CLOUGH HARBOUR & ASSOCIATES LLP

November 21, 2007

Mr. Joshua Cook
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7017

RE: Remedial Construction Design Report for the DeLaval Property ERP Remediation Project
ERP Project: # B00190
CHA Project Number: 14357.1008.1102

Dear Mr. Cook:

Clough Harbour & Associates LLP (CHA) is pleased to submit two (2) copies of the Remedial Construction Design Report for the DeLaval Property ERP project located off of Rinaldi Boulevard in the City of Poughkeepsie, New York. This report was prepared in accordance with the requirements of the NYSDEC's *Municipal Assistance for Environmental Restoration Projects Procedures Handbook*.

CHA does note that a detailed time schedule was not provided in this report. The contract documents currently require that the remedy be completed by the end of the year in 2008. However, given the delays associated with obtaining an executed contract with the remedial contractor, it is likely the actual completion date will need to be extended. Once the executed contract is in place, CHA will request the contractor to provide an updated schedule on the delivery of the steel bulkhead material to the site, since this is the critical item relative to schedule. The remaining details of the schedule can be established after we have a target date to start the construction, but CHA anticipates that the project will have an overall duration of approximately one year following the delivery of the steel to the site.

If you have any questions or comments, or require additional information, please do not hesitate to contact me at (315) 471-3920. Thank you for your continued assistance on this project.

Very truly yours,

CLOUGH HARBOUR & ASSOCIATES LLP

Scott M. Smith, P.E.
Senior Engineer

SS/cbd
Attachments
cc: Joseph Chenier – City of Poughkeepsie
Jeremy Doxsee – City of Poughkeepsie
Keith Ziobron, P.E.- CHA (w/o attachments)

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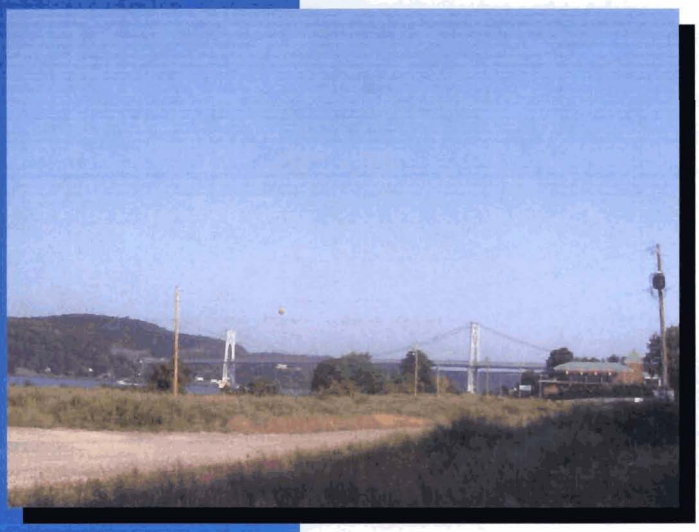
Remedial Construction Design Report

The DeLaval Property
Rinaldi Boulevard
City of Poughkeepsie, New York
ERP Site No. B00190-3

CHA Project Number: 14357.1004.1102



Prepared for:

City of Poughkeepsie
62 Civic Center Plaza
P.O. Box 300
Poughkeepsie, New York 12602-0300

Prepared by:

CLOUGH HARBOUR & ASSOCIATES LLP
III Winners Circle
Albany, New York 12205
(518) 453-4500
(518) 453-4773 - Fax

November 19, 2007

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CERTIFICATION

I, the undersigned, certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly prepared the Remedial Construction Design Report for the DeLaval Property located in the City of Poughkeepsie, New York, in accordance with the Division of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation (December 2002), and in compliance with the July 2004 Municipal Assistance for Environmental Restoration Projects Procedures Handbook.

Based upon my personal activities and my direct supervision of the persons directly responsible for preparing this Remedial Construction Design Report, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

For Clough Harbour & Associates LLP:

(Professional Seal)

Keith J. Ziobron
Printed Name of Certifying Engineer

Signature of Certifying Engineer

11/19/07
Date of Certification

072760-1
Registration Number

New York
Registration State

Clough Harbour & Associates LLP
Company

Associate
Title

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LIST OF ACRONYMS & ABBREVIATIONS

AMSL	Above Mean Sea Level
ASP	Analytical Services Protocol
ASTM	American Society of Testing and Materials
AOC	Area of Concern
CHA	Clough Harbour & Associates LLP
DER	Division of Environmental Remediation
DPW	Department of Public Works
EC	Environmental Control
HASP	Health & Safety Plan
HDPE	High Density Polyethylene
IC	Institutional Control
KSI	Kips per Square Inch
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl's
PPE	Personal Protection Equipment
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation & Recovery Act
ROD	Record of Decision
SCG	Standard, Criteria, and Guidance
SVOC	Semi- Volatile Organic Compound
SMP	Site Management Plan
TAGM	Technical & Administrative Guidance Memorandum
TAL	Target Analyte List
TCC	The Chazen Companies
TCL	Target Compound List
TCLP	Toxicity Leaching Characteristic Procedure
TMP	Tax Map Parcel
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The City of Poughkeepsie has retained Clough Harbour & Associates LLP (CHA) to prepare this Remedial Construction Design Report for the DeLaval property, a former industrial site located off of the intersection of Rinaldi Boulevard and Pine Street and along the Hudson River in the City of Poughkeepsie, Dutchess County, New York. A site location map has been included as Figure 1. The intent of the design report is to describe the drawings, specifications, and other documents that will be incorporated into the Contract Documents for completing the remedial construction related activities on the DeLaval Property (Site No. B00190-3).

The design elements described herein have been specified to meet or exceed the elements of the proposed remedy described in the New York State Department of Environmental Conservation's (NYSDEC's) Record of Decision (ROD) for the DeLaval Property dated March 2005.

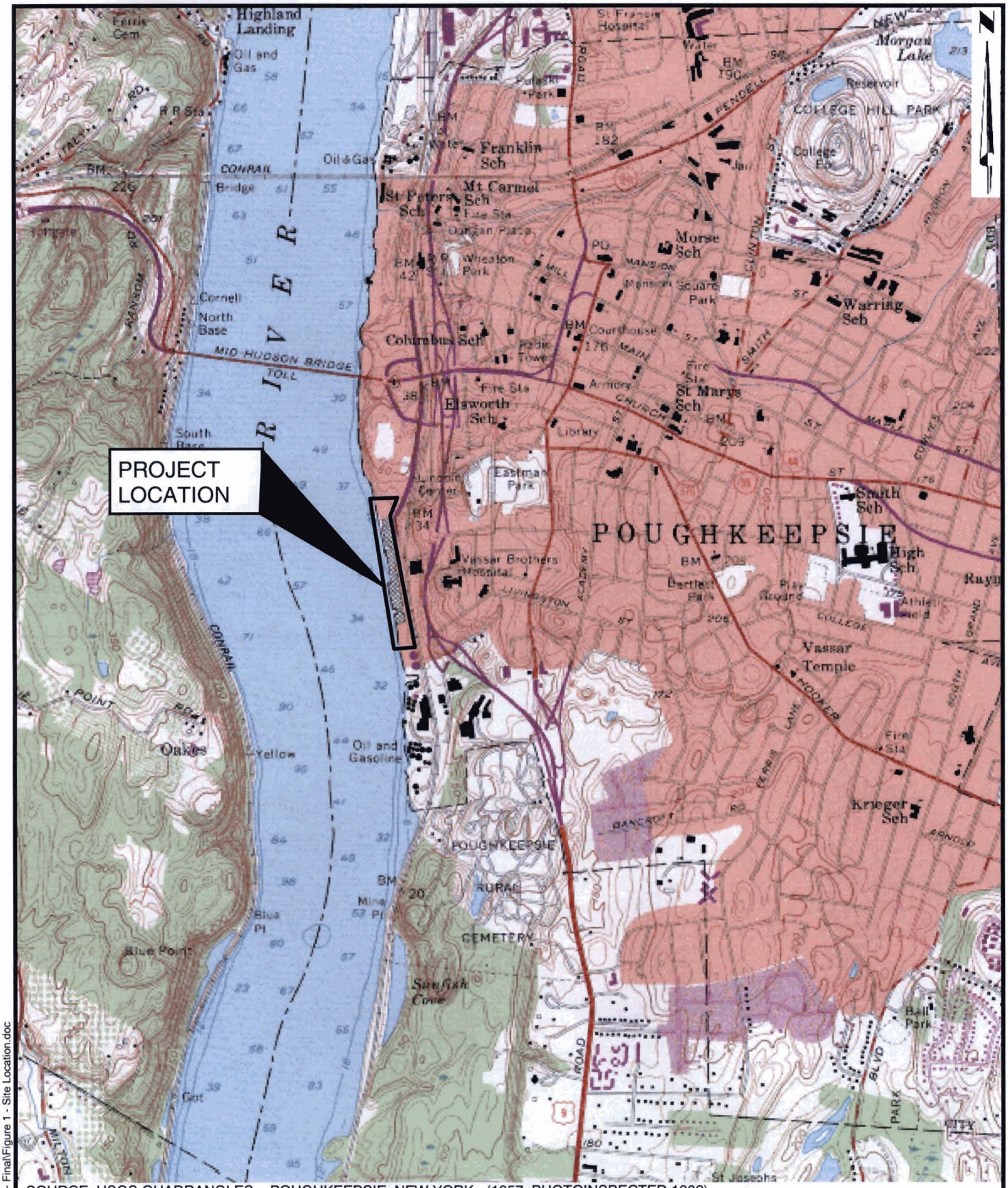
1.1 PURPOSE & SCOPE OF THE DESIGN REPORT

The purpose of this report is to outline the major elements of the remedial design for the DeLaval property and to describe the drawings, specifications, and other documents that are incorporated into the Contract Documents associated with implementing the remedy specified in the March 2005 ROD. Specifically, this report provides descriptions of operations, materials, construction practices, and quality assurance/quality control (QA/QC) procedures required to implement the specified remedy for the site. The design report is intended to supplement the Contract Documents (final design drawings and specifications) prepared for the project.

Since the remediation of the DeLaval property is to be funded in-part by the NYSDEC's Environmental Restoration Program, this design report has been prepared in accordance with the requirements specified in the July 2004 Municipal Assistance for Environmental Restoration Projects Procedures Handbook.

1.2 ORGANIZATION OF REPORT

The work plan is divided into six major sections. Section 1 identifies the DeLaval project and describes the purpose and organization of the report. Section 2 provides a description of the site, the history of the site, and the nature and extent of contamination on the site. Section 3 of the report summarizes each element of the remedial design included in the Contract Documents for the DeLaval property. The need to provide a final Certification Report for the remedial activities is summarized in Section 4, while the post-remediation activities, including inspection and monitoring requirements, are summarized in Section 5. Finally, the engineer's estimate of probable remedial construction costs is provided in Section 6.



SOURCE: USGS QUADRANGLES – POUGHKEEPSIE, NEW YORK. (1957, PHOTOINSPECTED 1982).

CLOUGH HARBOUR & ASSOCIATES LLP
III Winners Circle, Albany, New York 12205
www.cloughharbour.com

SCALE: 1"=2000'±

DATE: NOVEMBER 2007

FIGURE 1

SITE LOCATION MAP

DELAVAL PROPERTY

CITY OF POUGHKEEPSIE

COUNTY OF DUTCHESS, STATE OF NEW YORK

M:\14357\Rpts\Design Report - Final\Figure 1 - Site Location.doc

2.0 SITE BACKGROUND

The intent of this section is to provide a brief description of the subject property and summarize the major environmental concerns identified through previous site investigations. A detailed description of the areas of concern (AOCs), as well as all analytical data for all media investigated, is provided in CHA's *Supplemental Investigation Report*, dated January 2005.

2.1 SITE DESCRIPTION

The DeLaval property consists of a single parcel of land located to the southwest of the intersection of Rinaldi Boulevard and Pine Street, and is approximately 13.4-acres in size with approximately 2,200 feet of direct waterfront along the Hudson River. The site is identified as Tax Map Parcel (TMP) No. 31-6061-43-752749 by the City of Poughkeepsie and is currently vacant. The site is largely covered by grass, scrub brush, small trees, other vegetation and soil/debris stockpiles. The site is accessed through a gate at the north end of the property, located off the southwest corner of the intersection between Rinaldi Boulevard and Pine Street.

2.2 SITE HISTORY

The DeLaval property was utilized for a variety of industrial and manufacturing uses since at least 1887 and up until approximately 1976, at which time the parcel became vacant. The specific waste disposal practices related to the past industrial operations on the site are not definitively known. However, site investigations have revealed that an area on the southern portion of the property was once used as a landfill, and minor convenience dumping was observed at various locations on the site. In addition, significant petroleum contamination was identified near the central and southern portions of the DeLaval property.

2.3 AREAS OF CONCERN

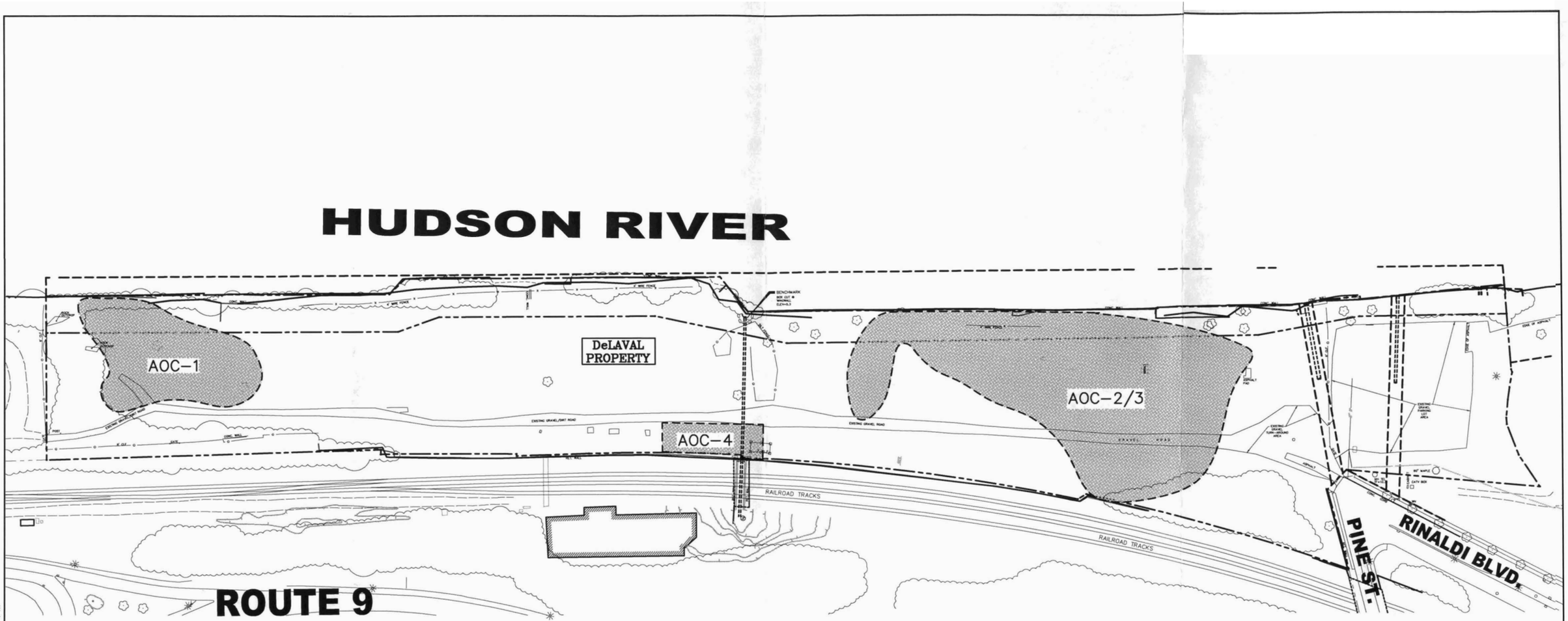
A number of investigations have been performed to assess the environmental condition of the DeLaval Property. Based upon the subsurface investigations previously completed at the site by CHA and The Chazen Companies (TCC), the following three AOCs associated with the DeLaval property have been identified.

- **AOC-1:** An industrial landfill/construction & demolition debris disposal area located along the southern end of the property and estimated to be approximately 0.8-acres in area.

- **AOC-2/3:** An area of petroleum-impacted soil and groundwater in the central portion of the site that parallels the Hudson River and estimated to be approximately 2.4-acres in area. An abandoned six-inch diameter pipeline and an approximately 4,000-gallon fuel oil underground storage tank (UST) were also identified in this area.

- **AOC-4:** An approximately 0.45-acrea area adjacent to a former Paint Shop along the eastern border of the site.

The location of each of the AOCs is identified on Figure 2. Significant petroleum-related contamination was identified in AOC-1 and AOC-2/3 during the previous investigations. It should be noted that grossly contaminated soils, referred to hereinafter throughout the design report are



LEGEND

AREA OF CONCERN

NOTE:

BASEMAP PROVIDED FROM THE CHAZEN COMPANIES (TCC) PHASE SUBSURFACE INVESTIGATION REPORT, DATED MAY 2001.

0 150 300
Scale in feet

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14357.1004.1102 | DATE: NOVEMBER 2007

FIGURE 2
EXISTING CONDITIONS
DELAVAL PROPERTY
CITY OF POUGHKEEPSIE
DUTCHESS COUNTY, STATE OF NEW YORK

defined as soil, fill or debris, sediment, surface water, or groundwater which contains free product or mobile contamination that is identifiable either visually, through strong odors, by elevated vapor levels as indicated by field instrumentation, or is otherwise readily detectable without laboratory analysis.

2.4 NATURE & EXTENT OF CONTAMINATION

A representative number of soil and groundwater samples were collected to characterize the nature and extent of contamination of the site during the site investigations. The surface soils and subsurface soils at the DeLaval Property were the most impacted media identified at the project site. The impact to groundwater was determined to be minimal and there was no evidence of active methane gas generation identified.

The main categories of contaminants that exceed the NYSDEC Standards, Criteria, and Guidance (SCG) values are volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals. Numerous SVOCs were detected in the soil samples collected at the site. The SVOCs consisted primarily of a group of compounds known as polynuclear aromatic hydrocarbons (PAHs). As could be expected at a former industrial property such as the DeLaval property, PAH compounds were found to be widespread across the site in both surface and subsurface soils. PAH compounds most commonly detected above SCGs at the DeLaval Property include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene.

Inorganics, or metals, were also detected in the on-site soils at the site at concentrations above SCGs. Specific metals most commonly detected include arsenic, cadmium, chromium, lead, silver, and mercury.

PCBs were detected above SCGs in the southern area of the site in surface and subsurface soils and groundwater.

3.0 REMEDIAL DESIGN

This section of the design report describes the development of the remedial design elements for the DeLaval Property. The design elements described herein are intended to comply with the remedy specified by the NYSDEC in the March 2005 ROD. Per the ROD for the site, the selected remedy will include source removal, placement of a soil cover or impervious surfaces over the site, installation of a hard-wall bulkhead down-gradient of AOC-1 and AOC-2/3, and natural attenuation of residual contaminants in the site's groundwater.

This section of the report is intended to summarize the elements of the remedial design and is not intended to provide the level of detail presented in the design documents. A complete set of design drawings and specifications (hereinafter referred to the Contract Documents) have been previously submitted to the NYSDEC and were approved by the Department on July 31, 2007 via a written letter. The final Contract Documents made available for bid were dated August 8, 2007.

3.1 SITE PREPARATION

3.1.1 Temporary Sediment and Erosion Controls

Prior to commencing with any heavy construction on the DeLaval site, a number of site controls will be installed. The first group of site controls installed will include temporary erosion and sediment controls. The sediment and erosion control devices specified in the Contract Documents for this project include the following:

1. The installation of a stabilized construction entrance at the entrance to the site to minimize the tracking of sediment off-site. An equipment decontamination pad will also be installed near the site entrance to facilitate the removal of contaminated sediment from on-site construction equipment prior to leaving the project site.

2. Silt fencing along the down-gradient side of the project site, along the Hudson River. The site is a long-narrow parcel that parallels the River. Since the retaining wall associated with the Metro North Railroad along the east side of the subject site prevents stormwater run-on from the areas up-gradient of the DeLaval property, no other major erosion controls will be installed on land on the down-gradient side of the project.

3. Silt fencing will also be installed around soil stockpile areas. It is anticipated that one soil stockpile area will be located adjacent to each AOC excavation. The two stockpile areas have been identified as being 100-feet by 200-feet in size in the Contract Documents, but may be increased in size depending upon the actual field conditions encountered during the excavation process.

4. A turbidity curtain will be installed in the Hudson River down-gradient of the shoreline work. The turbidity curtain is necessary to facilitate the capture of sediment that enters the River adjacent to the work site and to allow it to settle out. The turbidity curtain will be approximately 1,000 feet long and will be moved as the shoreline construction progresses.

5. All disturbed areas where continuous construction is not ongoing will be stabilized within 14 calendar days. Temporary stabilization will typically include seeding and mulching, although the on-site engineer may approve alternatives.

6. After placement of the final soil cover layer, the project site surface will be covered with mulch to provide temporary erosion control. The City of Poughkeepsie's future developer of the project site intends to begin the redevelopment construction immediately following the completion of the remedial construction. However, an alternate has been included in the Contract Documents in case the developer is not prepared to commence the proposed redevelopment work at the time remedial construction is complete. The alternate includes replacing the top 6 inches of the soil cover layer with 6 inches of topsoil and mulching and seeding the surface to establish vegetation. If the alternate is completed, the future developer will be responsible for removal of the topsoil as needed to facilitate the redevelopment construction activities.

3.1.2 Site Controls

Since the site is known to be contaminated, a number of additional site controls and procedures will be implemented to protect the environment, the health and safety of the public, and on-site workers. These controls include, but are not limited to the following:

1. The remedial contractor will prepare a site-specific health and safety plan (HASP) for the project. Work zones will be established as necessary and health safety kits and appropriate personal protective equipment (PPE) will be stored in job-site trailers installed on the project site.

2. The Site Management Plan (SMP) for the project specifies the anticipated construction phasing, pre-excavation sampling requirements, site controls and air monitoring requirements, procedures for managing contaminated soil, groundwater management, confirmatory sampling requirements, etc. To ensure that there is no hazardous waste on-site, pre-excavation samples will be submitted by the contractor to a certified laboratory for waste characterization analysis. By collecting the samples prior to the major excavation activities, the contractor will be afforded the opportunity to "direct load" trucks with materials designated for off-site disposal and it will reduce the potential for worker exposure, should hazardous waste be identified. The pre-excavation samples will be collected at the frequency specified in the Contract Documents and analyzed for the following parameters:

   - Target compound list (TCL) VOCs by NYSDEC Analytical Services Protocol (ASP) 95-1.
   - TCL SVOCs by NYSDEC ASP 95-2
   - TCL PCBs by NYSDEC ASP 95-3.
   - Target Analyte List (TAL) metals and cyanide by NYSDEC ASP.
   - Toxicity Leaching Characteristic Procedure (TCLP) Extraction
   - Hazardous Waste Characteristics as defined under the Resource Conservation and Recovery Act (RCRA), including ignitability, corrosivity, and reactivity.
   - pH via EPA Method 9045

- Percent Solids via Method 160.3
- Paint Filter Test via Method 9095
- Additional analyses as required by the disposal facility.

3. Additional chain link fencing and gates will be installed along the perimeter of the DeLaval property to control site access. The additional fencing will be installed at the site entrance near the intersection of Pine Street and Rinaldi Boulevard, across the Metro-North railroad tunnel along the east side of the property, and along a temporary easement near the southwest corner of the site. Although access to the site from the Hudson River is almost completely unrestricted, there is no apparent attraction of boaters to the site, and therefore, no fencing will be installed along the shoreline, particularly since shoreline fencing would interfere with the shoreline construction.

4. Construction of a decontamination pad near the site entrance to facilitate the cleaning of construction equipment and reduce the potential for contaminated sediment to be transported off-site. To provide a durable decontamination pad sufficient in size for heavy equipment, the decontamination will be constructed with a No. 2 crushed stone surface that is a minimum of 6 inches in thickness and a heavy-duty concrete sump. The pad will be lined with a 40-mil high density polyethylene (HDPE) membrane to reduce the potential for infiltration of contaminated water into the ground surface beneath the pad and fiberglass side panels to reduce overspray beyond the limits of the pad.

5. A smaller decontamination pad will also be installed to facilitate the decontamination of on-site personnel and small equipment and hand tools.

3.1.3 Demolition and Removals

A number of items will need to be demolished and/or removed from the DeLaval property to facilitate the remedial construction. These items include, but are not limited to, the following:

1. Removal of the existing swing gate near the site entrance to facilitate the installation of the new temporary chain-link fencing and gate. The existing swing gate provides no site access restriction to pedestrians.

2. Removal of a flag pole near the site entrance.

3. Removal of a metal antenna no longer in service near the north end of AOC-1.

4. Removal of existing wooden utility poles along with guy wires, light fixtures, transformers, wiring, etc. The utility poles, lights, electrical wire, and transformers will be salvaged by the remedial contractor and delivered to the City of Poughkeepsie Department of Public Works (DPW) facility.

5. Removal and salvaging of an existing stone monument near the site entrance. The remedial contractor will deliver the monument to the City's DPW facility.

6. Abandonment of existing groundwater monitoring wells because the locations conflict with the proposed redevelopment. However, the City of Poughkeepsie will be responsible for having new wells installed on the DeLaval property during the completion of the redevelopment. The new wells will be utilized to monitor the groundwater quality subsequent to the remedial construction.

7. Removal of underground utilities, including a 2-inch diameter waterline, a 4-inch diameter pipe outfall, and four 8 to 12-inch diameter pipe outfalls. The outfalls will be removed to a minimum distance from the discharge location to a point 20 feet up-gradient of the shoreline and the remaining pipe, if any, will be plugged in accordance with the details provided on the Contract Drawings.

8. Removal of an underground 6-inch diameter steel pipeline containing weathered fuel oil and an approximately 4,000-gallon underground storage tank containing petroleum product from AOC-2/3. Product will be pumped out and these items will be cleaned prior to being sent off-site for disposal.

9. A significant amount of concrete removal is anticipated along the shoreline. Additionally, some small concrete slab-on-grade pads will be removed as part of the remedial construction. All concrete that is not heavily stained with petroleum product will be crushed on-site and reused for backfill in the AOCs.

10. The existing bulkheads along the shoreline will be removed only to the extent necessary to facilitate the installation of the new bulkheads.

11. With the exception of a few trees (anticipated to be 10 to 15 trees) designated to remain along the southern boundary of the DeLaval Property and potentially some trees on the rock outcropping near the site entrance, all existing trees and stumps on the project site will be removed and disposed of off-site to facilitate the installation of the soil cover system. All brush and grass will be mowed to a maximum height of 4 inches prior to the stripping of topsoil and placement of the soil cover system. However, the future developer of the DeLaval site will be provided an opportunity to strip the topsoil before the final soil cover system is installed.

12. Because contaminated surface soil was identified on the rock outcropping near the site entrance, the vegetation and soil on the rock outcropping will be removed to the extent practical and disposed of off-site at a properly permitted facility. To provide some guidance to the remedial contractor, CHA has indicated that the contractor shall remove soil and vegetation to the extent possible using a 40-ton excavator with a minimum reach of 20 feet, or equivalent. No equipment will be positioned on top of the rock outcropping to facilitate these clearing activities.

With the exception of the concrete that is crushed on-site for reuse and the items salvaged and surrendered to the City of Poughkeepsie, all items identified for demolition or removal will be disposed of off-site at a properly permitted facility.

3.2 BULKHEAD INSTALLATION & SHORELINE STABILIZATION

Once the initial site preparation activities are complete, the construction of the primary elements of remedy will commence. The first element of the remedy that will be completed is the installation of the steel bulkheads down-gradient of the AOC-1 and AOC-2/3. The new bulkheads need to be installed prior to commencing with the proposed excavation activities because the existing bulkheads are heavily dilapidated and could be breached during the excavation of the contaminated soils on-site. The new bulkheads will restrict the potential migration of subsurface contaminants beneath the DeLaval property from migrating into the Hudson River both during the remedial construction and after all development activities are complete. Two separate steel sheet pile bulkheads will be installed as part of this project, and are summarized as follows:

1. Zone 1 Bulkhead – Down-gradient of AOC-1:
   - Approximately 409 lineal feet of anchored bulkhead (configuration of anchoring system will be determined in the field based upon the conditions and depth to bedrock encountered)
   - Approximately 41 lineal feet of cantilevered bulkhead (southern return only)

2. Zone 3 Bulkhead – Down-gradient of AOC-2/3:
   - Approximately 703 lineal feet of cantilevered bulkhead

3. The steel sheet piles will conform to the requirements of the American Society of Testing and Materials (ASTM) A 572 or A 690 with a minimum yield strength (F_y) of 50 kips per square inch (KSI).

4. All steel shapes and plates will be epoxy coated and all steel hardware (e.g. bolts, nuts, washers, etc.) will be hot-dipped galvanized.

5. Bolted connections will be completed using ¾-inch diameter A 325 high-strength bolts.

6. All interlocks in the sheet piles will be filled with a hydrophilic water stop material to minimize the potential for water flow through the wall.

7. The top of the new bulkheads will be set at an elevation of 6 feet above mean sea level (AMSL) and will be completed with a precast concrete cap to facilitate the future development of the site.

While not included as part of the remedy of the site, the City of Poughkeepsie has requested that the remainder of the shoreline between the bulkheads as well as the shoreline between the DeLaval Property and Kaal Rock Park (north of the project site) be stabilized with a rip-rap revetment. The rip-rap revetment will be installed on a 12-inch thick layer of aggregate bedding and a geotextile fabric will be placed on the subgrade to minimize the migration of fines from the river bank into the stone bedding and rip-rap. A large toe stone will be installed at the base of rip-rap to hold the revetment in place; however, in areas where the water is deep or the existing side slopes along the river are steep, a steel sheet pile cut-off wall may be installed to help hold the revetment in place. It should be noted that, unlike the bulkheads, the rip-rap revetment work will not be required to be completed prior to commencement of the excavation activities.

Since it is known that the future developer is planning to install six (6) stormwater sewer outfalls along the Hudson River shoreline, a portion of the outfalls will be installed as part of the remedial contractors work. The installation of these outfalls will typically include the installation of 20 lineal feet of 24 or 26-inch diameter corrugated HDPE pipe (with N-12 watertight integral bell and spigot joints), a backflow preventer, appropriate bedding and backfill materials, a plug on the up-gradient end of the pipe, and a wooden marker so that the developer can find the pipe ends in the future. However, the southernmost outfall in AOC-1 will include a 60-foot long section of pipe to avoid future conflicts with the rods installed for the anchored bulkhead system. The purpose of installing the pipe outfall "stubs" as part of the remedial construction is to avoid the need for the developer to cut holes in the bulkhead wall or disturb the rip-rap revetment. Additionally, existing in-service outfalls will be extended as appropriate through the rip-rap revetment.

An approximately 311-foot long section of the rip-rap revetment will include the installation of live stake plantings that will eventually provide vegetation and a softer appearance across the northernmost portion of the revetment.

3.3 EXCAVATION IN AREAS OF CONCERN

After the bulkheads have been installed and all site controls are in place, the grossly contaminated soils in AOC-1 and AOC-2/3 will be excavated for off-site disposal in accordance with the SMP included in the Contract Documents. As specified in the SMP, all excavated materials will be screened in the field for visual, olfactory, and photoionic evidence of contamination. Materials not exceeding the thresholds specified in the SMP will be temporarily staged on site for reuse as backfill in the AOCs beneath the demarcation layer, while grossly-contaminated soils will be loaded into trucks for off-site disposal. Where possible, all materials (e.g. tanks, piping, etc.) requiring off-site disposal will be immediately loaded into dump trucks for transport to the disposal facility.

Based upon previous investigations at the site, it is anticipated that the top 3 to 4 feet of material (on average) in the AOCs will be able to be staged for reuse as backfill to reduce the amount of clean fill that must be imported to the site. After the grossly-contaminated soils are encountered in each AOC, the excavations will continue in the unsaturated zone until the limits of the grossly-contaminated soils are reached. Where possible, the deeper excavations in the AOCs will be conducted at periods of low-tide to avoid extensive dewatering costs. A majority of the excavations may be terminated at the depth groundwater is encountered; however, deeper excavations may be conducted in certain areas as directed by the NYSDEC. The focus of this remedial approach is to eliminate the mobile sources of contamination as required by NYSDEC policy. Any dewatering or free product removal that is required to facilitate the excavations in the AOCs will be conducted in accordance with the SMP.

A number of old foundations and brick walls were encountered during the excavations of the test pits in AOC-2/3. While the concrete slab beneath the pipe and small brick walls will be removed during the excavation activities, the excavation contractor will be directed to work around large concrete foundations that cannot be easily removed. No special demolition equipment, such as large hydraulic hammers, will be mobilized to the site to complete the concrete removal.

3.4 EXCAVATION & REMOVAL OF FUEL OIL TANK & PIPELINE

The approximately 4,000-gallon fuel oil UST located near the center of AOC-2/3 will be exposed and removed after the bulkheads are installed. After the top of the UST is exposed, the liquid inside

the tank, if any, will be sampled to facilitate proper disposal. A vacuum truck will then be used to remove the remaining mixture of fuel oil, sludge, and/or groundwater in the tank. After the tank is emptied, the remainder of the tank will be unearthed and an excavator or similar piece of equipment will be used to lift the tank out of the excavation for cleaning and disposal. A final cleaning of the tank will be performed prior to salvaging it for scrap metal.

The six-inch diameter pipe containing weathered fuel oil that runs west to east across the center of AOC-2/3 will be removed prior to the excavation of other grossly-contaminated media in this area. The liquid inside the pipe, if any, will be collected in a vacuum truck and characterized for off-site disposal prior to the actual removal of the pipe. Excavation of the pipe will begin at the east/up-gradient end and continue westerly along the pipeline to the existing bulkhead. The soils that are excavated to facilitate the pipe removal will be managed in accordance with the SMP. However, the fill soils above the pipeline that have no significant petroleum impact based upon field screening (including visual, olfactory, and photoionization detector readings) will be staged on site for reuse as backfill.

3.5 CONFIRMATORY SAMPLING

A minimum of twelve (12) confirmatory soil samples will be collected by the remedial contractor in each AOC after the maximum extent of the proposed excavation is reached, including two (2) from the face of each excavation (e.g. north, west, south, and east) and four (4) from the bottom of each excavation. Although the intent of the excavation activities is not to remove all impacted soil, these samples will document the residual levels of contamination following the implementation of the remedy that may be useful for future intrusive activities within the limits of each AOC. The soil samples will be submitted to a certified laboratory and analyzed for the same parameters as the pre-excavation samples, defined in Section 3.1.2 of this report.

All sample locations will clearly be marked on a field sketch that is to be submitted to the Engineer and the City of Poughkeepsie along with the analytical laboratory results. These results will also be included in the engineering certification report which will be prepared at the conclusion of the remedial phase of the project.

3.6 BACKFILLING OF EXCAVATIONS

After the excavations are complete, they will be backfilled using a combination of on-site materials and imported clean fill meeting the contract specifications. On-site materials meeting the specifications in the Contract Documents will be utilized to backfill the excavations to the extent practical to minimize the need of importing clean fill. The backfill materials are anticipated to include the following:

- Non-grossly-contaminated soils and materials temporarily staged on the project site (e.g. the top 2 to 3 feet of soil in each AOC).
- Crushed recycled concrete meeting the specifications in the Contract Documents, including the following gradation requirements:

Sieve	Percent Passing
4"	100
No. 40	0-70
No. 200	0-10

- Topsoil in areas designated as greenspace (or other areas designated by the future developer of the site).
- Non-grossly-contaminated soils excavated for utility trenches by the future developer.
- Clean imported fill.

It is anticipated that the remedial contractor will first use the temporarily staged on-site materials and recycled concrete to backfill the AOC excavations. While some topsoil will be removed by the remedial contractor to facilitate the AOC excavations, it is anticipated that majority of the topsoil removal will be completed by the future developer. As described later in this report, the future developer of the DeLaval property will be provided a 90-day period in which he/she can place topsoil and material excavated from utility trenches into the AOCs. While it is preferred to backfill the AOCs immediately, providing the future developer the opportunity to place trench cuttings into the AOCs will reduce the amount of clean fill that must be imported into the site.

After all on-site materials are used to backfill the AOCs to the extent practical, clean imported fill will be used to bring the excavations up to grade (to meet surrounding grades) prior to placement of the soil cover system. However, prior to placement of the clean, imported backfill into the AOCs, a geotextile demarcation fabric will be placed in the excavation. The imported fill will meet the following criteria:

1. Off-site borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products. The materials cannot be defined as solid waste in accordance with 6 NYCRR Part 360-1.2(a) and must be free of deleterious and organic materials.

2. If the contractor designates a source as "virgin" soil, it will be further documented in writing to be native soil material from areas not having supported any known prior commercial or industrial development or agricultural use. Additionally, one composite sample prepared from at least five equally sized sub-samples will be collected for every 5,000 cubic yards of material. Each sample will be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and cyanide. The soil will be considered acceptable for use as backfill provided that all parameters are below the recommended soil cleanup objective concentrations specified in NYSDEC's Technical & Administrative Guidance Memorandum (TAGM) 4046.

3. Non-virgin soils will be tested via the collection of composites sample prepared from at least five equally-sized sub-samples each. Said composite samples will be analyzed for the same parameters as virgin soils. The sampling frequency for non-virgin soils will be one composite sample per 500 cubic yards of material borrowed from each source area. If more than 1,000 cubic yards of soil are borrowed form a given off-site source, and both samples from the first 1,000 cubic yards meets the TAGM 4046 concentrations, the sample collection frequency will be reduced to one sample for every 2,500 cubic yards of additional soils from the same source up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, the sampling

frequency may be reduced to one sample per every 5,000 cubic yards, provide that the early samples met all TAGM 4046 recommended soil cleanup concentrations.

4. The backfill material shall consist of sound, durable, sand, gravel, stone or blends of these materials, which are free from organic (i.e. not topsoil), frozen, or other deleterious materials, conforming to the requirements of the New York State Department of Transportation (NYSDOT) Section 203-2.02C and meet the following requirements:

   1. Gradation:

Sieve	Percent Passing
4"	100
No. 40	0-70
No. 200	0-10

   2. Particles passing the No. 200 sieved shall be non-plastic

   3. Particle size analysis shall show no gap grading.

If no further intrusive site redevelopment activities are planned within thirty days following the backfilling of these excavations, the disturbed areas will be seeded and mulched for erosion and sediment control.

3.7 WEEP HOLE EXTENSIONS

Based upon the final grading plan for the DeLaval property provided by the future developer, the final grades across much of the project site will be raised. While the remedy includes the placement of a 1-foot thick layer of clean soil across the entire project area, the developer's plans indicate that site grades will be raised by as much as 4 or 5 feet in some locations. As a result of the grade changes on the DeLaval property, a number of the weep holes associated with the drainage system behind the existing Metro North railroad retaining wall (east side of the property) will be buried. Simply burying these weep holes could result in the surcharging of groundwater behind the wall and greatly increase the hydrostatic pressure behind the wall. To ensure that the proposed grade changes do not result in the covering of the existing weep holes, a drainage system including the following elements has been included in the Contract Documents:

1. Since the steel piping for the weep holes does not protrude from the concrete retaining wall, a 1/8-inch thick stainless steel plate with a 4-inch diameter pipe flange will be secured to the retaining wall over the center of the existing 4-inch diameter pipe using adhesive anchors. A urethane sealant will be placed between the concrete retaining wall and the steep plate to minimize seepage between the wall and plate. It should be noted that only those weep holes that will be buried as part of the final site grade changes will be connected to this storm sewer system.

2. The stainless steel flange will be connected to a 4-inch diameter, SDR-35 polyvinyl chloride (PVC) pipe using a rubber fernco coupling.

3. Using one 45-degree bend and one 8-inch by 8-inch by 4-inch wye, the weep hole extension pipe will be connected to an 8-inch diameter PVC (SDR-35) storm sewer main.

4. The 8-inch PVC storm sewer main has been designed as a gravity sewer that runs parallel to the existing concrete retaining wall. Using the 8-inch PVC pipe and a series of pre-cast concrete manholes, the discharge from the existing weep holes will be routed to an existing storm sewer manhole near the tunnel that provides access between the DeLaval property and the development to the east.

5. Backflow prevention devices will be installed on each of inlet pipes into the existing storm sewer manhole to reduce the potential for surcharging of the system.

3.8 COVER SYSTEM

To eliminate the potential exposure pathway associated with direct contact with on-site residual contamination, a one-foot thick soil cover system has been selected for installation across the DeLaval property. Covering the on-site residually contaminated soils and constructed fill areas with the cover system, in conjunction with other remediation efforts, will significantly reduce the potential for direct contact with potentially elevated levels of the contaminants of concern. The NYSDEC has approved a one foot thick cover system given that the site's green spaces will be utilized for passive rather than active recreational uses. NYSDEC defines "passive" recreational uses as bicycle or walking paths, tennis courts, or other public uses with a limited potential for soil contact.

3.8.1 Installation Coordination with the Developer

Since the installation of the soil cover system in the final major step in the remedial construction, it will be necessary to complete all other on-site activities first. Since it is undesirable to have the future developer excavate through the soil cover system immediately following the completion of the remedial construction, the developer will be granted a 90-day period in which the following activities may be completed by the developer:

1. Prepare a site-specific, task-specific health and safety plan for the proposed developer activities. The developer's contractors conducting intrusive activities on-site will be required to have 40-hour Hazardous Waster Operations and Emergency Response training in accordance 29 CFR 1910.120. Said contractors will also be required to adhere to the provisions of the Site Management Plan included in the Contract Documents associated with the remedial construction.

2. Strip remaining topsoil from the site. It may be used to backfill the AOC excavations in areas selected by the developer or will require off-site disposal.

3. Complete rough grading activities with on-site materials that must be below the demarcation layer.

4. Install subsurface utilities and utilize acceptable excavated material for backfill in the AOCs. All trenches will be lined with a demarcation barrier similar to that described in Section 3.8.2 and backfilled with clean imported fill by the developer.

After the 90-day period is complete, it is anticipated that need to conduct additional excavations within the existing on-site soils will be minimal. The remedial contractor will then install a demarcation geotextile on the existing subgrade and install a 1-foot thick soil cover layer over the demarcation layer. It will be the responsibility of the developer to place additional clean fill, pavement, sidewalks, topsoil, etc. over the cover system to complete the site development. This approach will maximize the depth of the demarcation layer and result in fewer restrictions on future excavations on the site, as the developer will only be required to work under the final SMP when excavating deeper than the demarcation layer.

The barrier soil cover layer will be mulched to provide minimal erosion and sediment control protection. However, should the future developer indicate that he/she will not be prepared to take over control of the project site immediately following the installation of the cover system, an alternate (Alternate 1 in the Contract Documents) will be implemented. Under the alternate, the top six inches of the barrier protection soil will be replaced with six inches of topsoil and the topsoil will be seeded and mulched to establish vegetation and stabilize the site.

3.8.2 Cover System Design

The cover system will consist of a geotextile demarcation barrier and a one foot thick layer of barrier soil. The following subsections summarize the requirements for each component of the cover system.

3.8.2.1 Demarcation Barrier

Prior to placement of clean cover materials, a geotextile fabric will be placed over the entire site to serve as a demarcation layer for any future intrusive ground activities (e.g. utility upgrades or landscaping) following site remediation and redevelopment. The non-woven geotextile will be a continuous filament, needle punched geotextile and will not be heat-set or bonded. The non-woven geotextile will be resistant to ultraviolet light degradation and have 80 percent strength retention when tested according to ASTM D 4355, 500 hour Xenon arc test. The non-woven geotextile will meet the following specification:

Table 3-1. Non-Woven Geotextile Specifications

Property	Test Method	Value
Tensile Strength	ASTM D 4632	160 lbs min.
Burst Strength	ASTM D 3786	305 psi min.
Puncture Strength	ASTM D 4833	95 lbs min.
Elongation	ASTM D 4533	50% max.
A.O.S.	ASTM D 4751	70
Permittivity	ASTM D 4491	1.4 sec^{-1} min.
Weight	ASTM D 5261	6 $oz./yd^2$ min.

3.8.2.2 Soil Cover Layer

The soil cover layer will be placed over the demarcation barrier and will consist of not less than one-foot of compacted barrier soil. This layer will be placed and compacted such that it provides stability and resists erosion. The barrier protection fill should consist of sound, durable, sand,

gravel, stone, or blends of these materials, which are free from organic, frozen or other deleterious materials, conforming to the following requirements:

1. Gradation:

Sieve	Percent Passing
1"	100
No. 40	10-70
No. 200	0-10

2. Maximum particle size of the material shall be classified as sub-rounded to rounded.

3. Fines passing the No. 200 sieve shall be non-plastic.

4. Particle size analysis shall show no gap grading.

The pre-construction material qualification testing for the soil selected for the barrier soil will consist of the following:

- Grain size analysis in accordance with ASTM D422
- Atterberg Limits testing in accordance with ASTM D4318
- Moisture content testing in accordance with ASTM D2216
- Maximum density determination in accordance with ASTM D698
- Environmental testing

The frequency of testing will be implemented as described in the contract specifications for this project. The frequency and types of quality control testing to be conducted during the placement of the material are also described in the contract specifications.

3.8.2.3 Topsoil

If Alternate 1 in the Contract Documents is utilized, the topsoil layer will consist of not less than six inches of topsoil capable of supporting vegetative growth. The topsoil will be able to resist erosion for the short-term, be stable, and support growth of grass or similar vegetation. Specifically, the topsoil will be fertile, friable, natural, non-contaminated loam free of subsoil, clay lumps, brush, stones, or other deleterious materials larger than two (2) inches in greatest dimension, meeting the following gradation requirements:

1.

Sieve	Percent Passing
2"	100
1"	95-100
1/4"	70-100
No. 40	20-65
No. 200	10-50

2. pH range: 5.5 - 7.6

3. Organic Content: 5% - 20%

Pre-construction material qualifications and quality assurance testing for the topsoil are provided in the contract specifications. Additionally, documentation that the soil comes from a "clean" source will be required.

3.8.2.4 Vegetation

If Alternate 1 in the Contract Documents is utilized, grass seed used for final cover shall meet the following general requirements:

- Seed shall be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, conforming to Federal and State Standards.
- The entire ground surface disturbed by construction activities shall be seeded with 100 lbs/acre of the following seed mixture.

Table 3-2. Grass Seed Mixture

Species	% By Weight	% By Purity	% Germination
Kentucky Bluegrass	40	85	80
Red Fescue	35	95	85
Perennial Rye	25	95	85

- Weed seed content shall not exceed 0.25%.

Additional requirements for establishing vegetation on the DeLaval property are included in the Contract Documents.

4.0 CERTIFICATION REPORT

The City of Poughkeepsie has retained CHA to provide adequate on-site engineering and construction observation under the direction of a professional engineer licensed to practice in New York State during all remedial activities. CHA will provide full-time observation during the completion of intrusive remedial activities (e.g. excavation in AOCs) and part-time and project milestone inspections during other remedial activities (e.g. installation of the bulkheads). At the conclusion of the remedial construction, CHA will submit a certification report that is sealed by a New York State Licensed Professional Engineer to document that the remedy was completed in accordance with the approved remedial design and contract documents.

5.0 POST-REMEDIATION ACTIVITIES

5.1 PERMANENT INSTITUTIONAL CONTROLS

During the remedial construction or after the remedial construction is complete, a permanent environmental easement will be placed on the DeLaval property to accomplish the following:

1. Require compliance with the approved Site Management Plan. The plan will require any future contractors conducting intrusive activities to be properly trained, and will require that said contractors handle displaced soils accordingly.

2. Limit the use and development of the property to commercial or recreational uses only.

3. Restrict use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Dutchess County Department of Health.

4. Require the property owner to complete and submit to the NYSDEC an institutional control/environmental control (IC/EC) certification report on an annual basis or other period basis determined by the NYSDEC.

5.2 POST-REMEDIATION SITE MANAGEMENT PLAN

After the remedial actions are complete at the site, the future developer will be responsible for completing the site development activities. In general, activities completed above the demarcation layer can be completed by contractors who not possess 40-hour Hazardous Waster Operations and Emergency Response training in accordance 29 CFR 1910.120. However, since contamination levels in excess of NYSDEC standards and guidance values will remain at the DeLaval property following the remedial work, any work beneath the demarcation layer will require the use of contractors with this training and the contractor(s) will be required to follow the post-remediation SMP. The post-remediation SMP will define the institutional and engineering controls necessary to:

1. Address residually contaminated soils that may be excavated at the site during future redevelopment of the site or other intrusive activities (e.g. utility repairs or upgrades) that breach the pavement or soil cover systems on the property, including site characterization and, where applicable, disposal/reuse of such soils in accordance with NYSDEC regulations.

2. Provide for the operation and maintenance of the DeLaval property following the completion of the remedy, including the need to install sub-slab depressurization systems beneath any on-site structures. The plan will also require that any contractor or site personnel obtain a permit from the City of Poughkeepsie prior to performing any intrusive activities that will breach the soil cap or impervious surface installed across the entire site. The plan will require that the any contractors conducting intrusive activities on the DeLaval property have 40-hour Hazardous Waster Operations and Emergency Response training in accordance 29 CFR 1910.120.

3. The plan will detail the site inspection and maintenance activities that will be performed at the Site to monitor the integrity of the soil cover system, monitoring wells, and sub-slab depressurization systems.

A number of the elements of the post-remedial construction SMP, particularly those associated with the management of contaminated soils and groundwater, will be similar to those described in the plan used during the remedial construction. The post-remediation SMP is expected to differ from the SMP included in the Contract Documents in the following ways:

1. The post remediation SMP will provide the results of the confirmatory soil samples so that workers on-site are aware of the residual levels of contamination remaining at the site.

2. The section on project phasing will be removed, as it was specific to the remedial construction.

3. Since vapor barriers and sub-slab depressurization system will be required to be installed beneath all future structures on the site, the post remediation SMP will specify the minimum requirements for these systems. These requirements were previously described in the approved November 15, 2005 *Remedial Design Work Plan & Conceptual Design* report prepared by CHA.

4. The post-remediation SMP will provide the requirements for on-going operation, maintenance, and monitoring of the site, including groundwater quality monitoring, inspections of the soil cover system, and drainage controls, etc.

5.3 MONITORING WELL REPLACEMENT

There are currently seven existing monitoring wells on the property that will be abandoned during the remedial construction. However, groundwater monitoring will be required at the DeLaval property to monitor the effectiveness of natural attention at the site following the completion of the remedial construction. Therefore, it will be necessary to install replacement wells subsequent to the remedial construction. The City of Poughkeepsie will be responsible for installing a network of wells up-gradient, within, and down-gradient of the AOCs to monitor future groundwater quality. Efforts will be made to coordinate the final location of the monitoring wells with the future development (e.g. wells will not be installed in the middle of sidewalks or beneath decks).

Specifications for the replacement wells are included with the final design documents.

5.4 POST-REMEDIAL INSPECTIONS & MONITORING

Semi-annual inspections of the DeLaval property will be performed to identify and document any problems that may have developed with time after the remedial construction was completed. The biannual inspections will be conducted for a minimum of four periods. Based upon the results of the inspections previously performed, a request to reduce the sampling frequency to annual or bi-annual inspections will be made following the fourth inspection. The overall duration of the inspection program will continue for an undetermined period of time following the completion of the remedial and site development activities, but is anticipated to be a maximum of 30 years.

The inspections should include the inspection of the soil cover system, the bulkhead system, the monitoring well network, and the sub-slab depressurization systems. A thorough visual site inspection should also be conducted to identify the presence of any vectors or other activities on the site that may adversely affect the integrity of the soil cover system. All periodic inspections will be completed under the supervision of, and certified by a New York State Licensed Professional Engineer.

The following subsections describe the recommended procedures for inspection of the DeLaval property. A site-specific post-closure inspection checklist will be developed for the DeLaval property and completed during each of the periodic inspections. The checklists will be included with the post-remedial action monitoring reports submitted to the NYSDEC.

5.4.1 Institutional Controls

The activities on the DeLaval property should be monitored on a quarterly basis to ensure that the site occupants are complying with the environmental easements and deed restrictions associated with the use of the DeLaval property.

5.4.2 Soil Cover System

Inspection of the soil cover system will be performed on quarterly basis with more frequent inspections following significant storm events and periods of drought. Visual observations of the cover system will be performed to determine the occurrence of any of the following conditions:

1. Areas of subsidence or inadequate storm water runoff control.

2. Areas of desiccation, poor vegetative cover or erosion.

3. Indications of animal/rodent disturbance that could potentially penetrate the demarcation barrier.

Pavement surfaces will also be inspected for signs of settlement, cracking, and delamination, which, if left unchecked, could become routes of exposure to potential site users, and or routes for storm water to mobilize previously immobile contaminants.

5.4.3 Bulkhead System

The bulkhead systems will be visually inspected to ensure their integrity. The bulkheads will be inspected for the following at a minimum:

1. Warping or deflection that indicates that the barriers are under excessive stress.

2. Evidence of damage to the bulkheads from ice and berthing vessels.

3. Evidence of seeps from the sheeting joints or other damaged areas in the sheeting.

4. Damage to the capping system or other components of the bulkhead system.

5.4.4 Drainage System

Inspection of the drainage system should be conducted during each quarterly inspection as well as after all major storm events (5-year storms). After completing a representative number of inspections with no issues noted, a request to reduce the inspection frequency of the drainage system will be made, based upon the historical performance of the drainage system. The drainage system inspection should identify any erosion, siltation, settlement, or restriction to the flow of water in the drainage channels and storm water piping systems on the DeLaval property. All eroded or settled areas should be repaired by replacing and compacting the eroded material or replacing and compacting additional material, followed by re-seeding to prevent additional erosion. In areas where siltation or some other restriction to the flow of water in the drainage ditches on piping has occurred, excess silt or other blockage should be removed and the surface repaired to allow the free passage of water.

5.4.5 Vectors

A complete visual inspection should be completed during the quarterly site inspections to determine if there is any vector activity at the DeLaval property. The inspection should note any live vectors, dead vectors, animal tracks, droppings, feeding areas, or dens. If the visual observations determine a substantial degree of vector activity, a professional exterminator should be contacted to develop and implement a plan to control the vector population.

5.4.6 Monitoring Wells

All monitoring wells should be checked to insure that they are undamaged and have been secured. Any damaged well or well cap/cover systems should be repaired using suitable methods based on the nature of the structure and damage. All monitoring wells should be re-secured immediately.

5.4.7 Sub-Slab Depressurization Systems

The sub-slab depressurizations systems should be visually inspected on a quarterly basis to ensure that the systems remain operational and functional. Staff maintenance personnel associated with the new structures on the site should inspect the depressurization systems on a monthly basis and perform routine maintenance as necessary. These inspections should be documented and made available to personnel conducting the quarterly inspections of the overall site. During the quarterly inspections, the following items will be observed:

1. The blower systems are operational and there is no evidence of squealing or other indications of excessive wear.

2. The controls (e.g. on/off switches) for the blower systems are secure.

3. The vacuum gauges on the suction side of the piping network indicate that a negative pressure is being maintained by the system.

4. The moisture knock-out containers have been emptied.

5. There are no leaks or obstructions in the discharge piping system.

6. The systems are properly labeled.

The vent pipes associated with passive systems in small structures will also be inspected to verify that they have not become plugged by seasonal debris.

5.4.8 Post-Remedial Monitoring

Groundwater sampling of the monitoring wells will be performed at a frequency to be established by NYSDEC. The samples will be analyzed for the parameters specified in the post remedial construction SMP. A request to reduce the sampling frequency will be made following the eighth sampling event. The overall duration of the monitoring program will be determined based upon the monitoring data.

5.5 POST-REMEDIATION MAINTENANCE ACTIVITIES

5.5.1 Soil Cover

In areas where the soil cover system becomes desiccated, the soils should be re-worked and re-compacted prior to reseeding. Areas of settlement should be promptly filled to design grade and reseeded. If necessary, additional barrier layer soil or topsoil should be imported.

A permit will need to be obtained from the City of Poughkeepsie in order to complete any intrusive activities on the DeLaval property following the installation of the soil cover system. This will include any excavations that would breach the demarcation fabric, including utility repairs and the installation of landscaping. However, the final depth of the demarcation layer will dictate how restrictive the final SMP will be at any given location on the DeLaval property.

5.5.2 Vegetative Cover

The vegetative cover on the DeLaval property will need periodic maintenance. Bare spots on the DeLaval property should be repaired by re-working the cover soil in these areas, re-seeding, fertilizing and mulching. Periodic mowing of the vegetative cover is required to prevent the establishment of brush-type vegetation and to help maintain the integrity of the cover system. The placement of trees and landscaping beds on the property will be permitted, provided that the conditions of the SMP are followed.

The frequency of the required periodic mowing of the vegetative cover on the surface of the cover system will vary slightly depending upon climatic conditions. However, it is anticipated that it will be necessary to mow the vegetated cover several times a year, based upon the need as identified by site management. The recommended mowing height of the vegetative cover is approximately three to four inches, but should not be more than eight inches. The mowing height should be increased during periods of drought to avoid excessive root damage to the grass. Mowing operations will be conducted in a manner and with equipment that will avoid excessive compaction of the cover system and/or the creation of ruts and other damage to the cover system.

5.5.3 Pavement Systems

Any pavement placed over the final cover system will be inspected for severe cracking, potholes, or other evidence of severe deterioration. If the deterioration is significant and could possible result in the deterioration of the soil cover system or exposure of the demarcation layer, the pavement systems will be required to be repaired.

5.5.4 Sub-Slab Depressurization System

The sub-slab depressurizations systems should be maintained and repaired as necessary to ensure continuous operation of the systems.

6.0 PROJECT COSTS

Based upon the Contract Documents, CHA prepared an engineer's estimate or probable remedial construction costs associated with the DeLaval Project. CHA's detailed estimate, including pricing for each unit price item in the Contract Documents has been included in Appendix A. CHA's total estimated cost for the remedial activities was $11,710,500.00 and the estimated cost for Alternate 1 was $413,700.00. The engineer's estimate was previously submitted to the NYSDEC and the City of Poughkeepsie on October 5, 2007 prior to the opening of the contractors' bids.

APPENDIX A

Engineer's Estimate

CLOUGH HARBOUR & ASSOCIATES LLP

OPINION OF PROBABLE CONSTRUCTION COST

Also, attached a detailed estimate breakdown identifying the quantities and unit prices for all items contained in the systems in accordance with the system classification sheets.

CLIENT City of Poughkeepsie **PROJECT NO.** 14357-1004-1102

LOCATION Rinaldi Boulevard **PROJECT** The DeLaval Property
Poughkeepsie, NY Environmental Restoration Program

DESIGNER Clough Harbour & Associates LLP **DATE** September 27, 2007

*** COST CONSULTANT** _____ **START CONSTRUCTION** _____

COMPLETE CONST. _____

		TOTAL COST
1	Mobilization/Demobilization	$290,517.00
2	Health & Safety	$100,000.00
3	Construction of Decontamination Pad	$14,231.00
4	Stabilized Construction Entrance	$13,345.00
5	Silt Fence	$17,136.00
6	Install & Relocate Turbidity Curtain	$3,670.00
7	Temporary Chain Link Fence Gate	$3,105.00
8	Temporary Chain Link Fence	$1,988.00
9	Waste Characterization Soil Samples	$27,995.00
10	Removal of Existing Swing Gate	$272.00
11	Remove Flag Pole & Metal Antenna	$3,379.00
12	Remove Utility Poles & Associated Equip.	$86,984.00
13	Salvage Monument	$5,545.00
14	Remove & Recycle Concrete	$516,800.00
15	Clearing & Grubbing	$126,917.00
16	Clearing Rock Outcropping	$6,428.00
17	Protection of Tree Root System	$7,930.00
18	Monitoring Well Abandonment	$4,366.00
19	2" Waterline Removal	$3,651.00
20	4" Pipe Outfall Abandonment	$672.00
21	8" and 12" Pipe Outfall/Intake Abandonment	$3,623.00
22	Excavate & Remove 6" Fuel Oil Pipeline	$7,868.00

CLOUGH HARBOUR & ASSOCIATES LLP

OPINION OF PROBABLE CONSTRUCTION COST

Also, attached a detailed estimate breakdown identifying the quantities and unit prices for all items contained in the systems in accordance with the system classification sheets.

CLIENT	**City of Poughkeepsie**	**PROJECT NO.**	**14357-1004-1102**
LOCATION	**Rinaldi Boulevard** **Poughkeepsie, NY**	**PROJECT**	**The DeLaval Property** **Environmental Restoration Program**
DESIGNER	**Clough Harbour & Associates LLP**	**DATE**	**September 27, 2007**
*** COST CONSULTANT**		**START CONSTRUCTION**	
		COMPLETE CONST.	

		TOTAL COST
23	Excavate, Clean, Remove & Dispose UST	$7,341.00
24	Excavate, Soil & Stockpile for Reuse	$112,296.00
25	Excavate Grossly-Contaminated Soils for Off-Site Disposal	$2,643,685.00
26	Confirmatory Soil Samples	$23,995.00
27	Place & Compact On-Site Soils & Recycled Concrete	$109,436.00
28	Place & Compact Imported Clean Fill	$507,600.00
29	Install 24" HDPE Pipe & Outfall	$78,903.00
30	Install 36" HDPE Pipe & Outfall	$23,756.00
31	Weep Hole Extensions	$12,896.00
32	Install 8" PVC Pipe	$31,982.00
33	Install Precast Concrete Manholes	$20,706.00
34	Connect 8" PVC Pipe to Existing Manhole	$1,166.00
35	Site Grading	$111,815.00
36	Install Demarcation Barrier	$88,275.00
37	Install Barrier Protection Soil Cover Layer	$501,960.00
38	Mulch Barrier Protection Soil Layer	$32,434.00
39	Dewatering & Groundwater Management	$442,634.00
40	Free Product Removal & Disposal	$41,510.00
41A-C	Anchored Steel Sheet Pile Bulhead (SSP)	$959,788.00
42	Cantilever Steel Sheet Pile Bulhead (SSP)	$1,425,793.00
43	SSP Interlock Waterstop	$8,339.00

CLOUGH HARBOUR & ASSOCIATES LLP

OPINION OF PROBABLE CONSTRUCTION COST

Also, attached a detailed estimate breakdown identifying the quantities and unit prices for all items contained in the systems in accordance with the system classification sheets.

CLIENT	**City of Poughkeepsie**	**PROJECT NO.**	**14357-1004-1102**
LOCATION	**Rinaldi Boulevard** **Poughkeepsie, NY**	**PROJECT**	**The DeLaval Property** **Environmental Restoration Program**
DESIGNER	**Clough Harbour & Associates LLP**	**DATE**	**September 27, 2007**
*** COST CONSULTANT**		**START CONSTRUCTION**	
		COMPLETE CONST.	

		TOTAL COST
44	SSP Toe Pins	$10,350.00
45	Riprap Toe Protection	$139,855.00
46	Riprap Revetment	$613,140.00
47	Outfall Extension Pipe for Existing Pipes	$5,000.00
48	Live Stakes	$50,000.00
49	Allowance 1: Additional Soil & Groundwater Sampling	$5,000.00
51	Steel Sheet Pile Cut-Off Wall	$319,874.00
52	Off-Site Disposal of Construction & Demolition Debris Material (Non-Concrete	$265,110.00
53	Off-Site Disposal of Solid Waste Materials	$133,343.00
	SUBTOTAL	**$9,974,404.00**
7%	GENERAL CONDITIONS (if not included above)	$698,208.28
	OVERHEAD AND PROFIT (if not included in above)	
5%	CONTINGENCIES (if not included in above)	$533,630.61
4.5%	ESCALATION FOR 3RD QUARTER 2007 CONSTRUCTION	$504,280.93
	TOTAL ESTIMATE	**$11,710,523.82**
	SITE BUDGET	**$11,710,500.00**
50	Alternate No. 1 Topsoil and Seeding	$352,358.00
	SUBTOTAL	**$352,358.00**
7%	GENERAL CONDITIONS (if not included above)	$24,665.06
	OVERHEAD AND PROFIT (if not included in above)	
5%	CONTINGENCIES (if not included in above)	$18,851.15
4.5%	ESCALATION FOR 3RD QUARTER 2007 CONSTRUCTION	$17,814.34
	TOTAL ESTIMATE	**$413,688.55**
	SITE BUDGET	**$413,700.00**

This estimate was prepared under the supervision of:

Keith J. Ziobron, P.E., L.E.P.

CLOUGH HARBOUR & ASSOCIATES LLP

CLIENT: City of Poughkeepsie
PROJECT: The DeLaval Property — Environmental Restoration Program
LOCATION: Rinaldi Boulevard — Poughkeepsie, NY
ARCHITECT: None
PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
ESTIMATOR: M. Campagna — **CHECKED BY:**

Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
1	**Mobilization/Demobilization**							**$252,623.00**		**$290,517.00**
1	Mob/Demobilization (3%)	LS	100%			$252,623.14	$252,623.14	$252,623.00	$290,516.61	$290,517.00
2	**Health & Safety**							**$86,957.00**		**$100,000.00**
1	Health and Safety Plan Implementation	LS	100%	$86,956.52			$86,956.52	$86,957.00	$100,000.00	$100,000.00
3	**Construction of Decontamination Pad**							**$11,160.00**		**$14,231.00**
1	Footing Excavation, Common Earth 1 CY	CY	40.00		$6.51	$7.08	$13.59	$544.00	$17.26	$690.00
2	For Tamping Backfilled Trenches, Vibrating Plate	CY	32.00		$5.00	$0.26	$5.26	$168.00	$7.82	$250.00
3	Backfill Trench, F.E. Loader, 100' Haul	CY	32.00		$2.69	$1.33	$4.02	$129.00	$5.40	$173.00
4	Trenching 2' Wide 6' Deep 1/2 on 1	LF	20.00		$12.38	$3.78	$16.16	$323.00	$18.08	$362.00
5	Pipe Bedding 2' Wide, 6" Dia. 1/2 on 1	LF	20.00	$1.12	$1.44		$2.56	$51.00	$3.00	$60.00
6	6" Dia. PVC, SDR 35 Pipe (Solid or Perforated)	LF	20.00	$5.03	$2.85		$7.88	$158.00	$10.25	$205.00
7	30" Square C.B. (6 ft Deep)	EA	1.00	$1,849.60	$950.62	$103.99	$2,904.21	$2,904.00	$3,757.05	$3,757.00
8	Fiberglass Underground, Single Wall, 1,000 Gal.	EA	1.00	$3,554.70	$338.14		$3,892.84	$3,893.00	$4,719.60	$4,720.00
9	Grade Subgrade for Subbase Course	SY	51.00		$0.19	$0.18	$0.37	$19.00	$0.48	$24.00
10	Membrane Lining System, HDPE, 30mil Thick	SF	459.00	$0.37	$0.63		$1.00	$459.00	$1.39	$638.00
11	Geotextile Fabric, Non-Woven 120lb	SY	51.00	$1.21	$0.23		$1.44	$73.00	$1.80	$92.00
12	Bedding Pipe/Conduit Crushed Stone 3/4-1/2"	CY	4.00	$36.99	$6.44	$2.07	$45.50	$182.00	$55.27	$221.00
13	Fine Grade Subbase for Small Irregular Areas	SY	51.00		$1.03	$1.08	$2.11	$108.00	$2.71	$138.00
14	Augar Fence Post Holes, 3' Deep, by Machine	EA	16.00		$7.27	$4.08	$11.35	$182.00	$15.28	$244.00
15	Concrete Ready Mix, 3000 psi	CY	2.00	$120.22			$120.22	$240.00	$141.59	$283.00
16	Framing, Column 4" x 4"	LF	136.00	$1.93	$1.93		$3.86	$525.00	$5.38	$732.00
17	Framing, Misc. Nailers, Treated, 2"X4", Pneumatic N	LF	108.00	$0.60	$0.78		$1.38	$149.00	$1.97	$213.00
18	Fiberglass, Corrugated Panels, 8oz/SF	SF	324.00	$1.77	$1.48		$3.25	$1,053.00	$4.41	$1,429.00
4	**Stabilized Construction Entrance**							**$10,921.00**		**$13,345.00**
1	Stone Stabilized Entrance	SY	616.67	$15.57	$0.78	$1.36	$17.71	$10,921.00	$21.64	$13,345.00
5	**Silt Fence**							**$14,364.00**		**$17,136.00**
1	Erosion Control Silt Fence	LF	4,200.00	$2.17	$1.06	$0.19	$3.42	$14,364.00	$4.08	$17,136.00
6	**Install & Relocate Turbidity Curtain**							**$2,940.00**		**$3,670.00**
1	Turbidity Barrier, Type 1, 36" Curtain, 100' Sections	SF	1,000.00	$1.94	$1.00		$2.94	$2,940.00	$3.67	$3,670.00
7	**Temporary Chain Link Fence Gate**							**$2,504.00**		**$3,105.00**
1	Double Swing Gate 6'High 12 ft Opening	EA	2.00	$919.02	$274.34	$58.70	$1,252.06	$2,504.00	$1,552.50	$3,105.00
8	**Temporary Chain Link Fence**							**$1,561.00**		**$1,988.00**
1	Temporary Fencing Chain Link, 11 ga., 6' High	LF	165.00	$7.51	$1.95		$9.46	$1,561.00	$12.05	$1,988.00
9	**Waste Characterization Soil Samples**							**$25,010.00**		**$27,995.00**
1	Sample & Waste Classification of Petro Contaminate	EA	28.00		$893.20		$893.20	$25,010.00	$999.81	$27,995.00
10	**Removal of Existing Swing Gate**							**$196.00**		**$272.00**
1	Selective Demo., Chain Link, Gates, 10-12' Width	EA	1.00		$59.97	$19.40	$79.37	$79.00	$111.16	$111.00
2	Selective Demo, Fence Posts, Steel, In Concrete	EA	2.00		$12.06	$3.88	$15.94	$32.00	$22.17	$44.00
3	Concrete Removal 7 to 24" Thick Plain	CY	1.00		$50.40	$35.09	$85.49	$85.00	$116.75	$117.00
11	**Remove Flag Pole & Metal Antenna**							**$2,981.00**		**$3,379.00**
1	Remove & Dispose of Flagpole	EA	2.00		$1,142.02	$262.86	$1,404.88	$2,810.00	$1,572.56	$3,145.00

CLOUGH HARBOUR & ASSOCIATES LLP

CLIENT: City of Poughkeepsie
PROJECT: The DeLaval Property — Environmental Restoration Program
LOCATION: Rinaldi Boulevard — Poughkeepsie, NY
ARCHITECT: None
PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
ESTIMATOR: M. Campagna — **CHECKED BY:**

Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
2	Concrete Removal 7 to 24" Thick Plain	CY	2.00		$50.40	$35.09	$85.49	$171.00	$116.75	$234.00
12	**Remove Utility Poles & Associated Equip.**							**$77,708.00**		**$86,984.00**
1	Remove Utility Pole & Appurtenances	EA	14.00		$4,466.00	$1,084.60	$5,550.60	$77,708.00	$6,213.11	$86,984.00
13	**Salvage Monument**							**$4,478.00**		**$5,545.00**
1	Salvage Monument	LS	100%	$4,392.80			$4,392.80	$4,393.00	$5,427.54	$5,428.00
2	Concrete Removal 7 to 24" Thick Plain	CY	1.00		$50.40	$35.09	$85.49	$85.00	$116.75	$117.00
14	**Remove & Recycle Concrete**							**$358,815.00**		**$516,800.00**
1	Concrete Removal 7 to 24" Thick Reinf.	CY	1,900.00		$69.54	$47.85	$117.39	$223,041.00	$161.46	$306,774.00
2	Selective Conc. Demo, Break Up ino Small Pieces, I	CY	1,900.00		$61.89	$9.57	$71.46	$135,774.00	$110.54	$210,026.00
15	**Clearing & Grubbing**							**$99,767.00**		**$126,917.00**
1	Clear & Grub Cut & Chip Medium, Trees to 12" Dia.	Acres	12.50		$3,674.88	$4,306.50	$7,981.38	$99,767.00	$10,153.35	$126,917.00
16	**Clearing Rock Outcropping**							**$5,742.00**		**$6,428.00**
1	Structure Excavation (Small Amt.)	CY	200.00		$14.29	$14.42	$28.71	$5,742.00	$32.14	$6,428.00
17	**Protection of Tree Root System**							**$5,711.00**		**$7,930.00**
1	Trench Excavation by Hand w/ Pick & Shovel 2' to 6'	CY	27.78		$73.37		$73.37	$2,038.00	$111.16	$3,088.00
2	Spread Conditioned Topsoil, 4" Deep, by Hand	SY	250.00	$5.09	$1.91		$7.00	$1,750.00	$8.94	$2,235.00
3	Mulch Aged Bark, 3" Deep, Hand Spread	SY	333.33	$2.84	$2.93		$5.77	$1,923.00	$7.82	$2,607.00
18	**Monitoring Well Abandonment**							**$3,794.00**		**$4,366.00**
1	Monitoring Well Cut and Cap	EA	7.00	$147.04	$270.51	$124.44	$541.99	$3,794.00	$623.77	$4,366.00
19	**2" Waterline Removal**							**$3,158.00**		**$3,651.00**
1	Trenching 2' Wide 6' Deep 1/2 on 1	LF	155.00		$12.38	$3.78	$16.16	$2,505.00	$18.08	$2,802.00
2	Pipe Bedding 2' Wide, 6" Dia. 1/2 on 1	LF	155.00	$1.12	$1.44		$2.56	$397.00	$3.00	$465.00
3	Selective Demo., Water & Sewer Pipe & Fittings, Co	LF	155.00		$1.65		$1.65	$256.00	$2.48	$384.00
20	**4" Pipe Outfall Abandonment**							**$558.00**		**$672.00**
1	Trenching 2' Wide 6' Deep 1/2 on 1	LF	20.00		$12.38	$3.78	$16.16	$323.00	$18.08	$362.00
2	Pipe Bedding 2' Wide, 6" Dia. 1/2 on 1	LF	20.00	$1.12	$1.44		$2.56	$51.00	$3.00	$60.00
3	Selective Demo., Water & Sewer Pipe & Fittings, Ca	LF	20.00		$4.12		$4.12	$82.00	$6.21	$124.00
4	Fittings, Class 150, DR 18, Plug End, 4"	EA	1.00	$23.70	$9.95		$33.65	$34.00	$43.47	$43.00
5	Concrete Thrust Blocks	CY	0.50	$120.22	$15.44	$0.46	$136.12	$68.00	$165.19	$83.00
21	**8" and 12" Pipe Outfall/Intake Abandonment**							**$2,930.00**		**$3,623.00**
1	Trenching 2' Wide 6' Deep 1/2 on 1	LF	80.00		$12.38	$3.78	$16.16	$1,293.00	$18.08	$1,446.00
2	Pipe Bedding 2' Wide, 12" Dia. 1/2 on 1	LF	80.00	$2.16	$2.77		$4.93	$394.00	$5.77	$462.00
3	Selective Demo., Water & Sewer Pipe & Fittings, Ca	LF	80.00		$8.74		$8.74	$699.00	$13.17	$1,054.00
4	Concrete Thrust Blocks	CY	4.00	$120.22	$15.44	$0.46	$136.12	$544.00	$165.19	$661.00
22	**Excavate & Remove 6" Fuel Oil Pipeline**							**$6,508.00**		**$7,868.00**
1	Trenching 2' Wide 6' Deep 1/2 on 1	LF	165.00		$12.38	$3.78	$16.16	$2,666.00	$18.08	$2,983.00
2	Pipe Bedding 2' Wide, 12" Dia. 1/2 on 1	LF	165.00	$2.16	$2.77		$4.93	$813.00	$5.77	$952.00
3	Selective Demo., Water & Sewer Pipe & Fittings, Ca	LF	165.00		$6.38		$6.38	$1,053.00	$9.69	$1,599.00
4	Vacuum Truck, Hazardous Material, 2500 Gal	Day	2.00	$298.48	$329.46		$627.94	$1,256.00	$737.57	$1,475.00
5	Dispose of Sludge Off-site, Average	Gal.	121.00	$5.95			$5.95	$720.00	$7.10	$859.00

CLOUGH HARBOUR & ASSOCIATES LLP

CLIENT: City of Poughkeepsie
PROJECT: The DeLaval Property — Environmental Restoration Program
LOCATION: Rinaldi Boulevard — Poughkeepsie, NY
ARCHITECT: None
PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
ESTIMATOR: M. Campagna — **CHECKED BY:**

Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
23	**Excavate, Clean, Remove & Dispose UST**							**$6,038.00**		**$7,341.00**
1	Footing Excavation, Common Earth 1 CY	CY	65.00		$6.51	$7.08	$13.59	$883.00	$17.26	$1,122.00
2	Rem. U.G. Petroleum Storage Tank 3 to 5K Gal.	EA	1.00		$465.74	$77.84	$543.58	$544.00	$782.46	$782.00
3	Remove Sludge & Water from 3 to 5k Tank	EA	1.00		$75.28	$169.71	$244.99	$245.00	$291.87	$292.00
4	Vacuum Truck, Hazardous Material, 2500 Gal	Day	1.00	$298.48	$329.46		$627.94	$628.00	$737.57	$738.00
5	Dispose of Sludge Off-site, Average	Gal.	500.00	$5.95			$5.95	$2,975.00	$7.10	$3,550.00
6	Haul 3 to 5K Tank to Certified Salvage Dump, 100 m	EA	1.00	$762.96			$762.96	$763.00	$856.98	$857.00
24	**Excavate, Soil & Stockpile for Reuse**							**$96,704.00**		**$112,296.00**
1	Excav. Backhoe, Hydraulic, Crawler, 3 CY Cap.	CY	10,000.00		$0.55	$2.16	$2.71	$27,100.00	$3.12	$31,200.00
2	Hauling Off Highway, 22 CY Capac., 1mi R.T.	CY	10,000.00		$0.55	$2.34	$2.89	$28,900.00	$3.32	$33,200.00
3	Fill Spread with Dozer 300 HP, 300' Haul	CY	10,000.00		$0.89	$2.77	$3.66	$36,600.00	$4.30	$43,000.00
4	Erosion Control Silt Fence	LF	1,200.00	$2.17	$1.06	$0.19	$3.42	$4,104.00	$4.08	$4,896.00
25	**Excavate Grossly-Contaminated Soils for Off-Site Disposal**							**$2,273,420.0**		**$2,643,685.00**
1	Excav. Backhoe, Hydraulic, Crawler, 3 CY Cap.	CY	35,500.00		$0.55	$2.16	$2.71	$96,205.00	$3.12	$110,760.00
2	Hauling Excavated Material, 20 CY 20 Mi	CY	35,500.00		$3.87	$7.46	$11.33	$402,215.00	$13.85	$491,675.00
3	Disposal of Contaminated Soil to Landfill Min.	CY	35,500.00	$50.00			$50.00	$1,775,000.00	$57.50	$2,041,250.00
26	**Confirmatory Soil Samples**							**$21,437.00**		**$23,995.00**
1	Sample & Waste Classification of Petro Contaminate	EA	24.00		$893.20		$893.20	$21,437.00	$999.81	$23,995.00
27	**Place & Compact On-Site Soils & Recycled Concrete**							**$93,496.00**		**$109,436.00**
1	Borrow, Loading Common Earth, Front End Loader 5	CY	12,400.00		$0.20	$0.37	$0.57	$7,068.00	$0.66	$8,128.00
2	Hauling Off Highway, 22 CY Capac., 1mi R.T.	CY	12,400.00		$0.55	$2.34	$2.89	$35,836.00	$3.32	$41,168.00
3	Fill Spread with Dozer 300 HP, 300' Haul	CY	12,400.00		$0.89	$2.77	$3.66	$45,384.00	$4.30	$53,320.00
4	Compaction Vib. Roller 12" Lift 4 Pass	CY	12,400.00		$0.20	$0.22	$0.42	$5,208.00	$0.55	$6,820.00
28	**Place & Compact Imported Clean Fill**							**$424,260.00**		**$507,600.00**
1	Borrow, Load &/or Spread, Select Granular Fill, Loac	CY	18,000.00	$10.92	$0.19	$0.34	$11.45	$206,100.00	$13.54	$243,720.00
2	Hauling Excavated Material, 20 CY 10 Mi	CY	18,000.00		$2.74	$5.30	$8.04	$144,720.00	$9.81	$176,580.00
3	Fill Spread with Dozer 300 HP, 300' Haul	CY	18,000.00		$0.89	$2.77	$3.66	$65,880.00	$4.30	$77,400.00
4	Compaction Vib. Roller 12" Lift 4 Pass	CY	18,000.00		$0.20	$0.22	$0.42	$7,560.00	$0.55	$9,900.00
29	**Install 24" HDPE Pipe & Outfall**							**$65,443.00**		**$78,903.00**
1	Trenching 4' Wide 6' Deep 1/2 on 1	LF	100.00		$17.99	$6.38	$24.37	$2,437.00	$27.28	$2,728.00
2	Geotextile Fabric in Trench	SY	44.44	$1.68	$0.37		$2.05	$91.00	$2.55	$113.00
3	Pipe Bedding 4' Wide, 24" Dia. 1/2 on 1	LF	100.00	$5.03	$6.44		$11.47	$1,147.00	$13.43	$1,343.00
4	24" Dia. Corrugated Type S HDPE Pipe Watertight	LF	100.00	$29.48	$4.80	$0.83	$35.11	$3,511.00	$42.85	$4,285.00
5	24" Dia. HDPE, Watertight Bends or Elbows	EA	5.00	$439.28	$132.70	$23.16	$595.14	$2,976.00	$745.20	$3,726.00
6	Concrete Headwall 30" Pipe, w/ 3'-6" Wings	EA	5.00	$976.82	$2,424.40		$3,401.22	$17,006.00	$3,920.68	$19,603.00
7	24" Dia. Tide Flex Backflow Preventor	EA	5.00	$7,335.98	$241.16	$77.84	$7,654.98	$38,275.00	$9,421.07	$47,105.00
30	**Install 36" HDPE Pipe & Outfall**							**$19,665.00**		**$23,756.00**
1	Trenching 6' Wide 6' Deep 1/2 on 1	LF	20.00		$22.39	$12.50	$34.89	$698.00	$39.06	$781.00
2	Geotextile Fabric in Trench	SY	20.00	$1.68	$0.37		$2.05	$41.00	$2.55	$51.00
3	Pipe Bedding 6' Wide, 36" Dia. 1/2 on 1	LF	20.00	$8.90	$11.36		$20.26	$405.00	$23.71	$474.00
4	36" Dia. Corrugated Type S HDPE Pipe Watertight	LF	20.00	$59.53	$6.64	$1.16	$67.33	$1,347.00	$81.35	$1,627.00

CLOUGH HARBOUR & ASSOCIATES LLP

CLIENT: City of Poughkeepsie
PROJECT: The DeLaval Property — Environmental Restoration Program
LOCATION: Rinaldi Boulevard — Poughkeepsie, NY
ARCHITECT: None
PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
ESTIMATOR: M. Campagna — **CHECKED BY:**

Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
5	36" Dia. HDPE, Watertight Bends or Elbows	EA	1.00	$907.46	$149.29	$26.16	$1,082.91	$1,083.00	$1,335.15	$1,335.00
6	Concrete Headwall 36" Pipe, w/ 3'-6" Wings	EA	1.00	$1,213.80	$2,902.90		$4,116.70	$4,117.00	$4,749.10	$4,749.00
7	36" Dia. Tide Flex Backflow Preventor	EA	1.00	$11,495.26	$361.75	$116.75	$11,973.76	$11,974.00	$14,738.63	$14,739.00
31	**Weep Hole Extensions**							**$10,271.00**		**$12,896.00**
1	Pipe Internal Cleaning & Inspection 4"-24" Dia. Max.	LF	240.00			$8.19	$8.19	$1,966.00	$9.54	$2,290.00
2	Plates, for Connections & Stiffener Plates, Shop Fab	SF	12.00	$21.24	$63.80		$85.04	$1,020.00	$97.66	$1,172.00
3	4" Dia. SS Pipe, Welded, w/ Clevis Hangers @ 10', S	LF	12.00	$60.69	$18.69	$1.79	$81.17	$974.00	$101.84	$1,222.00
4	Welding Structural, Continuous Fillet, 1/8" Thick	LF	48.00	$0.23	$2.95	$0.98	$4.16	$200.00	$6.71	$322.00
5	Drilling for Anchors, in Conc. 3/8" Dia., Up to 4" L	EA	48.00	$0.10	$5.95		$6.05	$290.00	$9.69	$465.00
6	Expansion Anchors & Shields, for Conc., Brick or Stc	EA	48.00	$3.38	$4.99		$8.37	$402.00	$12.05	$578.00
7	Trenching 2' Wide 6' Deep 1/2 on 1	LF	60.00		$12.38	$3.78	$16.16	$970.00	$18.08	$1,085.00
8	Pipe Bedding 2' Wide, 6" Dia. 1/2 on 1	LF	60.00	$1.12	$1.44		$2.56	$154.00	$3.00	$180.00
9	4" Cut-in Sleeves with Rubber Gaskets	EA	12.00	$191.90	$66.35	$11.61	$269.86	$3,238.00	$339.07	$4,069.00
10	Fittings, PVC, SDR 35 Bend or Elbow, 4" Dia.	EA	12.00	$9.07	$52.32		$61.39	$737.00	$90.05	$1,081.00
11	4" Dia. PVC, SDR 35 Pipe (Solid or Perforated)	LF	60.00	$2.69	$2.65		$5.34	$320.00	$7.20	$432.00
32	**Install 8" PVC Pipe**							**$27,392.00**		**$31,982.00**
1	Trenching 4' Wide 6' Deep 1/2 on 1	LF	586.00		$17.99	$6.38	$24.37	$14,281.00	$27.28	$15,986.00
2	Pipe Bedding 2' Wide, 8" Dia. 1/2 on 1	LF	586.00	$1.86	$2.39		$4.25	$2,491.00	$4.97	$2,912.00
3	8" Dia. PVC, SDR 35 Pipe	LF	586.00	$10.46	$2.97		$13.43	$7,870.00	$16.89	$9,898.00
4	Fittings, PVC, SDR 35 Wye, 8" Dia.	EA	12.00	$77.31	$151.84		$229.15	$2,750.00	$265.49	$3,186.00
33	**Install Precast Concrete Manholes**							**$16,234.00**		**$20,706.00**
1	Footing Excavation, Common Earth 1 CY	CY	105.00		$6.51	$7.08	$13.59	$1,427.00	$17.26	$1,812.00
2	For Tamping Backfilled Trenches, Vibrating Plate	CY	77.00		$5.00	$0.26	$5.26	$405.00	$7.82	$602.00
3	Backfill Trench, F.E. Loader, 100' Haul	CY	77.00		$2.69	$1.33	$4.02	$310.00	$5.40	$416.00
4	Geotextile Fabric in Trench	SY	45.00	$1.68	$0.37		$2.05	$92.00	$2.55	$115.00
5	4' Dia. Storm MH/CB (6 f t Deep)	EA	5.00	$1,920.12	$692.23	$187.64	$2,799.99	$14,000.00	$3,552.12	$17,761.00
34	**Connect 8" PVC Pipe to Existing Manhole**							**$981.00**		**$1,166.00**
1	Kor-N-Seal Drainage Structure	EA	2.00	$82.08	$341.97	$66.35	$490.40	$981.00	$582.75	$1,166.00
35	**Site Grading**							**$95,408.00**		**$111,815.00**
1	Excav. 300 HP Dozer Common Earth 300' Haul	CY	17,833.33		$1.31	$4.04	$5.35	$95,408.00	$6.27	$111,815.00
36	**Install Demarcation Barrier**							**$73,295.00**		**$88,275.00**
1	Geotextile Stabilization Fabric	SY	53,500.00	$1.24	$0.10	$0.03	$1.37	$73,295.00	$1.65	$88,275.00
37	**Install Barrier Protection Soil Cover Layer**							**$419,546.00**		**$501,960.00**
1	Borrow, Load &/or Spread, Select Granular Fill, Loac	CY	17,800.00	$10.92	$0.19	$0.34	$11.45	$203,810.00	$13.54	$241,012.00
2	Hauling Excavated Material, 20 CY 10 Mi	CY	17,800.00		$2.74	$5.30	$8.04	$143,112.00	$9.81	$174,618.00
3	Fill Spread with Dozer 300 HP, 300' Haul	CY	17,800.00		$0.89	$2.77	$3.66	$65,148.00	$4.30	$76,540.00
4	Compaction Vib. Roller 12" Lift 4 Pass	CY	17,800.00		$0.20	$0.22	$0.42	$7,476.00	$0.55	$9,790.00
38	**Mulch Barrier Protection Soil Layer**							**$27,513.00**		**$32,434.00**
1	Mulching Oat Straw, 1" Deep, Power Mulcher, Large	MSF	479.16	$55.49	$1.10	$0.83	$57.42	$27,513.00	$67.69	$32,434.00
39	**Dewatering & Groundwater Management**							**$328,187.00**		**$442,634.00**
1	Fractualization Tank Rental	Month	2.00	$3,280.73	$5,104.00		$8,384.73	$16,769.00	$10,191.36	$20,383.00

CLOUGH HARBOUR & ASSOCIATES LLP

CLIENT: City of Poughkeepsie
PROJECT: The DeLaval Property — Environmental Restoration Program
LOCATION: Rinaldi Boulevard — Poughkeepsie, NY
ARCHITECT: None
PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
ESTIMATOR: M. Campagna — **CHECKED BY:**

Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
2	Dewater Pump 8 hrs., Attended 8 hrs, 6" Dia.	DAY	40.00		$535.92	$382.80	$918.72	$36,749.00	$1,210.95	$48,438.00
3	Dewatering Wellpoint Sys., 1000 Hdr, 1st Mo.	LF-HD	1,000.00	$51.44	$128.88		$180.32	$180,320.00	$250.88	$250,880.00
4	Dewatering Wellpoint Sys., 1000 Hdr, After	LF-HD	1,000.00	$25.43	$35.73		$61.16	$61,160.00	$83.21	$83,210.00
5	Water Meter Turbine Flanged 6" Dia.	EA	1.00	$2,947.80	$491.26		$3,439.06	$3,439.00	$4,222.80	$4,223.00
6	Dispose of Sludge Off-site, Average	Gal.	5,000.00	$5.95			$5.95	$29,750.00	$7.10	$35,500.00
40	**Free Product Removal & Disposal**							**$32,709.00**		**$41,510.00**
1	Dewater Pump 8 hrs., Attended 8 hrs, 6" Dia.	DAY	20.00		$535.92	$382.80	$918.72	$18,374.00	$1,210.95	$24,219.00
2	Fractualization Tank Rental	Month	1.00	$3,280.73	$5,104.00		$8,384.73	$8,385.00	$10,191.36	$10,191.00
3	Dispose of Sludge Off-site, Average	Gal.	1,000.00	$5.95			$5.95	$5,950.00	$7.10	$7,100.00
41A-C	**Anchored Steel Sheet Pile Bulhead (SSP)**							**$753,298.00**		**$959,788.00**
1	Mob Setup & Rem, Air Compressor 600 CFM	EA	0.50		$200.33	$13.65	$213.98	$107.00	$317.95	$159.00
2	Mob Setup & Rem, Crane, Leads & Hammer 75T	EA	0.50		$5,008.30	$3,509.00	$8,517.30	$4,259.00	$11,519.55	$5,760.00
3	Sheet piling, 25' excav., 38 psf, left in place	SF	11,888.50	$24.85	$3.01	$3.80	$31.66	$376,390.00	$38.50	$457,707.00
4	Sheet Piling Drive, Wales, Connections Etc.	TON	32.24	$283.22			$283.22	$9,131.00	$334.10	$10,771.00
5	Str. Steel, Paints & Protective Coatings, Sprayed I	SF	11,888.50	$0.20	$0.23		$0.43	$5,112.00	$0.65	$7,728.00
6	Tiebacks only, Typical Average, 35' Long	EA	30.00	$965.26	$1,263.24	$28.07	$2,256.57	$67,697.00	$3,167.10	$95,013.00
7	Sheet piling, 20' excav., 27 psf, left in place	SF	6,468.00	$17.05	$3.14	$3.96	$24.15	$156,202.00	$29.19	$188,801.00
8	Lt. Weight, Angle Framing 4" & Larger	LB	12,700.80	$0.68	$2.92	$0.33	$3.93	$49,914.00	$6.52	$82,809.00
9	Drilling for Anchors, in Conc. 3/4" Dia., Up to 4" L	EA	201.50	$0.23	$8.29		$8.52	$1,717.00	$13.66	$2,752.00
10	Expansion Anchors & Shields, for Conc., Brick or Stc	EA	201.50	$7.46	$5.35		$12.81	$2,581.00	$17.39	$3,504.00
11	Concrete Beams, 5 kip /LF, 25 Span	CY	48.27	$375.70	$510.40	$50.40	$936.50	$45,209.00	$1,304.10	$62,954.00
12	Borrow Select Structural Backfill, 5 mi. Haul	CY	1,761.26	$10.92	$3.04	$5.90	$19.86	$34,979.00	$23.75	$41,830.00
42	**Cantilever Steel Sheet Pile Bulhead (SSP)**							**$1,122,161.00**		**$1,425,793.00**
1	Mob Setup & Rem, Air Compressor 600 CFM	EA	0.50		$200.33	$13.65	$213.98	$107.00	$317.95	$159.00
2	Mob Setup & Rem, Crane, Leads & Hammer 75T	EA	0.50		$5,008.30	$3,509.00	$8,517.30	$4,259.00	$11,519.55	$5,760.00
3	Sheet piling, 25' excav., 38 psf, left in place	SF	26,412.00	$24.85	$3.01	$3.80	$31.66	$836,204.00	$38.50	$1,016,862.00
4	Sheet Piling Drive, Wales, Connections Etc.	TON	29.76	$283.22			$283.22	$8,429.00	$334.10	$9,943.00
5	Str. Steel, Paints & Protective Coatings, Sprayed I	SF	26,412.00	$0.20	$0.23		$0.43	$11,357.00	$0.65	$17,168.00
6	Lt. Weight, Angle Framing 4" & Larger	LB	24,105.60	$0.68	$2.92	$0.33	$3.93	$94,735.00	$6.52	$157,169.00
7	Drilling for Anchors, in Conc. 3/4" Dia., Up to 4" L	EA	372.00	$0.23	$8.29		$8.52	$3,169.00	$13.66	$5,082.00
8	Expansion Anchors & Shields, for Conc., Brick or Stc	EA	372.00	$7.46	$5.35		$12.81	$4,765.00	$17.39	$6,469.00
9	Concrete Beams, 5 kip /LF, 25 Span	CY	91.62	$375.70	$510.40	$50.40	$936.50	$85,804.00	$1,304.10	$119,485.00
10	Borrow Select Structural Backfill, 5 mi. Haul	CY	3,692.44	$10.92	$3.04	$5.90	$19.86	$73,332.00	$23.75	$87,696.00
43	**SSP Interlock Waterstop**							**$6,114.00**		**$8,339.00**
1	Waterstop Ribbed, PVC, 9" Wide, 3/8" Thick	LF	1,147.00	$2.45	$2.88		$5.33	$6,114.00	$7.27	$8,339.00
44	**SSP Toe Pins**							**$7,631.00**		**$10,350.00**
1	Drilling & Grouting Anchor Bolts or Rebar	LF	200.00	$5.78	$9.57	$1.91	$17.26	$3,452.00	$20.87	$4,174.00
2	Anchor Bolts 1" Dia. L-Type, incl. Washer, 42" L	EA	50.00	$13.07	$70.50		$83.57	$4,179.00	$123.52	$6,176.00
45	**Riprap Toe Protection**							**$114,099.00**		**$139,855.00**
1	Pipe Zone Bedding Crushed/Screened ROB Gravel	CY	207.00	$27.74	$6.44	$2.07	$36.25	$7,504.00	$44.71	$9,255.00
2	Stone Filling (Heavy)	CY	1,655.00	$34.80	$13.27	$14.80	$62.87	$104,050.00	$77.00	$127,435.00

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PROJECT ENG: S. Smith — **PROJECT NO.:** 14357-1004-1102
ESTIMATE: Construction Documents (CD) — **DATE:** September 27, 2007
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Item Number	Item Description	Unit of Meas.	Item Quantity	Material Cost	Labor Cost	Equipment Cost	Bare Unit Cost	Total Bare Cost	OH & P Unit Cost	Total with OH & P Cost
3	Geotextile Fabric in Trench	SY	1,241.22	$1.68	$0.37		$2.05	$2,545.00	$2.55	$3,165.00
46	**Riprap Revetment**							**$505,319.00**		**$613,140.00**
1	Pipe Zone Bedding Crushed/Screened ROB Gravel	CY	811.00	$27.74	$6.44	$2.07	$36.25	$29,399.00	$44.71	$36,260.00
2	Stone Filling (Heavy)	CY	6,490.00	$34.80	$13.27	$14.80	$62.87	$408,026.00	$77.00	$499,730.00
3	Geotextile Fabric in Trench	SY	4,867.56	$1.68	$0.37		$2.05	$9,978.00	$2.55	$12,412.00
4	Temporary Precast Concrete Median Barrier	LF	2,928.00		$12.76	$7.02	$19.78	$57,916.00	$22.11	$64,738.00
47	**Outfall Extension Pipe for Existing Pipes**							**$4,348.00**		**$5,000.00**
1	Outfall Extension Pipe for Existing Pipes	LS	100%	$4,347.83			$4,347.83	$4,348.00	$5,000.00	$5,000.00
48	**Live Stakes**							**$43,478.00**		**$50,000.00**
1	Woody Plant Cuttings	LS	100%	$43,478.26			$43,478.26	$43,478.00	$50,000.00	$50,000.00
49	**Allowance 1: Additional Soil & Groundwater Sampling**							**$4,348.00**		**$5,000.00**
1	Additional Soil & Groundwater Sampling	LS	100%	$4,347.83			$4,347.83	$4,348.00	$5,000.00	$5,000.00
51	**Steel Sheet Pile Cut-Off Wall**							**$263,202.00**		**$319,874.00**
1	Sheet piling, 15' excav., 22 psf, left in place	SF	12,720.00	$13.58	$3.06	$3.87	$20.51	$260,887.00	$24.84	$315,965.00
2	Steel Cutting, Hand Burning, incl. Prep., 1" Thick	LF	848.00		$2.21	$0.52	$2.73	$2,315.00	$4.61	$3,909.00
52	**Off-Site Disposal of Construction & Demolition Debris Material (Non-C**							**$242,070.00**		**$265,110.00**
1	Hauling Excavated Material, 20 CY 20 Mi	CY	3,000.00		$3.87	$7.46	$11.33	$33,990.00	$13.85	$41,550.00
2	Dump Charges, Building Const. Materials	Ton	2,000.00	$104.04			$104.04	$208,080.00	$111.78	$223,560.00
53	**Off-Site Disposal of Solid Waste Materials**							**$111,496.00**		**$133,343.00**
1	Hauling Excavated Material, 20 CY 20 Mi	CY	750.00		$3.87	$7.46	$11.33	$8,498.00	$13.85	$10,388.00
2	Disposal of Contaminated Soil to Landfill Min.	CY	750.00	$137.33			$137.33	$102,998.00	$163.94	$122,955.00

	Notes:	**Subtotal**	=	$9,974,404.00
1	Escalation Factor: 1.00	**5% Design Contingency**	=	**$498,720.20**
2		**Budget**	=	**$10,473,100.00**

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50	**Alternate No. 1 Topsoil and Seeding**							**$300,545.00**		**$352,358.00**
1	Spread Topsoil, w/ Loader and Dozer	CY	8,873.33	$25.43	$1.07	$3.32	$29.82	$264,603.00	$34.78	$308,615.00
2	Seeding, Fescue, Creeping, Hydro w/ Mulch & Fertili	MSF	479.16	$55.49	$12.31	$7.21	$75.01	$35,942.00	$91.29	$43,743.00

	Notes:	**Subtotal**	=	**$352,358.00**
1	Escalation Factor: 1.00	**5% Design Contingency**	=	**$17,617.90**
2		**Budget**	=	**$370,000.00**