Final Engineering Report

Courtlandt Corners II

Bronx, New York

October 2010

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COURTLANDT CORNERS II
BRONX, NEW YORK

Final Engineering Report

NYSDEC BCP Number: C203041

October 2010

Prepared for:

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Prepared by:

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CERTIFICATIONS

I, Edward S. Wong, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Courtlandt Corners II Site (NYSDEC BCA Index No. A2-0592-07-07 Site No. C203041).

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for Courtlandt Corners II and related amendments.

I certify that the Remedial Action Work Plan dated June 2008 and Stipulations in a letter dated 27 June 2008 and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the Remedial Action Work Plan and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in for the remedy.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by Department.

I certify that all export of contaminated soil, fill, water or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that all import of soils from off-Site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

Edward S. Wong, P.E.
NYS Professional Engineer # 071703 Date: 10/14/2010

It is a violation of Article 145of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

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EXECUTIVE SUMMARY

This Final Engineering Report documents remedial actions completed on the Courtlandt Corners II property (NYSDEC BCA Index No. A2-0593-07-07, Site No. C203041) Tax Block 2408, Lot 20 (BCA - Appendix A). Under the redevelopment plan the Site is being reclassified as a single Lot 1 for Block 2408 a portion of which is the former Lot 20.

Site Description/Physical Setting/Site History

The Courtlandt Corners II site is located in the County of Bronx, Bronx, New York. The Courtlandt II Site is identified as Block 2408 Lot 20 on the Bronx Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1-1) shows the Site location. The Site is situated on an approximately 0.16 acres bounded by East 162nd Street to the north, East 161st Street to the south, Melrose Avenue to the east, and Courtlandt Avenue to the west (see Figure 1-2 Site Plan). The property is also fully described in Appendix B – Environmental Easement with Metes and Bounds and under the redevelopment plan is being reclassified as a single Lot 1 for Block 2408.

Courtlandt Corners II Associates, L.P is a Volunteer in the Brownfield Cleanup Program. Courtlandt Corners II was developed on the property on the Tax Block 2408 (including Lot 20, which is the portion that was accepted in the NYSDEC BCP). The re-development of Block 2408, including Lot 20, will consist of approximately 255 units of affordable rental housing, approximately 18,000 square feet of new commercial space located on the ground floors on East 161st Street and an approximately 20,000 square foot below grade parking garage. Parking, retail and residential uses are included on the former Lot 20.

The property is in an area of mixed residential and commercial use. Previous uses of the Courtland II BCP site (Block 2408 Lot 20) included residential dwellings and a filling station between 1891 and 1989. Block 2408 Lot 20 had a NYSDEC Spill Case due to a tank test failure.

Summary of the Remedial Investigation

The remedial investigation (RI) scope of the work consisted of a geophysical survey, groundwater, soil, and soil vapor sampling. All groundwater samples collected as part of the RI were analyzed for VOCs,

SVOCs, target analyte list (TAL) metals using USEPA SW-846 Methods 8260B, 8270C, 6010B, and 7471 respectively. All soil samples collected as part of the RI were analyzed for VOCs, SVOCs, pesticides and target analyte list (TAL) metals using USEPA SW-846 Methods 8260B, 8270C, 8081 and 6010B, respectively. All soil vapor samples collected as part of the investigation were analyzed for VOCs using EPA Method TO-15.

The site is underlain by urban fill varying in thickness from approximately 5 to 15 feet. The fill consists of a mixture of fine to medium sand, some silt, gravel and traces of brick, cinder, concrete, coal fragments and wood. Highly variable native soil was encountered beneath the fill layer, generally ranging from medium to fine to coarse sand to clay.

A geotechnical engineering investigation conducted by Pillori Associates in December, 2007, encountered bedrock between 30 and 35 feet below grade at the Courtlandt I property and between 35 and 55 feet at the Courtlandt II property. The bedrock in this area is composed of Fordham Gneiss and Inwood Marble.

Groundwater at the Courtlandt I site is approximately 16.5 feet below grade and between 14.5 and 19.5 feet below grade at the Courtlandt II site. Based on topography of the site, regional groundwater flow in this area of the Bronx would be expected to be to the south towards the East River. However, actual groundwater flow as noted in Quarterly Monitoring Reports for Spill Case# 94-01207 is to the northeast. ERM has confirmed this northeasterly flow direction with the installation of additional monitoring wells.

Soil beneath the Courtlandt I site is impacted by VOCs, SVOCs, metals and pesticides at concentrations which exceed the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs). Soil beneath the Courtlandt II site is impacted primarily by VOC and metals (primarily lead, zinc and minor concentrations of mercury). Groundwater beneath the site is impacted primarily by VOCs with some SVOCs and metals (primarily lead and chromium) at concentrations which exceed the NYSDEC Ambient Groundwater Standards. Soil vapor is impacted by VOCs (primarily gasoline compounds and to a lesser extent PCE and Freon.

Qualitative Human Health Exposure Assessment

The following table summarizes the qualitative human health exposure assessment:

	SOIL	
Exposure Pathway	**Current**	**Future**
Dermal contact with and ingestion of soil – unpaved areas	Passersby, Adjacent Property Occupants	Construction Workers, *Future Residents, *Commercial Workers, Adjacent Property Occupants, Passersby (if soil remains and is left uncovered)
Dermal contact with and ingestion of soil in paved/covered soil areas	Not applicable	Construction Workers, *Commercial Workers
Inhalation of Dust from Construction Activities	Not applicable	*Future Residents, *Commercial Workers, Construction Workers, Adjacent Property Occupants
Ingestion of Particulates from Construction Activities	Not applicable	*Future Residents, *Commercial Workers, Construction Workers, Adjacent Property Occupants

* Potential exposure pathway exists only if the Site is not remediated

Exposure Pathway	**Current**	**Future**
	GROUNDWATER	
Dermal contact with groundwater	Not applicable	Construction Workers
Ingestion of Groundwater	Not applicable	Not applicable
Volatilization to Indoor Air	Not applicable	*Residents, *Commercial Workers,

* Potential exposure pathway exists only if the Site is not remediated

Summary of the Remedy

The Site was remediated in accordance with the scope of work presented in the NYSDEC-approved Remedial Action Work Plan dated 30 June 2008 (Appendix A), with the Track 4 status due to some residual contamination.

Below is a summary of the Remedial Actions required and implemented at the Site:

1. All soil within the boundaries of the Site that exceeds 6NYCRR Part 375-6 Track 4 Unrestricted Use Soil Cleanup Objectives (UUSCOs) was excavated and removed. Soils exceeding criteria below the water table were removed via the use of sheeting/shoring and dewatering.

2. Groundwater from dewatering operations was treated through filters and activated carbon on-site prior to discharge to the New York City combined sewer.

3. Residual groundwater contamination was treated in situ via the addition of a calcium peroxide compound to the dewatered portions of the affected aquifer.

4. All soil, fill, fluids and other material removed from the property under this Plan were transported and disposed of in accordance with all Federal, State and local laws and requirements. All exported material was properly characterized, and taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

5. End-point samples were collected and analyzed to evaluate the performance of the remedy with respect to attainment of UUSCOs.

6. A vapor barrier and an active sub-slab depressurization system (SSDS) were installed in all building areas to prevent vapor intrusion from residually contaminated groundwater a soil.

7. Any imported soil/fill met 6NYCRR Part 375-6 UUSCOs.

8. A composite cover system consisting of asphalt or concrete pavement on walkways, roads, parking lots, and concrete building slabs and one foot of gravel that covers the entire Site. Slabs and paving systems (building slabs, roadways, walkways, parking lots, etc.) are at least 12-inches thick and are recorded in as-built cover system drawings provided in Appendix C.

9. The recording of an Environmental Easement (Appendix B), including Institutional Controls, was required to prevent future exposure to any residual contamination remaining at the Site.

10. Publication of a Site Management Plan (Appendix D) for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting.

11. Periodic certification of the institutional and engineering controls listed above.

12. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, were addressed in accordance with all applicable Federal, State and local rules and regulations.

FINAL ENGINEERING REPORT

1.0 BACKGROUND

Courtlandt Corner LLC entered into two Brownfield Cleanup Agreements (BCAs) (NYSDEC BCA Index Nos. A2-0592-07-07 and A2-0593-07-07 Site Nos. C203040 and C203041) with the New York State Department of Environmental Conservation (NYSDEC) in March, 2008, to remediate two properties, known as Courtlandt Corners I (0.29 acres) and Courtlandt Corners II (0.16 acres) located on East 161st Street between Melrose Avenue and Courtlandt Avenue in Melrose Commons, Bronx County New York. The BCAs was assigned to and assumed by Courtlandt Corners I Associates, L.P. and Courtlandt Corners II Associates, L.P., respectively. Courtlandt Corners I Associates, L.P. and Courtlandt Corners II Associates, L.P are Volunteers in the Brownfield Cleanup Program. A mix of residential and commercial use is proposed for the properties. Courtlandt Corners I was developed on Tax Block 2407, Lots 5, 8, 10 -12, which have been accepted in the NYSDEC BCP, and will consist of approximately 70 units of affordable housing and approximately 12,000 square feet of commercial on the ground floor on East 161st Street. Courtlandt Corners II was developed on the subject property on Tax Block 2408 (including Lot 20, which has been accepted in the NYSDEC BCP). It will consist of approximately 255 units of affordable rental housing, approximately 18,000 square feet of new commercial space located on the ground floors on East 161st Street and an approximately 20,000 square foot below grade parking garage.. This FER documents remedial actions completed on the Courtlandt Corners II property (NYSDEC BCA Index No. A2-0593-07-07, Site No. C203041) Tax Block 2408, Lot 20. Under the redevelopment plan the Site is being reclassified as a single Lot 1 for Block 2408 a portion of which is the former Lot 20.

This Remedial Action Work Report (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between 17 March 2008 and 2 April 2008. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document and performed is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC

and New York State Department of Health (NYSDOH) had determined that this Site posed a significant threat to human health and the environment (see Fact Sheet Appendix D). The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document was not prepared.

1.1 SITE LOCATION AND DESCRIPTION

The Courtlandt Corners II site is located in the County of Bronx, Bronx, New York. The Courtlandt II Site is identified as Block 2408 Lot 20 on the Bronx Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1-1) shows the Site location. The Site is situated on an approximately 0.16 acres bounded by East 162nd Street to the north, East 161st Street to the south, Melrose Avenue to the east, and Courtlandt Avenue to the west (see Figure 1-2 Site Plan). The property is also fully described in Appendix B – Easement with Metes and bounds.

The Site is bounded by Melrose Avenue and Courtlandt Avenue to the east and west and East 162nd Street and East 161st Street to the north and south, respectively, and is legally defined as Tax Block 2408, Lot 20. A Site Plan indicating Courtlandt II Lot 20 is presented in Figure 1-2. The Site is located in a mixed-use residential and commercial area and formerly contained a filling station and community garden. The neighboring land uses are primarily residential and commercial.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action has made the site the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this determination. However, the Remedial Action contemplated under this RAWP has been implemented independent of the proposed redevelopment plan.

The proposed future use of the property is a combination of approximately 350 units of affordable rental housing and 27,000 square feet of commercial space. The basements and first floors of the proposed redevelopment areas are occupied by parking lots, mechanical rooms, retail space and storage areas. Building plans and plans of the basement

and first floor of the Courtlandt II property are provided as Figures 1-3, Figure 1-4 and Figure 1-5 respectively.

Courtlandt Corners II was developed on the subject property on Tax Block 2408 (including Lot 20, which has been accepted in the NYSDEC BCP). It will consist of approximately 255 units of affordable rental housing, approximately 18,000 square feet of new commercial space located on the ground floors on East 161st Street and an approximately 20,000 square foot below grade parking garage.

As part of the redevelopment plan, all existing structures on the associated lots was demolished and soils was excavated to varying depths based on the building plans provided in Appendix F. These plans call for varying depths of excavation to allow for basements and crawl spaces.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located on East 161st Street in Bronx, New York. The Site, which is bounded by Melrose Avenue and Courtlandt Avenue to the east and west and East 162nd Street and East 160th Street to the north and south, respectively is legally defined as Tax Block 2408, Lot 20 and Tax Block 2407, Lots 5, 8, 10, 11, and 12. A Site location map is presented as Figure 1-1. The Site is located in a mixed-use residential and commercial area and currently contains two filling stations, one parking lot, one vacant three-story warehouse, one three-story vacant residential building, a community garden and several two-to-three story residential buildings with first-floor commercial lots. The neighboring land uses are primarily residential and commercial.

According to a May, 2007, Fleming-Lee Shue, Inc. Phase II Report, Block 2408 Lot 20 was occupied by residential dwellings, and a filling station between 1891 and 1989. A portion of Block 2408 was demolished between 1978 and 1989. Between 1981 and 1989, Block 2407, Lot 5, contained residential buildings and a filling station, Lots 11 and 12 contained an auto repair shop, and later Lots 8, 10, 11, and 12 contained parking lots. Most of the buildings on Block 2407 were demolished between 1978 and 1989. Historical Sanborn maps of the area are presented in Appendix G.

The following is a list of schools, hospitals and daycare centers in the general vicinity of the site:

Schools, Day Care Centers and Hospitals in the Vicinity of Courtlandt Corners	
Ana Maldonado, Principal Mott Haven Village Preparatory High School 701 St. Ann's Avenue, Bronx, NY 10455	Donald Bastian, Principal New Millennium Business Academy Middle School (X328) 1000 Teller Avenue Bronx, NY 10456
Denise Simone, Principal New Explorer's High School 701 St. Ann's Avenue Bronx, NY 10455	Paul Cannon, Principal PS 140 Eagle (x140) 916 Eagle Avenue Bronx, NY 10456
Felice Lepore, Principal The Urban Assembly School for Careers in Sports 701 St. Ann's Avenue Bronx, NY 10455	Michelle McKeon, Principal St. Peter and St. Paul School 838 Brook Avenue Bronx, NY 10451
Anthony Harris, Principal Crotona Academy High School (x321) 639 Saint Ann's Avenue Bronx, NY 10455	Sister Lourdes Mercado, Principal St. Angela Merici School 266 E. 163rd Street Bronx, NY 10451
Sydney Blair, Principal Passages Academy - High School 560 Brook Avenue Bronx, NY, 10455	Lionel Farrington, Director Melrose Community School 838 Brook Avenue Bronx, NY 10451
Ramona Duran, Principal P.S. 157 - Grove Hill School (x157) 757 Cauldwell Avenue Bronx, NY 10456	Sister Patrice Owens, S.C.C., Principal Immaculate Conception School 378 E. 151st Street Bronx, NY 10455
Jorge Perdomo, Principal P.S. 001 Courtlandt School (x001) 335 E. 152nd Street Bronx, NY 10451	Rene Cassanova, Principal H.S. 600 Alfred E. Smith High School 333 E. 151st Street Bronx, NY 10451
Dorothy Carmichael, Principal P.S./M.S. 029 Melrose School (x029) 758 Courtlandt Avenue Bronx, NY 10451	Brightside Academy Attn: Rosa Milan, Director 331 East 150th Street Bronx, NY 10451

Lisa Diaz, Principal
P.S./M.S. 031 The William Lloyd Garrison (x031)
250 East 156th Street
Bronx, NY 10451

Graciela Navarro, Principal
P.S. 035 Franz Siegel (x035)
261 E. 163rd Street
Bronx, NY 10451

Jeanene Worrell-Breeden, Principal
P.S. 018 John Peter Zenger (x018)
502 Morris Avenue
Bronx, NY 10451

Maryann Manzolillo, Principal
IS 162 L. Rodriguez De Tio Academy of Future Tech
600 St. Ann's Avenue
Bronx, NY, 10455

John Piazza, Principal
JHS 151 Lou Gehrig (x151)
250 East 156th Street
Bronx, NY 10451

Blanca Ruiz, Principal
KIPP Academy Charter School (x704)
250 East 156th Street
Bronx, NY 10451

Robert Hannibal, Principal
JHS 145 Arturo Toscaninni (X145)
1000 Teller Avenue
Bronx, NY 10456

Patrick Kelly, Principal
Urban Science Academy (x325)

HAC/Marshall England Early Childhood Learning Center

Attn: Wanda Carter, Director
800 Concourse Village East
Bronx, NY 10451

Iola Jordan Day Care Center
Attn: Director
421 E. 161st St.
Bronx, NY 10451

Philip H. Michaels Child Development Center
Attn: Director
629 Courtlandt Avenue
Bronx, NY 10451

Safe Horizon Infant/Toddler Program

Attn: Director
900 Sheridan Avenue
Bronx, NY 10451

The Salvation Army Bronx Day Care Center
Attn: Director
425 E.159th St.
Bronx, NY 10451

Lincoln Hospital
234 E 149th St.
Bronx, NY 10451

Bronx Lebanon Hospital
1650 Grand Concourse
Bronx, NY 10457

Harlem Hospital Center
506 Lenox Ave
New York, NY 10037

1000 Teller Avenue Bronx, NY 10456	NY-Presbyterian Hospital/ Columbia Univ. Medical Center 41 Audobon Avenue New York, NY 10032

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with a scope of work which followed the requirements in DER-10. The objectives of the remedial investigation were as follows:

- Define the vertical and horizontal extent of soil and groundwater impacts on the Site;
- Assess the potential offsite health risk associated with soil and groundwater impacts at the Site; and
- Gather sufficient information to develop a remedial action consistent with the planned site use and is protective of human health and the environment.

The investigation was conducted between 17 March 2008 and 2 April 2008. The RI results are presented and discussed in Section 2.1 of this FER.

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

The RI scope of work consisted of groundwater, soil, and soil vapor sampling. The investigation data was used to evaluate remedial needs for the Site. Under current redevelopment plans, the ground floor of the Site was converted into a mixed use of parking, mechanical rooms, storage areas, and commercial properties.

2.1.1 Groundwater Profile Borings and Monitoring Well Sampling and Installation

Groundwater profile borings were placed along the perimeter of the Courtlandt I property by direct push methods to further delineate the vertical and horizontal extent of groundwater impacts at the Site; one (1) in Lot 12 along the eastern property line, one (1) in Lot 11 along the northern property line, one (1) in Lot 10 along the southern property line, and three (3) in Lot 5 along the northern, southern and western property lines. The western boring in Lot 5 (GWVP-01) and the boring in Lot 10 (GWVP-04) were completed as monitoring wells.

Two additional (2) vertical profile borings (GWVP-07 and GWVP-08) were installed across the street from the Courtlandt I property on the north side

of East 161st Street to determine if contaminants are migrating off-site from this property. A map presenting the groundwater contours is provided as Figure 2-1.

The Courtlandt II property (Block 2408 Lot 20) is currently listed in the NYDEC spill database (case# 94-01207) and is being sampled on a quarterly basis. There are several monitoring wells associated with the spill case which intermittently contain light non-aqueous phase liquid (LNAPL). The Courtlandt II property has eight (8) monitoring wells located within its boundaries. As part of the Remedial Investigation (RI) conducted by ERM, groundwater samples were collected from each of the existing monitoring wells. A map showing the location of all monitoring wells associated with the spill case is presented as Figure 2-2. In addition, four (4) vertical profile borings were installed within the property boundaries to delineate the vertical extent of contamination on-site and two (2) vertical profile borings were installed along the eastern and southern perimeters of the property in order to identify any contamination that may be migrating off-site. A map presenting the groundwater vertical profile boring locations is provided as Figure 2-2.

As part of the Public Health exposure assessment conducted during the RI, seven (7) monitoring wells located south and east of the Courtlandt II property along East 161st Street and on either side of Melrose Avenue were sampled. These wells had previously been installed as part of the monitoring associated with the spill on this Lot. A map showing the location of all the pre-existing monitoring wells is presented as Figure 2-2. The purpose of these samples was to determine if contamination from the Courtlandt II property is migrating off-site causing a potential vapor intrusion pathway to adjacent properties.

Vertical profile groundwater samples were collected from the top of the water table every ten feet until bedrock or refusal was encountered.

All borings for the purpose of collecting groundwater samples were installed using direct push technologies. Groundwater samples were collected by advancing a screen point sampling device to the desired sampling depth. Once the tool was at the desired depth, three volumes were purged from the rods and a sample was collected. Due to the presence of LNAPL at the Courtlandt II property the borings were double cased 5′ into the groundwater to prevent contamination from being dragged down into deeper sampling intervals.

2.1.2 Soil Borings

Soil sampling data collected as part of the open spill case at the Courtlandt II property was used in determining the remedial action for the property. In addition to the historical data gathered at the Courtlandt II site, four (4) new soil borings were installed throughout the property in the vicinity of the groundwater sampling locations during the Remedial Investigation. A map depicting the soil boring locations is presented as Figure 2-2. Continuous cores (5 ft) were collected from the surface to twenty (20) feet into the groundwater table or to refusal. At three of the locations (SVPB-07, SVPB-09 and SVPB-10) a sample was collected from the 0-2 foot interval and then every five (5) feet until the completion depth. At one location (SVPB-08), a worst case sample was collected from the 0-10 foot interval (as determined by PID, visual and olfactory observation) and then every five (5) feet until the completion depth.

All borings were installed using direct push technologies to advance a macro-core sampler fitted with an acetate liner into the subsurface to collect the soil samples.

2.1.3 Soil Vapor Sampling

Nineteen (19) soil vapor samples were collected in an attempt to define vapor intrusion pathways. Four points were installed on each of the Courtlandt BCP properties and an additional eleven (11) points were installed outside the property boundaries to assess public health exposure. A map depicting the soil vapor sampling locations is presented as Figure 2-2.

The eight (8) soil vapor samples inside the perimeter of the Courtlandt properties were collected from ten feet below grade and the eleven (11) off-site samples were collected from a depth of three feet below grade. All soil vapor sampling points were installed using direct push technologies.

2.1.4 Samples Collected

The following table lists the sample IDs, depths and analyses for all soil samples used in determining the remedial action for the Courtlandt I and II properties. Soil boring locations are presented in Figure 2-2.

INVESTIGATIVE SOIL SAMPLE SUMMARY TABLE								
SITE_ID	DTW (feet)	DATE	DEPTH (feet)	Metals 6010B/7471	Pesticides 8081	PCBs 8082	SVOCs 8270	VOCs 8260
*SB-01	18	11/6/2006	2	X	X	X	X	X
		11/6/2006	20	X	X	X	X	X
*SB-02	21	11/6/2006	2	X	X	X	X	X
		11/6/2006	20	X	X	X	X	X
*SB-03	19	11/6/2006	2	X	X	X	X	X
		11/6/2006	20	X	X	X	X	X
*SB-04	27	11/6/2006	2	X	X	X	X	X
		11/6/2006	16	X	X	X	X	X
*SB-05	28	11/7/2006	2	X	X	X	X	X
		11/7/2006	15	X	X	X	X	X
*SB-06	17	11/7/2006	2	X	X	X	X	X
		11/7/2006	18	X	X	X	X	X
*SB-07	11	11/7/2006	2	X	X	X	X	X
		11/7/2006	20	X	X	X	X	X
*SB-08	17	11/7/2006	2	X	X	X	X	X
		11/7/2006	18	X	X	X	X	X
SVPB-01	16	3/17/2008	10	X	X		X	X
		3/17/2008	14	X	X		X	X
		3/17/2008	18	X	X		X	X
		3/17/2008	23	X	X		X	X
SVPB-02	14	3/17/2008	4	X	X		X	X
		3/20/2008	13	X	X		X	X
		3/20/2008	18	X	X		X	X
SVPB-03	16	3/17/2008	2	X	X		X	X
		3/17/2008	7	X	X		X	X
		3/17/2008	14	X	X		X	X
		3/17/2008	22	X	X		X	X
		3/17/2008	25	X	X		X	X
SVPB-04	16	3/18/2008	2	X	X		X	X
		3/18/2008	8	X	X		X	X
		3/18/2008	13	X	X		X	X
		3/18/2008	18	X	X		X	X
		3/18/2008	23	X	X		X	X
		3/18/2008	28	X	X		X	X
SVPB-05	15.5	3/18/2008	2	X	X		X	X
		3/18/2008	9	X	X		X	X
		3/18/2008	13	X	X		X	X
		3/18/2008	18	X	X		X	X
		3/18/2008	23	X	X		X	X
		3/18/2008	28	X	X		X	X
SVPB-06	NA	3/18/2008	8	X	X		X	X
		3/18/2008	13	X	X		X	X
SVPB-07	14	3/19/2008	2	X	X		X	X
		3/19/2008	10	X	X		X	X

		3/19/2008	14	X	X		X	X
		3/19/2008	19	X	X		X	X
		3/19/2008	22	X	X		X	X
SVPB-08	12.5	3/19/2008	10	X	X		X	X
		3/19/2008	14	X	X		X	X
		3/19/2008	19	X	X		X	X
		3/19/2008	23	X	X		X	X
		3/19/2008	28	X	X		X	X
SVPB-09	14	3/19/2008	2	X	X		X	X
		3/19/2008	9	X	X		X	X
		3/19/2008	14	X	X		X	X
		3/19/2008	20	X	X		X	X
		3/19/2008	23	X	X		X	X
SVPB-10	15	3/19/2008	2	X	X		X	X
		3/19/2008	7	X	X		X	X
		3/19/2008	13	X	X		X	X
		3/19/2008	18	X	X		X	X
		3/19/2008	23	X	X		X	X

* Collected during Fleming Lee Shue Phase II
NA: Not Available

The following table lists the sample IDs, depths and analyses for all groundwater samples used in determining the remedial action for the Courtlandt I and II properties. Groundwater sampling locations are presented in Figure 2-2.

INVESTIGATIVE GROUNDWATER SAMPLE SUMMARY TABLE

SITE ID	DATE	DEPTH (FT)	Metals 6010/7470	Pesticides 8081	PCBs 8082	SVOCs 8270	VOCs 8260
*GW-01	11/5/2006		X	X	X	X	X
*GW-02	11/6/2006						X
*GW-03	11/6/2006		X	X	X	X	X
*GW-04	11/6/2006		X	X	X	X	X
*GW-05	11/7/2006		X	X	X	X	X
GWVP-01	3/21/2008	22	X			X	X
GWVP-02	3/20/2008	22	X			X	X
GWVP-03	3/21/2008	25	X			X	X
GWVP-04	3/24/2008	25	X			X	X
	3/24/2008	30	X			X	X
GWVP-05	3/21/2008	28	X			X	X
GWVP-06	3/21/2008	27	X			X	X
GWVP-07	3/28/2008	23	X			X	X
GWVP-08	3/27/2008	23	X			X	X
	3/28/2008	33	X			X	X
	3/28/2008	43	X			X	X
GWVP-09	3/25/2008	19	X			X	X

	3/26/2008	28	X			X	X
GWVP-10	3/25/2008	19	X			X	X
	3/25/2008	29	X			X	X
	3/25/2008	38	X			X	X
GWVP-11	3/26/2008	19	X			X	X
	3/26/2008	29	X			X	X
GWVP-12	3/24/2008	25	X			X	X
GWVP-13	3/24/2008	25	X			X	X
	3/24/2008	45	X			X	X
GWVP-14	3/25/2008	20	X			X	X
	3/25/2008	29	X			X	X
	3/25/2008	39	X			X	X
MW-01	3/31/2008		X			X	X
MW-02	3/31/2008		X			X	X
MW-03	3/28/2008		X			X	X
MW-04	3/31/2008		X			X	X
MW-05	4/2/2008		X			X	X
MW-06	3/31/2008		X			X	X
MW-07	4/2/2008		X			X	X
MW-08	4/2/2008		X			X	X
MW-09	4/1/2008		X			X	X
MW-10	4/1/2008		X			X	X
MW-12	3/28/2008		X			X	X
MW-13	4/2/2008		X			X	X
MW-14	4/1/2008		X			X	X
MW-15	4/2/2008		X			X	X
MW-17	3/31/2008		X			X	X

* Collected during Fleming Lee ShuePhase II

The following table lists the sample IDs, depths and analyses for all soil vapor samples used in determining the remedial action for the Courtlandt I and II properties. Soil vapor sampling locations are presented in Figure 2-2.

SOIL VAPOR SAMPLING SUMMARY TABLE			
Sample Ids	Date	Depth	TO-15
SG-01	3/31/2008	10	X
SG-02	3/31/2008	10	X
SG-03	3/31/2008	10	X
SG-04	3/31/2008	10	X
SG-05	3/31/2008	10	X
SG-06	3/31/2008	10	X
SG-07	3/31/2008	10	X
SG-08	3/31/2008	10	X
SG-09	4/1/2008	3	X
SG-10	3/31/2008	3	X
SG-11	3/31/2008	3	X

SG-12	3/27/2008	3	X
SG-13	4/1/2008	3	X
SG-14	4/1/2008	3	X
SG-15	4/1/2008	3	X
SG-16	4/1/2008	3	X
SG-17	4/1/2008	3	X
SG-18	4/1/2008	3	X
SG-19	4/1/2008	3	X

2.1.5 Chemical Analytical Work Performed

All groundwater samples collected as part of the RI conducted by ERM were analyzed for VOCs, SVOCs, target analyte list (TAL) metals and Mercury, using USEPA SW-846 Methods 8260B, 8270C, 6010B, and 7471 respectively.

All groundwater samples collected as part of the Fleming Lee Shue Phase II were analyzed for VOCs, SVOCs, pesticides, PCBs target analyte list (TAL) metals and Mercury using USEPA SW-846 Methods 8260B, 8270C, 8081, 8082, 6010B, and 7471 respectively.

All soil samples collected as part of the RI conducted by ERM were analyzed for VOCs, SVOCs, pesticides and target analyte list (TAL) metals using USEPA SW-846 Methods 8260B, 8270C, 8081 and 6010B, respectively.

All soil samples collected as part of the pre-BCP Fleming Lee-Shue Phase II were analyzed for VOCs, SVOCs, pesticides, PCBs and target analyte list (TAL) metals using USEPA SW-846 Methods 8260B, 8270C, 8081, 8082 and 6010B, respectively.

All soil vapor samples collected as part of the investigation were analyzed for VOCs using EPA Method TO-15.

All analyses were performed by a laboratory with current NYSDOH Environmental Laboratory Accreditation Program (ELAP) Certification.

2.1.6 Geophysical Work, Test Pits, Other

A GPR survey of both BCP properties was performed to identify underground utilities and sub-surface features that may have potential environmental implications. All underground utilities, structures and anomalies identified during the survey were documented in a report supplied by the subcontractor (Appendix H) and illustrated on Figure 2-3.

2.2 SIGNIFICANT THREAT

The NYSDEC and New York State Department of Health (NYSDOH) had determined that this Site posed a significant threat to human health and the environment. Notice of that determination was provided for public review (see Appendix – E).

2.3 SITE HISTORY

2.3.1 Past Uses and Ownership

According to the May 2007 Phase II ESA Report, prepared by Fleming-Lee Shue, Inc., Block 2408 Lot 20 was occupied by residential dwellings, and a filling station between 1891 and 1989. A portion of Block 2408 was demolished between 1978 and 1989. Between 1891 and 1989 Block 2407 Lot 5 contained residential buildings and a filling station, Lots 11 and 12 contained an auto repair shop, and later Lots 8, 10, 11, and 12 contained parking lots. Most of the buildings on Block 2407 were demolished between 1978 and 1989.

2.3.2 Phase I Report

A Phase I Environmental Site Assessment was conducted in May, 2006, by AKRF, Inc. to identify any potential environmental concerns resulting from past and present usage of the site and neighboring properties.

The Phase I Report as it relates to the Blocks and Lots associated with this BCP identified several potential environmental concerns resulting from past and present land uses:

- Block 2408, Lot 20, contains a filling station listed in the NY SPILLS database for having one active status tank failure and two closed status spills.
- The surrounding land uses include gasoline filling stations, automobile repair shops, parking lots, industrial manufacturing and storage facilities and a dry cleaner which is listed as a small quantity generator. While these lots are outside the subject property, activities on these properties have the potential to affect the soil and groundwater within the subject property.

A Phase II Environmental Site Assessment was conducted in May, 2007, by Fleming-Lee Shue, Inc. solely provided information related to the Courtlandt Corners I site.

2.3.3 Sanborn Maps

All Sanborn Maps available for this Site were reviewed prior to preparation of the RAWP. Sanborn Fire Insurance Maps from 1891, 1909, 1952, 1969, 1978, and 1989 were reviewed to determine historic on-site and surrounding area usage and are presented in Appendix G. These maps were used to develop the site history and detailed description of past uses of the property is presented in Section 2.3 and 2.3.1 of this document.

2.4 GEOLOGICAL CONDITIONS

Several environmental investigations have been performed on the Courtlandt I and II properties in order to characterize the geological and hydrological conditions:

- In April, 1994, the former Getty Station located on the corner of East 161st Street and Melrose Avenue was entered into the NYSDEC spill database (case# 94-01207). Over the course of the site investigation at this property a total of 17 monitoring wells have been installed by The Tyree Company on and off-site and gauged periodically to obtain groundwater flow direction.
- In May 2007, a Phase II investigation was performed by Fleming-Lee Shue. During this investigation, eight (8) soil borings were installed and five (5) groundwater samples were collected from 5 feet below the water table interface on the Lots in Block 2407 associated with the BCP. No borings were installed on Block 2408 Lot 20 (Courtlandt II) associated with the BCP.
- In December 2007, a geotechnical engineering investigation was conducted by Pillori Associates. As part of this investigation three (3) soil borings were installed on the Courtlandt II BCP property and six (6) soil borings were installed on the Courtlandt I BCP property. No environmental samples or PID readings were collected as part of this investigation.

According to the information gathered in the May, 2007, Fleming-Lee Shue Phase II investigation, the site is underlain by urban fill varying in thickness from approximately 5 to 15 feet. The fill consists of a mixture of

fine to medium sand, some silt, gravel and traces of brick, cinder, concrete, coal fragments and wood. Highly variable native soil was encountered beneath the fill layer, generally ranging from medium to fine to coarse sand to clay.

A geotechnical engineering investigation conducted by Pillori Associates in December, 2007, encountered bedrock between 35 and 55 feet at the Courtlandt II property. The bedrock in this area is composed of Fordham Gneiss and Inwood Marble. Geologic cross sections of the site based on the investigation by Pillori Associates are provided as Figure 2-4.

Groundwater at the Courtlandt I site is approximately 16.5 feet below grade and between 14.5 and 19.5 feet below grade at the Courtlandt II site. Based on topography of the site, regional groundwater flow in this area of the Bronx is expected to be to the south towards the East River. However, actual groundwater flow direction at the site is in the northeast direction. Groundwater gradient was determined using gauging results from 13 of the existing monitoring wells located in and around the Courtlandt II property as well as the two new monitoring wells installed on the Courtlandt I property. A groundwater flow map is presented as Figure 2-1. Groundwater elevation measurements are presented in Table 2-1.

2.5 CONTAMINATION CONDITIONS

Results from recent and previous investigations were reviewed for characterization of environmental conditions on-Site. This section summarizes the nature and extent of contamination for Site media (soil, groundwater, and soil vapor) on the Courtlandt II site.

2.5.1 Conceptual Model of Site Contamination

The Courtlandt II property was occupied by a service station from 1959 until the present. On April 25, 1994, several of the USTs on the property failed a tightness test and spill# 94-01207 was assigned by the NYSDEC Region 2. In July, 1994, The Tyree Company (Tyree) installed three monitoring wells and conducted soil and groundwater sampling around the tanks. The wells were found to contain LNAPL. In February, 1995, twelve 550 gallon underground storage tanks (USTs) were removed and two 4,000 gallon USTs were installed at the Site. As part of the UST replacement activities, a total of 400 tons of impacted soil were removed. In April, 1995, three additional monitoring wells and an LNAPL recovery system were installed. This system was operated until the end of 1999 and

a total of 3,961 gallons of LNAPL was recovered during this period. Additional site remediation was conducted by Tyree beginning in January, 2000. Total Phase High Vacuum Extraction (TPHVE) was used on wells MW-1 through MW-6, on a weekly basis from January, 2000, to March ,2000, semi-monthly from April, 2000, to September, 2000, and then monthly until December, 2002. From April to June, 2000, an average of 42 gallons and from July to September, 2000, an average of 20 gallons of groundwater/product mixture was pumped semi-monthly from each well. From March, 2000, (with the exception of 2004 and 2005) through the present, enhanced vapor fluid recovery (EVFR) has been performed at the site. A total of 1,740 gallons of total liquids have been recovered in this time. Since the initial investigation, seventeen (17) total monitoring wells have been installed on and off-site. The most recent gauging event (March 29, 2008) revealed the presence of LNAPL at two of the wells (MW-11 and MW-16) both of which are located off-site on the sidewalk along 161st Street. The depth to groundwater at the site is approximately thirteen (13) feet below ground surface. Tyree reported groundwater flows in a north-northeast direction with a gradient of 0.0052 ft/ft. Four (4) vertical profiling groundwater borings were installed and fifteen (15) existing monitoring wells were sampled as part of the BCP RI to define the vertical and horizontal extent of contamination. Elevated levels of gasoline constituents exceeding Part 375-6 UUSCOs were identified at depths extending to nineteen (19) feet below ground surface. Groundwater is not used as a source of drinking water in this area; therefore, no public supply wells exist in the area. There are no other known sensitive receptors along the groundwater flow path.

Soil analytical results for the Courtlandt II property from samples collected during the BCP RI also revealed lead, mercury and zinc in excess of the unrestricted use criteria in the 0-2 foot interval. This contamination is believed to be derived from the historical fill observed at these depths. This RAWP calls for the excavation and removal of contaminated soil in this area eliminating any potential threat to nearby sensitive receptors.

VOCs were detected in soil vapor samples collected in and around the Courtlandt II property. A total of twenty six (26) compounds were detected. Only one of the four major constituents observed at the site (tetrachloroethane at levels ranging from non-detect to 13.29 ug/m3) was considered non-petroleum related. The remaining compounds were primarily petroleum related and are believed to be associated with the open spill case. This RAWP calls for the excavation and removal of contaminated soil and treatment of groundwater in this area eliminating the source of these vapors. In addition, a vapor barrier and sub-slab

depressurization system was installed eliminating any potential vapor intrusion pathways into the future structure. Documentation on the vapor barrier and depressurization system is provided in Appendix I.

2.5.2 Description of Areas of Concern (AOC)

Petroleum Contaminated Soil:

Three of the four soil borings on the Courtlandt II property contained petroleum related compounds in excess of their respective Part 375UUSCOs for VOCs. The presence of these compounds is related to Spill Case# 94-01207. Contamination was present to a depth of nineteen (19) feet below grade surface (bgs).

Petroleum Contaminated Groundwater:

Petroleum related compounds were observed in groundwater samples throughout the Courtlandt II property and in off-site wells adjacent to the property extending to a depth of 39 feet bgs in GWVP-14. This contamination is the result of leaking USTs associated with the Getty service station which occupied the site. In 1994, a Spill Case # 94-01207 was opened and Tyree performed an investigation of the property. Since 1994, several remedial activities have taken place to address the contamination. Currently, LNAPL is observed intermittently in several of the wells on and off-site.

Urban Fill:

Soil borings on the Courtlandt II property contained elevated levels of metals consistent with urban fill in the area. Lead, Mercury and Zinc were found at concentrations exceeding their respective Part 375 UUSCOs in surface soils (0-2 bgs).

Underground Storage Tanks:

Two 4,000 gallon underground storage tanks associated with the Getty station were present on-site and were abandoned and removed according to local and State regulations prior to the start of construction. Documentation on these tank removals are provided in Appendix J.

Soil Vapor:

VOCs were detected in the ten (10) soil vapor samples collected in and around the Courtlandt II property. A total of twenty six (26) compounds were detected. Only one of the four major constituents observed at the site (tetrachloroethane at levels ranging from non-detect to 13.29 ug/m3 was considered non-petroleum related). The remaining compounds were primarily petroleum related and are believed to be associated with the open spill case.

2.5.3 Identification of Standards, Criteria and Guidance

Table 2-2 identifies the applicable standards, criteria, and guidance (SCGs) for the Site. Results of the RI were compared to the identified SCGs as a basis for development of a site-specific remedy that is protective of human health and the environment.

2.5.4 Soil/Fill Contamination

This section describes in detail the type and concentration of contaminants found in the different media (soil , groundwater, soil vapor) at the Courtlandt II site during previous the Remedial Investigations as well as previous environmental site assessments.

2.5.4.1 Summary of Soil/Fill Data

VOC Analytical Results:

VOCs exceeding the Part 375 UUSCO were detected in three (3) of the four (4) soil borings on the Courtlandt II property. Lot 20 was occupied by an inactive service station and had an open spill case associated with the property.

SVOC Analytical Results:

SVOCs in excess of the Part 375 UUSCOs were observed in one (1) of the four (4) soil borings conducted within the Courtlandt II property boundaries.

Metals Analytical Results:

Metals in excess of the Part 375 UUSCOs were observed in three (3) of the four (4) soil borings conducted at the Courtlandt II property.

Pesticide Analytical Results:

Pesticides excess of the Part 375 Unrestricted Use Criteria were observed in one (1) of the four (4) soil borings conducted within the Courtlandt II property boundaries.

2.5.5 On-Site and Off-Site Groundwater Contamination.

2.5.5.1 Summary of Groundwater Data

VOC Analytical Results:

VOCs exceeding the TOGS Criteria were detected in seventeen (17) of the twenty one (21) groundwater borings/monitoring wells where groundwater samples were collected within the Courtlandt II property and in off-site samples conducted in the sidewalks adjacent to the site on the eastern and southern boundaries. Lot 20 is occupied by an inactive service station and had an open spill case associated with the property which was believed to be the source of the VOC contamination in this area.

SVOC Analytical Results:

Fifteen (15) of the twenty one (21) groundwater borings/monitoring wells where groundwater samples were collected within the Courtlandt II property and in off-site samples conducted in the sidewalks adjacent to the site on the eastern and southern boundaries contained SVOCs exceeding their respective TOGS Criteria.

Metals Analytical Results:

Metals in excess of the TOGS Criteria were observed in all twenty one (21) groundwater borings/monitoring wells where groundwater samples were collected within the Courtlandt II property and in off-site samples conducted in the sidewalks adjacent to the site on the eastern and southern boundaries.

2.5.6 Summary of On-Site and Off-Site Soil Vapor Contamination

Nineteen (19) soil vapor samples were collected as part of the RI work conducted by ERM. Four (4) samples were collected from within the boundaries of each BCP property and eleven (11) samples were collected around their perimeters.

There were a number of other hydrocarbon VOCs detected which are believed to be the result of contaminated soil and groundwater at the site.

2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.6.1 Qualitative Human Health Exposure Assessment

Potential Exposure Pathways

Soil:

As discussed above, soil containing contaminants of concern at concentrations in excess of the Part 375 UUSCOs are present at the Courtland II Site. Potential exposure pathways for Site soil include: inhalation, dermal contact, ingestion and volatilization to indoor air.

Following is a summary of the potential current and future exposure pathways. The future exposure pathways are linked to redevelopment of the Site.

Exposure Pathway	Current	Future
Dermal contact with and ingestion of soil – unpaved areas	Passersby, Adjacent Property Occupants	Construction Workers, *Future Residents, *Commercial Workers, *Adjacent Property Occupants, Passersby (if soil remains and is left uncovered)
Dermal contact with and ingestion of soil in paved/covered soil areas	Not applicable	Construction Workers, *Commercial Workers
Inhalation of Dust from Construction Activities	Not applicable	*Future Residents, *Commercial Workers, Construction Workers, Adjacent Property Occupants
Ingestion of Particulates from Construction Activities	Not applicable	*Future Residents, *Commercial Workers, Construction Workers, Adjacent Property Occupants

* Potential exposure pathway exists only if the Site is not remediated

Currently, soil containing contaminants of concern at concentrations above the Part 375 UUSCOs is present throughout the Courtland Site. Under current Site use, there is the potential for dermal contact with and ingestion of soil in unpaved areas by commercial workers and passersby, as well as off-site residents.

As noted in the above table, a number of future exposure pathways would be complete during Site redevelopment (i.e., future exposure pathways). These exposure pathways were considered in determining remedial action objectives (RAOs) for the Site and also in designing the recommended remedial alternative. These include construction related exposure pathways and non-construction related exposure pathways.

A Community Air Monitoring Plan (CAMP), and an Odor, Dust and Nuisance Control Plan was implemented as part of any construction activities at the Site to address construction-related exposure pathways. The Odor, Dust and Nuisance Control Plan is presented in section 5.4.13 and the CAMP is discussed in Section 5.4.12 and CAMP data presented in Appendix K.

To address the non-construction related exposure pathways, the remedial actions discussed further in this report will include removal of impacted Site soil in the area of the proposed buildings, installation of a vapor barrier and sub-slab depressurization system below the proposed buildings, and installation of surface covers over the entire Site footprint.

Groundwater:

Groundwater containing VOCs, SVOCs and metals is present upgradient and downgradient of the Courtland Site. Potential exposure pathways for Site groundwater include: dermal contact, ingestion and volatilization to indoor air.

Following is a summary of the potential current and future exposure pathways.

Exposure Pathway	Current	Future
Dermal contact with groundwater	Not applicable	Construction Workers
Ingestion of Groundwater	Not applicable	Not applicable

Exposure Pathway	Current	Future
Volatilization to Indoor Air	Not applicable	*Residents, *Commercial Workers

* Potential exposure pathway exists only if the Site is not remediated

There are no water supply wells at the Site and thus ingestion of groundwater is not a complete exposure pathway. The Site is connected to city water and thus groundwater ingestion would not occur under any future use of the Site. There are no current on-site receptors for potential volatilization to indoor air.

Potential future exposure pathways include dermal contact with groundwater during future construction work and volatilization of VOCs from groundwater to indoor air of the proposed buildings. To address this latter potential exposure pathway, future building designs would include a vapor barrier and sub-slab depressurization system, remediation of source material and groundwater residuals should alleviate off-site vapor migration from the Courtlandt Corners BCP site. Post remediation monitoring was used to confirm the mitigation of soil vapor concentrations

Off-site groundwater impacted by this site prior to remediation has the potential to impact soil vapor concentrations.

2.6.2 Fish & Wildlife Remedial Impact Analysis

Site conditions and lack of surrounding natural resources do not warrant a fish and wildlife assessment.

2.7 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.7.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.

- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.7.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.7.3 Surface Water and Sediment

There are no surface water bodies in the vicinity of the site; therefore, it was not necessary to establish RAOs for surface water or sediment.

3.0 DESCRIPTION OF APPROVED REMEDIAL ACTION

The approved Remedial Action was evaluated in terms of the protection of public health and the environment. Nine (9) criteria were evaluated, as detailed in Section 4.1 of the Draft BCP Guide (NYSDEC, May 2004), and 4.2 of DER-10. The nine criteria were:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (SCGs);
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

A criterion for remedy selection was evaluation for conformance with SCGs that are applicable, relevant and appropriate. Principal SCGs that are applicable, relevant and appropriate for evaluating the alternatives for remediation of the BCP Sites include the following:

- 6 NYCRR Part 375-6 Soil Cleanup Objectives;
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation - December 2002 (or later version if available);
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;

- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan;
- NYS Waste Transporter Permits – 6 NYCRR Part 364; and
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364.

An evaluation of these criteria is set forth in Table 3-1 which compares a remedy pursuant to a Track 1 (unrestricted use) and a remedy which would require a restricted end use. Although Alternative 1 (unrestricted use) was selected as the proposed remedial action for the Site, a Track 4 restricted use alternative was provided that would remain protection of public health and the environment. The remedy attained was Track 4 and included:

- The majority of soil exceeding Part 375 UUSCOs (Track 1) on the Site was removed, which would eliminate any potential for further leaching to groundwater; the remaining soils exceeding Track 1, but below Track 4 limits will be managed as described in the Site Management Plan (Appendix D) the pathway for VOCs to migrate to indoor air is still eliminated through the use of a vapor barrier and an SSD system;
- residual groundwater contamination was addressed through the addition of a calcium peroxide compound which will enhance the natural attenuation of residual hydrocarbons (see Appendix L); and
- this remedy when combined with the Site Management Plan, engineering controls, and institutional controls is protective of human health and the environment.

3.1 SELECTION OF THE PREFERRED REMEDY

As shown in Table 3-1, this remedy was chosen as it is most protective of human health and the environment; it meets SCGs; it was effective both short and long-term; and will either eliminate or significantly reduce the toxicity and mobility of contaminated material. The chosen alternative is able to be implemented in a safe and effective manner, and is cost effective. The following land use evaluation demonstrates that the chosen

remedial alternative is also consistent with Article 27, Title 14 of the Environmental Conservation Law 27-1415.

3.1.1 Zoning

The remedy including adherence to the Site Management Plan and Environmental Easement and the proposed development is consistent with the current zoning for these Tax Blocks and Lots.

3.1.2 Applicable Comprehensive Community Master Plans or Land Use Plans

The proposed development is consistent with the master plan for the Melrose Commons Urban Renewal Area. Due to testing at extents of portions of the soil removal action, the final remedy conforms to a Track 4 cleanup. The Courtlandt I site falls within urban renewal site #46 and the Courtlandt II site falls within urban renewal site #56 in the Melrose Commons Urban Renewal Area master plan. A copy of this plan is included as Appendix M.

3.1.3 Surrounding Property Uses

Surrounding property uses are primarily residential and commercial. The proposed remedy conforms restricted residential use is therefore consistent with the surrounding property uses. Due to testing at extents of portions of the soil removal action, the final remedy conforms to a Track 4 cleanup and protection of surrounding properties was addressed in the Site Management Plan.

3.1.4 Citizen Participation

A Citizens Participation Plan was mailed to the stakeholders and a complete copy is available in the document repository.

3.1.5 Environmental Justice Concerns

There are no known environmental justice concerns with these properties and the proposed remedy and its implementation is consistent with applicable laws.

3.1.6 Land Use Designations

The proposed remedy and the proposed development are consistent with the land use designations for this area. The Melrose Commons Urban

Renewal Area master plan calls for both residential and commercial development. Due to testing at extents of portions of the soil removal action, the final remedy conforms to a Track 4 cleanup and Land Use Designations and land use and designations was addressed in Site Management Plan and easement with required restrictions.

3.1.7 Population Growth Patterns

The Melrose Commons Urban Renewal Area master plan calls for a minimum of 400 residential units in the designated areas that the Courtlandt sites fall within, making the proposed development consistent with the master plan for these Tax Blocks and Lots. Since the goal of this remediation allows for restricted residential use, current growth patterns will not be impacted by this remedy.

3.1.8 Accessibility to Existing Infrastructure

The Courtlandt sites have ready access to sufficient infrastructure to complete the remedy. The sites are situated less than one mile from major interstate highways for truck access. Sewers and water supply are readily available.

3.1.9 Proximity to Cultural Resources

There are no important cultural resources within 0.5 miles of the site; therefore, the proposed remedy will not impact any cultural resources.

3.1.10 Proximity to Natural Resources

There are no important natural resources proximal to the site.

3.1.11 Off-Site Groundwater Impacts

The proposed remedy was designed to remove the source material (i.e. all soil above UUSCOs) that has impacted both on and off-site groundwater. A significant part of this source removal required large areas of the sites to be dewatered which removed the groundwater with the highest concentrations of contaminants. In addition, a calcium peroxide compound was introduced to the excavations to aid in remediation of any residual groundwater contamination. The highly concentrated dissolved oxygen released from this compound will enhance the natural attenuation of off-site groundwater impacts (see Appendix L).

3.1.12 Proximity to Floodplains

There are no known floodplains proximal to the Site.

3.1.13 Geography and Geology of The Site

The proposed remedy is readily implemented given the geography and geologic conditions encountered during the remedial investigation and geotechnical studies of the Site.

3.1.14 Current Institutional Controls.

There are no known current institutional controls that would prevent this remedy from being implemented.

3.2 SUMMARY OF REMEDIAL ACTIONS

The following is a summary of the chosen remedy. As shown in Table 3-1, this remedy was chosen as it is most protective of human health and the environment, it meets SCGs, it was effective both short and long-term, will either eliminate or significantly reduce or eliminate the toxicity and mobility of contaminated material. The chosen alternative can also be implemented in a safe and effective manner, and was cost effective.

1. All soil within the boundaries of the Site that exceeds 6NYCRR Part 375-6 Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs) was excavated. Soils exceeding criteria below the water table was removed via the use of sheeting/shoring and dewatering.

2. Groundwater from dewatering operations was treated on-site as necessary prior to discharge to the New York City combined sewer.

3. Residual groundwater contamination was treated in situ via the addition of a calcium peroxide compound to the dewatered portions of the affected aquifer to address potential recontamination from groundwater migration following completion of dewatering. Documentation on materials applied are provided in Appendix L.

4. All soil, fill, fluids and other material removed from the property under this Report was transported and disposed of in accordance with all Federal, State and local laws and requirements. All exported material was properly characterized, and was taken to

facilities licensed to accept this material in full compliance with all Federal, State and local laws.

5. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of UUSCOs.

6. As a precaution against vapor intrusion from residually contaminated groundwater a soil vapor barrier was installed in all building areas along with an active sub-slab depressurization system (SSDS).

7. Any imported soil/fill will meet 6NYCRR Part 375-6 UUSCOs.

8. Since UUSCOs were not attained during remediation, a composite cover system consisting of asphalt or concrete pavement on walkways, roads, parking lots, and concrete building slabs, will cover the entire Site. Slabs and paving systems (building slabs, roadways, walkways, parking lots, etc.) were at least 12-inches thick and as-built drawings are provided in Appendix C.

9. Since UUSCOs were not attained during remediation, the recording of an Environmental Easement (Appendix B), including Institutional Controls, was required to prevent future exposure to any residual contamination remaining at the Site.

10. Since Unrestricted Use SCOs were not attained during remediation, the recording of an Environmental Easement, including Institutional Controls, was required to prevent future exposure to any residual contamination remaining at the Site.

11. A Site Management Plan (Appendix D) was produced for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting.

12. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, was addressed in accordance with all applicable Federal, State and local rules and regulations.

Remedial activities were performed at the Site in accordance with a NYSDEC-approved RAWP. All deviations from the RAWP were promptly reported to NYSDEC for approval and are fully delineated Section 4.9 of this in the FER.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

A site specific Health and Safety Plan was utilized that conformed to OSHA regulations and is included as Appendix N. All remedial work performed under this plan was performed in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties prepared the remedial documents submitted to the State and those performed the construction work, were completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator was Justin Buton.

All confined space entries complied with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.2 Quality Assurance Project Plan (QAPP)

A Quality Assurance Project Plan (QAPP) detailed the frequency of sample collection, analytical methods and the quality standards that were achieved by the analytical laboratory is included within the Site Management Plan (Appendix D). This plan also detailed the number and frequency of quality assurance/quality control (QA/QC) samples required for the proposed remedial activities.

4.1.3 Construction Quality Assurance Plan (CQAP)

A Construction Quality Assurance Plan (CQAP) can be found in Appendix O. This plan describes how the successful performance of the Remedial Action tasks and any future remedial tasks will be assured through designed and documented QA/QC methodologies applied in the

field and in the lab. The CQAP provides a detailed description of the observation and testing activities that was used to monitor construction quality and confirm that remedy construction was in conformance with the remediation objectives and specifications. The CQAP includes:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.
- Qualifications of the quality assurance personnel that demonstrate that they possess the proper training and experience necessary to fulfill project-specific responsibilities.
- The observations and tests that was used to monitor construction and the frequency of performance of such activities.
- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications.
- Requirements for project coordination meetings between the Applicant and its representatives, the Construction Manager, Excavation Contractor, remedial or environmental subcontractors, and other involved parties.
- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
- Description of the final documentation retention provisions.

4.1.4 Soil/Materials Management Plan (SoMP)

A Soil/Material Management Plan (SoMP) is included as Appendix H of the Site Management Plan found in Appendix D. The primary elements of this plan (excavation, handling, storage, transport and disposal) are also detailed in Section 5.4 of the RAWP and include measures to address the change to Track 4 cleanup.

4.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

This section addresses the requirements of New York State Storm-Water Management Regulations including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water. All work conducted under this Work Plan utilized erosion and sediment controls that are in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control.

In general, the Contractor took all necessary measures to control erosion and sedimentation until the Site was restored and remedial activities and construction were complete. All soil erosion and sediment control practices were installed prior to any earth disturbance activities, and maintained until permanent protection was established in accordance to New York City and the NYS Standards and Specifications for erosion and sediment control. The Site was graded and maintained such that all stormwater run-off was diverted to onsite excavations (where impacts to remedial and/or construction activities allow). Hay bales and silt fence was installed at the perimeter of the work area, and also at a maximum slope interval of 200 feet, prior to beginning earthwork activities. Hay bales and silt fence were placed at locations downgradient of earth work areas to prevent soil from migrating to undisturbed areas of the Site.

Any disturbed area that was left exposed for more than 30 days and not subject to construction traffic immediately received a cover material. Exposed areas were limited to five (5) acres at any given time unless work in areas over this amount was ongoing and controls had been proven to control stormwater at the site.

Inspection of temporary erosion control measures by the Contractor were frequent, and repair or replacement was made promptly and when directed by Department or Department's Representative. If Contractor's Work interfered with or required relocation of any temporary erosion control devices, the Contractor made all required changes and relocations to the devices as needed or as directed by the Engineer.

At the conclusion of Work, no areas were left uncontrolled and were covered or maintained by protective stone and/or geotechnical cover.

4.1.6 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan (CAMP) for this project conformed with NYSDOH guidelines designed to protect site workers and nearby residents during all remedial activities and was included in the Remedial Action Work Plan and is part of the Site Management Plan (Appendix D). This plan documents the locations and frequency of monitoring as well as record keeping and notification requirements. The results of air monitoring during implementation of the CAMP during remedial activities is provided in Appendix K.

4.1.7 Contractors Site Operations Plan (SOP)

The Remediation Engineer reviewed all plans and submittals for this remedial project and confirmed that they were in compliance with this RAWP. The Remediation Engineer was responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, were in compliance with this RAWP. All remedial documents were submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 Community Participation Plan

A certification of mailing was sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that included: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected and that it contained all of applicable project documents.

No changes were made to approve Fact Sheets authorized for release by NYSDEC. No other information, such as brochures and flyers, was included with the Fact Sheet mailing.

The Community Participation Plan for this project is attached in Appendix P.

Document repositories were established at the following locations and contain all applicable project documents:

NYSDEC Region 2 Office
1 Hunter's Point Plaza
47-40 21st Street

Long Island City, NY 11101 – 5407
Phone: (718) 482-4949
Hours: Monday through Friday: 9:00 AM to 5:00 PM (call for appointment)

Community Board 3:
Mr. John Dudley, District Manager
Ms. Gloria Alston, Chairperson
Bronx Community Board 3
1426 Boston Road
Bronx, New York 10456

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Involved Parties

Mr. Ernest Rossano, C.P.G. acted as the principal-in-charge of this project. As such, he was responsible for all project elements and has act to ensure the project's overall success. Mr. Edward Wong, P.E. acted as the remedial engineer and overall project manager for all remedial actions. Mr. John Kuhn acted as the construction manager responsible for ensuring all elements of the plan were carried out in a safe manner consistent with all applicable codes. Mr. Michel Jean-Baptiste acted as the Site Superintendent, keeping detailed records of all remedial activities and health and safety monitoring. Mr. Brian Windsor acted as the health and safety coordinator for the project and Mr. Andrew Coenen was the QA/QC officer. An organization chart is included in Figure 4-1.

4.2.2 Remedial Engineer

The Remedial Engineer for this project was Mr. Edward Wong, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer had primary direct responsibility for implementation of the remedial program for the Courtlandt Corners Site (NYSDEC BCA Index Nos. A2-0592-07-07 Site No. C203040). The Remedial Engineer is certifying in this Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 were achieved in full conformance with that Plan. Other Remedial Engineer certification requirements were listed later in the RAWP.

The Remedial Engineer coordinated the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The Remedial Engineer was responsible for all appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer, Edward S. Wong, P.E., has provided the certification in the Final Engineering Report.

4.2.3 Remedial Action Construction Schedule

Remedial Action work on the Site began in November 2008, and was completed in July 2009. A remedial action schedule is presented as Figure 4-2. This schedule details the various elements required to complete the remediation and indicates when key project deliverables were submitted.

4.2.4 Work Hours

The hours for operation of remedial construction conformed to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. NYSDEC was notified by the Applicant of any variances issued by the Department of Buildings.

4.2.5 Site Security

The sites were and are currently fenced and kept locked at all times. During all remedial and construction activities, access to the properties were limited and all persons entering the site were required to sign a log book and meet all applicable health and safety requirements. All excavations were secured with construction and snow fencing and the site was secured during non-working hours.

4.2.6 Traffic Control

An entrance gate was established for the site. Trucks entering the Site stopped inside the entrance gate for inspection by the Contractor and Remedial Engineer's personnel. Trucks were inspected for caked on soils and debris. If the truck was not clean as determined by the Contractor or

Engineer, it was rejected and not allowed to enter the Site until such time the vehicle was cleaned by the transport subcontractor to the satisfaction of the Engineer. The transport vehicle was then directed to the designated staging areas for loading.

On-Site traffic of transport vehicles was maintained on paved portions of the Site or on temporary construction access roads, to minimize disturbance of surface soils. The Contractor was responsible for notifying drivers transport vehicles as to what roadways and traffic patterns exist on-site.

Transport vehicles left the Site through the same gate along 161st Street. Off-site transport vehicles were inspected at the exit pad to ensure they met the requirements established for off-site waste transport. They were inspected for caked on soils or debris, and for transport integrity (i.e. leaking trailer bed, appropriately covered.) At this location, corrective measures were taken prior to leaving the Site. If necessary, transport vehicles proceeded to the on-site decontamination pad prepared and maintained by the Contractor. Cleaning of the vehicle wheels and under carriage was performed to eliminate soils tracked off-site by transport vehicles exiting the Site.

The Contractor was responsible for maintaining all onsite roadways (permanent or temporary), construction zone exit pads, and decontamination pads, kept clear of debris or soils. Maintenance of roadways consisted of new asphalt or concrete (permanent) or stone (temporary.)

4.2.7 Contingency Plan

If underground tanks or other previously unidentified contaminant sources had been found during on-Site remedial excavation or development related construction, sampling was performed on product, sediment and surrounding soils, etc. No additional tanks were found at the Courtlandt Corners II site and no unknown or unexpected contaminated media identified during the remedial work required additional evaluation or contingency plans.

4.2.8 Worker Training and Monitoring

Worker training requirements included HAZWOPER, site safety training and medical monitoring for site workers involved in any of the remedial activities. Current certificates were kept on file with the Site

Superintendent. Site safety meetings occurred daily and were documented by the Site Superintendent.

4.2.9 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or were, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A partial list of all Federal, State and local governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is shown below. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list was updated in the Final Engineering Report.

- City Council and Mayoral for disposition, rezoning and UDAAP designation
- New York City Department of Buildings (NYCDOB) – Demolition, Foundation, New Building Permits
- New York City Department of Environmental Protection (NYCDEP) - Water Discharge, Notice to Proceed (for e-designation)
- NYSDEC – SPDES Construction Stormwater General Permit – Notice of Intent, Termination and Transfer (6NYCRR Part 750)

There is no planned remedial or construction work in regulated wetlands.

4.2.10 NYSDEC BCP Signage

A project sign was erected at the main entrance to the Site prior to the start of any remedial activities. The sign indicated that the project was being performed under the New York State Brownfield Cleanup Program. The sign met the detailed specifications provided by the NYSDEC Project Manager.

4.2.11 Pre-Construction Meeting with NYSDEC

A pre-construction meeting was held on November 25, 2008, prior to any construction or remedial activities as shown in the Remedial Action Schedule (Figure 4-2).

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included below. The following defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

Title/Name	*Phone Numbers*
ERM Project Director Ernie Rossano	Work: Mobile: 631-756-8900 516-250-1429
Project Manager Edward Wong, P.E.	Work: 631-756-8900 Mobile: 516-315-6687
Site Superintendent/ Site Safety Officer Michel Jean-Baptiste	Work: 631-756-8900 Mobile: 516-315-8305
Project Health and Safety Coordinator Brian Windsor	Work: 212-447-1900 Mobile: 484-802-5243
Dana Kaplan -NYSDEC	Work: 718-482-6405
Albert DeMarco - NYSDOH	Work: 518 402-7860
Local Emergency Responders – all services	Phone: 911
Hospital: Columbia Presbyterian Hospital 622W 168th Street New York, NY 10032	Phone: (212) 305-2500

4.2.13 Remedial Action Costs

The total estimated cost of the Remedial Action is $3,489,406. An itemized and detailed summary of actual costs for all remedial activity and

development costs for the site and future predicted operations and maintenance costs is attached as Table 4-1.

4.2.14 Contaminated Materials Removal

4.2.14.1 Mobilization

Areas for remedial equipment staging, temporary offices, and material storage were agreed upon prior to mobilization. No remedial equipment, materials, or temporary structures were placed on the streets without proper local permits. No remedial work commenced until a Notice To Proceed with Remedial Activities was provided by the Remedial Engineer.

4.2.14.2 Erosion and Sedimentation Controls

This section covers the preventive measures required for protection of the Site and adjacent areas during remediation, from soil erosion and sedimentation. The Volunteer and its contractors took all necessary measures to control soil erosion and sedimentation until the point in time when the remedial work was completed and the Site and adjacent areas were restored.

Controls met the requirements of the RAWP. In addition, cuts and fills within the remediation areas were graded to control erosion within acceptable limits. The area of bare soil exposed at any one time by remedial operations were held to a minimum. Erosion and sedimentation control measures consisted of the erection of geotextile fences, placement of erosion control blankets and hay bales, and protection of surface water inlets with geotextiles. Additional erosion control measures were determined by the Remedial Engineer during remedy construction on an as needed basis, and were implemented and maintained by the Volunteer and its Contractor.

The Remedial Engineer notified the NYSDEC project manager of non-compliance provisions stated in this section and the required action to be taken. The Volunteer and its Contractors inform the Remedial Engineer of the proposed corrective action and take such action as was approved. If Contractor's Work interfered with, or required relocation of, any erosion control devices, the Contractor made all required changes and relocations to the devices as needed or as directed by the Engineer.

The Contractor removed all erosion control devices at the conclusion of the Work, when directed by the Remedial Engineer.

4.2.14.3 Stabilized Construction Entrance(s)

A stabilized construction entrance and exit was constructed from non-paved to paved areas, to limit tracking of Site soils outside the contamination reduction zones. The construction zone exit pad was constructed using #2 crushed stone and was a minimum of 8-inches thick. The construction zone exit pad was constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control, and detailed on the Construction Drawings and in the technical specifications. The number and location of construction zone exit pads was determined by the Contractor, and included in the Contractor's Work Plan.

4.2.14.4 Utility Marker and Easements Layout

The Volunteer and its contractors were solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under the RAWP. The Volunteer and its contractors were solely responsible for safe execution of all invasive and other work performed under the RAWP. The Volunteer and its contractors obtained any Federal, State, or local permits or approvals pertinent to such work that may have been required to perform work under the RAWP. Approval of the RAWP by NYSDEC did not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site had been investigated by the Remedial Engineer. It had been determined that no risk or impediment to the planned work under the Remedial Action Work Report was posed by utilities or easements on the Site.

4.2.14.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities (including excavation) was the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors were solely responsible for safe execution of all invasive and other work performed under this Report. The Volunteer and its contractors obtained any Federal, State or local permits or approvals that were required to perform work under this Report. Further, the Volunteer and its contractors were solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

4.2.14.6 Equipment and Material Staging

Contractor stored its equipment and materials at the Project Site in accordance with the requirements of the RAWP, manufacturer's recommendations, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. The Contractor maintained accurate records documenting the measures taken to protect each equipment item. The Contractor did not store materials or encroach upon private property without the written consent of the owners of such private property. No work commenced until Notice To Commence work was provided by the Remedial Engineer.

4.2.14.7 Decontamination Area

The Contractor was responsible for the construction of a truck and equipment decontamination pad. This was include the construction of entrance and exit pads from non-paved to paved areas, to limit tracking of Site soils outside the contamination reduction zones. The construction zone exit pad was constructed using #2 crushed stone and was a minimum of 8-inches thick. The construction zone exit pad was constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control, and detailed on the Construction Drawings and in the technical specifications. The number and location of construction zone exit pads was determined by the Contractor and included in the Contractor's Work Plan.

All construction equipment exiting the contamination reduction zone was first decontaminated regardless if the equipment has come in contact with contaminated materials. Additionally, to prevent spread of Gross Contamination, equipment in contact with Gross Contamination was decontaminated after use.

During remediation, soil and liquids adhered to construction vehicles and equipment was removed in the decontamination area prior to such vehicles and equipment leaving the Site. After wetting with potable water, brooms or shovels were utilized for the gross removal of soil from vehicles and equipment. The decontamination procedure for the removal of the remaining soil and liquids consisted of washing with potable water. Soil generated by the decontamination process was stockpiled and tested, and based on the results of the testing was either reused onsite or transported offsite for disposal. Decontamination liquids was collected and treated along with the dewatering liquids as described in Section 4.4.8.7.

This included the construction of entrance and exit pads from non-paved to paved areas, to limit tracking of Site soils outside the contamination reduction zones. The construction zone exit pad was constructed using #2 crushed stone and was a minimum of 8-inches thick. The construction zone exit pad was constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control, and detailed on the Construction Drawings and in the technical specifications. The number and location of construction zone exit pads was determined by the Contractor, and included in the Contractor's Work Plan.

4.2.14.8 Site Fencing

1. The Contractor protected all Work Areas by temporary fencing to control public access and protect the site from theft and vandalism. The Contractor erected, maintained, and dismantled temporary fencing around construction site and materials storage areas. The fencing was New York City Department of Transportation approved plywood barricades.

The Contractor provided personnel and vehicle gates as necessary for the quantity and size to complete the Remedial Work. The installation of temporary fencing was constructed as not to deter or hinder access to existing and new hose connections and fire hydrants.

The posts for fencing met the following requirements or as required by local, state, or federal requirements:

1. Space as 10 feet maximum.

2. Drive posts, set in holes and backfill, or anchor in pre-cast concrete blocks.

3. For soft and unstable ground conditions, cast concrete plug around post.

4. Posts over pavement: Use steel post plates or pre-cast concrete blocks.

5. Gate posts: Use bracing or concrete footings to provide rigidity for accommodating size of gate.

The contractor maintained fencing in good condition and, if damaged, immediately repaired.

4.2.14.9 Demobilization

Demobilization consisted of the following elements:

- Restoration of areas that had been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], and access area);
- Removal of temporary access areas (whether on-Site or off-Site) and restoration of disturbed access areas to pre-remediation conditions;
- Removal of temporary sediment and erosion control measures and disposal of materials and establishment of long-term sediment and erosion controls in accordance with acceptable rules and regulations;
- Equipment decontamination; and
- General refuse disposal.

4.2.15 Application of Calcium Peroxide

Calcium peroxide was applied to the base of excavation areas to address potential recontamination from groundwater migration following completion of dewatering. Calcium peroxide works by releasing oxygen when it hydrolyzes with water:

$CaO2 + H2O \rightarrow Ca(OH)2 + O2$

The oxygen stimulates aerobic biodegradation. One pound of calcium peroxide will yield 0.44 lbs of oxygen. The commercial calcium peroxide products are about 75% pure so the actual oxygen release is 0.33 lbs oxygen per pound.

Approximately 10 pounds of a calcium peroxide product were required to degrade each pound of hydrocarbon. The intent of this remedial action was to remove all soil in excess of UUSCOs, but in order to estimate an application rate for calcium peroxide it was assumed that the residual soil contained 10 mg hydrocarbon per kg of soil. This equated to the applied application rate of about 2.5 lb of Calcium peroxide for every 10 ft2 of excavation floor. Actual volume and density application rates for calcium peroxide was based on activity of material applied as provided by the manufacturer.

4.2.16 CAMP Results

During the remedial activities, perimeter air monitoring was conducted in accordance with the Community Air Monitoring Plan (CAMP). The results of air monitoring during implementation of the CAMP during remedial activities is provided in Appendix K.

The CAMP required in summary:

- establishment of an exclusion zone around the perimeter of the Site;
- establishment of upwind and downwind air monitoring locations immediately outside the exclusion zone;
- continuous real time air monitoring of Volatile Organic Compounds (VOCs) and particulates at the upwind and downwind locations;
- comparison of the real-time air monitoring results and the air sampling results to trigger and action levels; and
- performance of corrective actions should these trigger or action levels be exceeded.

Continuous real-time air monitoring was conducted throughout the remedial effort. Air monitoring logs were completed for each day of monitoring. Sporadic exceedances of the real-time VOC and particulate levels occurred during logging of the calibration units during startup. These errors were corrected by re-calibration of the instrument and equipment maintenance.

The air monitoring logs are included in Appendix K. A review of this data shows exceedances of action or stop work concentrations during 14 days out of approximately 123 work days onsite. Action levels for VOCs and particulate were 5 parts per million (ppm) and 100 micrograms per cubic meter (ug/m3) respectively and Stop Work values were 25 ppm and 150 ug/m3 respectively. These values are based on 15-minute averages. Excluding days for which there was only one or two 15-minutes exceedances for the entire day, there were only six days with more than two exceedances (3/19/2009, 4/1/2009, 4/2/2009, 4/14/2009, 5/2/2009, 5/9/2009). Only one day was a stop work exceedance for VOCs (4/14/2009) experienced and three days for particulates (3/19/2009, 4/1/2009 and 5/2/2009). Work was stopped and dust and odor suppressing foam was applied to the worksite on these days until air

concentrations were below Action values before work was allowed to resume. This foam was used throughout the project to maintain values below action level concentrations for the majority of the project.

4.2.17 Reporting

Site activities and progress was compiled on a daily and monthly basis as described below. All daily and monthly Reports are included in the Final Engineering Report in Appendix Q (on a CD).

4.2.17.1 Daily Reports

Daily reports were submitted electronically to the NYSDEC and NYSDOH Project Managers periodically for each reporting period (Appendix Q). The report format conformed to DER-10 Section 5.7(b), and included:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions; and
- An explanation of notable Site conditions.

Daily reports were not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions were also included in the daily reports. Emergency conditions and changes to the RAWP were addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports included a description of daily activities keyed to an alpha-numeric map for the Site that identified work areas. These reports included a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is included at the front of Appendix Q.

The NYSDEC assigned project numbers (C203040 and C203041) will appear on all reports.

4.2.17.2 Monthly Reports

Monthly reports were due to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period. The reports conformed to DER-10 Section 5.7(b), and included:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.2.17.3 Photographs and Other Reporting

Photographs were taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format (see Appendix R). Photos illustrated all remedial program elements and were of acceptable quality. Representative photos of the Site prior to any Remedial Actions were provided. Representative photos were provided of each contaminant source, source area and Site structures before, during and after remediation. Photos were submitted to NYSDEC on CD or other acceptable electronic media and were sent to NYSDEC's Project Manager (2 copies) and to NYSDOH's Project Manager (1 copy). CD's were labeled and a general file inventory structure separated photos into directories and sub-directories according to date.

Job-site record keeping for all remedial work was appropriately documented. These records were maintained on-Site at all times during the project and were available for inspection by NYSDEC and NYSDOH staff.

4.2.17.4 Complaint Management Plan

This discusses the procedures for handling complaints from the public regarding nuisance or other Site conditions. All complaints received, if any, were logged in by the Site Superintendent and reported in the daily report. Each complaint was investigated as to its validity, its source determined and a resolution adopted. Once a remedy had been put in place, it was recorded with the original complaint and reported in the daily report.

No complaints were received or recorded from the public regarding nuisance or other Site conditions for this project.

4.2.17.5 Deviations from the Remedial Action Work Plan

The process followed when there was deviations from the RAWP, at a minimum, included a written submission to the NYSDEC with the following information:

- Reasons for deviating from the approved RAWP;
- Approval process to be followed for changes/edits to the RAWP; and
- Effect of the deviations on overall remedy.

Actual deviations from the proposed work plan are provided in Section 4.5.

4.3 CONTAMINATED MATERIALS REMOVAL

The remedial action planned for the Courtlandt Corners sites was to remove all soils that exceed the UUSCOs. In certain areas this required dewatering, which also removed impacted groundwater. Groundwater was treated and discharged to the sewer system (see Section 4.4.8.7). A calcium peroxide compound was added to excavated areas to aid in remediating any residual groundwater contamination. In order to accomplish the remedy, all existing structures on the sites were removed. Planned redevelopment calls for a mix of residential and commercial buildings, with basement structures in areas to be remediated. New building construction included sub-slab depressurization systems and soil vapor barriers. Areas not covered by building slabs were covered by a

composite cover system consisting of asphalt or concrete pavement on walkways, roads and parking lots.

4.3.1 Soil Cleanup Objectives

The Soil Cleanup Objectives for this Site were the unrestricted use criteria listed in 6NYCRR Part 375-6, Table 375-6.8(a): Unrestricted Use Soil Cleanup Objectives. As indicated in Section 4.5 Deviation from Remedial Action Work Plan and further discussed in 4.6 Contamination Remaining On-Site, all bottom samples for the site meet the Unrestricted Use Soil Cleanup Objectives except for four samples. These four samples met the Track 4 Restricted Residential Use Soil Cleanup Objectives.

Soil and materials management on-Site and off-Site was conducted in accordance with the Soil/Material Management Plan as described in Section 5.4 below.

UST closures conform to criteria defined in DER-10.

4.3.2 Material Removal Quantities

All soil exceeding UUSCOs were excavated and removed. The estimated quantity of soil/fill to be removed from the Courtlandt II Site is 9,451 tons (approximately 5,923 cubic yards). There was also two hundred eighty-two (282) tons of concrete, rock, and construction and demolition (C&D) debris removed from the site following demolition of existing structures. There was no soil reused on the Site.

Figure 5-1 depicts the areas to be excavated and the depth of each proposed excavation. This figure was generated using the results from the Remedial Action Work Plan, which determined the horizontal and vertical extent of soil impacts. Actual area excavated is presented in Appendix C – As Built Drawings.

4.4 REMEDIAL PERFORMANCE (END-POINT) SAMPLE RESULTS

4.4.1 End-Point Sampling Frequency

End-point sampling was performed on soils from excavation sidewalls and bottoms. Excavation sidewall and bottom samples were to be performed at the completion of all excavations. Confirmation samples

were collected from stockpiled soils at a frequency stated in the QAPP and as discussed in Section 5.2.6.

4.4.2 Post Remediation Groundwater and Soil Vapor Sampling

Post remediation groundwater samples will be collected at locations specified by the Site Management Plan once the remedial work had been completed and construction activities had advanced to the point where permanent monitoring wells and soil vapor monitoring points can be installed without threat of damage from heavy machinery etc. Post remedial monitoring of groundwater and soil vapor will be performed as specified by the Site Management Plan for review by the NYSDEC/NYSDOH for review in the Periodic Report.

4.4.3 Methodology

Laboratory analysis of soil samples followed "Test Methods for Evaluation Solid Waste, USEPA SW 846, Third Edition, September 1986, with revisions. The analyses performed for soils excavated during this Remedial Action included analysis for VOCs, SVOCs, pesticides and metals in accordance with USEPA SW-846 Method 8260B, 8270C, 8081, 6010 and 7471. Laboratory analysis for groundwater samples included VOCs, SVOCs and Metals in accordance with USEPA SW-846 Method 8260B, 8270C, 6010 and 7471. Soil vapor samples were analyzed for VOCs using EPA method TO-15.

4.4.4 Reporting of Results

Field data was recorded and reported by field personnel using appropriate field data documentation materials such as the field logbook, field management forms and COC forms.

Good field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Proper completion of these forms and the field logbook were necessary to support the consequent actions that resulted from the sample analysis. This documentation supported that the samples were collected and handled properly, making the resultant data complete, comparable and defensible.

The analytical results of all samples collected, as part of the Remedial Action, were reported as NYSDOH Category B deliverables. The Category B data deliverables include all backup QA/QC documentation necessary to facilitate a complete validation of the data. The sample tracking forms were specified and supplied by the 2000 NYSDEC Analytical Services Protocol (ASP.)

The laboratory transmitted the analytical data in an electronic format to minimize the chances of transposition errors in summarizing the data. The data was transmitted in an electronic data deliverable (EDD) in GISKEY (most recent version) format and a PDF copy of each ASP deliverable.

4.4.5 QA/QC

A Quality Assurance Project Plan (QAPP) detailing the frequency of sample collection, analytical methods and the quality standards that must be achieved by the analytical laboratory is included in the Site Management Plan.

Specific guidance regarding the collection of field and laboratory QA/QC samples is presented separately below.

The trip blank was used to determine if any cross-contamination occurred between aqueous samples during shipment. Trip blanks were supplied by the analytical laboratory as aliquots of distilled, deionized water that was sealed in a sample bottle prior to initiation of each day of fieldwork. Glass vials (40 ml) with Teflon®-lined lids were used for trip blanks. The sealed trip blank bottles were placed in a cooler with the empty sample bottles and were shipped to the site by the laboratory personnel. If multiple coolers were necessary to store and transport aqueous VOC samples, then each cooler contained an individual trip blank. Trip blanks were analyzed for VOCs only, by USEPA SW-846 Method 8260B.

Field blanks (FB) were collected to evaluate the cleanliness of the sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment, sample bottles and contaminants present in the air. Field blanks were collected at a frequency of one per decontamination event for each type of sampling equipment, and each media being sampled at a minimum of one per equipment type and/or media per day.

Field blanks were collected prior to the occurrence of any analytical field sampling event by pouring deionized or distilled water over a particular piece of sampling equipment and into a sample container. The analytical laboratory provided field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars were used for organic blanks. The field blanks accompanied field personnel to the sampling location. The field blanks were analyzed for the same analytes as the environmental samples being collected that day and were shipped with the samples taken.

Field blanks were taken in accordance with the procedure described below:

- Decontaminate sampler using the procedures specified in the QAPP;
- Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate sample bottles;
- The sample was immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory; and
- Fill out sample log, labels and chain of custody (COC) forms, and record in field notebook.

The temperature blank was used to determine the temperature of the samples within the cooler upon arrival at the analytical laboratory. A laboratory-supplied temperature blank was an aliquot of distilled, deionized water that was sealed in a sample bottle. The sealed temperature blank bottles were placed in a cooler with the empty sample bottles and were shipped to the site by the laboratory personnel. If multiple coolers were necessary to store and transport samples, then each cooler contained an individual temperature blank.

Blind field duplicate (DUP) samples were collected analyzed to check laboratory reproducibility of analytical data. Blind field duplicate samples were collected at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. The blind field duplicate sample was submitted to the analytical laboratory as a normal sample, however it did have a fictitious sample identification and fictitious time of sample collection. The blind field duplicate was cross-referenced to

document which actual sample it was a blind field duplicate of in the field notes.

Additional environmental sample volume were collected for use as matrix spike/ matrix spike duplicate (MS/MSD) samples at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. To ensure the laboratory had sufficient volume for MS/MSD analysis, triple sample volume was submitted for aqueous organic extractable and volatile samples once per every 20 samples in a sample delivery group (SDG).

4.4.6 Data Usability Report (DUSR)

A qualified data validator had prepared a Data Usability Report (DUSR) which is found in Appendix S. The DUSR was prepared according to the guidelines contained in Appendix 2B of DER-10, and reviewed the following:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?
- Have all holding times been met?
- Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
- Have all of the data been generated using established and agreed upon analytical protocols?
- Does an evaluation of the raw data confirm the results provided in the data summary sheets and qualify control verification forms?
- Have the correct data qualifiers been used?

The DUSR described the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems were identified and their effect on the data was discussed. The DUSR also included recommendations on resampling/reanalysis. All data qualifications were documented following the NYSDEC ASP 2005 Rev. Guidelines.

4.4.7 End-Point Data

Chemical labs used for all end-point sample results and contingency sampling were NYSDOH ELAP certified.

End point sampling, including bottom and side-wall sampling, was performed in accordance with DER-10 sample frequency requirements. Side-wall samples were collected a minimum of every 30 linear feet. Bottom samples were collected at a rate of one for every 900 square feet unless the bottom of the excavation was below the water table.

Tables 4-2 provided a tabular and map summary of bottom and sidewall end-point sample results and exceedances of SCOs. Sample locations for all end-point and sidewall sample points is provided in Figure 4-3 and data are presented in Tables 4-3A through 4-3H.

As noted in the Remedial Action Work Plan, and further discussed in Section 4.5 and 4.6 the achievement of the Track 4 restricted use alternative with Engineering and Institutional Controls as further delineated in this report remains protective of public health and the environment and therefore meets the remedial action objectives.

4.4.8 Soil/Materials Management Plan

The soil/material management plan utilized for this project was included in the Remedial Action Work Plan and is also included in the Site Management Plan (Appendix D). Various elements of this plan and the methods utilized during the implementation are described below.

4.4.8.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment was performed by a qualified environmental professional under the supervision of the Remedial Engineer during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening was performed regardless of when the invasive work was done and included all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to the two 4,000-gallon underground tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action were

surveyed by a surveyor licensed to practice in the State of New York. This information is provided on maps in the Final Engineering Report.

Screening was performed by qualified environmental professionals. Resumes were provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

4.4.8.2 Stockpile Methods

Stockpiles were inspected at a minimum once each week and after every storm event. Results of inspections were recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles were kept covered at all times with appropriately anchored tarps. Stockpiles were routinely inspected and damaged tarp covers were promptly replaced.

Soil stockpiles were continuously encircled with silt fences. Hay bales were used as needed near catch basins, surface waters and other discharge points.

A dedicated water cannon connected through a permitted fire hydrant was available on-Site for dust control.

4.4.8.3 Materials Excavation and Load Out

The Remedial Engineer or a qualified environmental professional under his/her supervision oversaw all invasive work and the excavation and load-out of all excavated material.

The Volunteer and its contractors were solely responsible for safe execution of all invasive and other work performed under the Plan.

The presence of utilities and easements on the Site was investigated by the Remedial Engineer. It had been determined that no risk or impediment to the planned work under the Remedial Action Work Report was posed by utilities or easements on the Site.

Loaded vehicles leaving the Site were appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck decontamination pad was operated on-Site. The Remedial Engineer was responsible for ensuring that all outbound trucks were washed at the truck wash before leaving the Site until the remedial construction was complete.

Locations where vehicles enter or exit the Site were inspected daily for evidence of off-Site sediment tracking.

The Remedial Engineer was responsible for ensuring that all egress points for truck and equipment transport from the Site were clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets was performed as needed to maintain a clean condition with respect to Site -derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, were completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that were affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer was responsible to ensure that Site development activities did not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Report.

Each hotspot and structure remediated (USTs, vaults and associated piping, transformers, etc.) was removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills were not performed without NYSDEC approval and did not interfere with, or otherwise impair or compromise, the performance of remediation required by this report.

Mechanical processing of historical fill and contaminated soil on-Site was prohibited.

4.4.8.4 Materials Transport Off-Site

All transport of materials was performed by licensed haulers in accordance with appropriate Federal, State, and local regulations, including 6 NYCRR Part 364. Haulers were appropriately licensed and trucks properly placarded.

All trucks loaded with Site materials were allowed to exit the vicinity of the Site using only approved truck routes. Truck transport routes are as follows:

For Trucks Heading South:

Head west 0.4 miles on 161st Street and turn left on Ground Concourse. Continue south on Grand Concourse 1.2 miles and merge onto Major Deegan Expressway South.

For Trucks Heading North:

Head west on 161st Street approximately 1 mile to Jerome Avenue and make left. The entrance to the Major Deegan Expressway north was approximately 0.1 miles on the right.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 5-2. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; (g) community input [where necessary].

Trucks were prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site was kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks was performed on-Site in order to minimize off-Site disturbance. Off-Site queuing was prohibited.

Material transported by trucks exiting the Site were secured with tight-fitting covers. Loose-fitting canvas-type truck covers were prohibited. If loads contain wet material capable of producing free liquid, truck liners were used.

All trucks were washed prior to leaving the Site. Truck wash waters were collected and disposed of off-Site in an appropriate manner.

4.4.8.5 Materials Disposal Off-Site

The disposal location was the Middlesex County Landfill and was reported to the NYSDEC Project Manager and documented in Appendix T.

The total quantity of material disposed off-Site was 9,451 tons (approximately 5,923 cubic yards) of soil. It is anticipated based on the remedial investigation results that all soils removed from the site was classified as non-hazardous and was disposed of at an appropriate disposal facility. Two hundred eighty-two (282) tons of concrete, rock, and construction and demolition (C&D) debris were also removed from the site following demolition of existing structures.

All soil/fill/solid waste excavated and removed from the Site was treated as contaminated and regulated material and was disposed in accordance with all Federal, State and local (including 6NYCRR Part 360) regulations. No soil/fill from this Site was proposed for unregulated disposal (i.e. clean soil removed for development purposes). Unregulated off-Site management of materials from this Site was prohibited without formal NYSDEC approval. Material was not taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation was obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter stated that material to be disposed was contaminated material generated at an environmental remediation Site in New York State. The letter provided the project identity and the name and phone number of the Remedial Engineer. The letter included as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it was in receipt of the correspondence (above) and was approved to accept the material. These co-documents are included in Appendix T.

Non-hazardous historic fill and contaminated soils taken off-Site were handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2.

Historical fill and contaminated soils from the Site were prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that were contaminated but non-hazardous and were removed from the Site were considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be C&D materials with contamination not typical of virgin soils. These soils were sent to a permitted Part 360 landfill. They were sent to a permitted C&D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material was prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures were include, at a minimum, a letter to the C&D facility that provides a detailed explanation that the material was derived from a DER remediation Site, that the soil material was contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter provided the project identity and the name and phone number of the Remedial Engineer. The letter included as an attachment a summary of all chemical data for the material being transported.

An accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids are included in Appendix T. Documentation associated with disposal of all material includes records and approvals for receipt of the material. Trucking and disposal logs are also presented in a tabular form in Appendix T.

Bill of Lading system were used for off-Site movement of non-hazardous wastes and contaminated soils. This information is reported in Appendix T. All documentation on the two 4,000-gallon tank removals and permit closeout are provided in Appendix J.

Hazardous wastes derived from on-Site was stored, transported, and disposed of in full compliance with applicable Federal, State, and local regulations.

Appropriately licensed haulers were used for material removed from this Site and were in full compliance with all applicable local, State and Federal regulations.

Waste characterization was performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable

permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC were reported in the FER. All data available for soil/material to be disposed at a given facility were submitted to the disposal facility with suitable explanation prior to shipment and receipt.

4.4.8.6 Materials Reuse On-Site

No excavated material on site was reused. Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes was not reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. Concrete crushing or processing on-Site was prohibited. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site was also prohibited from reuse on-Site.

4.4.8.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, was handled, stored, and treated for disposal in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system was addressed through approval by NYCDEP.

Dewatered fluids were not recharged back to the land surface or subsurface of the Site. Dewatering fluids were treated in storage tanks, managed off-Site. Approximately 15,000 gallons per day of groundwater were extracted, stored in an 18,000-gallon weir tank and treated with a bag filter and two 4,000 pound activated carbon vessel in series before gravity drain to the New York City Sewer system from a 5,000-gallon plastic tank. Discharges were done under NYC Permit #0538718.

Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) was prohibited. All discharges of water were under the NYCDEP sewer permit.

4.4.8.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to foundation construction, a land survey was performed by a New York State licensed surveyor. The survey defined the top elevation of residual contaminated soils where present and the bottom depth of the excavation. A physical demarcation layer, consisting of orange snow fencing material was placed on this surface to provide a visual reference. Since some residual contaminated soils remain following remediation, this demarcation layer constitutes the top of the 'Residuals

Management Zone', the zone requires adherence to special conditions for disturbance of any contaminated residual soils. Residual contaminated soils remaining at the site in the Residuals Management Zone are defined in the Site Management Plan. The survey measured the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface constitutes the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan. An as-built drawing (Appendix C) showing the survey results is included in the Final Engineering Report and is also included in the Site Management Plan.

4.4.8.9 Backfill from Off-Site Sources

No soils or materials were imported onto the Site. No materials from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites were used at the Site.

4.4.8.10 Stormwater Pollution Prevention

A complete Stormwater Pollution Prevention Plan (SWPPP) was developed by the Contractor that conforms to the requirements of NYSDEC Division of Water guidelines and NYS regulations and was submitted to the NYSDEC for approval. The plan included the following elements:

- Barriers and hay bale checks was installed and inspected once a week and after every storm event. Results of inspections were recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs were be made immediately.
- Accumulated sediments were removed as required to keep the barrier and hay bale check functional.
- All undercutting or erosion of the silt fence toe anchor was repaired immediately with appropriate backfill materials.
- Manufacturer's recommendations were followed for replacing silt fencing damaged due to weathering.
- Erosion and sediment control measures identified in the RAWP were observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they were inspected to

ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

- Silt fencing or hay bales was installed around the entire perimeter of the remedial construction area.

4.4.8.11 Contingency Plan

No additional underground tanks or other previously unidentified contaminant sources were found during on-Site remedial excavation or during development related construction. Therefore implementation of contingency plans was unnecessary.

4.4.8.12 Community Air Monitoring Plan

A site-specific CAMP was developed to prevent unnecessary exposures during remedial activities. The results of air monitoring generated from the implementation of the CAMP for this Site is included as Appendix K. Each day sampling stations were moved to downwind locations at the perimeter of the work area.

Exceedances observed in the CAMP were reported to NYSDEC Project Managers and included in the Daily Report.

4.4.8.13 Odor, Dust and Nuisance Control Plan

The Remedial Engineer certified that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.

4.4.8.13.1 Odor Control Plan

This odor control plan was capable of controlling emissions of nuisance odors off-Site. Specific odor control methods that were utilized on a routine basis included limiting the area of open excavations and shrouding open excavations with tarps or other covers when necessary. If nuisance odors were identified, work was halted and the source of odors was identified and corrected. Work did not resume until all nuisance odors were abated. NYSDEC and NYSDOH were notified of all odor complaints (none recorded) and of all other complaints about the project (none recorded). Implementation of all odor controls, including the halt of work, was the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means was employed to prevent on- and off-Site nuisances. At a minimum, procedures included: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils.

4.4.8.13.2 Dust Control Plan

Dust management during invasive on-Site work, included, at a minimum, the items listed below:

- Dust suppression was achieved though the use of a dedicated on-Site dust suppressing foams and water from hydrants for road wetting. The hose was equipped with a nozzle capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing was done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel was used on roadways to provide a clean and dust-free road surface.
- On-Site roads were limited in total area to minimize the area required for water hose sprinkling.

4.4.8.13.3 Other Nuisances

A plan for rodent control was developed and utilized by the contractor prior to and during Site clearing and Site grubbing and during all remedial work.

A plan was developed and utilized by the contractor for all remedial work and conformed to NYCDEP and NYCDOB noise control standards.

4.5 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

Four of fourteen bottom samples exceeded Track 1 use limits, but were within the Track 4 cleanup standards. The exceedance of Track 1 standards was reported to the NYSDEC project manager and the NYSDEC was notified of the change for the site from a Track 1 to a Track 4 cleanup (Appendix A), which was provided as a contingency in the RAWP. Thus, the site will be managed under a Site Management Plan with institutional controls and engineering controls. Notification and approval of the Courtlandt II Remedial Action Work Plan (RAWP) and substantive

documentation concerning the modification from Track 1 to Track 4 was provided to the NYSDEC and is included in documentation provided in Appendix A. The contamination remaining onsite is further delineated in Section 4.6.

4.6 CONTAMINATION REMAINING ON-SITE

The Remedial Action achieved Track 4 cleanup with engineering and institutional controls required to manage remaining contamination at the site. Four samples B-CCII-03, B-CCII-07, B-CCII-10, and SW-CCII-11 as shown in Figure 4-3 were bottom samples that exceeded Track 1 cleanup samples. A summary of all analytical data for bottom and sidewall samples is provided in Tables 4-3A through 4-3H. All other bottom samples were below NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs).

Table 4-2 shows that only one bottom sample exceeded a single Track 1 unrestricted volatile organic concentration parameter: SW-CCII-11 exceeded total xylene at 350 ug/kg versus the unrestricted use value of 260 ug/kg.

The remaining three bottom samples with residual contamination did not exceed any unrestricted volatile organic concentration parameters. B-CCII-03 had one pesticide – 4,4'-DDT of 12.6 ug/kg versus unrestricted value of 3.3 ug/kg and two metals – lead of 79.8 versus unrestricted value of 63 ug/kg and zinc of 206 ug/kg versus unrestricted of 109 ug/kg. All these values were below the Track 4 restricted values. B-CCII-07 had one pesticide – 4,4'-DDT of 12.6 ug/kg versus unrestricted value of 3.3 ug/kg and two metals – lead of 79.8 versus unrestricted value of 63 ug/kg and zinc of 206 ug/kg versus unrestricted of 109 ug/kg. All these values were below the Track 4 restricted values. Bottom sample B-CCII-10 had only one exceedance of – zinc of 117 ug/kg versus unrestricted value of 109 ug/kg.

A table of the Track 4 site specific soil cleanup objectives is included in Table 4-2 and are also provided in Table 4-4 and are the same as those presented in the RAWP. Track 4 cleanup objectives were developed using a combination of statistical analysis of detected compounds and depth of detections at the BCP sites, Part 375 Soil Cleanup objectives and NYSDEC guidance. The remedial objectives in Table 4-4 are protective of human health and the environment and are justified based on the planned remedial activities and future site use.

Since UUSCOs were not achieved and residual contaminated soil and groundwater/soil vapor remains beneath the Site, Engineering and Institutional Controls (ECs and ICs) are required for long term management to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination would be executed under a site specific Site Management Plan (SMP) (Appendix D).

ECs are implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) has two primary EC systems. These are: (1) a composite cover system consisting of asphalt covered roads, concrete covered sidewalks, concrete building slabs, and soil cover in open spaces; and a (2) sub slab depressurization systems and vapor barrier.

Residual contamination on the Site is presented in Figure 4-3 and Table 4-2. These figures and tables include exceedances of Track 1. No final bottom samples exceeded Track 4 values. As noted in the Remedial Action Work Plan, the achievement of the Track 4 restricted use alternative with Engineering and Institutional Controls as further delineated in this report remains protective of public health and the environment and therefore meets the remedial action objectives.

4.7 ENGINEERING CONTROLS

The following engineering controls were implemented:

- Composite cover system
- Sub-slab depressurization systems and vapor barrier

4.7.1 Composite Cover System

For any residual contamination left in place, exposure to residual contaminated soils is prevented by an engineered, composite cover system that was built on the Site. As-Built drawings showing the composite cover system and redevelopment at the Site are included in Appendix C. A composite cover system consisting of asphalt or concrete pavement on walkways, roads, parking lots, and concrete building slabs and one foot of gravel covers the entire Site. Slabs and paving systems including subbase

materials (building slabs, roadways, walkways, parking lots, etc.) are at least 12-inches thick.

A Soil and Underground Structure Management Plan is included in the Site Management Plan to outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the Remedial Action is complete. It is recognized that the composite cover system is a permanent control and the quality and integrity of this system was inspected at defined, regular intervals in perpetuity. Maintenance of this composite cover system was described in the Site Management Plan of the FER.

4.7.2 Sub-Slab Depressurization

A waterproofing/vapor barrier membrane was installed during construction of the new building structures, and was overlain by a concrete slab. The vapor barrier is a 15 mil ASTM –E 1745 compliant polyolefin Stego Wrap. The membrane was overlapped by a minimum of six inches and secured with mastic or asphaltic tape. Conduits penetrating the slab surface were sealed with mastic. Vapor barrier engineering specifications are referenced within Appendix I.

Figure 7-1 presents a schematic of the installed sub-slab depressurization system, and its relationship to the construction of the concrete floor. This system consists of the following elements which are discussed in further detail below:

- Four (4) inches or more of ASTM #5 aggregate under the entire footprint of the building slabs;
- Geotextile material (Mirafi paper – Size 1100N) to prevent migration of fines into the aggregate layer;
- Multiple sub-slab suction pits measuring 3 feet x 3 feet x 12 inches deep; and
- Multiple exhaust stacks consisting of six-inch PVC Schedule 40 piping fitted with blower motors properly sized to achieve the required vacuum/flow needed to achieve the appropriate radii of influence.

Prior to placing the concrete building slab, a layer of ASTM #5 aggregate was placed under the slab. This aggregate is between ½-inch and 1 inch in diameter, with less than 10% passing through a ½-inch sieve. This

aggregate provides a highly permeable layer for collection of any vapors. Once placed, the aggregate was rolled to prevent sharp edges from protruding. As noted in the detail for Figure 7-2, a six-inch layer of Type I recycled concrete aggregate (RCA) was placed above the ASTM #5 aggregate (i.e., the gas collection layer) to improve the load-bearing characteristics of the concrete floor. It is recognized that RCA may only be used if a) recognizable as RCA, and b) received from NYSDEC registration facility. To prevent fines from this layer from migrating to the gas collection layer, Mirafi paper (size 1100N) was placed above the gas collection layer, and below the Type I RCA.

Following placement of the aggregate, seven sub-slab suction pits were installed. The recommended spacing for suction pits of this size in an active system, in ASTM #5 aggregate, is one per 100,000 square feet (corresponding to a radius of influence of 178 feet) to achieve coverage over that area. However, to achieve this coverage, it is also necessary to seal all penetrations of the building floor and other possible vapor entry routes. Therefore, to improve efficiency in the event that this system is activated, a conservative spacing of approximately one suction pit per 50,000 square feet is provided. This corresponds to a 126-foot radius of influence.

The construction of the suction pits is provided in Detail No. 1 in Figure 7-2. The key component of the suction pit is a six-inch PVC Schedule 40 pipe that terminates in the middle of a void measuring 3 feet x 3 feet x 12 inches deep. The void was framed by #13 expanded metal with ½-inch by 1-inch openings attached to angle supports. A galvanized metal deck was provided on the top of the suction pit to provide support when the concrete building slab is placed.

The piping exits the pit horizontally and extends to the adjacent building column or interior wall. The horizontal piping slopes back toward the suction pit to allow for any condensation to drain back to the pit. The six-inch piping runs vertically along the building column and exit through the building roof. A blower motor properly sized to achieve the required vacuum/flow needed to achieve the appropriate radii of influence is connected to this piping. Each of the blowers have an exhaust point that allows for sub-slab vapors to exit the building. To prevent entry of subsurface vapors into the building, the exhaust point must be: 1) 10 feet above the ground, 2) 10 feet from other buildings or HVAC intakes, 3) above the eave of the roof, and preferably 12 inches above the roof, and 4) 10 feet from any opening less than 2 feet below the exhaust point.

The SSDS system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the SSDS system may be submitted by the property owner based on confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

4.7.3 Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities were outlined in the Monitoring Plan of the SMP.

The criteria for completion of remediation/termination of remedial systems is addressed further in the Site Management Plan.

4.8 INSTITUTIONAL CONTROLS

The remediation at the site achieved Track 4 restricted residential SCOs. Institutional controls in the form of an Environmental Easement (Appendix B) and Site Management Plan (Appendix D) are being implemented as follows.

After the remedy is complete, and since the Site has residual contamination remaining in place; Engineering Controls (ECs) for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two additional elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan. These elements are described in this Section. A Site -specific Environmental Easement was recorded with Bronx County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved Site Management Plan. ICs provide

restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

4.8.1 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete (Appendix B). Since the Site has residual contamination after completion of the Remedial Actions, an Environmental Easement is required. This remedy is following a Track 4 cleanup, with some residual contamination remaining at the Site; therefore an Environmental Easement approved by NYSDEC was filed and recorded with the Bronx County Clerk. The Environmental Easement is part of the SMP.

The Environmental Easement will render the Site a Controlled Property. The Environmental Easement will be recorded with the Bronx County Clerk before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor the Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil, and restricting the use of the Site to residential/commercial use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;

- All Engineering Controls must be operated and maintained as specified in this SMP;
- A composite cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs must be inspected, certified and maintained as required in the SMP;
- A soil vapor mitigation system consisting of a sub slab depressurization system under all building structures must be inspected, certified, operated and maintained as required by the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater, soil vapor, and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement and was implemented under the Site Management Plan (discussed in the next section). The Controlled Property (Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;

- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;

- The Controlled Property may be used for residential/commercial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;

- The Controlled Property may not be used for a higher level of use, such as unrestricted residential use, without an amendment or extinguishment of this Environmental Easement;

- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

4.8.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report (FER) and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the FER (Appendix D) but was written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA (Appendix A) with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional

Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Periodic Review Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP includes four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP was prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification are scheduled on a certification period basis. The Site Management Plan was based on a calendar year and the first Periodic Report will be due for submission to NYSDEC 18-months after the issuance of the Certificate Of Completion (COC) and annually thereafter.

The Site Management Plan in the Final Engineering Report includes a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site -wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all volatile organic carbon remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

No exclusions for handling of residual contaminated soils were provided in the Site Management Plan (SMP). All handling of residual contaminated material is subject to provisions contained in the SMP.