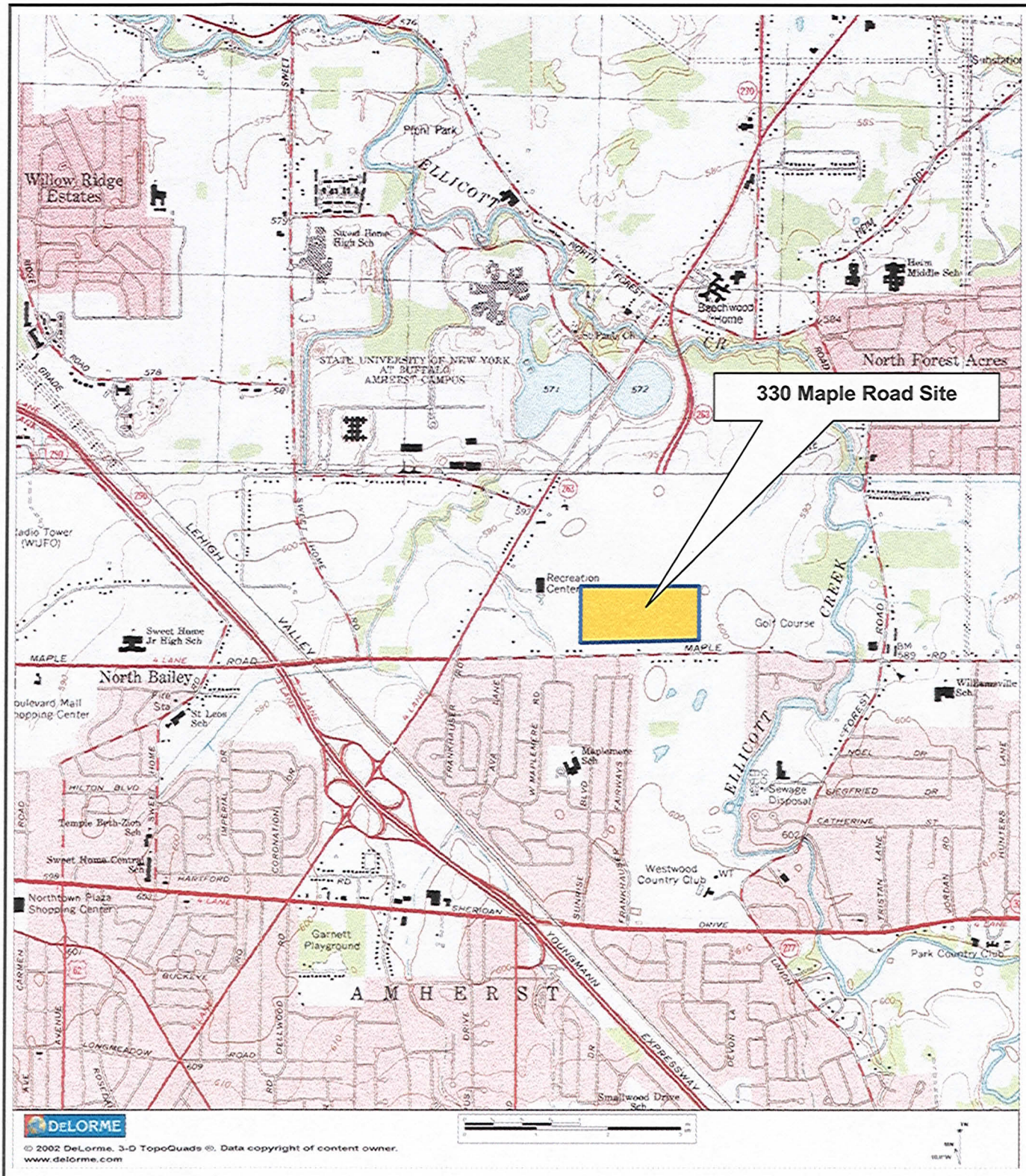
FIGURES

FIGURE 1



BENCHMARK
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SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0105-002-201

DATE: JULY 2008

DRAFTED BY: NTM

SITE LOCATION AND VICINITY MAP

330 MAPLE ROAD SITE

AMHERST, NEW YORK

PREPARED FOR

BENDERSON DEVELOPMENT COMPANY

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 2, Site Plan Map.dwg

LEGEND:

SITE DEVELOPMENT BOUNDARY (APPROX. 32.0 ACRES)

BCP SITE BOUNDARY (APPROX. 26.0 ACRES)

80' 0' 80' 160'

SCALE: 1 INCH = 160 FEET
SCALE IN FEET
(approximate)

N

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REVISIONS

NO.	BY	DATE	REMARKS

SEAL

DRAWN BY: BCH
DATE: JULY 2008
CHECKED BY: MK
APPROVED BY:

SITE PLAN

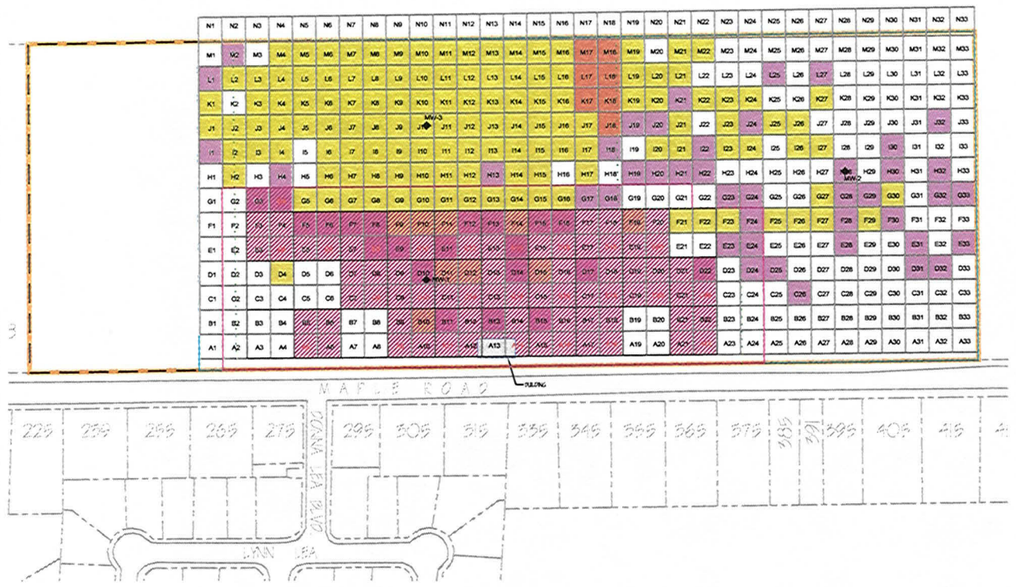
REMEDIAL WORK PLAN
330 MAPLE ROAD SITE
AMHERST, NEW YORK

PREPARED FOR
BENDERSON DEVELOPMENT COMPANY

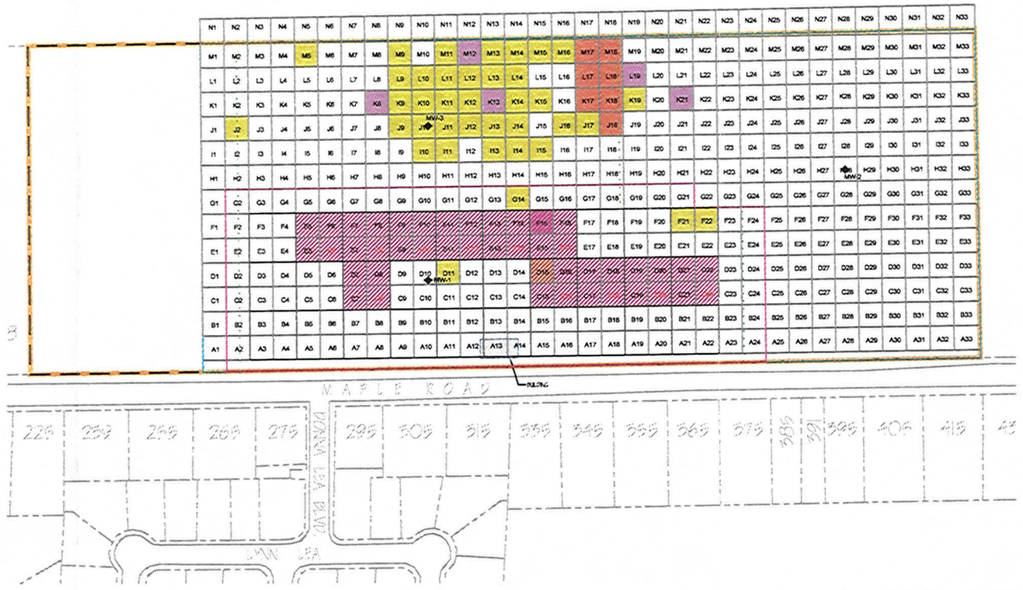
FIGURE 2

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 3; Analytical Results versus Residential.dwg

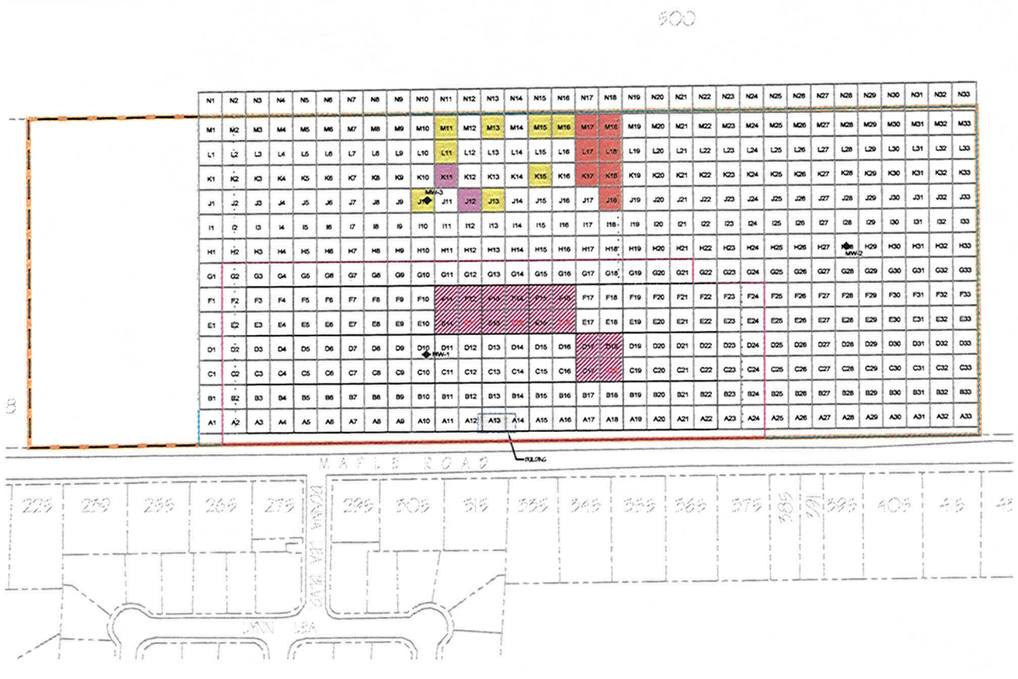
SAMPLE INTERVAL: 0.0 - 0.5 fbgs



SAMPLE INTERVAL: 0.5 - 1.0 fbgs



SAMPLE INTERVAL: 1.0 - 2.0 fbgs



LEGEND:

- SITE DEVELOPMENT BOUNDARY (APPROX. 32.0 ACRES)
- BCP SITE BOUNDARY (APPROX. 26.0 ACRES)
- PAH SAMPLING AREA
- VEGETATION LIMITS
- MW-1 MONITORING WELL LOCATION
- Analytical result exceeds the Residential SCO for Lead
- PAH sample grid; sample representative of grid is red
- Analytical result exceeds the Residential SCO for PAHs
- SOIL SAMPLE GRID LOCATION
- NOT SAMPLED DUE TO STANDING WATER
- VISIBLE LEAD SHOT (VLS) OBSERVED AT THIS LOCATION

SCALE: 1 INCH = 140 FEET
SCALE IN FEET
(approximate)

N

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JOB NO.: 0105-002-201

REVISIONS

NO.	BY	DATE	REMARKS
1	NTM	MAY 2007	Updated Lead/PAH impacted areas

DRAWN BY: BCH
DATE: JULY 2006
CHECKED BY:
APPROVED BY:

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SEAL

LEAD AND PAHs IN SOIL DISTRIBUTION MAP

REMEDIAL WORK PLAN
330 MAPLE ROAD SITE
AMHERST, NEW YORK

PREPARED FOR
BENDERSON DEVELOPMENT COMPANY

FIGURE 3

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 4; Excavation Limits (Res-Res).dwg

DATE: JANUARY 2009
DRAFTED BY:NTM

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JOB NO.: 0105-002-201

APPROXIMATE EXCAVATION LIMITS

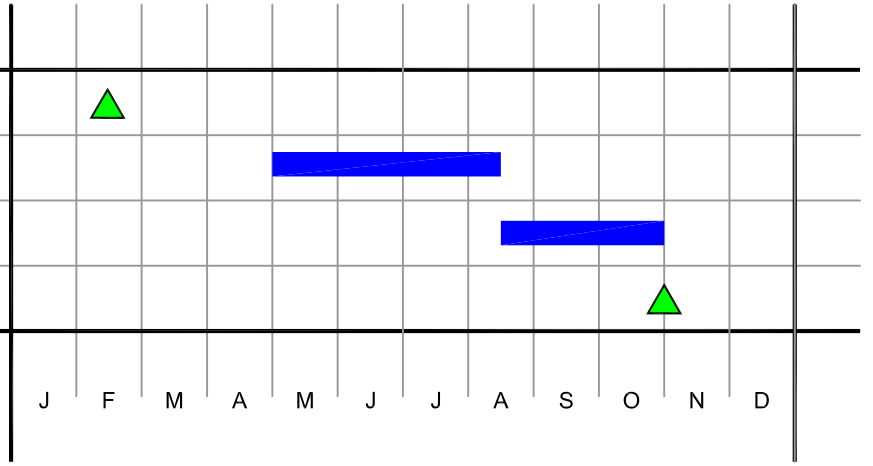
REMEDIAL WORK PLAN
330 MAPLE ROAD SITE
AMHERST, NEW YORK
PREPARED FOR
BENDERSON DEVELOPMENT COMPANY

FIGURE 4

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 5; Remedial Action Project Schedule.dwg

PROJECT TASKS:

SUBMIT REMEDIAL ACTION WORK PLAN / ALTERNATIVES ANALYSIS REPORT
REMEDIAL CONSTRUCTION ACTIVITIES
PREPARE FINAL ENGINEERING REPORT
SUBMIT FINAL ENGINEERING REPORT (FER)



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PROJECT NO.: 0105-002-201

DATE: AUGUST 2008

DRAFTED BY: NTM

REMEDIAL ACTION PROJECT SCHEDULE

330 MAPLE ROAD

AMHERST, NEW YORK

PREPARED FOR

BENDERSON DEVELOPMENT COMPANY, LLC

FIGURE 5

APPENDIX A

ALTERNATIVES ANALYSIS REPORT

REMEDIAL ACTION WORK PLAN
APPENDIX A

ALTERNATIVES ANALYSIS REPORT

330 MAPLE ROAD SITE
AMHERST, NEW YORK
SITE NO. C915207

August 2008 0105-002-201

Prepared for:

Benderson Development Company, LLC

ALTERNATIVES ANALYSIS REPORT

330 Maple Road Site

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ALTERNATIVES ANALYSIS REPORT
330 Maple Road Site

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APPENDICES

1.0 INTRODUCTION

This Alternatives Analysis Report (AAR) has been prepared on behalf of Benderson Development Company, LLC (Benderson) for the 330 Maple Road Site in Amherst, New York (see Figures 1 and 2). Benchmark Environmental Engineering & Science, PLLC (Benchmark) implemented RI activities at the Site in November 2006 through February 2007. The RI activities were performed on behalf of Benderson under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP No. C915207).

1.1 Background

1.1.1 Site Description

The property located at 330 Maple Road, in the Town of Amherst, New York (Erie County Tax Map No. 55.03-1-10) is a 31.6 acre parcel owned by Benderson Development Company, LLC (see Figure 1). Based on previous environmental investigations at the site, 26 acres of the 31.6-acre parcel have been contaminated as a result of historic site use. As such, that 26-acre portion of the greater 31.6-acre parcel is defined as the Site within the context of the BCP (see Figure 2).

The Site is generally bounded by Maple Road to the south, residential property to the west, and a golf course to the north and east. Residential properties line the opposite (south) side of Maple Road. The Site presently consists of an outdoor shooting range and a two-story clubhouse. The shooting range consists of ten trap stations (two of which double as skeet ranges) and three sheds used to store targets and supplies. The clubhouse, located on the south side of the property, is a two-story wood frame structure with a basement.

1.1.2 Site History

The subject property is currently unoccupied. Available records indicate that the only known site operator at 330 Maple Road has been the Buffalo Gun Club, present from approximately 1943 until 2006. The Site was apparently undeveloped prior to 1943 (Ref. 1).

1.1.3 Environmental History

1.1.3.1 March 2005– Phase I Environmental Site Assessment

A Phase I Environmental Site Assessment (ESA) was performed for the subject property by Great Lakes Environmental & Safety Consultants, Inc. in March 2005 (Ref. 1). The Phase I ESA indicated that the primary concern is potential lead contamination from shooting (gun) range activities, which cover a significant portion of the property. The former indoor gun range located in the basement was also of concern.

1.1.3.2 April 2005 – Limited Phase II Site Investigation

In April 2005, Great Lakes Environmental & Safety Consultants, Inc. (GLESC) performed limited Phase II environmental investigations at the site (Ref. 2). Due to the nature of the shooting activities, the Phase II investigations focused on sampling for lead and semi-volatile organic compounds (SVOCs) in surface and subsurface soil, and in the basement of the clubhouse. A total of 19 soil samples were collected for analysis of lead; one of the samples was analyzed for STARS List SVOCs. The Phase II investigation indicated that Site soils contained concentrations of lead above typical background levels at commercial/industrial sites (500-800 parts per million (ppm)). The Phase II report indicated that an area of approximately 1,000-ft. by 70-ft. was covered with spent clay pigeon fragments (shooting targets). Groundwater was not addressed during that investigation.

1.1.3.3 May 2006 – Supplemental Phase II Site Investigation Findings

In May 2006, Benchmark performed a supplemental soil investigation on behalf of Benderson (Ref. 3) focusing on collecting site-wide near-surface (i.e., 0-6 inches below ground surface) soil samples to better delineate the areal extent of previously identified lead impact on-site. Forty-one soil samples were collected and analyzed for total lead concentrations and one sample was analyzed for toxicity characteristic leaching procedure (TCLP) for lead. The findings of that investigation indicate that the majority of the near-surface soils across the Site have been impacted by lead. Lead concentrations in soil up to 98,000 ppm were reported. A sample collected from the area of the active shooting range had a TCLP concentration of 50.2 milligrams per liter (mg/L), which exceeds the regulatory threshold for hazardous waste toxicity characteristic for lead of 5 mg/L. A duplicate sample from that area was sieved to remove the lead shot present in the sample and analyzed for TCLP to evaluate whether removal of lead shot would result in a TCLP lead concentration below 5 mg/L. The TCLP lead result for the sieved sample was 11.5 mg/L. These findings

established that some of the soils on-site will either require treatment (including soils with lead shot removed) to render them non-hazardous or be handled and disposed off-site at a permitted hazardous waste landfill.

1.1.3.4 November 2006 – BCP Remedial Investigation

In November 2006 through February 2007, Benchmark performed Remedial Investigation activities at the 330 Maple Road site to evaluate the vertical and horizontal extent of impacts across the site (Ref. 4). Four hundred and twenty-nine (429) 50-ft.-by-50-ft. grids from A-1 to M-33 were utilized across the Site. The sampling focused on collecting soil samples 0 to 4 feet below ground surface (fbgs), with samples being collected from the following depth intervals: 0-0.5 fbgs, 0.5-1 fbgs, 1-2 fbgs, 2-3 fbgs, and 3-4 fbgs. The findings of the investigation show that lead impacted soil is widespread across the site with the highest concentrations observed in the 0-0.5 fbgs depth interval in the area 300-650 feet north of the shooting lanes. The areal extent of lead-impacted soil decreased significantly with depth, such that lead concentrations above the NYSDEC Part 375 residential soil cleanup objectives (SCOs) were not observed beyond 2 fbgs. Lead concentrations in soil exceeded residential SCOs only sporadically from 0-1 fbgs in the southern portion (i.e., grids A-F) of the Site. Only ten grids in the north-central portion of the Site exceeded the residential lead SCO at the 1-2 fbgs depth.

PAHs were also detected in soils above residential SCOs, with the areal extent of PAH-impacted soil limited to the area directly north of the shooting lanes. PAH-impacts decreased significantly with distance and depth, such that PAH concentrations above residential SCOs were not observed beyond 2 fbgs and were highest in the southern 300-feet closest to the shooting stations. The lateral and vertical distribution of lead and PAHs in soil at the Site is illustrated on Figure 3.

TCLP lead analysis revealed that some (six of eleven samples) of the lead-impacted soils exceeded TCLP hazardous waste characteristic threshold concentration of 5 mg/L, indicating the need to treat the characteristic hazardous lead-impacted soil prior to disposal as a non-hazardous waste; or, dispose of the soil exceeding the TCLP threshold as a hazardous waste. No linear correlation appears to exist between total and TCLP lead concentrations.

Groundwater samples collected during the RI indicated no significant groundwater impact, with the exception of one total lead exceedance in MW-3.

1.2 Purpose

Benderson intends to redevelop the Site as the "Town Centre," a mixed-use commercial and residential complex. This AAR has been prepared to identify and evaluate effective and implementable remedial alternatives for the 330 Maple Road Site and to develop a recommended remedial approach that is protective of human health and the environment. The AAR provides sufficient detail to support the decision making process relative to remedial actions for the Site, and will provide the basis for the Remedial Work Plan. This Report contains the following sections.

- Section 1.0 presents Site background and history.
- Section 2.0 presents a summary of the RI findings.
- Section 3.0 presents Remedial Action Objectives for the Site
- Section 4.0 provides an estimate of the volume and extent of contamination requiring cleanup under various end use and remedial scenarios.
- Section 5.0 identifies and evaluates of the remedial alternatives for the Site.
- Section 6.0 describes institutional and engineering controls that will be implemented as a component of the Site remedy.
- Section 7.0 presents cited references.

2.0 REMEDIAL INVESTIGATION FINDINGS

The Remedial Investigation (RI) was conducted to more fully define the nature and extent of contamination on-site, and to collect data of sufficient quantity and quality to perform the remedial alternatives evaluation. RI activities included: surface and subsurface soil sampling; monitoring well installation; groundwater sampling of newly installed monitoring wells; collection of hydraulic data; and bench-scale soil treatability testing.

The findings of the RI, described in detail in the Remedial Investigation Report (Ref. 3), are summarized below. Based on the data presented in the RI, constituents of concern (COCs) at the Site are comprised of lead and polycyclic aromatic hydrocarbons (PAHs) in surface and subsurface soil and, to a lesser extent, total lead in groundwater. Figure 3 illustrates the concentrations of COCs above the residential SCOs. Based on the data collected during the RI:

- It is estimated that visible lead shot (VLS) is present in approximately 9,000 cubic yards (CY) of surface and sub-surface soil on-site. Approximately 72% of the VLS is present in the upper six inches and over 90% of the VLS is present in the upper 1 foot. VLS was evident at two surface locations (N9 and N14) on the off-site soil berm. None of the other soil berm samples analyzed contained lead concentrations in excess of the residential SCO.
- It is estimated that lead is present above the residential SCO in approximately 13,200 CY of surface and sub-surface soil on-site (samples impacted with VLS are assumed to exceed the residential SCO and are included in that estimated volume).
- It is estimated that PAHs are present above their respective residential SCOs in approximately 8,100 CY of surface and sub-surface soil on-site.
- Some areas of the Site are impacted with both lead and PAHs such that the total volume of impacted soil on-site is less than the sum of the lead-impacted soil and PAH-impacted soil. As such, the net volume of lead- and PAH-impacted soil above residential SCOs is estimated at approximately 19,800 CY.
- TCLP lead analysis was completed for 11 samples with a broad range of total lead concentrations (i.e., 357 mg/kg to 89,500 mg/kg). Six of those samples exceeded the TCLP hazardous waste characteristic threshold concentration of 5 mg/L. However, no linear correlation appears to exist between total and TCLP lead concentrations. Furthermore, during the supplemental lead sampling event in May 2006, TCLP lead analysis of one soil sample with VLS removed exhibited TCLP lead concentration of 11.5 mg/L, indicating that removal of VLS does not preclude the need to treat lead-impacted soil to attain a TCLP lead concentration below 5 mg/L.

- Bench-scale testing on the lead-impacted soil was completed using varying concentrations of phosphoric acid (0.5% to 5%) and Portland cement (2% to 10%). Bench-scale testing results indicate that an addition of approximately 5% Portland cement successfully treated lead-impacted soil to TCLP lead concentrations below 5 mg/L, including samples with VLS. To evaluate whether soil treatment was successful on the varying sample conditions observed during the RI, the samples treated and analyzed contained a broad range of initial TCLP lead concentrations, samples that that were sieved to remove VLS, and samples that contained high concentrations VLS.
- Shooting target debris covered an area approximately 1,000 feet by 70 feet north of the trap shooting lanes. In some areas, the debris was observed to be greater than 1-foot deep. The material is not known to be composed of hazardous or regulated substances. As the target debris will not be re-used on-site during future development, the materials will be tested in accordance with a permitted solid waste disposal facility's waste characterization protocols for disposal and transported to a solid waste disposal facility prior to Site redevelopment. Soil sampling completed during the RI did not include the target debris. The uppermost soil sampling interval (i.e., 0-0.5 fbgs) was located beneath the target debris.
- Groundwater data indicate no significant impact. With the exception of one total lead exceedance in MW-3, detected constituents were generally limited to naturally occurring metals and minerals.

3.0 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES AND GENERAL RESPONSE ACTIONS

The development of an appropriate remedial approach begins with definition of site-specific Remedial Action Objectives (RAOs). RAOs are site-specific statements that convey the goals for minimizing or eliminating substantial risks to public health and the environment to address significant environmental issues identified in the Remedial Investigation (RI). The final remedial measure for the 330 Maple Road Site must satisfy the site-specific RAOs. General Response Actions are then developed as potential means to achieve the RAOs.

3.1 Remedial Action Objectives

For the 330 Maple Road Site, appropriate RAOs are:

- Removal of soil impacted with COCs above NYSDEC Part 375 SCOs for residential use.
- Treatment of characteristic hazardous lead-impacted soil to render it non-hazardous.
- Disposal of impacted soils at a NYSDEC-approved disposal facility.
- Preparation of a Site Management Plan (SMP) that includes an Environmental Easement filed in Erie County.

3.2 General Response Actions

General Response Actions are broad classes of actions that may satisfy the RAOs. General response actions form the foundation for the identification and screening of remedial technologies and alternatives. General Response Actions considered for the Site include:

- In-Situ Soil Stabilization / Solidification
- Excavation and Off-Site Disposal
- On-Site Treatment and Off-Site Disposal
- Institutional Controls
- Engineering Controls
- Groundwater Monitoring
- No Action

3.3 Standards, Criteria and Guidance (SCGs)

The cleanup objectives for on-site soils are the NYSDEC Residential-Use Soil Cleanup Objectives (SCOs) as listed in 6NYCRR Part 375 Environmental Remediation Program, Subpart 376-6 Remedial Program Soil Cleanup Objectives (December 2006).

4.0 VOLUME, NATURE AND EXTENT OF CONTAMINATION

Estimation of the volume, nature and extent of media that may require remediation to satisfy the Remedial Action Objectives or that needs to be quantified to facilitate evaluation of remedial alternatives is presented in this section. The estimates are a function of the cleanup goal: for the unrestricted use scenario, the cleanup goal would involve achieving NYSDEC Part 375 unrestricted soil cleanup objectives (SCOs); whereas for the reasonably anticipated future use scenario, the cleanup goal would involve achieving the residential-use SCOs. The volume and extent of media requiring cleanup under these scenarios is presented in Sections 4.1 and 4.2. These estimates (and associated cost estimates presented later in this AAR) are based on data and observations collected during the Remedial Investigation.

4.1 Comparison to Unrestricted SCOs

Total lead concentrations above the unrestricted SCO for lead (i.e., 63 mg/kg) were observed in 337 sample grids in the 0-0.5 fbgs, 84 sample grids in the 0.5-1.0 fbgs, 15 sample grids in the 1.0-2.0 fbgs, and 2 sample grids in the 2.0-3.0 fbgs sample intervals. There were no samples observed on-site with lead concentrations above the unrestricted SCO beyond 3.0 fbgs. It is estimated that lead is present above the unrestricted SCO in approximately 21,700 cubic yards (CY) of surface and sub-surface soil. Samples impacted with VLS are assumed to exceed the unrestricted SCO and are included this volume.

PAH compounds above unrestricted SCOs are present in 26 sampling grids in the 0-0.5 fbgs, 11 sample grids in the 0.5-1.0 fbgs, and 4 sample grids in the 1.0-2.0 fbgs sample intervals. There were no samples observed on-site with PAH concentrations above the unrestricted SCOs beyond 2.0 fbgs. It is estimated that PAHs are present above the unrestricted SCO in approximately 8,300 CY of surface and sub-surface soil.

Some areas of the Site are impacted with both lead and PAHs such that the total volume of impacted soil on-site is less than the sum of the lead-impacted soil and PAH-impacted soil. As such, the net volume of lead- and PAH-impacted soil above unrestricted SCOs is estimated at approximately 24,700 CY.

4.2 Comparison to Residential SCOs

It is estimated that lead is present above its residential SCO in approximately 13,200 CY of surface and sub-surface soil on-site (samples impacted with VLS are assumed to exceed the residential SCO and are included in that estimated volume). It is estimated that PAHs are present above their respective residential SCOs in approximately 8,100 CY of surface and sub-surface soil on-site.

Some areas of the Site are impacted with both lead and PAHs such that the total volume of impacted soil on-site is less than the sum of the lead-impacted soil and PAH-impacted soil. As such, the net volume of lead- and PAH-impacted soil above residential SCOs is estimated at approximately 19,800 CY.

5.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

5.1 Development of Alternatives

The following remedial alternatives have been developed in accordance with the General Response Actions and NYSDEC regulation and policy:

- Alternative 1: No Action.
- Alternative 2: Excavation of Lead- and PAH-Impacted Soil with Off-Site Disposal of Lead-Impacted Soils as Hazardous Waste and Off-Site Disposal of PAH-Impacted Soils as Non-Hazardous Waste.
- Alternative 3: In-Situ Treatment, Excavation, and Off-Site Disposal of Lead-Impacted Soils as Non-Hazardous Waste; and Excavation and Off-Site Disposal of PAH-Impacted Soils as Non-Hazardous Waste.
- Alternative 4: Excavation, Ex-Situ Treatment, and Off-Site Disposal of Lead-Impacted Soils as Non-Hazardous Waste; and Excavation and Off-Site Disposal of PAH-Impacted Soils as Non-Hazardous Waste.

Institutional controls, though identified in the General Response Actions, were not identified as a stand-alone remedial alternative. Accordingly, all of the above alternatives inherently include these institutional controls. Engineering controls in the form of existing fencing and signs would be kept to deter trespassing during remedial action and Site development. Section 6.0 discusses the institutional and engineering controls that would be incorporated into the final remedy for the Site.

5.2 Evaluation of Alternatives

NYSDEC's Brownfield Cleanup Program calls for remedy evaluation in accordance with DER-10 Technical Guidance for Site Investigation and Remediation (Ref. 4). Specifically, the guidance states "When proposing an appropriate remedy, the person responsible for conducting the investigation and/or remediation should identify and develop a remedial action that is based on the following criteria..:"

- **Overall Protection of Public Health and the Environment.** This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are

eliminated, reduced, or controlled through removal, treatment, engineering controls, or institutional controls.

- **Compliance with Standards, Criteria, and Guidance (SCGs)**. Compliance with SCGs addresses whether a remedy will meet applicable environmental laws, regulations, standards, and guidance.
- **Long-Term Effectiveness and Permanence**. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: (i) the magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals), (ii) the adequacy of the engineering and institutional controls intended to limit the risk, (iii) the reliability of these controls, and (iv) the ability of the remedy to continue to meet RAOs in the future.
- **Reduction of Toxicity, Mobility or Volume with Treatment**. This criterion evaluates the remedy's ability to reduce the toxicity, mobility, or volume of Site contamination. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.
- **Short-Term Impacts and Effectiveness**. Short-term effectiveness is an evaluation of the potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during construction and/or implementation. This includes a discussion of how the identified adverse impacts and health risks to the community or workers at the Site will be controlled, and the effectiveness of the controls. This criterion also includes a discussion of engineering controls that will be used to mitigate short term impacts (i.e., dust control measures), and an estimate of the length of time needed to achieve the remedial objectives.
- **Implementability**. The implementability criterion evaluates the technical and administrative feasibility of implementing the remedy. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.
- **Cost-Effectiveness**. Capital, operation, maintenance, and monitoring costs are estimated for each remedial alternative and presented on a present worth basis. Table 1 summarizes the costs for each remedial alternative. Detailed cost estimates for each alternative, excluding the no action alternative, are presented on Tables 2, 2, and 4.
- **Community Acceptance**. This criterion evaluates the public's comments, concerns, and overall perception of the remedy. The Community Acceptance criterion incorporates public concerns into the evaluation of the remedial alternatives. Therefore, Community Acceptance of the remedy will be evaluated after the public comment period required by the BCP.

- **Land Use**. In addition to the above criteria, 6NYCRR Part 375-1 specifies that the criterion of Land Use (i.e., the current, intended, and reasonably anticipated future land uses of the Site and its surroundings) be considered in the selection of the remedy. The reasonably anticipated future use of the Site as mixed-use commercial/ residential is discussed in Appendix A.

5.2.1 Alternative 1: No Action

The no-action alternative is defined as taking no further action to address the lead- and PAH-impacted soils. The no-action alternative also provides a baseline for comparison against the other remedial alternatives and justifies the need for any remedial action.

Overall Protection of Human Health and the Environment – This alternative would not be protective of human health and the environment or meet the Remedial Action Objectives for the Site.

Compliance with SCGs – This alternative would not actively reduce contaminants within on-site soils and would not result in compliance with SCGs.

Long-Term Effectiveness and Permanence – The no-action alternative provides no control of exposure to or migration of impacted soils. This alternative provides no long-term management measures. All current and future risks would remain under this alternative.

Reduction of Toxicity, Mobility, or Volume – This alternative provides no reduction in toxicity, mobility, or volume of lead and PAH impacted soils.

Short-Term Effectiveness and Impacts – There would be no additional risks posed to the community, Site workers, or the environment with implementation of this alternative.

Implementability – No technical implementability issues or action-specific administrative implementability issues are associated with this alternative.

Cost – There are no capital or operation, maintenance and monitoring (O,M&M) costs associated with this alternative.

Land Use – This alternative is not consistent with the reasonably anticipated future use of the Site.

5.2.2 Alternative 2: Excavation and Off-site Disposal of Lead-Impacted Soils and PAH-Impacted Soils

This alternative would entail excavation of the lead- and PAH- impacted soil with transport of the excavated materials and disposal at a permitted, off-site disposal facility. Soils exhibiting hazardous waste characteristics for lead per toxicity characteristic leaching protocol (TCLP) determination, may be subject to State and Federal Land Disposal Restrictions. Soils that are characteristically hazardous for lead would need to be treated at an off-site Treatment, Storage and Disposal Facility (TSDF) to meet LDR criteria prior to disposal.

Overall Protection of Human Health and the Environment – This alternative would be protective of human health and the environment, as it would eliminate the presence of lead- and PAH-impacted soil above SCGs.

Compliance with SCGs – This alternative would comply with applicable SCGs. Treatment at the off-site disposal facility may be required to satisfy land disposal restrictions. A permitted hauler and individuals properly trained to complete manifests would be required for offsite disposal.

Long-Term Effectiveness and Permanence – No significant residual risk would remain on-site since the soil would be excavated and disposed off-site. Soil verification sampling would be performed to verify cleanup effectiveness to satisfy SCGs.

Reduction of Toxicity, Mobility, or Volume – Through the complete removal of lead- and PAH-impacted soil above SCGs, this alternative will permanently and significantly reduce the toxicity, mobility, and volume of Site contamination. However, the toxicity, mobility and volume of waste soils is unchanged, simply moved from the Site to a more

controlled commercial solid waste or hazardous waste landfill from which the soil constituents are less mobile.

Short-Term Effectiveness and Impacts – No significant risks to the community or the environment are anticipated under this alternative. Construction workers could be exposed to contaminated dust during excavation of the soil and particulate matter during placement of clean backfill; however, these exposure risks can be managed through the use of personal protection equipment (PPE) and dust suppression methods. During soil excavation and loading activities, dust monitoring will be performed to assure conformance with NYSDOH-approved community air monitoring action levels. Some short-term disruption of the neighboring community may occur due to truck traffic from material transport and deliveries and noise from heavy equipment used to construct the remedy.

Implementability – No significant technical or administrative implementability issues are associated with this alternative. Off-site disposal would require development of a waste profile and approval of the material by the TSDF.

Cost – The present worth cost for Alternative 2 is estimated at $6,330,000 for the residential use scenario (see Table 2a) and $9,278,000 for the unrestricted use scenario (see Table 2b).

Land Use – This alternative is consistent with the reasonably anticipated future use of the Site.

5.2.3 Alternative 3: In-Situ Treatment of Lead-Impacted Soils, Excavation and Off-Site Disposal of Lead- and PAH-Impacted Soils

This alternative would entail in-situ treatment (i.e., mechanical mixing) of lead-impacted soils using approximately 5% Portland cement, excavation of the treated lead-impacted soils and PAH-impacted soils, transport of the excavated materials and disposal at a permitted, off-site disposal facility.

Overall Protection of Human Health and the Environment – This alternative would be protective of human health and the environment, as it would eliminate the presence of lead- and PAH-impacted soil above SCGs.

Compliance with SCGs – This alternative would comply with applicable SCGs. A permitted hauler and individuals properly trained to complete manifests would be required for offsite disposal.

Long-Term Effectiveness and Permanence – No significant residual risk would remain on-site since the soil would be treated on-site, excavated and disposed off-site. Soil verification sampling would be performed to verify cleanup effectiveness to satisfy SCGs.

Reduction of Toxicity, Mobility, or Volume – Through the treatment of characteristic hazardous lead soils and the complete removal of lead- and PAH-impacted soil above SCGs, this alternative will permanently and significantly reduce the toxicity, mobility, and volume of Site contamination both on-Site and off-Site.

Short-Term Effectiveness and Impacts – No significant risks to the community or the environment are anticipated under this alternative. Construction workers could be exposed to contaminated dust during excavation of the soil and particulate matter during placement of clean backfill; however, these exposure risks can be managed through the use of PPE and dust suppression methods. During soil excavation and loading activities, dust monitoring will be performed to assure conformance with NYSDOH-approved community air monitoring action levels. Some short-term disruption of the neighboring community may occur due to truck traffic from material transport and deliveries and noise from heavy equipment used to construct the remedy.

Implementability – No significant technical or administrative implementability issues are associated with this alternative. On-Site treatment would employ mechanical mixing with readily available and commonly used heavy equipment (tractor, harrow plow, etc.) that has been successfully utilized on other soil remediation projects. Portland cement is readily available and easily applied and mixed into the impacted soil. Off-site disposal would

require development of a waste profile and approval of the material by the waste disposal facility.

Cost – The present worth cost for Alternative 3 is estimated at $2,506,000 for the residential use scenario (see Table 3a) and $3,232,000 for the unrestricted use scenario (see Table 3b).

Land Use – This alternative is consistent with the reasonably anticipated future use of the Site.

5.2.4 Alternative 4: Excavation, Ex-Situ Treatment of Lead-Impacted Soils, and Off-Site Disposal of Lead- and PAH-Impacted Soils

This alternative would entail excavation of lead-impacted soil, ex-situ treatment (i.e., mechanical mixing) of lead-impacted soils using approximately 5% Portland cement, excavation of the PAH-impacted soils, and transport and disposal of the excavated materials to a permitted, off-site disposal facility.

Overall Protection of Human Health and the Environment – This alternative would be protective of human health and the environment, as it would eliminate the presence of lead- and PAH-impacted soil above SCGs.

Compliance with SCGs – This alternative would comply with applicable SCGs. A permitted hauler and individuals properly trained to complete manifests would be required for off-site disposal.

Long-Term Effectiveness and Permanence – No significant residual risk would remain on-site since the soil would be treated on-site, excavated and disposed off-site. Soil verification sampling would be performed to verify cleanup effectiveness to satisfy SCGs.

Reduction of Toxicity, Mobility, or Volume – Through the treatment of characteristic hazardous lead soils and the complete removal of lead- and PAH-impacted soil above SCGs, this alternative will permanently and significantly reduce the toxicity, mobility, and volume of Site contamination both on-Site and off-Site.

Short-Term Effectiveness and Impacts – No significant risks to the community or the environment are anticipated under this alternative. Construction workers could be exposed to contaminated dust during excavation of the soil and particulate matter during placement of clean backfill; however, these exposure risks can be managed through the use of PPE and dust suppression methods. During soil excavation and loading activities, dust monitoring will be performed to assure conformance with NYSDOH-approved community air monitoring action levels. Some short-term disruption of the neighboring community may occur due to truck traffic from material transport and deliveries and noise from heavy equipment used to construct the remedy.

Implementability – No significant technical or administrative implementability issues are associated with this alternative. On-Site ex-situ treatment would employ a mechanical mixer (i.e., pug mill), which has been successfully used on soil remediation projects. Portland cement is readily available and easily mixed with the impacted soil. Off-site disposal would require development of a waste profile and approval of the material by the waste disposal facility.

Cost – The present worth cost for Alternative 4 is estimated at $3,054,000 for the residential use scenario (see Table 4a) and $3,702,000 for the unrestricted use scenario (see Table 4b).

Land Use – This alternative is consistent with the reasonably anticipated future use of the Site.

5.3 Preferred Remedial Alternative

The previous sections describe the remedial alternatives and evaluate them against the screening criteria. This final section of the evaluation considers the information and evaluations contained in the previous sections to identify appropriate remedial measures to achieve the RAOs for the 330 Maple Road Site.

Alternatives 3 is the preferred remedial alternative for the Site because it:

- satisfies the RAOs for the Site; approximately 19,800 CY of soil above residential SCOs would be removed from the Site;
- would be protective of human health and the environment, as it would eliminate the presence of lead- and PAH-impacted soil above residential SCOs;
- would comply with applicable SCGs;
- is effective and permanent; no significant residual risk would remain on-site since the soil would be removed from the Site;
- would permanently and significantly reduce the toxicity, mobility, and volume of Site contamination;
- present no significant short-term risks to the community or the environment; short term risks would be mitigated with the use of PPE, dust control measures, and community air monitoring; and,
- Can be implemented within a single construction season.

The present worth cost of the selected alternative is estimated at $2.5 million.

6.0 INSTITUTIONAL AND ENGINEERING CONTROLS

Based on the anticipated use of the Site as mixed commercial and residential, the following institutional and engineering controls will be incorporated into and made part of the proposed remedy. These are in addition to existing security fencing to mitigate unrestricted Site access and physical hazards during remedial activities and development.

6.1 Environmental Easements

An institutional control in the form of an Environmental Easement will be necessary to ensure future use of the Site to residential and commercial applications and to prevent groundwater use for potable purposes.

6.2 Periodic Certifications

The property owner will complete and submit to the NYSDEC an Annual Certification Report each year. The annual report will be consistent with the requirements of the BCP and DER-10, and will contain certifications that: the institutional controls put in place are still in place; have not been altered and are still effective; and, the conditions at the Site are fully protective of public health and the environment.

7.0 REFERENCES

1. Great Lakes Environmental & Safety Consultants, Inc. *Phase I Environmental Site Assessment (ESA) for the Buffalo Shooting Club, 330 Maple Road, Williamsville, New York.* March 2005.

2. Great Lakes Environmental & Safety Consultants, Inc. *Phase II Environmental Site Assessment (ESA) for the Buffalo Shooting Club, 330 Maple Road, Williamsville, New York.* May 2005.

3. Benchmark Environmental Engineering and Science, PLLC. *Supplemental Phase II Investigation Findings, 330 Maple Road, Williamsville, New York.* May 18, 2006.

4. Benchmark Environmental Engineering and Science, PLLC. *Remedial Investigation Report, 330 Maple Road, Williamsville, New York.* October 2007. Revised January 2008.

5. New York State Department of Environmental Conservation. *Draft DER-10; Technical Guidance for Site Investigation and Remediation.* December 2002.

TABLES

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

TABLE 1

SUMMARY OF COSTS FOR REMEDIAL ALTERNATIVES

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Remedial Alternative	Capital Cost	O,M&M Present Worth	Total Present Worth
Alternative #1 No Action	$0	$0	$0
Alternative #2 (residential use) Excavation and Disposal of Lead and PAH Impacted Soil	$6,307,000	$23,000	$6,330,000
Alternative #2a (unrestricted use) Excavation and Disposal of Lead and PAH Impacted Soil	$9,278,000	$0	$9,278,000
Alternative #3 (residential use) In-Situ Treatment of Lead-Impacted Soil; Excavation and Disposal of Lead and PAH Impacted Soil	$2,483,000	$23,000	$2,506,000
Alternative #3a (unrestricted use) In-Situ Treatment of Lead-Impacted Soil; Excavation and Disposal of Lead and PAH Impacted Soil	$3,232,000	$0	$3,232,000
Alternative #4 (residential use) Excavation, Ex-Situ Treatment and Disposal of Lead-Impacted Soils; Excavation and Disposal PAH-Impacted Soil	$3,031,000	$23,000	$3,054,000
Alternative #4a (unrestricted use) Excavation, Ex-Situ Treatment and Disposal of Lead-Impacted Soils; Excavation and Disposal PAH-Impacted Soil	$3,702,000	$0	$3,702,000

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2a

ALTERNATIVE 2:
EXCAVATION & DISPOSAL OF LEAD AND PAH IMPACTED SOIL
(RESIDENTIAL USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Capital Costs				
Lead-Impacted Soil[1]:	13200	CY		
Transportation and disposal (hazardous)	23760	Ton	$ 189.00	$ 4,490,640
			Subtotal:	**$ 4,490,640**
PAH-Impacted Soil:	6600	CY		
Transportation and Disposal (non-hazardous)[2]	11880	Ton	$ 59.00	$ 700,920
			Subtotal:	**$ 700,920**
Contractor Services:				
Contractor Mobilization/Demobilization[3]	1	LS	$ 10,000.00	$ 10,000
Soil Excavation and loading	19800	CY	$ 6.00	$ 118,800
			Subtotal:	**$ 128,800**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 75,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Verification Sampling - Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling - PAHs	100	EA	$ 120.00	$ 12,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 164,000**
Subtotal Capital Cost				***$ 5,484,360***
Contingency (15%)				$ 822,654
Total Capital Cost				***$ 6,307,014***
Annual Operation Maintenance & Monitoring (OM&M):				
Annual Certifications	1	Yr	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				***$ 1,500***
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				***$ 23,059***
Total Capital Cost				**$ 6,330,073**

Notes:

1. Transportation/disposal estimates provided by WTS, Inc. (assumes soil weight is 1.8 tons/CY). Soil impacted by both lead and PAHs included. Assumes all lead-impacted soil disposed as hazardous; however, quantity will be based on TCLP results during remedial action.
2. Transportation/disposal estimates provided by Russo Development, Inc. (assumes soil weight is 1.8 tons/CY).
3. Contractor estimates provided by R.E. Lorentz, July 2008.

BENCHMARK
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TABLE 2b

ALTERNATIVE 2:
EXCAVATION & DISPOSAL OF LEAD AND PAH IMPACTED SOIL
(UNRESTRICTED USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Capital Costs				
Lead-Impacted Soil[1]:	21700	CY		
Transportation and disposal (hazardous)	39060	Ton	$ 189.00	$ 7,382,340
			Subtotal:	**$ 7,382,340**
PAH-Impacted Soil:	3000	CY		
Transportation and Disposal (non-hazardous)[2]	5400	Ton	$ 59.00	$ 318,600
			Subtotal:	**$ 318,600**
Contractor Services:				
Contractor Mobilization/Demobilization[3]	1	LS	$ 30,000.00	$ 30,000
Soil Excavation and loading	24700	CY	$ 6.00	$ 148,200
			Subtotal:	**$ 178,200**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 100,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Verification Sampling - Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling - PAHs	100	EA	$ 120.00	$ 12,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 189,000**
Subtotal Capital Costs				***$ 8,068,140***
Contingency (15%)				$ 1,210,221
Total Capital Cost				***$ 9,278,361***

Total Capital Cost	**$ 9,278,361**

Notes:

1. Transportation/disposal estimates provided by WTS, Inc. (assumes soil weight is 1.8 tons/CY). Assumes all lead-impacted soil disposed as hazardous; however, actual quantity will be based on TCLP results during remedial action.
2. Transportation/disposal estimates provided by Russo Development, Inc. (assumes soil weight is 1.8 tons/CY).
3. Contractor estimates provided by R.E. Lorentz, July 2008.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 3a

ALTERNATIVE 3:
IN-SITU TREATMENT OF LEAD-IMPACTED SOIL;
EXCAVATION & DISPOSAL OF LEAD AND PAH IMPACTED SOIL
(RESIDENTIAL USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Lead-Impacted Soil[1]:	13200	CY		
In-situ Stabilization, Excavation, Transportation and Disposal (non-hazardous)	24948	Ton	$ 57.55	$ 1,435,757
			Subtotal:	**$ 1,435,757**
PAH-Impacted Soil[1]:	6600	CY		
Excavation, Transportation and Disposal (non-hazardous)	11880	Ton	$ 46.00	$ 546,480
			Subtotal:	**$ 546,480**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 75,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Pre-Treatment TCLP lead sampling	65	EA	$ 100.00	$ 6,500
Post-Treatment TCLP lead sampling	65	EA	$ 100.00	$ 6,500
Verification Sampling- Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling- PAHs	100	EA	$ 120.00	$ 12,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 177,000**
Subtotal Capital Cost				***$ 2,159,237***
Contingency (15%)				$ 323,886
Total Capital Cost				***$ 2,483,123***
Annual Operation Maintenance & Monitoring (OM&M):				
Annual Certifications	1	Yr	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				***$ 1,500***
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				***$ 23,059***
Total Capital Cost				**$ 2,506,182**

Notes:
1. Soil Treatment, Excavation, Transportation and Disposal estimate provided by Russo Development, Inc. (assumes soil weight is 1.8 T/CY plus 5% portland cement)

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 3b

ALTERNATIVE 3:
IN-SITU TREATMENT OF LEAD-IMPACTED SOIL;
EXCAVATION & DISPOSAL OF LEAD AND PAH IMPACTED SOIL
(UNRESTRICTED USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Lead-Impacted Soil[1]:	21700	CY		
In-situ Stabilization, Excavation, Transportation and Disposal (non-hazardous)	41013	Ton	$ 57.55	$ 2,360,298
			Subtotal:	**$ 2,360,298**
PAH-Impacted Soil[2]:	3000	CY		
Excavation, Transportation and Disposal (non-hazardous)	5400	Ton	$ 46.00	$ 248,400
			Subtotal:	**$ 248,400**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 100,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Pre-Treatment TCLP lead sampling	65	EA	$ 100.00	$ 6,500
Post-Treatment TCLP lead sampling	65	EA	$ 100.00	$ 6,500
Verification Sampling- Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling- PAHs	100	EA	$ 120.00	$ 12,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 202,000**
Subtotal Capital Cost				***$ 2,810,698***
Contingency (15%)				$ 421,605
Total Capital Cost				***$ 3,232,303***

Total Capital Cost	**$ 3,232,303**

Notes:
1. Soil Treatment, Excavation, Transportation and Disposal estimate provided by Russo Development, Inc. (assumes soil weight is 1.8 T/CY plus 5% portland cement)

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TABLE 4a

ALTERNATIVE 4:
EXCAVATION, EX-SITU TREATMENT & DISPOSAL OF LEAD-IMPACTED SOIL;
EXCAVATION & DISPOSAL OF PAH-IMPACTED SOIL
(RESIDENTIAL USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Lead-Impacted Soil[1]:	13200	CY		
Transportation and Disposal (non-hazardous)	24948	Ton	$ 46.00	$ 1,147,608
			Subtotal:	**$ 1,147,608**
PAH-Impacted Soil[1]:	6600	CY		
Transportation and Disposal (non-hazardous)	11880	Ton	$ 46.00	$ 546,480
			Subtotal:	**$ 546,480**
Contractor Services:				
Pug Mill Mobilization/Demobilization[2]	1	LS	$ 10,000.00	$ 10,000
Earthwork Mobilization/Demobilization[3]	1	LS	$ 30,000.00	$ 30,000
Soil Excavating and Staging (lead soils)	19800	CY	$ 6.00	$ 118,800
Treatment (Portland Cement 5% w/w)	1188	Ton	$ 200.00	$ 237,600
Pug Mill	2	MO	$ 15,000.00	$ 30,000
Pug Mill operator	8	WK	$ 2,750.00	$ 22,000
Pug Mill fuel	4800	Gallons	$ 5.00	$ 24,000
Soil Loading into Pug Mill (lead soils)	19800	CY	$ 6.00	$ 118,800
Soil Loading into Trucks (lead soils)	19800	CY	$ 6.00	$ 118,800
Soil Excavation and Loading (PAH soils)	6600	CY	$ 6.00	$ 39,600
			Subtotal:	**$ 749,600**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 100,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Post Treatment TCLP lead sampling	30	EA	$ 100.00	$ 3,000
Verification Sampling- Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling- PAHs	100	EA	$ 120.00	$ 12,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 192,000**
Subtotal Capital Cost				***$ 2,635,688***
Contingency (15%)				$ 395,353
Total Capital Cost				***$ 3,031,041***
Annual Operation Maintenance & Monitoring (OM&M):				
Annual Certifications	1	Yr	$ 1,500.00	$ 1,500
Total Annual OM&M Cost				***$ 1,500***
Number of Years (n):				30
Interest Rate (I):				5%
p/A value:				15.3725
OM&M Present Worth (PW):				***$ 23,059***
Total Cost Estimate				**$ 3,054,100**

Notes:

1. Soil Treatment, Excavation, Transportation and Disposal estimate provided by Russo Development, Inc. (assumes soil weight is 1.8 T/CY plus 5% portland cement)
2. Pug Mill estimates provided by Ash Groups, Inc., May 2007.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 4b

ALTERNATIVE 4:
EXCAVATION, EX-SITU TREATMENT & DISPOSAL OF LEAD-IMPACTED SOIL;
EXCAVATION & DISPOSAL OF PAH-IMPACTED SOIL
(UNRESTRICTED USE)

Alternatives Analysis Report
330 Maple Road Site
Benderson Development Company

Item	Quantity	Units	Unit Cost	Total Cost
Lead-Impacted Soil[1]:	21700	CY		
Transportation and Disposal (non-hazardous)	41013	Ton	$ 37.00	$ 1,517,481
			Subtotal:	**$ 1,517,481**
PAH-Impacted Soil[1]:	3000	CY		
Transportation and Disposal (non-hazardous)	5400	Ton	$ 37.00	$ 199,800
			Subtotal:	**$ 199,800**
Contractor Services:				
Pug Mill Mobilization/Demobilization[2]	1	LS	$ 10,000.00	$ 10,000
Earthwork Mobilization/Demobilization[3]	1	LS	$ 30,000.00	$ 30,000
Soil Excavating and Staging (lead soils)	24700	CY	$ 6.00	$ 148,200
Treatment (Portland Cement 5% w/w)	1953	Ton	$ 200.00	$ 390,600
Pug Mill	2	MO	$ 15,000.00	$ 30,000
Pug Mill operator	8	WK	$ 2,750.00	$ 22,000
Pug Mill fuel	4800	Gallons	$ 5.00	$ 24,000
Soil Loading into Pug Mill (lead soils)	24700	CY	$ 6.00	$ 148,200
Soil Loading into Trucks (lead soils)	24700	CY	$ 6.00	$ 148,200
Soil Excavation and Loading (PAH soils)	3000	CY	$ 6.00	$ 18,000
			Subtotal:	**$ 969,200**
Engineering:				
Remedial design and reporting		EST		$ 35,000
Remedial construction oversight and management		EST		$ 75,000
Waste characterization sampling (full TCLP)	15	EA	$ 600.00	$ 9,000
Post Treatment TCLP lead sampling	30	EA	$ 100.00	$ 3,000
Verification Sampling- Lead	200	EA	$ 40.00	$ 8,000
Verification Sampling- PAHs	50	EA	$ 120.00	$ 6,000
Equipment and materials	1	EST		$ 25,000
			Subtotal:	**$ 161,000**
Subtotal Capital Cost				***$ 2,847,481***
Contingency (15%)				$ 427,122
Total Capital Cost				***$ 3,274,603***

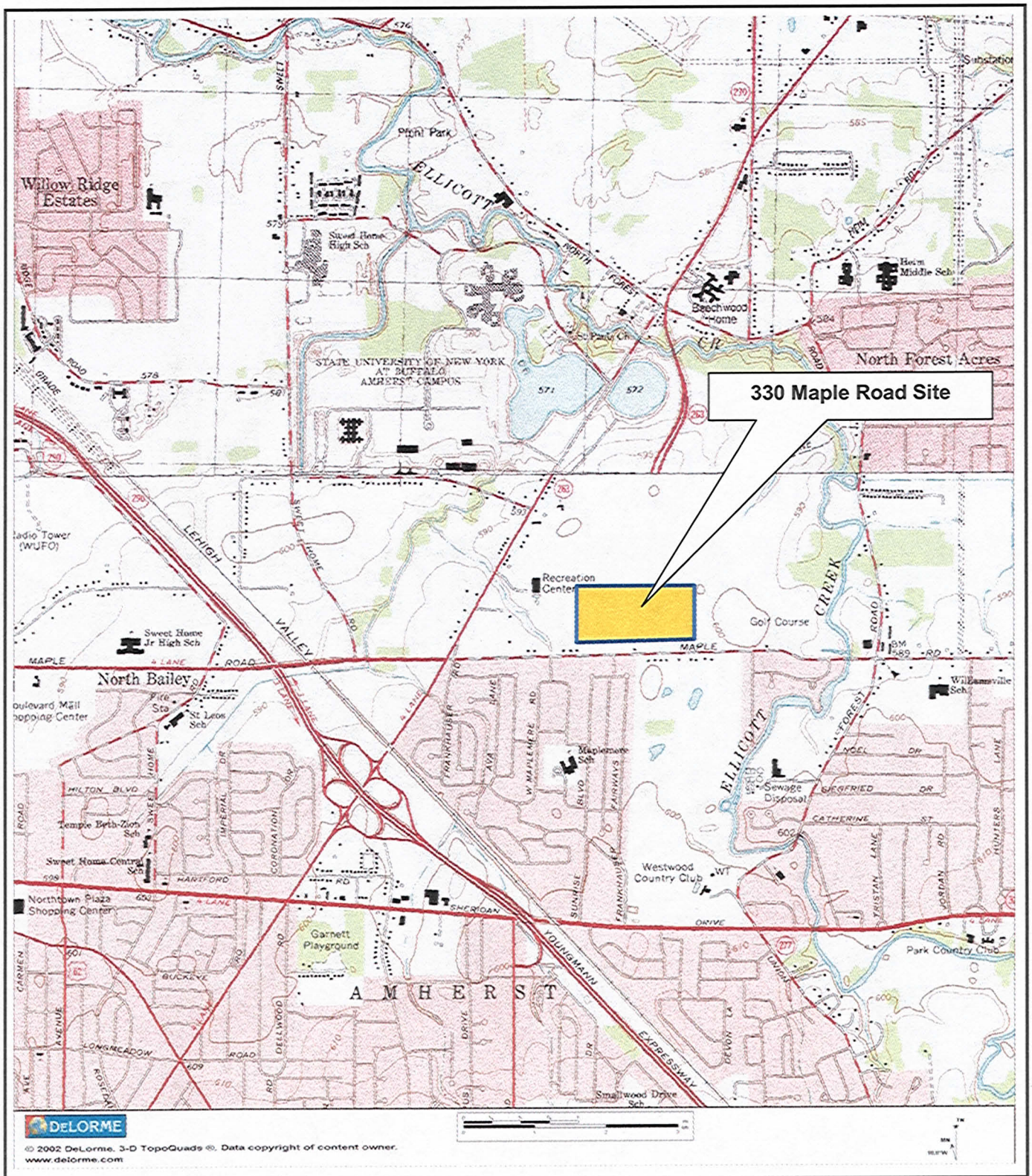
Total Cost Estimate	**$**	**3,701,725**

Notes:

1. Soil Treatment, Excavation, Transportation and Disposal estimate provided by Russo Development, Inc. (assumes soil weight is 1.8 T/CY plus 5% portland cement)
2. Pug Mill estimates provided by Ash Groups, Inc., May 2007.
3. Earthwork estimates provided by R.E. Lorentz, July 2008.

FIGURES

FIGURE 1



BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0105-002-201

DATE: JULY 2008

DRAFTED BY: NTM

SITE LOCATION AND VICINITY MAP

330 MAPLE ROAD SITE

AMHERST, NEW YORK

PREPARED FOR

BENDERSON DEVELOPMENT COMPANY

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 2; Site Plan Map.dwg

LEGEND:

- SITE DEVELOPMENT BOUNDARY (APPROX. 32.0 ACRES)
- BCP SITE BOUNDARY (APPROX. 26.0 ACRES)

SCALE: 1 INCH = 160 FEET
SCALE IN FEET
(approximate)

N

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

JOB NO.: 0105-002-201

REVISIONS

NO.	BY	DATE	REMARKS

SEAL

DRAWN BY: BCH
DATE: JULY 2008
CHECKED BY:
APPROVED BY: ML

SITE PLAN

REMEDIAL WORK PLAN
330 MAPLE ROAD SITE
AMHERST, NEW YORK

PREPARED FOR
BENDERSON DEVELOPMENT COMPANY

FIGURE 2

F:\CAD\Benchmark\Benderson\330 Maple Road - Williamsville\Remedial Work Plan\Figure 3; Analytical Results versus Residential.dwg

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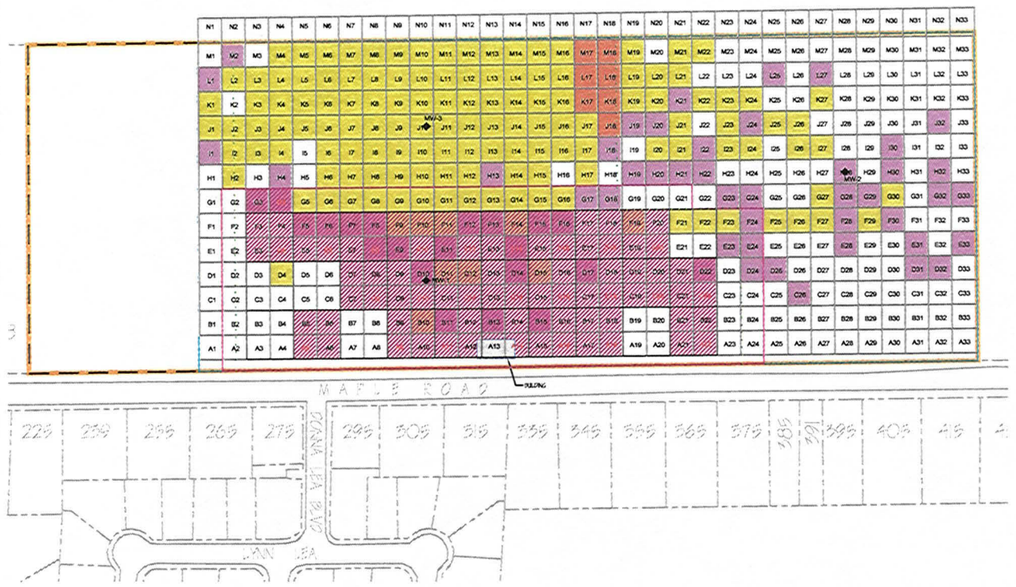

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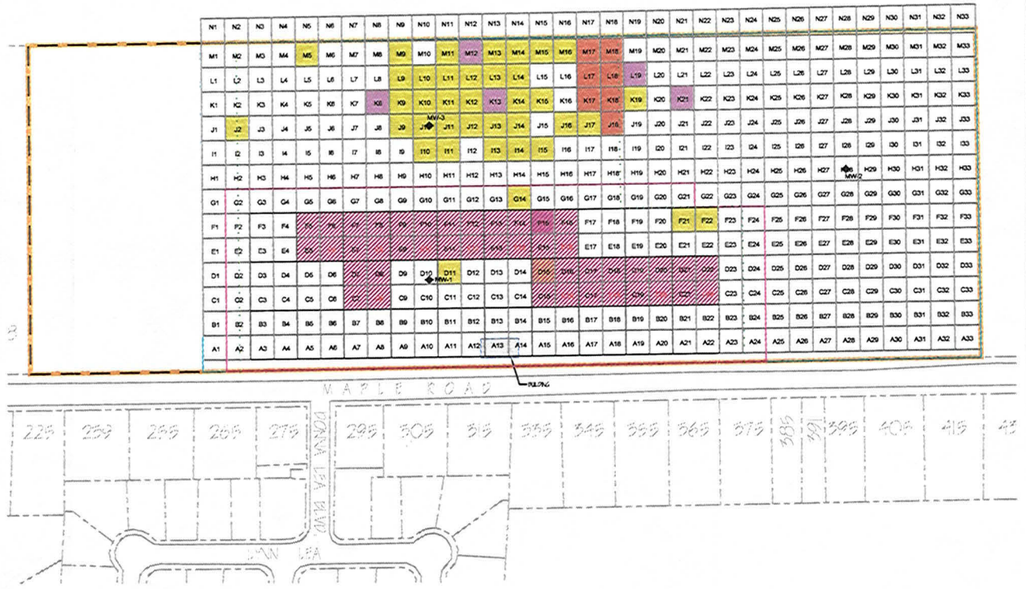

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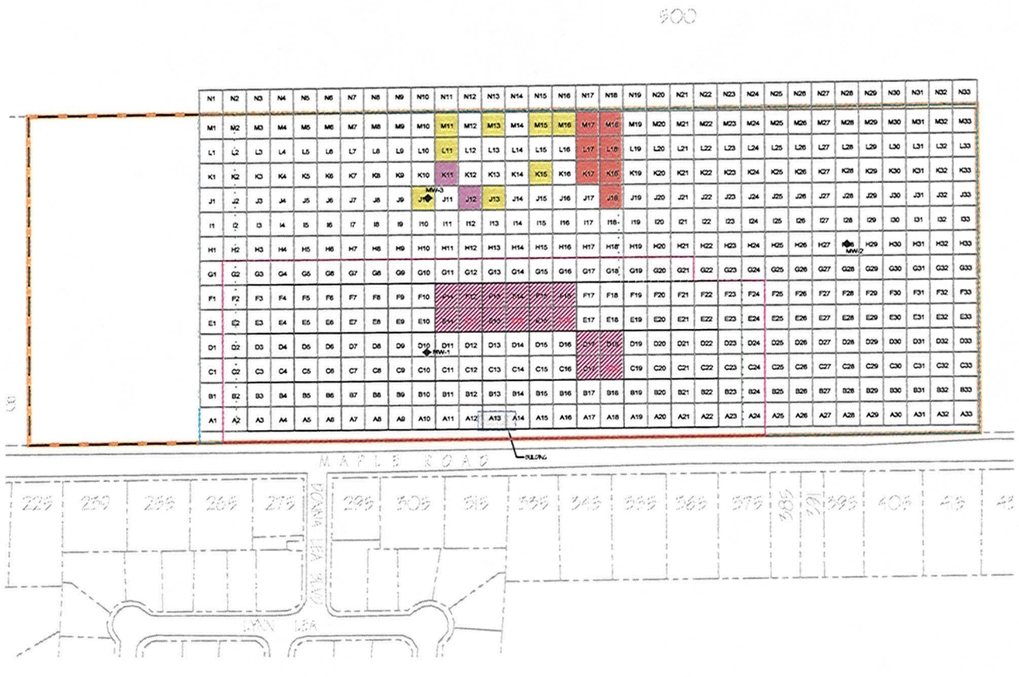

LEGEND:

- SITE DEVELOPMENT BOUNDARY (APPROX. 32.0 ACRES)
- BCP SITE BOUNDARY (APPROX. 26.0 ACRES)
- PAH SAMPLING AREA
- VEGETATION LIMITS
- MW-1 MONITORING WELL LOCATION
- H24 Analytical result exceeds the Residential SCO for Lead
- D19 D20 C19 C20 PAH sample grid; sample representative of grid is red
- Analytical result exceeds the Residential SCO for PAHs
- A1 SOIL SAMPLE GRID LOCATION
- M17 NOT SAMPLED DUE TO STANDING WATER
- J9 VISIBLE LEAD SHOT (VLS) OBSERVED AT THIS LOCATION

SCALE: 1 INCH = 140 FEET
SCALE IN FEET
(approximate)

N

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
700 EXCHANGE STREET
SUITE 400
BUFFALO, NEW YORK 14810
(716) 856-0599

JOB NO.: 0105-002-201

REVISIONS

NO.	BY	DATE	REMARKS
1	NTM	MAY 2007	Updated Lead/PAH exceeded areas

DRAWN BY: BCH
DATE: JULY 2006
CHECKED BY:
APPROVED BY:

SEAL

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LEAD AND PAHs IN SOIL DISTRIBUTION MAP

REMEDIAL WORK PLAN
330 MAPLE ROAD SITE
AMHERST, NEW YORK
PREPARED FOR
BENDERSON DEVELOPMENT COMPANY

FIGURE 3

APPENDIX A

LAND USE EVALUATION

APPENDIX A
LAND USE EVALUATION

The current, intended, and reasonably anticipated future land use of the Site is a mixed-use commercial and residential complex. The reasonably anticipated future land use of its immediate surroundings is residential and recreational. Per regulations contained in 6NYCRR Part 375, the reasonably anticipated future use of the Site and its surroundings is based on the following factors:

- **Current use and historical and/or recent development patterns:** *The Site is currently vacant and most recently occupied by the Buffalo Shooting Club, which consists of an outdoor shooting range and two-story clubhouse. The redevelopment plan for the Site is a mixed-use commercial and residential complex with associated buildings, drives, and surface parking lots. Restricted residential use, in the form of lofts/apartments, are planned to be incorporated in the complex.*

- **Applicable zoning laws and maps:** *The Site is located in an area of the Town zoned commercial/residential.*

- **Brownfield opportunity areas as designated set forth in GML 970-r:** *The Brownfield Opportunity Area (BOA) Program provides municipalities and community based organizations with assistance to complete revitalization plans and implementation strategies for areas or communities affected by the presence of brownfield sites, and site assessments for strategic sites. The subject property does not lie within a BOA.*

- **Applicable comprehensive community master plans, local waterfront revitalization plans as provided for in EL article 42, or any other applicable land use plan formally adopted by a municipality:** *Based on the Town of Amherst's February 2004 Bicentennial Comprehensive Plan, the commercial/residential plans for the subject property are consistent with the master planning for the area.*

- **Proximity to real property currently used for residential use, and to urban, commercial, industrial, agricultural, and recreational areas:** *Land uses immediately surrounding the Site include a public golf course to the north and east, and residential single use properties to the south and west. Beyond the adjacent properties, the University of Buffalo North Campus; a private country club and golf course; light commercial properties; public use areas; and some vacant properties surround the Site.*

- **Any written and oral comments submitted by members of the public on the proposed use as part of the activities performed pursuant to the citizen participation plan:** *The re-zoning of the Site has been discussed in a public forum on numerous occasions over the course of the last year. As with any redevelopment project, there are oppositions to this project; however, the Amherst Town Board voted in June 2008 to re-zone the property for the*

planned re-use as a commercial/ residential complex. Benchmark is not aware of any comments from the public regarding the environmental cleanup effort.

- **Environmental justice concerns, which for purposes of this subpart, include the extent to which the proposed use may reasonably be expected to cause or increase a disproportionate burden on the community in which the site is located, including low-income minority communities, or to result in a disproportionate concentration of commercial or industrial uses in what has historically been a mixed use or residential community:** *None identified.*

- **Federal or State land use designations:** *Based on the U.S. Department of Agriculture Soil Conservation Service, the soil on-site generally consists of three native soil horizons: (1) silt loam to 10-inches below grade, (2) clay loam to approximately 3.5 feet below grade, and (3) shaly-clay loam to 5-feet below grade.*

- **Population growth patterns and projections:** *The Town of Amherst, encompassing 54 square miles, has a population of approximately 116,369 (2004, U.S. Census Bureau), a decrease of 141 from the 2000 U.S. Census. The population density in the Town is approximately 2,155 people per square mile. This relatively insignificant population decline indicates population stability, which in turn supports commercial/ residential redevelopment.*

- **Accessibility to existing infrastructure:** *The main local roadways that provide access to the Site are the I-290 (Youngman Expressway), Millersport Highway (Rt. 263), and Maple Road. Existing sanitary sewer, supplied water, electrical, natural gas and communications utilities are present along Maple Road, immediately adjacent to the Site, and are of sufficient capacity for commercial/ residential redevelopment.*

- **Proximity of the site to important cultural resources, including federal or State historic or heritage sites or Native American religious sites:** *None.*

- **Natural resources, including proximity of the site to important federal, State or local natural resources, including waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species:** *The Site is located within the Erie-Niagara River basin. Viable aquatic habitats in the vicinity of the Site include the Niagara River (approximately 6 miles east northeast) and Ellicott Creek (approximately 1.75 miles east). There are no State or Federal wetlands on the subject property; however, State and Federal wetlands are located within 0.2 miles of the Site. The Site is not adjacent to a Significant Coastal Fish and Wildlife Habitat. There are no known threatened or endangered species, nor important plant habitats listed at the Site.*

- **Potential vulnerability of groundwater to contamination that might emanate from the site, including proximity to wellhead protection and groundwater recharge areas and other areas identified by the Department and the State's**

APPENDIX A
LAND USE EVALUATION

comprehensive groundwater remediation and protection program established set forth in ECL article 15 title 31: *Recharge to the Site water table is primarily from rainfall and snowmelt. Precipitation either infiltrates into the soil or moves to the storm drains present within the Site or in the adjacent roadways. Regional groundwater, however, appears to flow south and west towards the Niagara River. Regionally, groundwater in the area has not been developed for industrial, agriculture, or public supply purposes. Municipal potable water service is provided offsite and onsite by the Erie County Water Authority. Groundwater data collected during the RI indicate no significant impact.*

- **Proximity to flood plains:** *There are no floodplains on the Site.*

- **Geography and geology:** *The Site is located within the Erie-Ontario lake plain physiographic province, which is typified by little topographic relief and gentle slope toward Lake Erie, except in the immediate vicinity of major drainage ways. Generally, soil on-site consists of three native soil horizons: (1) silt loam to 10-inches below grade, (2) clay loam to approximately 3.5 feet below grade, and (3) shaly-clay loam to 5-feet below grade.*

- **Current institutional controls applicable to the site:** *No institutional controls currently exist for the Site.*

REMEDIAL WORK PLAN
APPENDIX B

SITE HEALTH AND SAFETY PLAN (HASP)

330 MAPLE ROAD SITE
AMHERST, NEW YORK

July 2008 0105-002-201

Prepared for:

Benderson Development Company, LLC

REMEDIAL WORK PLAN

HEALTH AND SAFETY PLAN
330 MAPLE ROAD SITE

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

Corporate Health and Safety Director: Thomas H. Forbes, P.E.

Project Manager: Michael A. Lesakowski

Designated Site Safety and Health Officer: Bryan C. Hann

Acknowledgement:
I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE

REMEDIAL WORK PLAN

HEALTH AND SAFETY PLAN
330 MAPLE ROAD SITE

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REMEDIAL WORK PLAN

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330 MAPLE ROAD SITE

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REMEDIAL WORK PLAN

HEALTH AND SAFETY PLAN
330 MAPLE ROAD SITE

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LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

1.1 General

In accordance with OSHA requirements contained in 29 CFR 1910.120, this Health and Safety Plan (HASP) describes the specific health and safety practices and procedures to be employed by Benchmark Environmental Engineering & Science, PLLC (Benchmark) employees during Remedial Activities on the 330 Maple Road Site, located in Amherst, New York (see Figure 1 of the Remedial Work Plan). This HASP presents procedures for Benchmark employees who will be involved with field activities; it does not cover the activities of other contractors, subcontractors or other individuals on the site. These firms will be required to develop and enforce their own HASP as discussed in Section 2.0. Benchmark accepts no responsibility for the health and safety of contractors, subcontractors or other personnel.

This HASP presents information on known site health and safety hazards using available historical information, and identifies the equipment, materials, and procedures that will be used to eliminate or control these hazards. Environmental monitoring will be performed during the course of field activities to provide real-time data for on-going assessment of potential hazards.

1.2 Background

The redevelopment site is a 31.6 acre parcel owned by Benderson Development Company, LLC. The Site presently consists of an outdoor shooting range, a two-story clubhouse, a gravel parking lots and otherwise fallow land. The shooting range consists of ten trap houses and three sheds used to store targets and supplies. The site is currently unoccupied, and available records indicate that the only known site operator at 330 Maple Road has been the Buffalo Gun Club, present from approximately 1943 until 2006. The Site was apparently undeveloped prior to 1943.

Based on preliminary environmental investigations completed at the site in 2006, approximately 26 acres of the 31.6-acre redevelopment parcel were identified as contaminated as a result of historic Site use. As such, that 26-acre portion of the greater 31.6-acre parcel is defined as the Site within the context of the BCA (see Figure 2 of the Remedial Work Plan).

Remedial activities are being conducted to address lead and semi-volatile organic compound (SVOC)-impacted soil at the 330 Maple Road Site. Details of the nature and extent of environmental impacts are included in the January 2008 RI report.

1.3 Parameters of Interest

Based on the RI results, constituents of potential concern (COPCs) at the Site include:

- **Semi-Volatile Organic Compounds (SVOCs)** – Specifically, the following SVOCs are of concern in Site soils: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. These compounds are also commonly referred to as cPAHs, as discussed in Section 3.1.

- **Lead** – An inorganic compound found at shooting range sites.

1.4 Overview of Remedial Activities

Benchmark personnel will be on-site to observe remedial activities. The field activities to be completed as part of the remediation are described below. Planned activities are more fully described in the Remedial Work Plan for the Site (Ref. 4), and generally include:

- Removal of soil impacted with COCs above NYSDEC Part 375 SCOs for residential use;
- Treatment of characteristic hazardous lead-impacted soil to render non-hazardous; and,
- Disposal of impacted soils at a NYSDEC approved disposal facility.

2.0 ORGANIZATIONAL STRUCTURE

This chapter of the HASP describes the lines of authority, responsibility, and communication as they pertain to health and safety functions at the site. The purpose of this chapter is to identify the personnel who impact the development and implementation of the HASP and to describe their roles and responsibilities. This chapter also identifies other contractors/subcontractors involved in work operations and establishes the lines of

communications among them for health and safety matters. The organizational structure described in this chapter is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this site.

2.1 Roles and Responsibilities

All Benchmark personnel on the site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this site are detailed in the following paragraphs.

2.1.1 Corporate Health and Safety Director

The Benchmark Corporate Health and Safety Director is *Mr. Thomas H. Forbes, P.E.* The Corporate Health and Safety Director is responsible for developing and implementing the Health and Safety program and policies for Benchmark Environmental Engineering & Science, PLLC and consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates Benchmark's Health and Safety training and medical monitoring programs and assists project management and field staff in developing site-specific health and safety plans.

2.1.2 Project Manager

The Project Manager for this site is *Mr. Michael Lesakowski.* The Project Manager has the responsibility and authority to direct all Benchmark work operations at the site. The Project Manager coordinates safety and health functions with the Site Safety and Health Officer, and bears ultimate responsibility for proper implementation of this HASP. He may delegate authority to expedite and facilitate any application of the program, including modifications to the overall project approach as necessary to circumvent unsafe work conditions. Specific duties of the Project Manager include:

- Preparing and coordinating the site work plan.
- Providing Benchmark workers with work assignments and overseeing their performance.

- Coordinating health and safety efforts with the Site Safety and Health Officer (SSHO).
- Reviewing the emergency response coordination plan to assure its effectiveness.
- Serving as the primary liaison with site contractors and the property owner.

2.1.3 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for this site is ***Mr. Bryan C. Hann.*** The SSHO reports to the Project Manager. The SSHO is on-site or readily accessible to the site during all work operations and has the authority to halt site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions for Benchmark personnel on the site.
- Serving as the point of contact for safety and health matters.
- Ensuring that Benchmark field personnel working on the site have received proper training (per 29 CFR Part 1910.120(e)), that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134), and that they are properly trained in the selection, use and maintenance of personal protective equipment, including qualitative respirator fit testing.
- Performing or overseeing site monitoring as required by the HASP.
- Assisting in the preparation and review of the HASP
- Maintaining site-specific safety and health records as described in this HASP
- Coordinating with the Project Manager, Site Workers, and Contractor's SSHO as necessary for safety and health efforts.

2.1.4 Site Workers

Site workers are responsible for: complying with this HASP or a more stringent HASP, if appropriate (i.e., Contractor and Subcontractor's HASP); using proper PPE; reporting unsafe acts and conditions to the SSHO; and following the safety and health

instructions of the Project Manager and SSHO.

2.1.5 Other Site Personnel

Other site personnel with health and safety responsibilities include the remediation contractor, who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than Benchmark's HASP. Benchmark assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non-Benchmark site personnel. Each Contractor shall assign a SSHO who will coordinate with Benchmark's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to Benchmark and Contractor personnel, other individuals who may have responsibilities in the work zone include subcontractors and governmental agencies performing site inspection work (e.g., the New York State Department of Environmental Conservation). The Contractor shall be responsible for ensuring that these individuals have received OSHA-required training (29 CFR 1910.120(e)), including initial, refresher and site-specific training, and shall be responsible for the safety and health of these individuals while they are on-site.

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the site, the possibility exists that workers will be exposed to hazardous substances during field activities. The principal points of exposure would be through direct contact with and incidental ingestion of soil/fill, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of medium to large-sized construction equipment (e.g., excavators, drill rigs) will also present conditions for potential physical injury to workers. Further, since work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing. Adherence to the medical evaluations; worker training relative to chemical hazards; safe work practices; proper personal protection; environmental monitoring; work zones and site control; appropriate decontamination procedures; and contingency planning outlined herein will reduce the potential for chemical exposures and physical injuries.

3.1 Chemical Hazards

As discussed in Section 1.3, historic activities related to former operations and facilities at the site have resulted in elevated concentrations of lead and SVOCs in site soils. Table 1 identifies concentration ranges for constituents of potential concern (COPCs) detected during previous investigations at the site, as identified in Section 1.4 of this HASP. Table 2 lists exposure limits for airborne concentrations of the COPCs. Brief descriptions of the toxicology and related health and safety guidance and criteria for the prevalent COPCs are provided below.

- **Polycyclic Aromatic Hydrocarbons (PAHs)** are formed as a result of the pyrolysis and incomplete combustion of organic matter such as fossil fuel. PAH aerosols formed during the combustion process disperse throughout the atmosphere, resulting in the deposition of PAH condensate in soil, water and on vegetation. In addition, several products formed from petroleum processing operations (e.g., roofing materials and asphalt) also contain elevated levels of PAHs. Hence, these compounds are widely dispersed in the environment. PAHs are characterized by a molecular structure containing three or more fused, unsaturated carbon rings. Seven of the PAHs are classified by USEPA as probable human carcinogens (USEPA Class B2). These are: benzo(a)pyrene; benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene. The primary route of

exposure to PAHs is through incidental ingestion and inhalation of contaminated particulates. PAH's are characterized by an organic odor, and exist as oily liquids in pure form. Acute exposure symptoms may include acne-type blemishes in areas of the skin exposed to sunlight.

- **Lead** can affect almost every organ and system in our bodies. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system. The effects are the same whether it is breathed or swallowed. Lead may decrease reaction time, cause weakness in fingers, wrists or ankles and possibly affect memory. Lead may cause anemia.

With respect to the anticipated remedial activities discussed in Section 1.5, possible routes of exposure to the above-mentioned contaminants are presented in Table 3. The use of proper respiratory equipment, as outlined in Section 7.0 of this HASP, will minimize the potential for exposure to airborne contaminants. Exposure to contaminants will also be minimized through the use of protective clothing (Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 12.0).

3.2 Physical Hazards

Field activities at the site may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as backhoes, excavators, and drill rigs.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 10.0).
- The potential for slip and fall injuries due to rough, uneven terrain and/or open excavations.

These hazards represent only some of the possible means of injury that may occur at the site during RI activities. Since it is impossible to list all potential injuries, it is the responsibility of each individual to exercise proper care and caution during all phases of the work.

4.0 TRAINING

4.1 Site Workers

All personnel performing remedial activities at the site (such as, but not limited to, equipment operators and general laborers) who may be exposed to hazardous substances, health hazards, or safety hazards, including their supervisors/managers responsible for the site, shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. This training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Additional site-specific training shall also be provided by the SSHO prior to the start of field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial and refresher training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5), and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3) and 1910.120(e)(8). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.
- Work zones and site control.

- Safe use of engineering controls and equipment.
- Decontamination procedures.
- Emergency response and escape.
- Confined space entry procedures.
- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.
- Spill containment.

Initial training also incorporates workshops for PPE and respiratory equipment use (Levels A, B and C), and respirator fit testing. Records and certifications received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at Benchmark's Buffalo, NY office. Contractors and subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones or engaging in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers are given a copy of the HASP and a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The site briefing shall be provided by the SSHO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health and other hazards present on the site.
- The site lay-out including work zones and places of refuge.

- The emergency communications system and emergency evacuation procedures.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the Site.
- Medical surveillance, including recognition of symptoms and signs of over-exposure as described in Section 5.0 of this HASP.
- The spill containment program as detailed in Section 9.0 of this HASP.
- Site control as detailed in Section 11.0 of this HASP.
- Decontamination procedures as detailed in Section 12.0 of this HASP.
- Confined space entry procedures, if required, as detailed in Section 13.0 of this HASP.
- The emergency response plan as detailed in Section 15.0 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSHO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP. Conditions for which the SSHO may schedule additional briefings include, but are not limited to: a change in site conditions (e.g., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during site work.

4.2 Supervisor Training

On-site safety and health personnel (SSHO) who are directly responsible for or supervise the safety and health of workers engaged in hazardous waste operations shall receive, in addition to the appropriate level of worker training described in Section 4.1, an additional 8 hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is addressed in the Emergency Response Plan appended to this HASP as Appendix A.

4.4 Site Visitors

Each Contractor's SSHO will provide a site-specific briefing to all site visitors and other non-Benchmark personnel who enter the site beyond the site entry point. The site-specific briefing will provide information about site hazards; the site layout including work zones and places of refuge; the emergency communications system and emergency evacuation procedures; and other pertinent safety and health requirements as appropriate.

Site visitors will not be permitted to enter the exclusion zone or contaminant reduction zones unless they have received the level of training required for site workers as described in Section 4.1.

5.0 MEDICAL MONITORING

Medical monitoring examinations are provided to Benchmark employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual, and employment termination physicals for employees involved in hazardous waste site field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, developed signs or symptoms of over-exposure to hazardous substances, or were accidentally exposed to substances at concentrations above the permissible exposure limits without the necessary PPE. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by HealthWorks WNY, an occupational health care provider located at, Seneca Square Plaza, 1900 Ridge Road, West Seneca, New York 14224. The facility can be reached at (716) 712-0670 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to the Benchmark Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examinations include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Spirometry testing.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 yrs age or as medical conditions dictate).
- Chest X-ray (baseline and exit, and every 5 years).
- Blood biochemistry (including blood count, white cell differential count, serum multiplastic screening).
- Medical certification of physical requirements (i.e., sight, musculoskeletal,

cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites and to establish baseline medical data.

In conformance with OSHA regulations, Benchmark will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report and have access to their medical records and analyses.

6.0 SAFE WORK PRACTICES

All Benchmark employees shall conform to the following safe work practices during all on-site work activities conducted within the exclusion and contamination reduction zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited.
- The hands and face must be thoroughly washed upon leaving the work area and before engaging in any activity indicated above.
- Respiratory protective equipment and clothing must be worn by all personnel entering the site as required by the HASP or as modified by the SSHO. Excessive facial hair (i.e., beards, long mustaches or sideburns) that interferes with the satisfactory respirator-to-face seal is prohibited.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Benchmark occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during the workday.
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.
- On-site personnel shall use the "buddy" system. No one may work alone (i.e., out of earshot or visual contact with other workers) in the exclusion zone.
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.
- All employees have the obligation to immediately report and if possible, correct unsafe work conditions.
- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for Benchmark employees, as requested and required.

The recommended specific safety practices for working around the Contractor's equipment (e.g., backhoes, bulldozers, excavators, drill rigs, etc.) are as follows:

- Although the Contractor and subcontractors are responsible for their equipment and safe operation of the site, Benchmark personnel are also responsible for their own safety.
- Subsurface work will not be initiated without first clearing underground utility services.
- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely.
- Care should be taken to avoid overhead wires when moving heavy equipment from location to location.
- Hard hats, safety boots and safety glasses should be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended.
- The work site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the site.
- Proper lighting must be provided when working at night.
- Construction activities should be discontinued during an electrical storm or severe weather conditions.
- The presence of combustible gases should be checked before igniting any open flame.
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not approach the edge of an unsecured trench/excavation closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Equipment Selection

Personal protective equipment (PPE) will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into four categories according to the degree of protection afforded. These categories designated A through D, consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- **Level A:** Should be selected when the highest level of respiratory, skin and eye protection is needed.

- **Level B:** Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.

- **Level C:** Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.

- **Level D:** Should not be worn on any site with elevated respiratory or skin hazards. This is generally a work uniform providing minimal protection.

OSHA requires the use of certain PPE under conditions where an immediate danger to life and health (IDLH) may be present. Specifically, OSHA 29 CFR 1910.120(g)(3)(iii) requires use of a positive pressure self-contained breathing apparatus, or positive pressure air-line respirator equipped with an escape air supply when chemical exposure levels present a substantial possibility of immediate serious injury, illness or death, or impair the ability to

escape. Similarly, OSHA 29 CFR 1910.120(g)(3)(iv) requires donning totally encapsulating chemical protective suits (with a protection level equivalent to Level A protection) in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate serious illness, injury or death, or impair the ability to escape.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for levels A/B, C, and D protection.

7.2 Protection Ensembles

7.2.1 Level A/B Protection Ensemble

Level A/B ensembles include similar respiratory protection; however, Level A provides a higher degree of dermal protection than Level B. Use of Level A over Level B is determined by: comparing the concentrations of identified substances in the air with skin toxicity data, and assessing the effect of the substance (by its measured air concentrations or splash potential) on the small area of the head and neck unprotected by Level B clothing.

The recommended PPE for level A/B is:

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA).
- Chemical-resistant clothing. For Level A, clothing consists of totally-encapsulating chemical resistant suit. Level B incorporates hooded one-or two-piece chemical splash suit.
- Inner and outer chemical resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

7.2.2 Level C Protection Ensemble

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air-purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if: oxygen content of the atmosphere is at least 19.5% in volume; substances are identified and concentrations measured; substances have adequate warning properties; the individual passes a qualitative fit-test for the mask; and an appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

Recommended PPE for Level C conditions includes:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the SSHO.
- Chemical-resistant clothing (hooded, one or two-piece chemical splash suit or disposable chemical-resistant one-piece suit).
- Inner and outer chemical-resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

7.2.3 Level D Protection Ensemble

As indicated above, Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, where there are no inhalable toxic substances,

and where the atmospheric contains at least 19.5% oxygen.

Recommended PPE for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat.
- Optional gloves, escape mask, face shield.

7.2.4 Recommended Level of Protection for Site Tasks

Based on current information regarding both the contaminants suspected to be present at the site and the various tasks that are included in the remedial activities, the minimum required Levels of Protection for these tasks shall be as identified in Table A-4.

8.0 EXPOSURE MONITORING

8.1 General

Based on the results of historic sample analysis and the nature of the proposed work activities at the site, the possibility exists that organic vapors and/or particulates may be released to the air during intrusive construction activities. Ambient breathing zone concentrations may at times, exceed the permissible exposure limits (PELs) established by OSHA for the individual compounds (see Table 2), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) by the SSHO based upon real-time field monitoring data.

8.1.1 On-Site Work Zone Monitoring

Benchmark personnel will conduct routine, real-time air monitoring during all intrusive construction phases such as excavation, backfilling, drilling, etc. The work area will be monitored at regular intervals using a photo-ionization detector (PID), combustible gas meter and a particulate meter. Observed values will be recorded and maintained as part of the permanent field record.

Additional air monitoring measurements may be made by Benchmark personnel to verify field conditions during subcontractor oversight activities. Monitoring instruments will be protected from surface contamination during use. Additional monitoring instruments may be added if the situations or conditions change. Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use.

8.1.2 Off-Site Community Air Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the site perimeter will be conducted. This will provide a real-time method for determination of substantial vapor and/or particulate releases to the surrounding community as a result of ground intrusive work.

Ground intrusive activities are defined by NYSDOH Appendix 1A Generic Community Air Monitoring Plan (Ref. 5, attached as Appendix B of this HASP). Ground intrusive activities include soil/waste excavation and handling; test pitting or trenching; and the installation of soil borings or monitoring wells. Non-intrusive activities include the

collection of soil, sediment, and groundwater samples. Continuous monitoring is required for ground intrusive activities and periodic monitoring is required for non-intrusive activities. Periodic monitoring consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil; monitoring while bailing a well; and taking a reading prior to leaving a sampling location. Periodic monitoring may be upgraded to continuous if the sampling location is in close proximity to individuals not involved in the site activity (i.e., on a curb of a busy street). The action levels below will be used during periodic monitoring.

8.2 Monitoring Action Levels

8.2.1 On-Site Work Zone Action Levels

A MiniRae 2000 PID equipped with a 10.6 eV lamp, or other appropriate instrument(s), will be used by Benchmark personnel to monitor organic vapor concentrations as specified in this HASP. Combustible gas will be monitored with the "combustible gas" option on the combustible gas meter or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (e.g., soil excavation) using a real-time particulate monitor as specified in this plan. In the absence of such monitoring, appropriate respiratory protection for particulates shall be donned. Sustained readings obtained in the breathing zone may be interpreted (with regard to other site conditions) as follows for Benchmark personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to 1 ppm above background on the PID) - Continue operations under Level D (see Appendix B of this HASP).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings from >1 ppm to 5 ppm above background on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Appendix B of this HASP).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of >5 ppm to 50 ppm above background on the PID - Continue operations under Level B (see Appendix B of this HASP), re-evaluate and alter (if possible) construction methods to achieve lower vapor

concentrations.

- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

The explosimeter will be used to monitor levels of both combustible gases and oxygen during site activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue engineering operations with caution.
- 10-25% LEL - Continuous monitoring with extreme caution, determine source/cause of elevated reading.
- Greater than 25% LEL - Explosion hazard, evaluate source and leave the Work Zone.
- 19.5-21% oxygen - Proceed with extreme caution; attempt to determine potential source of oxygen displacement.
- Less than 19.5% oxygen - Leave work zone immediately.
- 21-25% oxygen - Continue engineering operations with caution.
- Greater than 25% oxygen - Fire hazard potential, leave Work Zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities and during handling of site soil/fill. Action levels based on the instrument readings shall be as follows:

- Less than 50 $\mu g/m^3$ - Continue field operations.
- 50-150 $\mu g/m^3$ - Don dust/particulate mask or equivalent
- Greater than 150 $\mu g/m^3$ - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (e.g., wetting of excavated soils or tools at discretion of SSHO).

Readings with the organic vapor analyzer, combustible gas meter, and particulate monitor will be recorded and documented on the appropriate Project Field Forms. All instruments will be calibrated before use on a daily basis and the procedure will be documented on the appropriate Project Field Forms.

8.2.2 Community Air Monitoring Action Levels

In addition to the action levels prescribed in Section 8.2.1 for Benchmark personnel on-site, the following criteria shall also be adhered to for the protection of downwind receptors consistent with the NYSDOH Generic CAMP requirements (Appendix B of this HASP):

- ORGANIC VAPOR PERIMETER MONITORING:
  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background, work activities will be halted and monitoring continued. If the sustained organic vapor decreases below 5 ppm over background, work activities can resume but more frequent intervals of monitoring, as directed by the SSHO, must be conducted.

  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are greater than 5 ppm over background but less than 25 ppm, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever is less, is below 5 ppm over background; and more frequent intervals of monitoring, as directed by the SSHO, are conducted.

  - If the sustained organic vapor level is above 25 ppm at the perimeter of the exclusion zone, the SSHO must be notified and work activities shut down. The SSHO will determine when re-entry of the exclusion zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the ***Organic Vapor Contingency Monitoring Plan*** below. All readings will be recorded and will be available for NYSDEC and NYSDOH personnel to review.

- ORGANIC VAPOR CONTINGENCY MONITORING PLAN:
  - If the sustained organic vapor level is greater than 5 ppm over background 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.
  - If, following the cessation of the work activities or as the result of an emergency, sustained organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).
  - If efforts to abate the emission source are unsuccessful and if sustained organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, then the ***Major Vapor Emission Response Plan*** (see below) will automatically be placed into effect.

- MAJOR VAPOR EMISSION RESPONSE PLAN:

  Upon activation, the following activities will be undertaken:

  1. All Emergency Response Contacts as listed in this HASP and the Emergency Response Plan (Appendix A of this HASP) will be advised.
  2. The local police authorities will immediately be contacted by the SSHO and advised of the situation.
  3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two sustained successive readings below action levels are measured, air monitoring may be halted or modified by the SSHO.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Phone Number
SSHO	Police	911
SSHO	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Appendix A of this HASP.

- EXPLOSIVE VAPORS:
  - Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the site perimeter.
  - Sustained atmospheric concentrations of greater than 10% LEL at the downwind site perimeter – Halt work and contact local Fire Department.

- Airborne Particulate Community Air Monitoring

Respirable (PM-10) particulate monitoring will be performed on a continuous basis at the upwind and downwind perimeter of the exclusion zone. The monitoring will be performed using real-time monitoring equipment capable of measuring PM-10 and integrating over a 15-minute period for comparison to the airborne particulate action levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. All readings will be recorded and will be available for NYSDEC and NYSDOH review. Readings will be interpreted as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than the background (upwind perimeter) reading 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 provided that the downwind PM-10 particulate levels do not

exceed 150 μg/m³ above the upwind level and that visible dust is not migrating from the work area.

- If, after implementation of dust suppression techniques downwind PM-10 levels are greater than 150 μg/m³ above the upwind level, work activities must be stopped and dust suppression controls re-evaluated. Work can resume provided that supplemental dust suppression measures and/or other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 μg/m³ of the upwind level and in preventing visible dust migration.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Appendix A of this HASP).

9.0 SPILL RELEASE/RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the site. The purpose of this Section of the HASP is to plan appropriate response, control, counter-measures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The spill containment program addresses the following elements:

- Potential hazardous material spills and available controls.
- Initial notification and evaluation.
- Spill response.
- Post-spill evaluation.

9.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding RQ.
- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Chemicals regulated under 6NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding RQ.

Oil/petroleum products are considered to pose a significant spill potential whenever the following situations occur:

- The potential for a "harmful quantity" of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes that could form a visible sheen on the water or violate applicable water quality standards.

- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.

- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1,100 gallons or greater.

The evaluation indicates that, based on site history and decommissioning records, a hazardous material spill and/or a petroleum product spill is not likely to occur during site activities.

9.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSHO. The worker will, to the best of his/her ability, report the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, if any, and any associated injuries. The Emergency Response Plan (Appendix A) will immediately be implemented if an emergency release occurs.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the site owner and NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (e.g., USEPA) are to be

contacted regarding the release, and will follow-up with written reports as required by the applicable regulations.

9.3 Spill Response

For all spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned or otherwise blocked off to prevent unauthorized access.
- Appropriate PPE, as specified by the SSHO, will be donned before entering the spill area.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, the Contractor will maintain a Spill Control and Containment Kit in the Field Office or other readily accessible storage location. The kit will consist of, at a minimum, a 50-lb bag of "speedy dry" granular absorbent material, absorbent pads, shovels, empty 5-gallon pails, and an empty open-top 55-gallon drum. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the site. The response contractor may use heavy equipment (e.g., excavator, backhoe, etc.) to berm the soils surrounding the spill site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720

- Op-Tech: (607) 565-8891 (Waverly, NY) or (800) 225-6750

9.4 Post-Spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 9.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

10.0 HEAT/COLD STRESS MONITORING

Although it is anticipated that work activities at the site will be completed during the winter months, measures to be taken to minimize heat stress to Benchmark employees have also been included in the event that work activities extend to the spring months. The SSHO and/or his or her designee will be responsible for monitoring Benchmark field personnel for symptoms of heat/cold stress.

10.1 Heat Stress Monitoring

PPE may place an employee at risk of developing heat stress, a common and potentially serious illnesses often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. PPE may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately every 1 lb of weight lost). The normal thirst

mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be encouraged to drink more.

- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness - Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.

- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.

- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same. If the pulse rate is 100 beats per minute at the beginning of the nest rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period

should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No Benchmark employee will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

  1) **Frost Nip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/ heat.

  2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue, which will be firm to the touch but will yield little pain. The treatment is identical for Frost nip.

  3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. Treatment is identical to that for Frost nip.

- **Hypothermia** is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:

  1) Shivering

  2) Apathy (i.e., a change to an indifferent or uncaring mood)

3) Unconsciousness

4) Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

1) Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

2) Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).

3) Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the SSHO to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated area, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
  - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a workers request.

- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill less than 30 degrees Fahrenheit with precipitation).

- As a screening measure whenever anyone worker on site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

11.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established on a daily basis and communicated to all employees and other site users by the SSHO. It shall be the responsibility of each Contractor's SSHO to ensure that all site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- **Exclusion Zone ("Hot Zone")** - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape. All personnel entering the Exclusion Zone must wear the prescribed level of PPE identified in Section 7.0.

- **Contamination Reduction Zone** - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- **Support Zone** - The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

In the absence of other task-specific work zone boundaries established by the SSHO, the following boundaries will apply to all remedial activities involving disruption or handling of site soils or groundwater:

- **Exclusion Zone:** 50 foot radius from the outer limit of the sampling/construction activity.

- **Contaminant Reduction Zone:** 100 foot radius from the outer limit of the sampling/construction activity.

- **Support Zone:** Areas outside the Contaminant Reduction Zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the SSHO. Only personnel who are essential to the completion of the task and are wearing the prescribed PPE will be allowed access to these

areas. Entrance of all personnel must be approved by the SSHO. Construction fencing and warning symbols (i.e., construction cones and flags) will be erected around the site to alert the general public to the on-going site activities.

The SSHO will maintain a Health and Safety Logbook containing the names of Benchmark workers and their level of protection. The zone boundaries may be changed by the SSHO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

12.0 DECONTAMINATION

12.1 Decontamination for Benchmark Employees

The degree of decontamination required is a function of a particular task and the environment within which it occurs. The following decontamination procedure will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the site. All Benchmark personnel on-site shall follow the procedure below, or the Contractor's procedure (if applicable), whichever is more stringent.

Station 1 - Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the contamination reduction and exclusion zones (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.

Station 2 - Boots and Gloves Wash and Rinse: Scrub outer boots and outer gloves. Deposit tape and gloves in waste disposal container.

Station 3 - Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container.

Station 4 - Canister or Mask Change: If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot cover donned, and worker returns to duty.

Station 5 - Outer Garment/Face Piece Removal: Protective suit removed and deposited in separate container provided by Contractor. Face piece or goggles are removed if used. Avoid touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 6 - Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face, and forearms with absorbent wipes. If field activities proceed for 6 consecutive months or longer, shower facilities will be provided for worker use in accordance with OSHA 29 CFR 1910.120(n).

12.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a site contaminant would be considered "Immediately Dangerous to Life or Health."

12.3 Decontamination of Field Equipment

Decontamination of heavy equipment will be conducted by the Contractor in accordance with his approved Health and Safety Plan in the Contamination Reduction Zone. At a minimum, this will include manually removing heavy soil contamination, followed by steam cleaning on an impermeable pad.

Decontamination of all tools used for sample collection purposes will be conducted by Benchmark personnel. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal), which will aid in the decontamination effort. Any tool or part of a tool made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of bailers, split-spoons, spatula knives, and other tools used for environmental sampling and examination shall be as follows:

- Disassemble the equipment
- Wash with water to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene.

13.0 CONFINED SPACE ENTRY

OSHA 29 CFR 1910.146 defines a confined space as a space that is large enough and so configured that an employee can physically enter and do assigned work; has limited or restricted means for entry and exit; and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by Benchmark employees is not anticipated to be necessary to complete the site activities identified in Section 2.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by Benchmark employees cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed and a confined-space entry permit will be issued through Benchmark's corporate Health and Safety Director. Benchmark employees shall not enter a confined space without these procedures and permits in place.

14.0 FIRE PREVENTION AND PROTECTION

14.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

14.2 Equipment and Requirements

Fire extinguishers will be provided by each Contractor and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly, weighed semi-annually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

14.3 Flammable and Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

14.4 Hot Work

If the scope of work necessitates welding or blowtorch operation, the hot work permit presented in Appendix C of this HASP will be completed by the SSHO and reviewed/issued by the Project Manager.

15.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Appendix A. The hospital route map is presented as Figure A-1.

16.0 REFERENCES

1. *Phase I Environmental Site Assessment, 330 Maple Road Site,* Great Lakes Environmental & Safety Consultants, Inc., March 2005.

2. *Phase II Environmental Site Assessment, 330 Maple Road Site,* Great Lakes Environmental & Safety Consultants, Inc., May 2005.

3. *Supplemental Phase II Investigation Findings, 330 Maple Road, Williamsville, New York.* Benchmark Environmental Engineering and Science, PLLC. May 2006.

4. *Remedial Investigation Report, 330 Maple Road, Williamsville, New York.* Benchmark Environmental Engineering and Science, PLLC. October 2007. Revised January 2008.

5. *New York State Department of Health Generic Community Air Monitoring Plan,* Appendix 1A, Draft DER-10 Technical Guidance for Site Investigation and Remediation, December 2002.

TABLES

BENCHMARK
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TABLE 1

CONSTITUENTS OF POTENTIAL CONCERN

Benderson Development Company, LLC
330 Maple Road Site
Amherst, New York

Parameter	CAS No.	Maximum Detected Concentration [1]	
		Groundwater (mg/L)	Soil (mg/kg)
Polycyclic Aromatic Hydrocarbons (PAHs):			
Benzo(a)anthracene	56-55-3	ND	220
Benzo(a)pyrene	50-32-8	ND	240
Benzo(b)fluoranthene	205-99-2	ND	290
Benzo(k)fluoranthene	207-08-9	ND	88
Chrysene	218-01-9	ND	250
Indeno(1,2,3-cd)pyrene	193-39-5	ND	140
Inorganics:			
Lead	7439-92-1	512	98,000

Notes:
1. Constituents of Potential Concern Based on January 2008 RI report.
3. ND = not detected.

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TABLE 2

TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN [1]

Benderson Development Company, LLC
330 Maple Road Site
Amherst, New York

Parameter	Synonyms	CAS No.	Code	Concentration Limits [2,3]		
				PEL	TLV	IDLH
Polycyclic Aromatic Hydrocarbons (PAHs) : ppm						
Benzo(a)anthracene	*none*	56-55-3	*none*	--	--	--
Benzo(a)pyrene	*none*	50-32-8	*none*	--	--	--
Benzo(b)fluoranthene	*none*	205-99-2	*none*	--	--	--
Benzo(k)fluoranthene	*none*	207-08-9	*none*	--	--	--
Chrysene	*none*	218-01-9	*none*	--	--	--
Indeno(1,2,3-cd)pyrene	*none*	193-39-5	*none*	--	--	--
Inorganics : mg/m³						
Lead	*none*	7439-92-1	*none*	0.05	0.15	100

Notes:
1. Constituents are identified as Consituents of Potential Concern based on the January 2008 RI report.
2. Concentration limits as reported by NIOSH Pocket Guide to Chemical Hazards, February 2004 (NIOSH Publication No. 97-140, fourth printing with changes and updates).
3. " -- " = concentration limit not available; exposure should be minimized to the extent feasible through appropriate engineering controls & PPE.

Explanation:
Ca = NIOSH considers constituent to be a potential occupational carcinogen.
C-## = Ceiling Level equals the maximum exposure concentration allowable during the work day.
IDLH = Immediately Dangerous to Life or Health.
ND indicates that an IDLH has not as yet been determined.
TLV = Threshold Limit Value, established by American Conference of Industrial Hygienists (ACGIH), equals the maximum exposure concentration allowable for 8 hours/day @ 40 hours/week.
TLVs are the amounts of chemicals in the air that almost all healthy adult workers are predicted to be able to tolerate without adverse effects. There are three types.
TLV-TWA (TLV-Time-Weighted Average) which is averaged over the normal eight-hour day/forty-hour work week. (Most TLVs.)
TLV-STEL or Short Term Exposure Limits are 15 minute exposures that should not be exceeded for even an instant. It is not a stand alone value but is accompanied by the TLV-TWA. It indicates a higher exposure that can be tolerated for a short time without adverse effect as long as the total time weighted average is not exceeded.
TLV-C or Ceiling limits are the concentration that should not be exceeded during any part of the working exposure.
Unless the initials "STEL" or "C" appear in the Code column, the TLV value should be considered to be the eight-hour TLV-TWA.
PEL = Permissible Exposure Limit, established by OSHA, equals the maximium exposure conconcentration allowable for 8 hours per day @ 40 hours per week

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TABLE 3

POTENTIAL ROUTES OF EXPOSURE TO THE CONSTITUENTS OF POTENTIAL CONCERN [1]

Benderson Development Company, LLC
330 Maple Road Site
Amherst, New York

Activity [1]	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
1. Soil Excavation and Handling	x	x	

Notes:
1. Activity as described in Section 1.5 of the Health and Safety Plan.

TABLE 4

REQUIRED LEVELS OF PROTECTION FOR RI TASKS

Benderson Development Company, LLC
330 Maple Road Site
Amherst, New York

Activity	Respiratory Protection [1]	Clothing	Gloves [2]	Boots [2,3]	Other Required PPE/Modifications [2,4]
1. Soil Excavaion and Handling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS

Notes:

1. Respiratory equipment shall conform to guidelines presented in Section 7.0 of this HASP. The Level C requirement is an air-purifying respirator equiped with organic compound/acid gas/dust cartridge.
2. HH = hardhat; L= Latex; L/N = latex inner glove, nitrile outer glove; N = Nitrile; S = Saranex; SG = safety glasses; SGSS = safety glasses with sideshields; STSS = steel toe safety shoes.
3. Latex outer boot (or approved overboot) required whenever contact with contaminated materials may occur. SSHO may downgrade to STSS (steel-toed safety shoes) if contact will be limited to cover/replacement soils.
4. Dust masks shall be donned as directed by the SSHO (site safety and health officer) or site safety technician whenever potentially contaminated airborne particulates (i.e., dust) are present in significant amounts in the breathing zone. Goggles may be substituted with safety glasses w/side-shields whenever contact with contaminated liquids is not anticipated.

APPENDIX A

EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN
for
REMEDIAL ACTIVITIES

at the
330 Maple Road Site

Amherst, New York

July 2008 0105-002-201

Prepared for:

Benderson Development Company, LLC

330 MAPLE ROAD SITE
HEALTH AND SAFETY PLAN FOR RI ACTIVITIES
APPENDIX A: EMERGENCY RESPONSE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

1.0 GENERAL

This report presents the site-specific Emergency Response Plan (ERP) referenced in the Site Health and Safety Plan (HASP) prepared for Remedial Investigation (RI) activities conducted at the 330 Maple Road Site, Amherst, New York (see Figures 1 and 2 of the Remedial Work Plan). This appendix of the HASP describes potential emergencies that may occur at the Site; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training all workers must receive in order to follow emergency procedures. This ERP also describes the provisions this site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This ERP is consistent with the requirements of 29 CFR 1910.120(l) and provides the following site-specific information:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Evacuation routes and procedures.
- Decontamination procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Emergency personal protective equipment (PPE) and equipment.

2.0 PRE-EMERGENCY PLANNING

This Site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:

1. Medical, due to physical injury
2. Fire, due to use of gasoline onsite by vehicles.

Source of Emergency:

1. Slip/trip/fall
2. Fire

Location of Source:

1. Non-specific

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency clean up. Emergency response equipment available on the site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this site but not ordinarily stocked.

Any additional personal protective equipment (PPE) required and stocked for emergency response is also listed in below. During an emergency, the Emergency Response Coordinator (ERC) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Section 7.0, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
Spill Response Kit	1	Site Vehicle
First Aid Kit	1	Site Vehicle
Chemical Fire Extinguisher	2 (minimum)	All heavy equipment and Site Vehicle

Emergency PPE	Quantity	Location
Full-face respirator	1 for each worker	Site Vehicle
Chemical-resistant suits	4 (minimum)	Site Vehicle

4.0 EMERGENCY PLANNING MAPS

An area-specific map of the 330 Maple Road Site will be developed on a daily basis during performance of field activities. The map will be marked to identify critical on-site emergency planning information, including: emergency evacuation routes, a place of refuge, an assembly point, and the locations of key site emergency equipment. Site zone boundaries will be shown to alert responders to known areas of contamination. There are no major topographical features; however, the direction of prevailing winds/weather conditions that could affect emergency response planning is also marked on the map. The map will be posted at a site-designated place of refuge and inside the Benchmark personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Manager: *Michael A. Lesakowski*
Work: (716) 856-0599
Mobile: (716) 864-1730

Corporate Health and Safety Director: *Thomas H. Forbes*
Work: (716) 856-0599
Mobile: (716) 864-1730

Site Safety and Health Officer (SSHO): *Bryan C. Hann*
Work: (716) 856-0635
Home: (716) 870-1165

MILLARD FILLMORE SUBURBAN HOSPITAL (ER):	(716) 568-3600
FIRE:	911
AMBULANCE:	911
AMHERST POLICE DEPARTMENT:	(716) 689-1322 or 911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(716) 847-4385
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:
330 Maple Road Site
330 Maple Road
Amherst, New York 14221
Site Phone Number: (Insert Cell Phone or Field Trailer): _____

6.0 EMERGENCY ALERTING & EVACUATION

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of each contractor's Site Health and Safety Officer to ensure an adequate method of internal communication is understood by all personnel entering the site. Unless all personnel are otherwise informed, the following signals shall be used.

1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.

2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible, by way of the nearest exit. Emergency decontamination procedures detailed in Section 12.0 of the HASP are followed to the extent practical without compromising the safety and health of site personnel. The evacuation routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by rehearsals and inputs from emergency response organizations. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the construction Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all Benchmark workers of any changes.

Personnel exiting the site will gather at a designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly

site. If any worker cannot be accounted for, notification is given to the SSHO (***Bryan Hann***) so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

7.0 EXTREME WEATHER CONDITIONS

In the event of adverse weather conditions, the Site Safety and Health Officer in conjunction with the Contractor's SSHO will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (viz., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy snow)

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID

Personnel Exposure:

The following general guidelines will be employed in instances where health impacts threaten to occur acute exposure is realized:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Millard Fillmore Suburban Hospital.

- Inhalation: Move to fresh air and, if necessary, transport to Millard Fillmore Suburban Hospital.

- Ingestion: Decontaminate and transport to Millard Fillmore Suburban Hospital.

Personal Injury:

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Millard Fillmore Suburban Hospital via ambulance. The Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSHO to ensure that the expended items are replaced.

Directions to Millard Fillmore Suburban Hospital (see Figure A-1):

The following directions describe the best route to Millard Fillmore Suburban Hospital, 1540 Maple Road (total distance approximately 2.3 miles):

- Turn left (east) on Maple Road toward N. Forest Road.

- The hospital will be on the left hand (north) side of Maple Road. Follow signs to the emergency room (ER).

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING

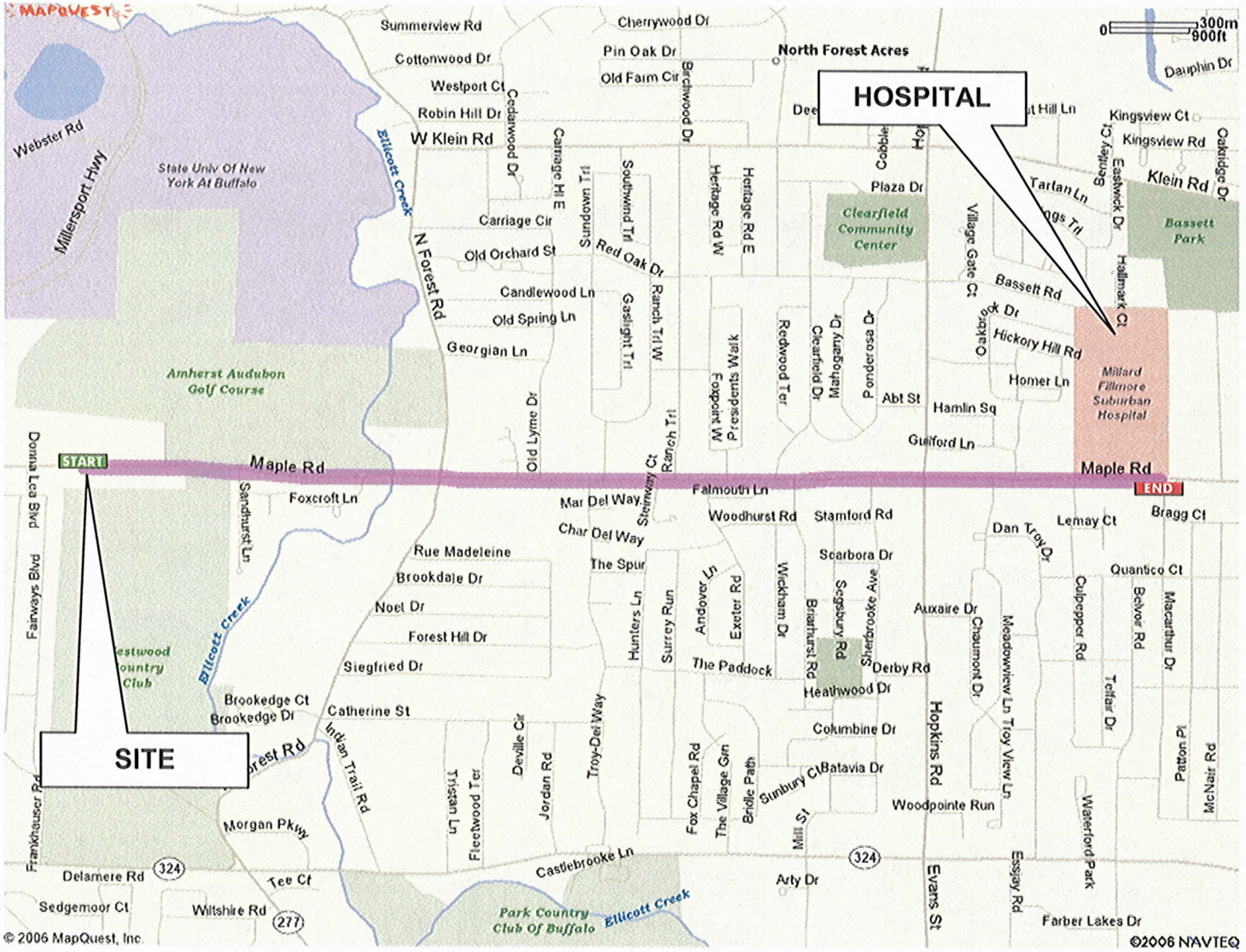
Following an emergency, the SSHO and Project Manager shall review the effectiveness of this Emergency Response Plan (ERP) in addressing notification, control and evacuation requirements. Updates and modifications to this ERP shall be made accordingly. It shall be the responsibility of each contractor to establish and assure adequate records of the following:

- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

10.0 EMERGENCY RESPONSE TRAINING

All persons who enter the worksite, including visitors, shall receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSHO. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

FIGURES



Millard Fillmore Suburban Hospital

1540 Maple Road
Williamsville, NY 14221
(716) 568-3600

Directions:

1. Turn right onto Maple Road from Site.
2. Stay on Maple approximately 3miles.
3. Hospital is on left.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0105-002-100
DATE: JUNE 2006
DRAFTED BY: BCH

HOSPITAL ROUTE MAP

HEALTH AND SAFETY PLAN (HASP)

330 MAPLE ROAD SITE
WILLIAMSVILLE, NEW YORK

PREPARED FOR
BENDERSON DEVELOPMENT COMPANY, LLC

FIGURE A-1

FILEPATH: g:\cad\benchmark\benderson\330 maple road - williamsville\ri work plan\hasp\figure a-1: hospital route map.dwg

APPENDIX B

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

APPENDIX B

New York State Department of Health
Generic Community Air Monitoring Plan [1]

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.

---

[1] Taken from Appendix 1A of the Draft DER-10 Technical Guidance for Site Investigation and Remediation, December 2002.

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 ($\mu g/m^3$) 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 $\mu g/m^3$ 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 $\mu g/m^3$ 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 $\mu g/m^3$ 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.

APPENDIX C

HOT WORK PERMIT FORM

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

HOT WORK PERMIT

PART 1 - INFORMATION

Issue Date:

Date Work to be Performed: Start: Finish (permit terminated):

Performed By:

Work Area:

Object to be Worked On:

PART 2 - APPROVAL

(for 1, 2 or 3: mark Yes, No or NA)*

Will working be on or in: Finish (permit terminated):

1. Metal partition, wall, ceiling covered by combustible material?	yes	no
2. Pipes, in contact with combustible material?	yes	no
3. Explosive area?	yes	no

* = If any of these conditions exist (marked "yes"), a permit will not be issued without being reviewed and approved by Thomas H. Forbes (Corporate Health and Safety Director). Required Signature below.

PART 3 - REQUIRED CONDITIONS**

(Check all conditions that must be met)

	PROTECTIVE ACTION		PROTECTIVE EQUIPMENT
	Specific Risk Assessment Required		Goggles/visor/welding screen
	Fire or spark barrier		Apron/fireproof clothing
	Cover hot surfaces		Welding gloves/gauntlets/other:
	Move movable fire hazards, specifically		Wellintons/Knee pads
	Erect screen on barrier		Ear protection: Ear muffs/Ear plugs
	Restrict Access		B.A.: SCBA/Long Breather
	Wet the ground		Respirator: Type:
	Ensure adequate ventilation		Cartridge:
	Provide adequate supports		Local Exhaust Ventilation
	Cover exposed drain/floor or wall cracks		Extinguisher/Fire blanket
	Fire watch (must remain on duty during duration of permit)		Personal flammable gas monitor
	Issue additional permit(s):		

Other precautions:

** Permit will not be issued until these conditions are met.

SIGNATURES

Orginating Employee: Date:

Project Manager: Date:

REMEDIAL WORK PLAN
APPENDIX C

MASTER EROSION CONTROL PLAN (MEC PLAN)

330 MAPLE ROAD SITE
AMHERST, NEW YORK

July 2008 0105-002-201

Prepared for:

Benderson Development Company, LLC

MASTER EROSION CONTROL PLAN
330 MAPLE ROAD SITE

Table of Contents

APPENDICES

1.0 INTRODUCTION

1.1 Background and History

Benderson Development Company, LLC (Benderson), has elected to pursue cleanup and redevelopment of the 330 Maple Road site (Site), located at 330 Maple Road, Amherst, New York, under the New York State Brownfield Cleanup Program (BCP) and has entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) (BCP Site No. C915207).

The redevelopment site is a 31.6 acre parcel owned by Benderson Development Company, LLC. The Site presently consists of an outdoor shooting range, a two-story clubhouse, a gravel parking lots and otherwise fallow land. The shooting range consists of ten trap houses and three sheds used to store targets and supplies. The site is currently unoccupied, and available records indicate that the only known site operator at 330 Maple Road has been the Buffalo Gun Club, present from approximately 1943 until 2006. The Site was apparently undeveloped prior to 1943.

Based on preliminary environmental investigations completed at the site in 2006, approximately 26 acres of the 31.6-acre redevelopment parcel were identified as contaminated as a result of historic Site use. As such, that 26-acre portion of the greater 31.6-acre parcel is defined as the Site within the context of the BCA (see Figure 2 of the Remedial Work Plan).

Remedial activities are being conducted to address lead and semi-volatile organic compound (SVOC)-impacted soil at the 330 Maple Road Site. Details of the nature and extent of environmental impacts are included in the January 2008 RI report.

1.2 Purpose and Scope

Erosion control will be a critical component of preventing the potential migration of contaminants onto remediated property or off-site during remediation of the site. This Master Erosion Control Plan was prepared to provide guidance to contractors during excavation and backfill activities. This document is generic in nature and provides minimum erosion control practices to be used during construction activities.

2.0 GENERAL PERMIT REQUIREMENTS

If construction activities disturb more than 1 acre of land, the Federal Water Pollution Control Act (as amended, 33 U.S.C. 1251 et. seq.) and the New York State Environmental Conservation Law (Article 17, Titles 7 and 8, and Article 70) would apply.

With some exceptions, operators of construction activities that will result in the disturbance of 1 or more acres of land must obtain coverage under SPDES General Permit (GP-02-01) prior to the commencement of soil disturbance. Also requiring a permit are construction activities disturbing less than 1 acre if they are part of a larger common plan of development or sale with a planned disturbance of equal to or greater than 1 acre, or activities that are designated by the NYSDEC. The NYSDEC can require a permit for construction activities disturbing less than 1 acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

As the Site is being remediated and redeveloped under the Brownfield Cleanup Program, this MECP is intended to meet the functional equivalent of NYSDEC Storm water Pollution Prevention Plan. Implementation of the MECP will be the responsibility of the remediation subcontractor.

3.0 POTENTIAL EROSION CONTROL CONCERNS

Potential areas and items of concern during site construction activities include the following:

- Remediated areas or off-site properties adjacent to the construction activity need protection so they do not become impacted by site operations.
- Storm water inlets will require protective measures to limit sediment transfer to storm sewers.
- Runoff from soil stockpiles (if any) will require erosion controls.
- Surface slopes need to be minimized as much as practical to control sediment transfer.
- Soil/fill excavated during construction will require proper handling and disposal.

4.0 EROSION CONTROL MEASURES

4.1 Background

Standard soil conservation practices need to be incorporated into the construction plans to mitigate soil erosion damage, off-site sediment migration, and water pollution from erosion. These practices combine vegetative and structural measures, many of which will be permanent in nature and become part of the completed project (i.e. drainage channels and grading). Other measures will be temporary and serve only during the construction stage. Selected erosion and sediment control measures will meet the following criteria:

- Minimize erosion through project design (maximum slopes, phased construction, etc.).
- Incorporate temporary and permanent erosion control measures.
- Remove sediment from sediment-laden storm water before it leaves the Site.

4.2 Temporary Control Measures

Temporary erosion and sedimentation control measures and facilities will be used during construction. These measures will be installed and maintained by the property owner(s) until they are either no longer needed or until such time as permanent measures are installed and become effective. At a minimum, the following temporary measures will be used:

- Silt fencing
- Straw/hay bales
- Temporary vegetation/mulching
- Temporary sedimentation basins
- Cautious placement, compaction and grading of stockpiles

4.2.1 Silt Fencing

Construction and regrading activities will result in surface water flow to drainage ditches and swales, storm sewers, and adjacent properties. Silt fencing will be the primary sediment control measure used in these areas. Prior to extensive soil excavation or grading activities, silt fences will be installed along the perimeter of all construction areas. The

orientation of the fencing will be adjusted as necessary as the work proceeds to accommodate changing site conditions.

Intermediate fencing will be used upgradient of the perimeter fencing to help lower surface water runoff velocities and reduce the volume of sediment to perimeter fencing. Stockpiles will also be surrounded with silt fencing.

As sediment collects, the silt fences will be cleaned as necessary to maintain their integrity. Removed sediment will be used elsewhere on-site as general fill. All perimeter silt fences will remain in place until construction activities in an area are completed and vegetative cover has been established. Silt fences will be installed in accordance with the details presented in Appendix C-1.

4.2.2 Straw and/or Hay Bales

Straw and/or hay bales will be used to intercept sediment laden storm water runoff in drainage channels during construction. The use of either hay or straw will be based on the availability of materials at the time of construction.

Bales will be placed in swales and ditches where the anticipated flow velocity is not expected to be greater than 5 feet/second (fps). Intermediate bales will be placed upgradient of the final barrier to reduce flow velocities and sediment loadings where higher velocities are anticipated.

As with silt fencing, sediment will be removed as necessary from behind the bales and disposed of on-site. Bales that have become laden with sediment or that have lost their structural integrity or effectiveness due to the weather will be replaced. Bales should be installed in accordance with the details presented in Appendix C-1.

4.2.3 Cautious Placement of Stockpiles

Excavation activities may produce stockpiles of soil and subgrade soil/fill materials. Careful placement and construction of stockpiles will be required to control erosion. Stockpiles will be placed no closer than 50 feet from storm water inlets and parcel boundaries. Additionally, stockpiles will be graded and compacted as necessary for positive surface water runoff and dust control. Impacted stockpiles will be underlain and covered with secured polyethylene tarpaulin until proper disposal has been secured.

4.3 Permanent Control Measures

Permanent erosion and sedimentation control measures and structures will be installed as soon as practical during construction for long-term erosion protection. Examples of permanent erosion control measures include:

- Using maximum slopes in erosion prone areas to limit erosion.
- Minimizing the potential contact with, and migration of, subsurface soil/fill through the placement of a "clean" soil cover system in all areas not covered with structures, roads, parking areas, sidewalks, etc.
- Planting and maintaining vegetation.
- Limiting runoff flow velocities to the extent practical.
- Lining collection channels with riprap, erosion control fabric, vegetation, or similar materials.

5.0 CONSTRUCTION MANAGEMENT PRACTICES

5.1 General

The following general construction practices should be evaluated for erosion and sedimentation control purposes during site construction activities:

- Clearing and grading only as much area as is necessary to accommodate the construction needs to minimize disturbance of areas subject to erosion (i.e. phasing the work).
- Covering exposed or disturbed areas of the site as quickly as practical.
- Installing all erosion and sediment control measures before disturbing the site subgrade.
- Using routine entry/exit routes to minimize both on-site and off-site tracking of soil by vehicles.

5.2 Monitoring, Inspection, and Maintenance Plan

All erosion and sedimentation controls described in this Plan should be inspected by a qualified representative of the property owner(s) within 24 hours of a heavy rainfall event and repaired or modified as necessary to effectively control erosion of turbidity problems. Inspections should include areas under construction, stockpile areas, erosion control devices (i.e., silt fences, hay bales, etc.), and entry/exit routes. Routine inspections of the entire site should also be made during the construction. If inspections indicate problems, corrective measures should be implemented within 24 hours.

APPENDIX C-1

EROSION CONTROL DETAILS

- *Silt Fence*
- *Straw Bale Dike*
- *Perimeter Dike/Swale*
- *Temporary Swale*
- *Sediment Trap for Drop Inlet*

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

New York State Standards and Specifications for Erosion and Sediment Control

August 2005

New York State
Department of Environmental Conservation

George E. Pataki, Governor

STANDARD AND SPECIFICATIONS FOR TEMPORARY CRITICAL AREA PLANTINGS

Definition

Providing erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

Purpose

To provide temporary erosion and sediment control. Temporary control is achieved by covering all bare ground areas that exist as a result of construction or a natural event.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

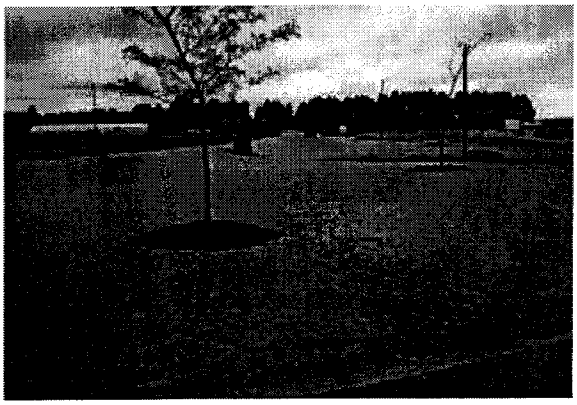
Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).
IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding.

STANDARD AND SPECIFICATIONS FOR MULCHING



Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/ acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

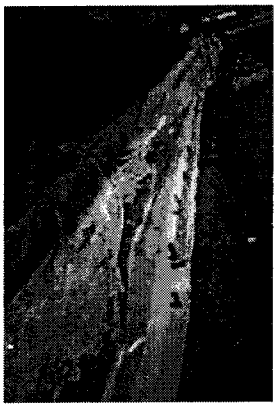
Table 3.7
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7"	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2"	9 cu. yds.	405 cu. yds.	3"	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/ yd. 60-90 lbs./roll	48" x 50 yds. or 48" x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	8" x 100" 2-sided plastic, 48" x 180" 1-sided plastic	—	—	Use without additional mulch. Excellent for seeding establishment. Tie down as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Compost	Up to 3" pieces, moderately to highly stable	3-9 cu. yds.	134-402 cu. yds.	1-3"	Coarser textured mulches may be more effective in reducing weed growth and wind erosion.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 3.8
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45^0 Fahrenheit are required.

STANDARD AND SPECIFICATIONS FOR TEMPORARY SWALE



Definition

A temporary excavated drainage way.

Purpose

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary swales are constructed:

1. to divert flows from entering a disturbed area.

2. intermittently across disturbed areas to shorten overland flow distances.

3. to direct sediment laden water along the base of slopes to a trapping device.

4. to transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 5A.2 on page 5A.5 for details.

	Swale A	Swale B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specification for Waterways on page 5B.11.

Stabilization

Stabilization of the swale shall be completed within 7 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade[1]	Flow Channel A (<5 Ac.)	Flow Channel B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, Sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. or stone or Recycled Concrete Equivalent[2] or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[2] or geotextile	Site Specific Engineering Design

[1] In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.
[2] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

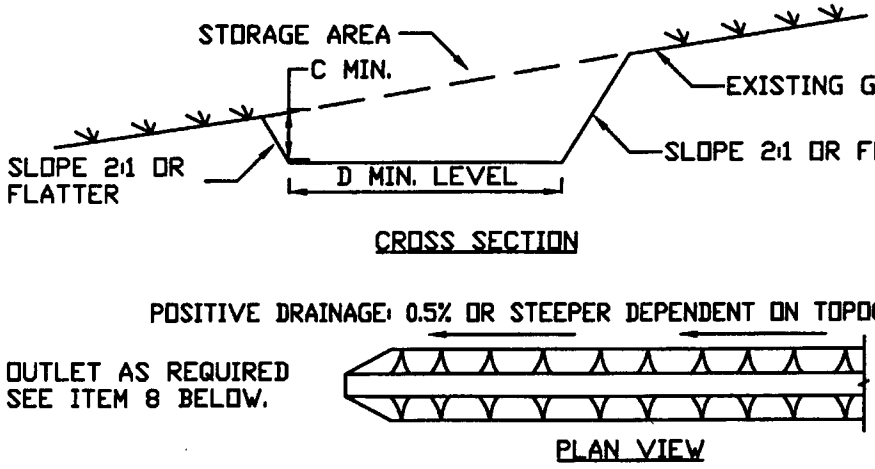
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

If a swale is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

Figure 5A.2
Temporary Swale



CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE FLOW CHANNEL STABILIZATION CHART BELOW:

TYPE OF TREATMENT	CHANNEL GRADE	A(5 AC. OR LESS)	B(5 AC -10AC)
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED AND COVER USING RECP
3	5.1-8.0%	SEED AND COVER WITH RECP	LINED WITH 4-8" RIP-RAP OR GEOTEXTILE
4	8.1-20.%	LINED WITH 4-8" RIP-RAP OR GEOTEXTILE	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

TEMPORARY SWALE

STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE

Definition

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area.

Purpose

The purpose of a perimeter dike/swale is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 5A.3 on page 5A.8 for details.

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from affected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area – Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres, see earth dike or temporary swale; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height – 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike – 2 feet minimum.

Width of swale – 2 feet minimum.

Grade – Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 8 percent.

Stabilization – The disturbed area of the dike and swale shall be stabilized within 7 days of installation, in accordance with the standard and specifications for temporary swales.

Outlet

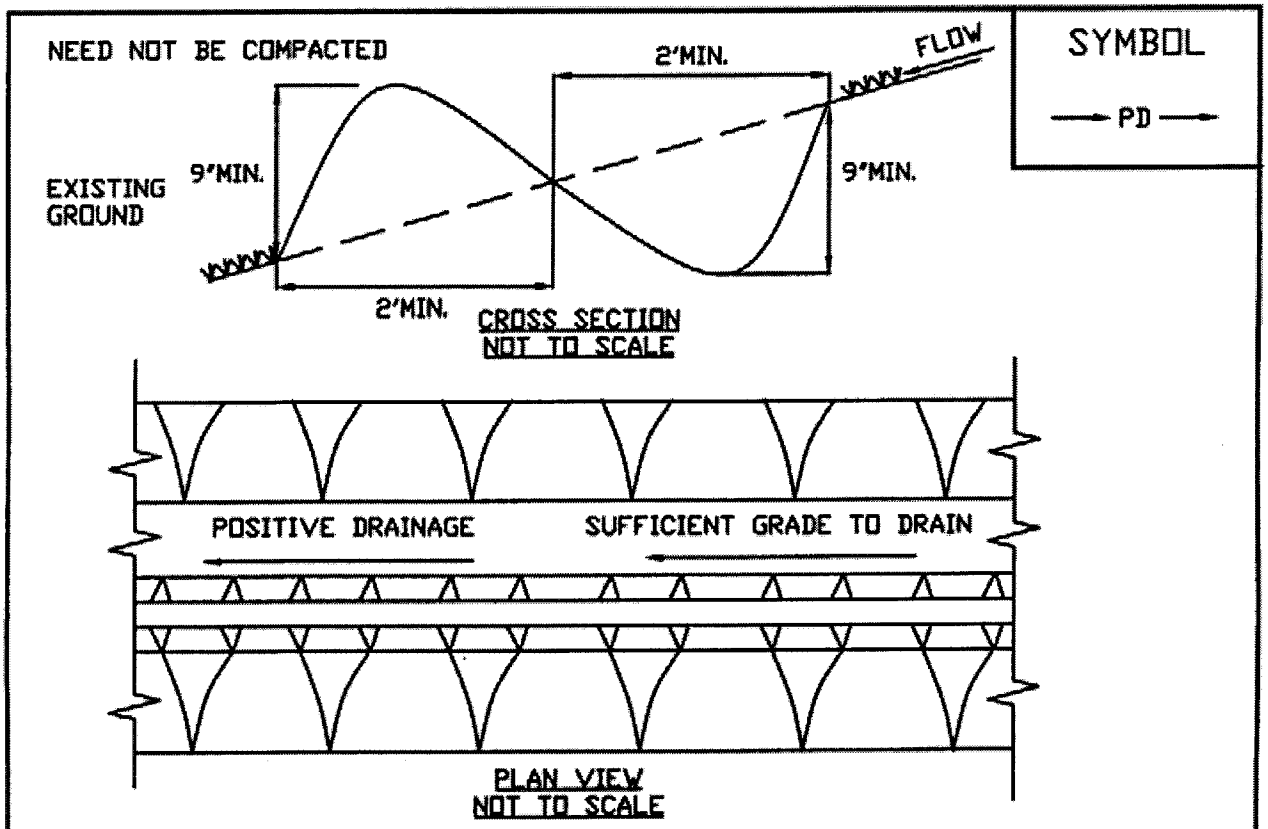
1. Perimeter dike/swale shall have a stabilized outlet.

2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.

3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.

4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 5A.3
Perimeter Dike/Swale



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	PERIMETER DIKE OR SWALE

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw, or similar material, used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes have an estimated design life of three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits.

Constructed Slope	Percent Slope	Slope Length (ft.)
2:1	50	25
3:1	33	50
4:1	25	75

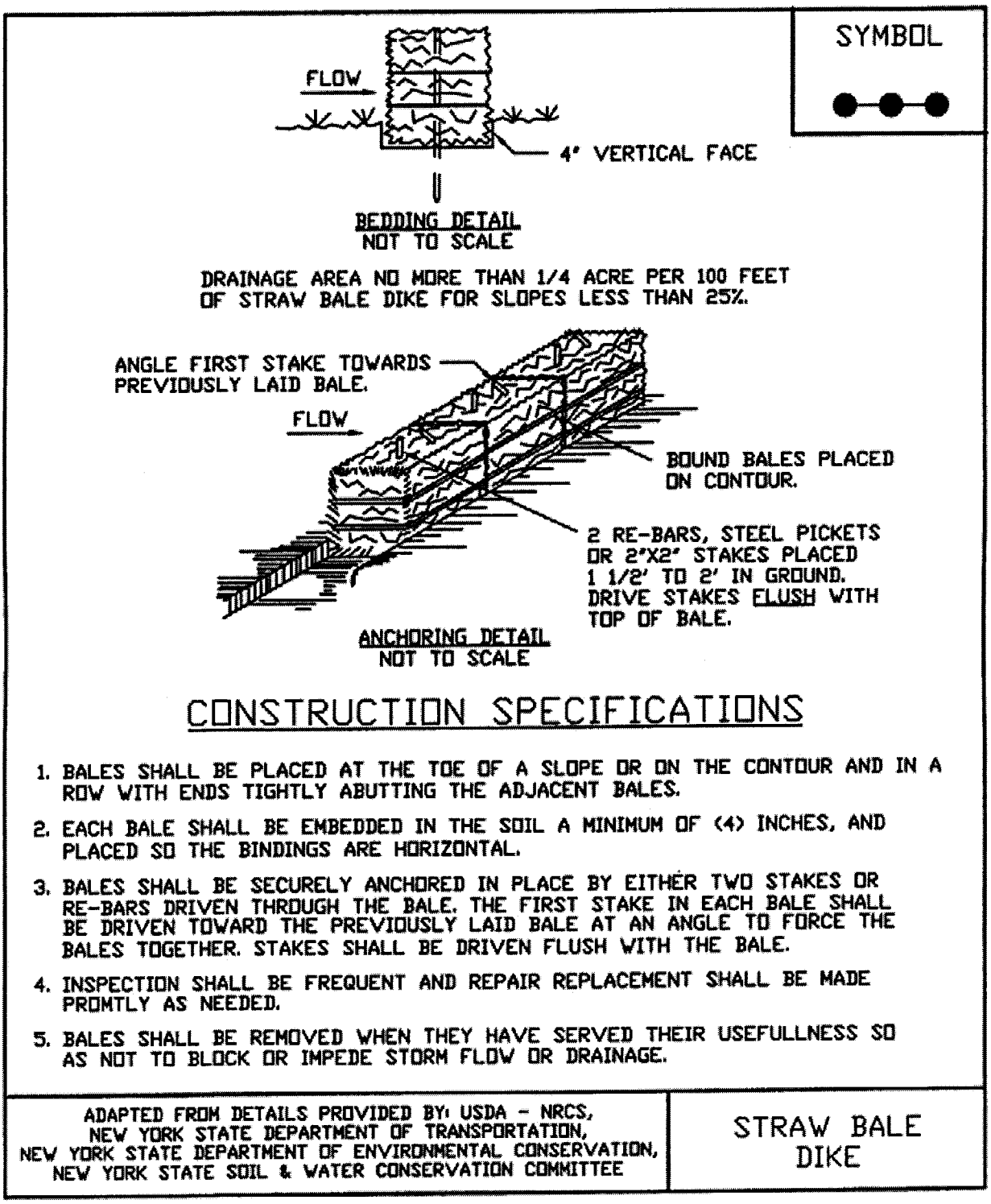
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage areas in this instance shall be less than one quarter of an acre per 100 feet of fence and the length of slope above the dike shall be less than 200 feet.

Design Criteria

The above table is adequate, in general, for a one-inch rainfall event. Larger storms could cause failure of this practice. Use of this practice in sensitive areas for longer than one month should be specifically designed to store expected runoff. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 5A.7 on page 5A.18 or details.

Figure 5A.7
Straw Bale Dike



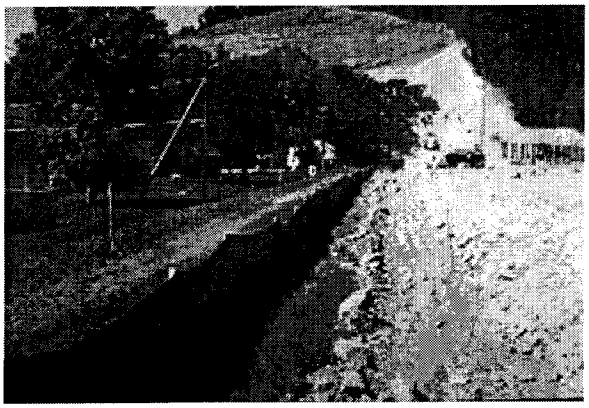
CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STRAW BALE DIKE

STANDARD AND SPECIFICATIONS FOR SILT FENCE



Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Steepness	Maximum Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence; and

3. Erosion would occur in the form of sheet erosion; and

4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.

Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. A detail of the silt fence shall be shown on the plan. See Figure 5A.8 on page 5A.21 for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682

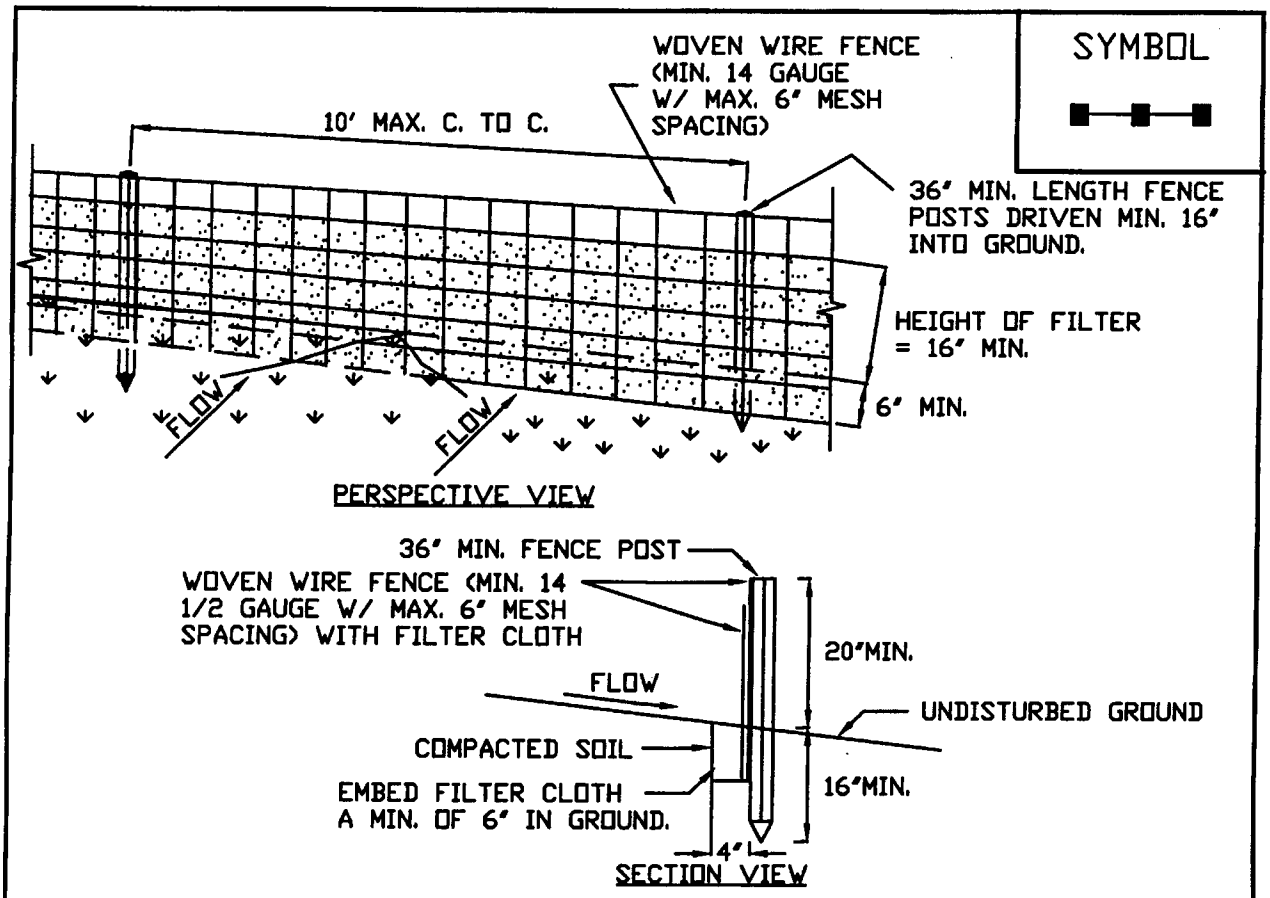
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.8.

Figure 5A.8
Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER 'T' OR 'U' TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN 'BULGES' DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

STANDARD AND SPECIFICATIONS FOR SEDIMENT TRAP

Definition

A temporary sediment control device formed by excavation and/or embankment to intercept sediment laden runoff and retain the sediment.

Purpose

The purpose of the structure is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties, and rights-of-way below the sediment trap from sedimentation.

Conditions Where Practice Applies

A sediment trap is usually installed in a drainage way, at a storm drain inlet, or other points of collection from a disturbed area.

Sediment traps should be used to artificially break up the natural drainage area into smaller sections where a larger device (sediment basin) would be less effective.

Design Criteria

If any of the design criteria presented here cannot be met, see Standard and Specification for Sediment Basin on page 5A.49.

Drainage Area

The drainage area for sediment traps shall be in accordance with the specific type of sediment trap used (Type I through V).

Location

Sediment traps shall be located so that they can be installed prior to grading or filling in the drainage area they are to protect. Traps must not be located any closer than 20 feet from a proposed building foundation if the trap is to function during building construction. Locate traps to obtain maximum storage benefit from the terrain and for ease of cleanout and disposal of the trapped sediment.

Trap Size

The volume of a sediment trap as measured at the elevation of the crest of the outlet shall be at least 3,600 cubic feet per acre of drainage area. The volume of a constructed trap shall be calculated using standard mathematical procedures. The volume of a natural sediment trap may be approximated by the equation: Volume (cu.ft.) = 0.4 x surface area (sq.ft.) x maximum depth (ft.).

Trap Cleanout

Sediment shall be removed and the trap restored to the original dimensions when the sediment has accumulated to ½ of the design depth of the trap. Sediment removed from the trap shall be deposited in a protected area and in such a manner that it will not erode.

Embankment

All embankments for sediment traps shall not exceed five (5) feet in height as measured at the low point of the original ground along the centerline of the embankment. Embankments shall have a minimum four (4) foot wide top and side slopes of 2:1 or flatter. The embankment shall be compacted by traversing with equipment while it is being constructed. The embankment shall be stabilized with seed and mulch as soon as it is completed

The elevation of the top of any dike directing water to any sediment trap will equal or exceed the maximum height of the outlet structure along the entire length of the trap.

Excavation

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Excavated portions of sediment traps shall have 1:1 or flatter slopes.

Outlet

The outlet shall be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.

Sediment traps must outlet onto stabilized (preferable undisturbed) ground, into a watercourse, stabilized channel, or into a storm drain system. Distance between inlet and outlet should be maximized to the longest length practicable.

Trap Details Needed on Erosion and Sediment Control Plans

Each trap shall be delineated on the plans in such a manner that it will not be confused with any other features. Each trap on a plan shall indicate all the information necessary to properly construct and maintain the structure. If the drawings are such that this information cannot be delineated on the drawings, then a table shall be developed. If a table is developed, then each trap on a plan shall have a number and the numbers shall be consecutive.

The following information shall be shown for each trap in a summary table format on the plans.

1. Trap number
2. Type of trap
3. Drainage area
4. Storage required
5. Storage provided (if applicable)
6. Outlet length or pipe sizes
7. Storage depth below outlet or cleanout elevation
8. Embankment height and elevation (if applicable)

Type of Sediment Traps

There are five (5) specific types of sediment traps which vary according to their function, location, or drainage area.

I. Pipe Outlet Sediment Trap
II. Grass Outlet Sediment Trap
III. Catch Basin Sediment Trap
IV. Stone Outlet Sediment Trap
V. Riprap Outlet Sediment Trap

I. Pipe Outlet Sediment Trap

A Pipe Outlet Sediment Trap consists of a trap formed by embankment or excavation. The outlet for the trap is through a perforated riser and a pipe through the embankment. The outlet pipe and riser shall be made of steel, corrugated metal or other suitable material. The top of the embankment shall be at least 1 ½ feet above the crest of the riser. The top 2/3 of the riser shall be perforated with one (1) inch nominal diameter holes or slits spaced six (6) inches vertically and horizontally placed in the concave portion of the corrugated pipe.

No holes or slits will be allowed within six (6) inches of the top of the horizontal barrel. All pipe connections shall be watertight. The riser shall be wrapped with ½ to ¼ inch hardware cloth wire then wrapped with filter cloth with a sieve size between #40-80 and secured with strapping or connecting band at the top and bottom of the cloth. The cloth shall cover an area at least six (6) inches above the highest hole and six (6) inches below the lowest hole. The top of the riser pipe shall not be covered with filter cloth. The riser shall have a base with sufficient weight to prevent flotation of the riser. Two approved bases are:

1. A concrete base 12 in. thick with the riser embedded 9 in. into the concrete base, or

2. One quarter inch, minimum, thick steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate shall have 2.5 feet of stone, gravel, or earth placed on it to prevent flotation. In either case, each side of the square base measurement shall be the riser diameter plus 24 inches.

Pipe outlet sediment traps shall be limited to a five (5) acre maximum drainage area. Pipe outlet sediment traps may be interchangeable in the field with stone outlet or riprap sediment traps provided that these sediment traps are constructed in accordance with the detail and specifications for that trap.

Select pipe diameter from the following table:

Minimum Sizes

Barrel Diameter[1] (in.)	Riser Diameter[1] (in.)	Maximum Drainage Area (ac.)
12	15	1
15	18	2
18	21	3
21	24	4
21	27	5

[1] Barrel diameter may be same size as riser diameter.

See details for Pipe Outlet Sediment Trap ST-I in Figure 5A.16 (1) and 5A.16 (2) on pages 5A.38 and 5A.39.

II. Grass Outlet Sediment Trap

A Grass Outlet Sediment Trap consists of a trap formed by excavating the earth to create a holding area. The trap has a discharge point over natural existing grass. The outlet crest width (feet) shall be equal to four (4) times the drainage area (acres) with a minimum width of four (4) feet. The outlet shall be free of any restrictions to flow. The outlet lip must remain undisturbed and level. The volume of this trap shall be computed at the elevation of the crest of the outlet. Grass outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Grass Outlet Sediment Trap ST-II in Figure 5A.17 on page 5A.40.

III. Catch Basin Sediment Trap

A Catch Basin Sediment Trap consists of a basin formed by excavation on natural ground that discharges through an opening in a storm drain inlet structure. This opening can either be the inlet opening or a temporary opening made by omitting bricks or blocks in the inlet.

A yard drain inlet or an inlet in the median strip of a dual highway could use the inlet opening for the type outlet. The trap should be out of the roadway so as not to interfere with future compaction or construction. Placing the trap on the opposite side of the opening and diverting water from the roadway to the trap is one means of doing this. Catch basin sediment traps shall be limited to a three (3) acre maximum drainage area. The volume of this trap is measured at the elevation of the crest of the outlet (invert of the inlet opening).

See details for Catch Basin Sediment Trap ST-III in Figure 5A.18 on page 5A.41.

IV. Stone Outlet Sediment Trap

A Stone Outlet Sediment Trap consists of a trap formed by an embankment or excavation. The outlet of this trap is over a stone section placed on level ground. The minimum length (feet) of the outlet shall be equal to four (4) times the drainage area (acres).

Required storage shall be 3,600 cubic feet per acre of drainage area.

The outlet crest (top of stone in weir section) shall be level, at least one (1) foot below top of embankment and no more than one (1) foot above ground beneath the outlet. Stone used in the outlet shall be small riprap (4 in. x 8 in.). To provide more efficient trapping effect, a layer of filter cloth should be embedded one (1) foot back into the upstream face of the outlet stone or a one (1) foot thick layer of two (2) inch or finer aggregate shall be placed on the upstream face of the outlet.

Stone Outlet Sediment Traps may be interchangeable in the field with pipe or riprap outlet sediment traps provided they are constructed in accordance with the detail and specifications for those traps. Stone outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Stone Outlet Sediment Trap ST-IV in Figure 5A.19 on page 5A.42.

V. Riprap Outlet Sediment Trap

A Riprap Outlet Sediment Trap consists of a trap formed by an excavation and embankment. The outlet for this trap shall be through a partially excavated channel lined with riprap. This outlet channel shall discharge onto a stabilized area or to a stable watercourse. The riprap outlet sediment trap may be used for drainage areas of up to a maximum of 15 acres.

Design Criteria for Riprap Outlet Sediment Trap

1. The total contributing drainage area (disturbed or undisturbed either on or off the developing property) shall not exceed 15 acres.
2. The storage needs for this trap shall be computed using 3600 cubic feet of required storage for each acre of drainage area. The storage volume provided can be figured by computing the volume of storage area available behind the outlet structure up to an elevation of one (1) foot below the level weir crest.
3. The maximum height of embankment shall not exceed five (5) feet.
4. The elevation of the top of any dike directing water to a riprap outlet sediment trap will equal or exceed the minimum elevation of the embankment along the entire length of this trap.

Riprap Outlet Sediment Trap ST-V
(for Stone Lined Channel)

Contributing Drainage Area (ac.)	Depth of Channel (a) (ft.)	Length of Weir (b) (ft.)
1	1.5	4.0
2	1.5	5.0
3	1.5	6.0
4	1.5	10.0
5	1.5	12.0
6	1.5	14.0
7	1.5	16.0
8	2.0	10.0
9	2.0	10.0
10	2.0	12.0
11	2.0	14.0
12	2.0	14.0
13	2.0	16.0
14	2.0	16.0
15	2.0	18.0

See details for Riprap Outlet Sediment Trap ST-V on Figures 5A.20(1) and 5A.20(2) on pages 5A.43 and 5A.44.

Optional Dewatering Methods

Optional dewatering devices may be designed for use with sediment traps. Included are two methods, which may be used. See Figure 5A.21 on page 5A.45 for details.

Figure 5A.16(1)
Pipe Outlet Sediment Trap: ST-I

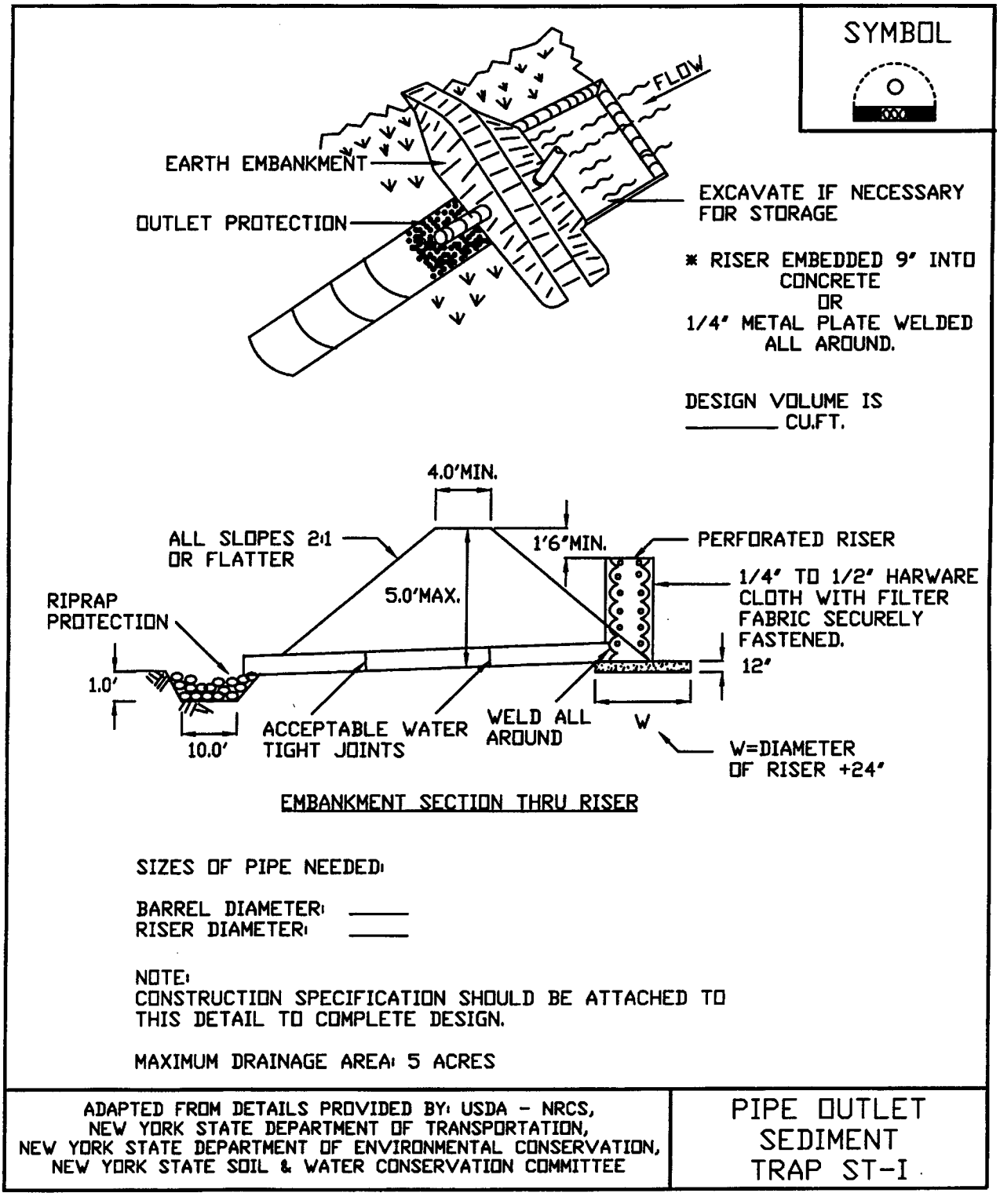


Figure 5A.16(2)
Pipe Outlet Sediment Trap: ST-I—Construction Specifications

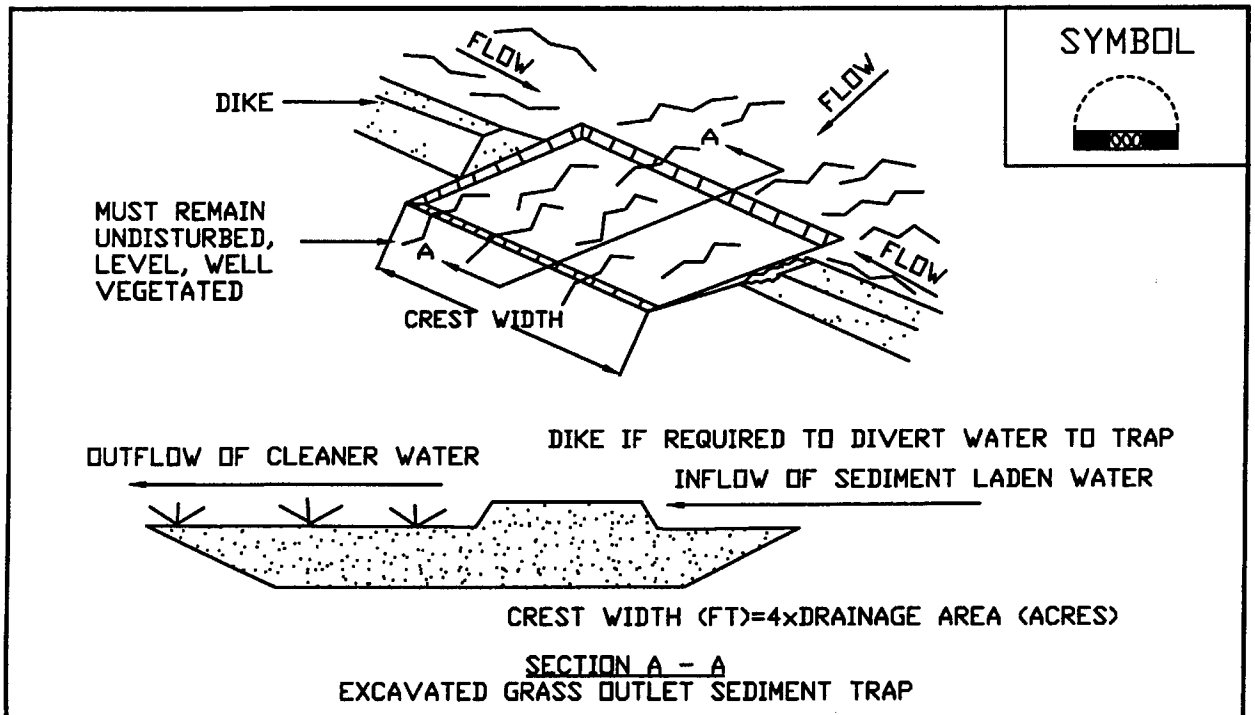
SYMBOL

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40-80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER-LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASED THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	PIPE OUTLET SEDIMENT TRAP ST-I

Figure 5A.17
Grass Outlet Sediment Trap: ST-II



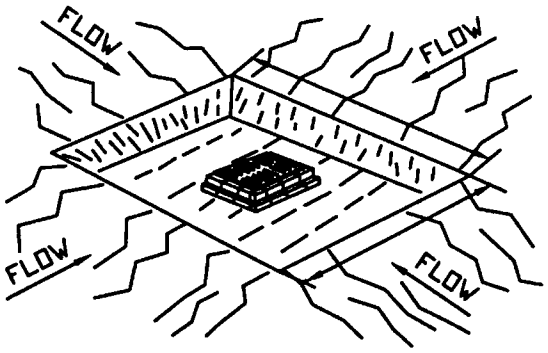
CONSTRUCTION SPECIFICATIONS

1. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE AREA.
2. MINIMUM CREST WIDTH SHALL BE 4 x DRAINAGE AREA
3. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
4. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
5. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
6. THE SEDIMENT TRAP SHALL BE REMOVED AND AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
7. ALL CUT SLOPES SHALL BE 1:1 OR FLATTER.

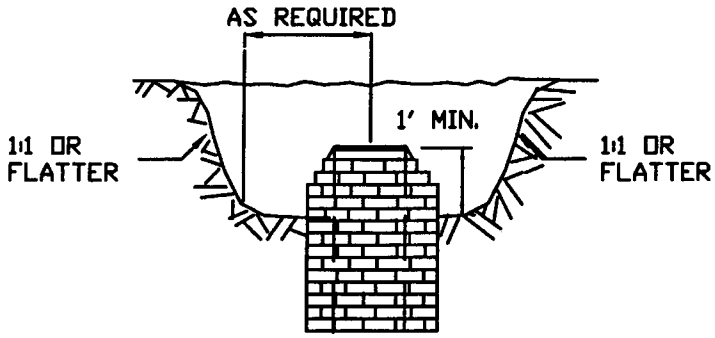
MAXIMUM DRAINAGE AREA: 5 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	GRASS OUTLET SEDIMENT TRAP ST-II

Figure 5A.18
Catch Basin Sediment Trap: ST-III



YARD DRAIN



CROSS SECTION

SYMBOL

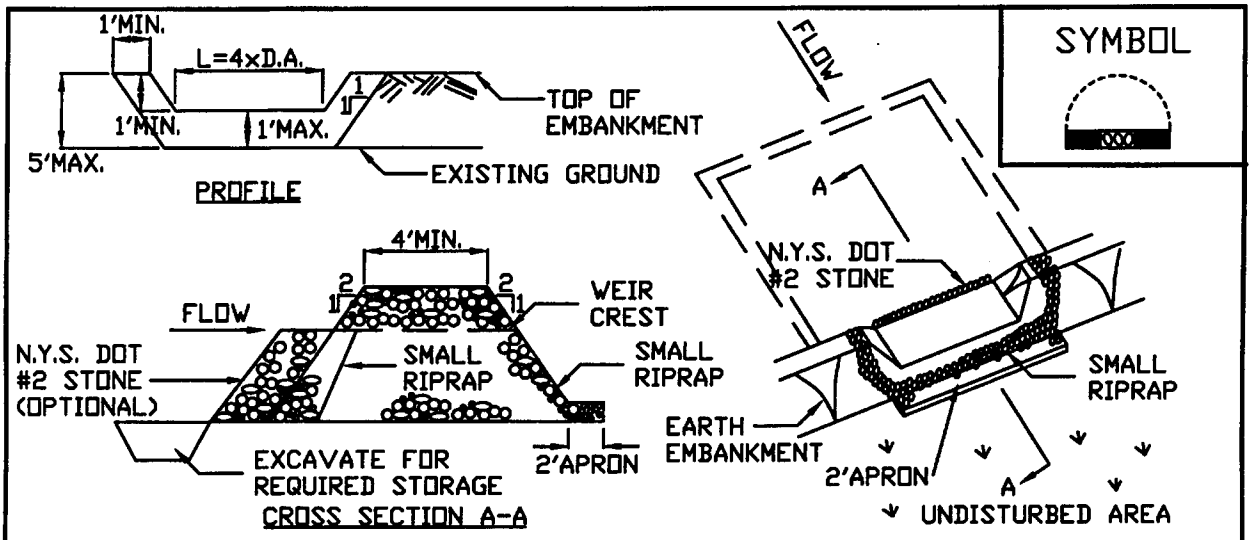
CONSTRUCTION SPECIFICATIONS

1. SEDIMENT SHALL BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
2. THE VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
3. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
5. THE SEDIMENT TRAP SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE CONSTRUCTED DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
6. ALL CUT SLOPES SHALL BE 1:1 OR FLATTER.

MAXIMUM DRAINAGE AREA: 3 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	CATCH BASIN SEDIMENT TRAP ST-III

Figure 5A.19
Stone Outlet Sediment Trap: ST-IV



OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

MAXIMUM DRAINAGE AREA 5 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STONE OUTLET SEDIMENT TRAP ST-IV

Figure 5A.20(1)
Riprap Outlet Sediment Trap: ST-V

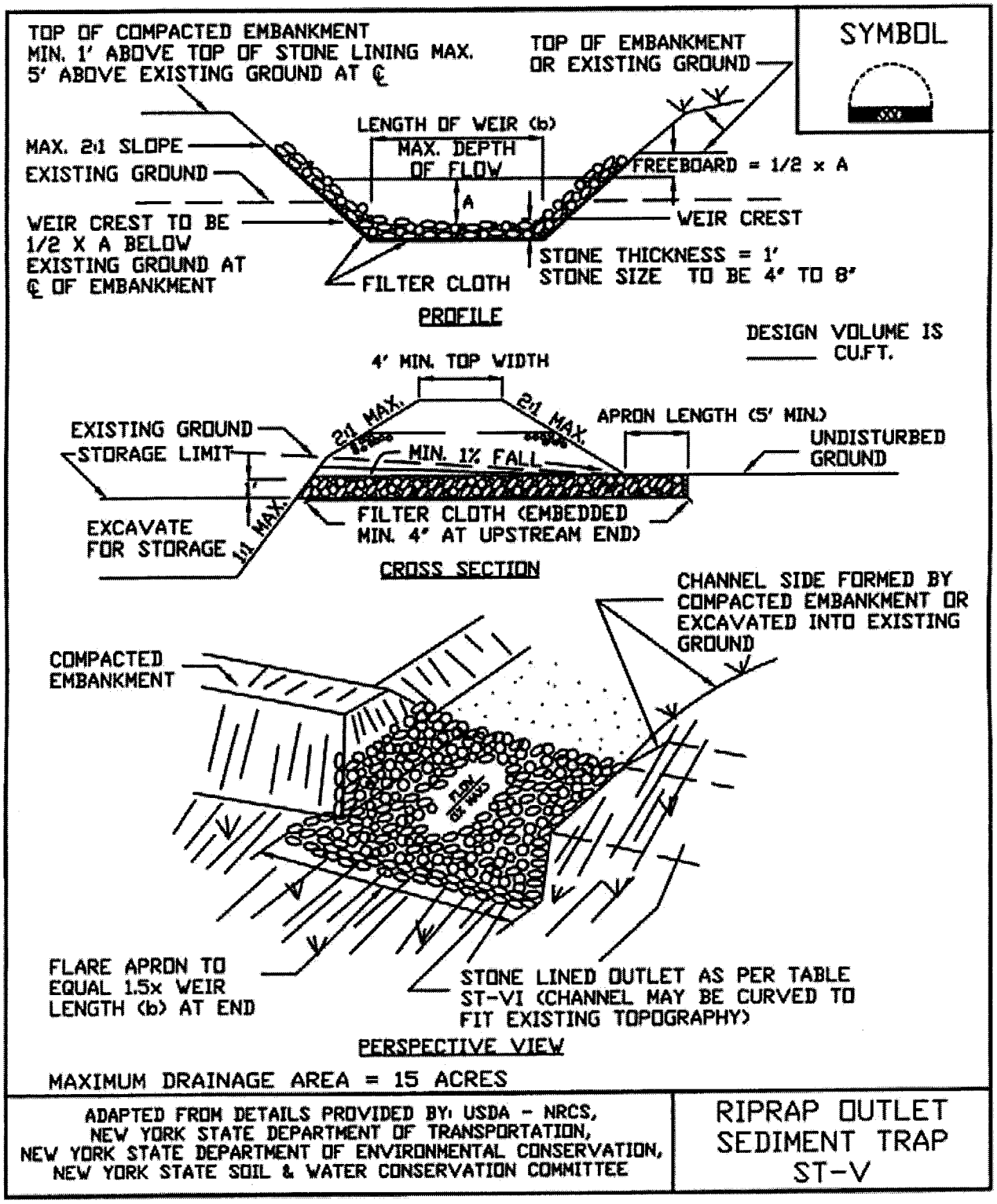


Figure 5A.202)
Riprap Outlet Sediment Trap: ST-V—Construction Specifications

SYMBOL

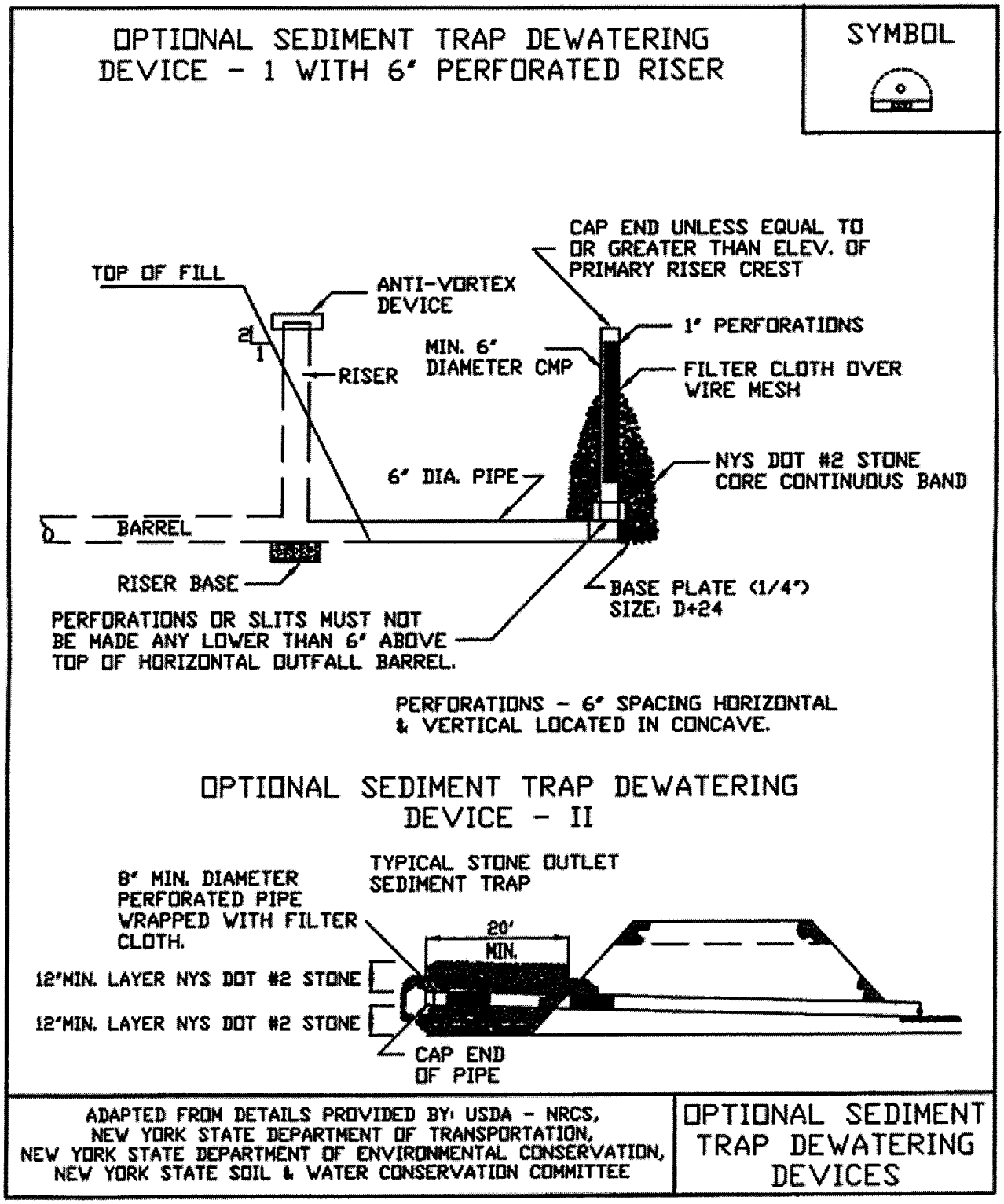
CONSTRUCTION SPECIFICATIONS

1. THE AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED. MAXIMUM HEIGHT OF OF EMBANKMENT SHALL BE FIVE (5) FEET, MEASURED AT CENTERLINE OF EMBANKMENT.
3. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER, CUT SLOPES 1:1 OR FLATTER.
4. ELEVATION OF THE TOP OF ANY DIKE DIRECTING WATER INTO TRAP MUST EQUAL OR EXCEED THE HEIGHT OF EMBANKMENT.
5. STORAGE AREA PROVIDED SHALL BE FIGURED BY COMPUTING THE VOLUME AVAILABLE BEHIND THE OUTLET CHANNEL UP TO AN ELEVATION OF ONE (1) FOOT BELOW THE LEVEL WEIR CREST.
6. FILTER CLOTH SHALL BE PLACED OVER THE BOTTOM AND SIDES OF THE OUTLET CHANNEL PRIOR TO PLACEMENT OF STONE. SECTIONS OF FABRIC MUST OVERLAP AT LEAST ONE (1) FOOT WITH SECTION NEAREST THE ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OUTLET CHANNEL.
7. STONE USED IN THE OUTLET CHANNEL SHALL BE FOUR (4) TO EIGHT (8) INCH RIPRAP. TO PROVIDE A FILTERING EFFECT, A LAYER OF FILTER CLOTH SHALL BE EMBEDDED ONE (1) FOOT WITH SECTION NEAREST ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OF OUTLET CHANNEL.
8. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
9. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRED AS NEEDED.
10. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
11. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
12. DRAINAGE AREA FOR THIS PRACTICE IS LIMITED TO 15 ACRES OR LESS.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

RIPRAP OUTLET
SEDIMENT TRAP
ST-V

Figure 5A.21
Optional Sediment Trap Dewatering Devices



APPENDIX D

PROJECT DOCUMENTATION FORMS

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

INSPECTOR'S DAILY REPORT

CONTRACTOR			
CLIENT		DATE:	

LOCATION				DAY		JOB NO.	
WEATHER		TEMP	° F	START		END	

WORK PERFORMED:

CONTRACTOR ACTIVITIES:

[PUT CONTRACTOR ACTIVITIES HERE, BE SPECIFIC. TYPE OF EQUIPMENT, ACTIVITIES PERFORMED, BY WHOM, LOCATION OF LANDFILL ETC.]

BENCHMARK ACTIVITIES:

[PUT ENGINEER ACTIVITIES HERE, BE SPECIFIC. TYPE OF EQUIPMENT, ACTIVITIES AND TESTING PERFORMED, SAMPLES COLLECTED, BY WHOM, LOCATION OF LANDFILL ETC.]

TEST PERFORMED		*QA PERSONNEL* SIGNATURE			
PICTURES TAKEN	none	REPORT NO.			
VISITORS	none	SHEET	1	OF	

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

INSPECTOR'S DAILY REPORT

CONTRACTOR			
CLIENT		DATE:	

LOCATION				DAY		JOB NO.	
WEATHER		TEMP	° F	START		END	

MEETINGS HELD & RESULTS:

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.			DJ Dump truck		
Laborer-Foreman			Carpenter						Water Truck		
Laborer									Backhoe		
Operating Engineer			Concrete Finisher						Excavator		
						Roller			Pad foot roller		
Carpenter						Paving Equipment					
						Air Compressor					

REMARKS:

REFERENCES TO OTHER FORMS:

SAMPLES COLLECTED:					
SAMPLE NUMBER					
APPROX. LOCATION OF STOCKPILE					
NO. OF STOCKPILE					
DATE OF COLLECTION					
CLIMATOLOGIC CONDITIONS					
FIELD OBSERVATION		SHEET		OF	

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DAILY LOG	DATE			
	REPORT NO.			
	PAGE		OF	

PROBLEM IDENTIFICATION REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Problem Description:

Problem Location (reference test location, sketch on back of form as appropriate):

Problem Causes:

Suggested Corrective Measures or Variances:

Linked to Corrective Measures Report No. *or Variance Log No.*

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

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DAILY LOG	DATE			
	REPORT NO.			
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CORRECTIVE MEASURES REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Corrective Measures Undertaken (reference Problem Identification Report No.)

Retesing Location:

Suggested Method of Minimizing Re-Occurrence:

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative