REMEDIAL ACTION WORK PLAN
FOR
ATLAS PARK SITE – PARCEL B
GLENDALE, QUEENS
NYSDEC BCP Site No. C241088

Prepared For:

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1.0 INTRODUCTION

1.1 GENERAL

Atlas Park LLC (Atlas), entered into a Brownfield Cleanup Program (BCP) Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in January 2004, to investigate and, where necessary, remediate a 12-acre, subdivided portion of a larger 80-year old, 20-acre industrial park, Atlas Terminals, located in Glendale, Queens, New York. A USGS topographical quadrangle map (Figure 1) shows the site location.

The BCA originally covered the entire 12-acre parcel. However, the 12-acre parcel was separated into two distinct areas: Parcel A (formerly known as the "IRM [Interim Remedial Measure] Area") and Parcel B (formerly known as the "RI [Remedial Investigation] Area") as shown on Figure 2. Parcel A consists of an 8.474-acre portion of the 12-acre parcel, and Parcel B (which is the subject of this report and is hereafter referred to as the "Site") consists of the remaining 3.531-acre portion. With concurrence from NYSDEC during a meeting on April 18, 2005, the Developer completed the administrative process of separating Parcels A and B into separate BCAs. An updated Site Plan is provided herein as Figure 2.

The original BCA was amended to reflect the IRM Area as Parcel A, and the RI Area as Parcel B. The Amendment clarifies that the original BCA now relates to Parcel A exclusively. As of the date of execution, Parcel B is subject to a new BCA Index No. W2-1070-05-06 Site No. C241088. Parcel A received a Certificate of Completion from NYSDEC on December 31, 2005.

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved IRM/RI Work Plan dated January 2004 and Supplemental RI Work Plan dated July 2005. Prior investigations at the Site uncovered a discontinuous layer of fill ranging in thickness from 3 to 10 feet. Portions of the upper zone of fill were found to contain elevated levels of several semi-volatile organic compounds (SVOCs) and metals above the New York State Recommended Soil Cleanup Objectives (RSCOs), contained within the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-4046 (January 1994). These contaminants appeared to be associated with ash and cinders present in the fill as localized

pockets or otherwise mixed in with the fill, and were generally present within the upper 4 feet of fill but as deep as 7 feet below grade surface (bgs).

The Site also contained several suspected areas of concern (AOCs), including underground fuel oil storage tanks (USTs), sub floor vaults and drain lines, transformers, and an area below existing building floor that contained lead contamination. In addition, investigations conducted on Parcel A and Parcel B identified areas of soil vapors in concentrations suggesting the presence of source area(s) on Parcel B. Recent draft guidelines published by the New York State Department of Health (NYSDOH) indicated that these levels of soil vapors require action to mitigate potential soil vapor intrusion into the Site buildings.

This Remedial Action Work Plan (RAWP) describes the proposed remedial action and remedial design components for addressing subsurface contamination present at the Site:

- It summarizes the nature and extent of contamination as determined from the data gathered during the RI, performed in October 2004, and SRI, performed in the fall of 2005 through August 2006, and

- It provides an evaluation of a Track 1 equivalent (TAGM 4046) cleanup and other applicable remedial action alternatives, their associated costs, and the recommended preferred remedy.

1.2 SITE DESCRIPTION

The Parcel B Site is located in the Borough of Queens, New York City, New York and is identified as Tax Block 3810 and Lot 350. The Site is bounded by 80th Street to the west, Cooper Avenue to the north, the Long Island Rail Road (LIRR) Right-of-Way to the south, and Parcel A to the east. Figure 1 consists of a Site Location Map and Figure 2 shows the proposed Site Development Plan.

Parcel B was originally occupied by former manufacturing Buildings 1, 7/7A, 28, 29, and 37. All of these buildings except Building 29 will be renovated. Building 29 will be an unoccupied

storage shed. These historic industrial buildings remain on site but Building 28 was cut into two buildings (new Building number 7 is the southern half of former Building 28, and the southern half of new Building number 3 is the northern half of former Building 28). A portion of Parcel A, which was investigated and remediated to Track 1 cleanup objectives, now lies between the two halves of Building 28.

Building 7/7A was the former boiler house. This building and the associated boiler stack were demolished. The table below relates the new building numbers designated for the renovation project. The original building numbers were used in the January 2005 RI Report and other previously-issued Brownfield Cleanup Program (BCP) documents. The building locations and former and new numbers are also shown on the figures.

New Building Number	**Old Building Number**
Building 3	Building 37 and North Half of Building 28
Building 7	South Half of Building 28
Building 8	Building 1
N/A	Building 7/7A Demolished
Building 29	Building 29

Hereafter, the new building designations are generally used in this document. To facilitate the presentation and discussion of the RI activities conducted and documented in the SRI Report, the Site is presented as three separate areas as illustrated on Figures 4, 5, and 6, respectively, Building 8/Service Corridor, Building 7, and Building 3. Figure 3 is an index map showing the break out of the Site into the three areas.

1.3 ADJOINING PROPERTY DESCRIPTION

The areas surrounding Atlas Park are zoned mixed residential and manufacturing. Atlas Park is located directly south of St. John's Cemetery. The area west of the Site, across 80th Street is predominantly zoned for light manufacturing, with some private residences. The LIRR easement lies to the south of the Site; the areas immediately south of the LIRR easement are primarily residential. Parcel A lies due east of the Site; the area further to the east consists of the remainder of the Atlas Terminals industrial park.

The Kliegman Bros. Superfund Site (NYSDEC Site 2-41-031) is located less than 1200 feet away from the Site to the west. This site was formerly used as a storage and distribution center for chemicals used in the dry cleaning industry (e.g., perchloroethylene or PCE). There is significant contamination present at this site in the form of volatile organic compounds (VOCs), in particular PCE and trichloroethylene (TCE), in the groundwater and in soil vapor under the site building and in the surrounding neighborhood. The NYSDEC has declared this site a significant threat site based on significant on-site source areas which have resulted in off-site groundwater impacts and vapor intrusion into nearby residences.

In addition, there are a number of documented petroleum spills in the immediate vicinity of the Site along 80th and Cooper Avenue, and the U.S. Geological Survey has documented the presence of area-wide, low level contamination of the aquifers under most of Queens by chlorinated solvents including PCE and TCE. A number of other suspect brownfield sites are also located in close proximity to the Parcel B Site based on visual observations.

1.4 SITE HISTORY

The Site history was compiled and presented in a Phase I Environmental Site Assessment (Phase I ESA), completed by Ambient Group, Inc. (Ambient) in March 2001. The report was provided as an attachment in the BCP Application submitted on December 11, 2003 to NYSDEC. According to the report, in 1867, the Site was owned by the Folk family and consisted primarily of farmland. Based on a review of Sanborn maps as part of the Ambient report, several buildings occupied the Site prior to 1922 although their usage was unknown. In

1922, the property was sold to the Hemmerdinger Corporation, and the Site became Atlas Terminals. The Hemmerdinger Corporation leased portions of the Site to various manufacturing and processing companies during the period of usage and continues to remain a tenant at the Atlas Terminals portion of the property in the textile industry. In 2002, the 12-acre portion of the property was transferred to Atlas Park LLC.

1.5 PREVIOUS INVESTIGATIONS

Two previous investigations were completed at the Site: (1) Phase I ESA completed by Ambient in March 2001, and (2) Limited Phase II Investigation completed by Metcalf & Eddy in March 2002 (Phase II ESI). The results of these investigations are summarized in the SRI Report. The pertinent findings of the two investigations relating to Parcel B are discussed below in Sections 1.5.1 and 1.5.2.

1.5.1 Ambient Phase I ESA

A Phase I ESA was conducted in March 2001 for the entire 20-acre Atlas Terminals property and identified areas of environmental concern within the RI Area as follows:

- Underground Storage Tanks: Two 20,000-gallon No. 6 fuel oil USTs were observed in the vicinity of Building 7.

- Chemical Storage: Chemicals were identified on-site and stored in a manner that posed a material threat of release in Buildings 7 and 28.

- Presumed Asbestos Containing Materials and Lead Based Paint: Potential asbestos containing materials and lead-based pain were identified in most buildings. These materials were abated and documentation was provided to NYSDEC under separate cover.

1.5.2 Metcalf & Eddy Phase II ESI

A Phase II ESI was completed for the entire Atlas Terminals property in March 2002. Investigation activities on the Atlas Park property included completion of twenty-nine borings, sixteen of which were completed within Atlas Park. Soil boring locations within Parcels A and B are shown on Figure 4 of the January 2005 RI Report. The findings of the Metcalf & Eddy Phase II relative to Parcel B are summarized as follows:

- Groundwater lies at a depth greater than 40 feet bgs, the maximum drilled depth with no groundwater encountered at any boring locations.

- Two 20,000-gallon fuel oil USTs are located east of Building 7.

- No evidence of petroleum or chemical spills was observed in any soil samples collected from the Site.

- No volatile organic compounds (VOCs) were detected above the NYSDEC TAGM 4046 criteria.

- A fill stratum with an average depth of 3-4 feet underlies most of the Site. Distinct ash/cinder or mixed ash/cinder/soil fill layers were present in 11 of the 29 borings with thicknesses ranging from 0.1 to 3 feet.

- Portions of the ash/cinder component found within the fill contained one or more of the following semi-volatile organic compounds (SVOCs) at concentrations greater than the NYSDEC RSCOs and Groundwater Protection Criteria contained in TAGM 4046: benzo(a)anthracene, chrysene, bis (2-ethylexyl) phthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and dibenz(a,h)anthracene. SVOCs were generally not detected or were detected below the TAGM levels in fill not containing visible ash or cinders.

- One or more of the following metals were detected at concentrations exceeding the TAGM criteria: aluminum, mercury, magnesium, cadmium, copper, and zinc. However, the exceedances were for the most part marginally above the criteria. It was concluded that the exceedances cannot be readily attributed to the presence of the ash/cinders/fill since: 1) similar exceedances occurred at depths in the native glacial material; 2) they are not representative of metal compounds typically associated with ash, such as arsenic, cadmium, chromium, lead and nickel; and 3) they are primarily major-element types such as aluminum, magnesium, and zinc. Since most of the elevated metals only marginally exceed average background levels for Eastern United States (from TAGM 4046), it is likely that they are naturally occurring concentrations.

1.5.3 Summary of Remedial Investigation Findings

The initial RI work commenced after the January 2004 RI Work Plan was reviewed and approved by NYSDEC and NYSDOH in June 2004, and concluded with issuance of the January 2005 RI Report. Selected summary data tables and figures from the January 2005 RI Report are included in Appendix A.1 of this RAWP for reference.

Soil

Thirty-eight soil samples were collected from 20 soil-boring locations. The sampling locations and findings are shown on Figures 4, 5, 6, 9, and 10, and the data are presented on Tables 5 through 10 of the January 2005 RI Report. Figures 9 and 10, and Table 10 of the RI Report are included in Appendix A.1 of this RAWP. The analytical findings are summarized as follows:

- The historic fill is present throughout the Site, including under all of the existing buildings that will remain, and ranges in thickness from 6 to 15 feet.

- There were no exceedances of the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-4046 Recommended Soil Cleanup Objectives (RSCOs) for VOCs, Polychlorinated Biphenyls (PCBs), pesticides, or herbicides in any samples.

- TAGM exceedances occurred in the historic fill for the metals mercury, arsenic, barium, cadmium, copper, and lead.

- TAGM exceedances occurred in the historic fill for individual SVOCs in 15 of the 38 samples, collected from 10 of the 20 borings locations. The exceedances occurred exclusively for the polynuclear aromatic hydrocarbon (PAH) suite of SVOCs.

Groundwater

Groundwater samples were collected from eight monitoring wells during the initial RI, four of which were located on or adjacent to Parcel B (MW-6, 16, 38 and 58; see Figure 3). The groundwater findings are presented on Figure 12 and Tables 17 through 21 of the January 2005 RI Report. Figure 12 and Table 21 of the RI Report are included in Appendix A.1 of this RAWP. The analytical findings are summarized as follows:

- Two VOCs, TCE and PCE, were detected in Site upgradient and downgradient groundwater above the NYSDEC Ambient Water Quality Standards and Guidance Values (hereafter referred to as NYSDEC SGVs).

- TCE was higher in an upgradient well than the downgradient Site wells.

- PCE was highest in a downgradient well located west of old Building 1 (new Building 8).

- The source(s) of these VOC detections is unknown.

- There were no PCBs, pesticides, herbicides or SVOCs detected above the NYSDEC SGVs in any groundwater samples.

- The nearest public water supply wells are approximately 1.9 miles downgradient of the Site. Based on calculations using the RI data, the PCE and TCE in groundwater will attenuate to concentrations below the state standard (to undetected levels) well before it reaches these public water supply wells. (Note: Since issuance of the January 2005

RI Report it was confirmed with the New York City Department of Environmental Protection [NYCDEP] that there are no public drinking water supply wells located downgradient of the Site. The supply wells noted above are located cross-gradient of the Site (see Figure 7 of the SRI Report, included in Appendix A.2 of this RAWP).

Therefore, while low level TCE and PCE groundwater contamination was detected, it was believed at this time that its distribution suggested background contamination known to be present in the Queens aquifer in industrial areas such as this area.

Soil Vapor

Ten soil vapor samples were collected during the initial RI, seven of which were located on Parcel B from probes installed 5-6 feet beneath the building floor slabs. The sampling locations and findings are shown on Figures 4 and 11, and the data are presented on Table 22 in the January 2005 RI Report. Figure 11 and Table 22 of the RI Report are included in Appendix A.1 of this RAWP. The analytical findings are summarized as follows:

- VOCs, including TCE and PCE, were detected in the soil gas samples under former Building 1 (new Building 8) and the northern half of former Building 28 (new southern half of Building 3).

- No VOCs were detected on field instruments during ambient air screening during the RI at any time within the buildings, suggesting that vapor intrusion is minimal, if occurring at all. However, some level of vapor mitigation was anticipated as necessary to address the elevated soil vapors.

Underground Storage Tanks (USTs)

Apparent petroleum impacts were noted in one of two soil borings conducted adjacent to two heating oil USTs formerly located in the southwest corner of the Site. Petroleum-like odors and

photoionization detector (PID) readings were observed in soil between 11 and 23 feet below grade. One SVOC TAGM exceedance, for chrysene, occurred in a soil sample collected from 19 to 23 feet below ground surface (bgs). Low levels of typical petroleum compounds (benzene, ethylbenzene, and xylenes) were also detected but below the TAGM RSCOs.

1.5.4 Summary of Supplemental Remedial Investigation Findings

The SRI activities were conducted pursuant to the SRI Work Plan, dated July 2005, and a letter addendum to the SRI Work Plan, dated August 15, 2005, both of which were approved by the NYSDEC and NYSDOH via an email communication from NYSDEC dated September 19, 2005. In November 2005, a meeting was held during which time the preliminary results of the SRI work performed pursuant to the SRI Work Plan was presented to NYSDEC and NYSDOH. At this meeting, implementation of additional fieldwork was discussed and subsequently implemented. In addition, more investigation work was performed beyond that discussed at the meeting to fully characterize the nature and extent of contaminants of concern (i.e., PCE and TCE) at the site and site boundary, including off-site vapor investigation. NYSDEC and NYSDOH staff also visited the site in February 2006 for a briefing on SRI Findings and on Langan's preliminary plans for the contents of this RAWP.

The following conclusions and recommendations were developed based on the implementation of the Supplemental Remedial Investigation. Figure 3 of this RAWP presents the SRI groundwater and soil findings, and Figures 4 and 5 present the SRI soil vapor findings for Buildings 3 and 8, respectively. Additionally, selected summary data tables and figures from the March 2006 SRI Report, which accompanies this RAWP, are included in Appendix A.2 of this RAWP for reference.

<u>General Conclusions</u>

- Delineation of on-site soil vapors is complete. No further on-site investigation of soil vapors is warranted.

- Soil vapors requiring mitigation (for PCE and TCE) are present under the Site buildings

- Soil vapors do not extent beyond the Site boundaries at significant concentrations that, in our opinion, require mitigation. Additional off-site and perimeter soil vapor sampling was conducted in August 2006 further confirming this conclusion.

- Delineation of on-site soils exceeding the NYSDEC RSCOs and groundwater exceeding the NYSDEC SGVs is complete; no further investigation of on-site soil or groundwater is recommended.

- Delineation of on and off-site groundwater contamination is complete and no further investigation or delineation is recommended. The groundwater plume will be managed and monitored as part of the Site Management Plan (SMP) for Parcel B. An air sparge/soil vapor extraction system (AS/SVE) is proposed to aggressively remediate the core of the plume on the Site, while monitoring will address the minimal contaminants of concern that have migrated offsite. These are expected to attenuate once the on-Site plume is addressed. One additional off-site well (Sentinel Well OSW-5) has been installed to complete the network of wells that will be utilized to monitor the plume.

- Sufficient analytical data were gathered during the SRI to establish site-specific cleanup levels and to develop remedial alternatives for soil vapors under the south half of Building 3 and Building 8, and for soil in all areas of the Site.

Specific conclusions are presented separately in the subsections below for soil and soil vapor for each of the three Site buildings. Site-wide and offsite groundwater conclusions, as well as a discussion of offsite soil vapor follow these subsections. For reference, Figures 4 through 8, 10, 11, 13 and 14, and Tables 5 through 8, 11, 13, and 15 through 17 from the SRI Report, which summarize the soil, soil vapor, and groundwater data and findings, are included in Appendix A.2 of this RAWP.

1.5.4.1 Building 3 Conclusions

Soil Vapor

- PCE and/or TCE vapor concentrations are present beneath the footprint of the south half of Building 3 and beneath the east side of the north half of Building 3 (Former Building 37) that, in our opinion, warrant mitigation.

- Soil vapors do not extend beyond the Site boundaries in concentrations that, in our opinion, warrant mitigation. Several rounds of Off-site soil vapor sampling were conducted to the northwest and across 80th Street , which further substantiates this conclusion.

Soil

- Two small, localized pockets of soil containing PCE and TCE concentrations exceeding the NYSDEC RSCOs were located beneath cracked segments of the building's former, combined sanitary/roof drainage piping system. These locations in the south half of Building 3 correlate to the central core of the PCE/TCE soil vapor plume beneath Building 3, and the estimated point of origin of the PCE/TCE groundwater plume delineated beneath the Site. Thus, we believe that waste drainage from the former Manhattan Postcard novelty manufacturing operations on the second floor of the Building and leakage from the damaged floor drains are the source of the PCE/TCE soil vapor and groundwater contamination on Parcel B.

- In the southwest corner of Building 3, a third area containing VOC-impacted soil contained within a concrete drain structure was located. PCE and TCE were detected at their highest Site concentrations in shallow soil samples collected from within the structure at a depth of 2.5-3 feet bgs. VOC-impacted soil exceeding the TAGM criteria was vertically and laterally delineated using Geoprobe borings, and was limited to the area directly around the structure to a total depth of 7.5 feet. The data indicated that the impacted soils were contained within the structure, and had not migrated downwards.

- Impacted soil associated with these three areas was delineated and removed from the Site in conjunction with the investigation of deeper soil conditions in these areas.

1.5.4.2 Building 7 Conclusions

Soil Vapor

The low concentrations of VOCs in soil vapors detected beneath Building 7 do not pose a significant future exposure risk. However, as a mitigation measure, a sub-slab depressurization system (SSDS) will be installed beneath Building 7.

Soil

- Delineation of VOCs in soil in Building 7 is complete; no further investigation of soil is required in this building. A deep-lying layer of VOC-impacted soil (9-10 feet below the floor slab) was located and fully delineated, laterally and vertically, beneath the south end of Building 7, however, this layer is not leaching since it is capped by the existing building and is not contributing to on-site vapors. Nevertheless, as noted above, a SSDS is being installed in this building as a precaution. No further action with respect to this soil was recommended in the SRI.

- Lead-impacted soil beneath Building 7, associated with these same materials encountered and removed from adjacent Parcel A, has been delineated beneath the south-central and east-central portions of this building. However, this lead contaminated soil is not leaching to groundwater because it is capped by an existing building. No further action with respect to this soil was recommended in the SRI.

1.5.4.3 Building 8/Service Corridor Conclusions

Soil Vapor

Soil vapor concentrations beneath the footprint of Building 8 require mitigation.

Additional soil vapor sampling conducted to the south of Building 8 along the Parcel B property boundary adjacent to the railroad right-of-way, resulted in either non-detect or minor detections of TCE and PCE in soil vapors. It is our opinion that soil vapors along the southern boundary of the Site are not migrating under the residences to the south at concentrations posing a human health risk or which require either monitoring or mitigation based on all the results of the RI and SRI.

Soil

No soil exceeding the RSCOs for VOCs was identified in the Building 8/Service Corridor area.

1.5.4.4 Site-Wide and Off-Site Groundwater Conclusions

PCE and TCE in groundwater exceed their respective NYSDEC groundwater standards in on-site groundwater and the configuration of the on-site plume has been delineated; therefore, no additional on-site groundwater investigation is required.

- On-site groundwater contamination exists as coincident PCE and TCE plumes oriented in a general north-south alignment, and originating in the southeast corner of Building 3.
- The groundwater data do not suggest the presence of NAPL PCE or TCE.
- The historic, regional groundwater flow direction at the Site has been to the south-south-southwest, but locally, the direction of groundwater flow has been modified by the ongoing Parcel A construction and operation of the storm water detention basin. Because of the combined effects of these Site conditions, the north end of the PCE/TCE plume deflects towards the west.
- There is off-site migration of groundwater exceeding the state standards originating at the Site. Several calculations were conducted using the current site-specific data (PCE concentrations, hydraulic gradient), regional estimates for hydraulic conductivity of the Upper Glacial Aquifer, and default values for the remaining equation parameters. The

equations used, the input parameters, and the results are provided in Appendix E. Based on these calculations, PCE will naturally attenuate to a concentration below the groundwater standard within one-quarter mile of the Site. The nearest public water supply wells are located approximately 1.9 miles downgradient of the Site.

- Based on the off-site monitoring well installation and sampling activities, it is evident that PCE and TCE concentrations have naturally attenuated at a rate of 50% within approximately 150 linear feet of the Parcel B property boundary. Based on the comparatively lower off-site concentrations of PCE and TCE than those observed on-site, we propose no further off-site investigation, delineation or remediation. One additional off-site well has been installed to complete the network of wells that will be utilized to monitor the plume as it is remediated.

- There are other industrial sources in the vicinity of Atlas Park that may have impacted off-site groundwater quality. A significant VOC plume is emanating from the Kliegman Brothers New York State Superfund Site, but it has not yet been fully delineated. Further, a former historic dry cleaner establishment was located just southwest of Building 8 on the west side of 80th Street less than 200 feet from the Site, and historical operations at this establishment could have impacted off-site groundwater quality and elevated vapor concentrations. Therefore, complete delineation of off-site PCE and TCE in groundwater originating from Parcel B could be complicated if there is a cumulative effect of the Kliegman Brothers New York State Superfund Site plume, and if there is VOC groundwater contamination (i.e., PCE) originating at the former dry cleaner site, and other industrial sites in the immediate vicinity of Parcel B.

1.6 SUMMARY OF IDENTIFIED SOURCE AREAS OF CONTAMINATION

1.6.1 On-Site Source Areas of Contamination

The following sources were identified as potential sources of contamination on the property (See Figure 3 for reference):

- Building 3 (South Half, VOCs) – Tenants on the first and second floors of the north half of former Building 28 (south half of new Building 3) apparently used PCE and/or TCE and poured such substances down drains, resulting in isolated soil hot spots , groundwater and soil vapor contamination.

- Building 7 (VOCs) - Former operations in the south half of Building 28 (new Building 7) resulted in an isolated VOC hot spot area in soil at a depth of 9' bgs, which does not appear to be migrating or contributing to site-wide vapor contamination issues;

- Building 7 (Lead) - Lead-impacted fill, which was suspected to extend under Building 7 from Parcel A where such material was removed, was delineated under Building 7 immediately adjacent to Parcel A and in two additional isolated areas beneath the center of Building 7 as depicted on Figure 3. The northernmost isolated pocket is conservatively extrapolated to extend to the east boundary of Parcel B as shown on Figure 3. On Parcel A, the lead-impacted fill tested hazardous in some instances as defined under the federal RCRA hazardous waste regulations. However, the investigation revealed this lead contamination is isolated, capped and is not contributing to groundwater contamination.

- Building 8 (VOCs) - Former operations in the east side of former Building 1 (new Building 8) also apparently used PCE and/or TCE and poured such substances down the drains in this building, resulting in a soil vapor problem, although no source was discovered under the Building as demonstrated by the results from the 28 soil samples collected in and around this Building;

- Parcel A USTs (petroleum constituents) - Former USTs discovered and removed during the Parcel A remediation near the south east corner of Former Building 37 (new north half of Building 3) have caused lingering petroleum related vapors under that building, specifically elevated toluene in soil vapors.

1.6.2 Potential Off-Site Sources Contributing to Local Groundwater and Soil Vapor Contamination

The following sources were identified as potential sources contributing to local groundwater and soil vapor contamination:

- Kliegman Brothers Superfund Site – High concentration PCE contamination is migrating off-site in groundwater and soil vapor at this New York State Superfund Site located approximately 1200 feet west of Building 8 of the Atlas Park Site. The Kliegman Brothers site was declared a significant threat site by NYSDEC. Releases of chlorinated hydrocarbons has resulted in groundwater impacts and vapor intrusion into nearby residences.

- A former historic dry cleaner establishment was located just southwest of Building 8 on the west side of 80th Street less than 200 feet from the Site.

- Active NYSDEC Petroleum Spills - Petroleum contamination from five documented spills in the immediate vicinity of the Site less than 0.2 mile north and west of the Site.

- Other suspect former industrial brownfield sites are present in the immediate vicinity of the Site.

1.7 PROPOSED CONSTRUCTION

The proposed future use of the property includes the renovation of existing buildings into commercial retail establishments. Figure 2 shows the proposed redevelopment of the site. Intrusive construction work has and will continue to principally consist of trenching and localized excavation, including some soil/fill removal and replacement, for construction of loading docks, new footings and foundation extensions, interior pits and sumps, and slab-on-grade concrete pads or floor slabs.

Based on the construction plans, intrusive construction work is required for the following:

- Modification/extension of existing building foundations along the building facades in accordance with the modernized architectural scheme,
- Construction of new building foundations for built-out portions of the existing buildings including the south end of Building 3, and the covered alleyway (Market Plaza) between Buildings 7 and 8,
- Construction of new strip footings and slab-on-grade floor slab for an addition to the south side of Building 8 to house new Con Edison electrical transformers,
- New outdoor utilities and electrical vaults,
- New utilities inside the buildings such as elevator pits, sumps, and sanitary plumbing.

The NYSDEC and NYSDOH has been notified prior to beginning any of the above intrusive activities through weekly emails, phone calls, and meetings.

The depth of excavation for the outdoor utilities, new/extended building foundations, and other outdoor structures will range from 3-7 ft below ground surface (bgs). The interior utility work involves installation of base building utility services as well as new plumbing piping, etc. required by tenant operations. Excavation for the indoor utilities, sumps and pits should not extend deeper than about 4-6 ft bgs. All excavation work is expected to occur entirely within the historic fill layer.

It should be noted that some intrusive construction activities were completed, including the following:

- Decommissioning and removal of two registered heating oil underground storage tanks (USTs) on the south end of the site that formerly served the development (See Figure 13 in Appendix A.2).

- Demolition of former Buildings 7 and 7A (former development boiler house and associated structures), and the boiler stack.
- Interior and exterior trenching for new utility installations.
- Excavation and off-site disposal of some soil/fill and subsequent construction of the new, un-manned Con Edison electrical transformer building off of the south side of Building 8 (See Figure 4 in Appendix A.2).
- Installation of an elevator pit in Building 8.
- Excavation for extensions of foundations on the east and north sides of new Building 7.
- Excavation for utilities and footings throughout Building 3.
- Discovery, investigation and removal or abandonment-in-place of former process USTs and vaults in Building 7 (See Figure 14 in Appendix A.2).

Separate work plans were submitted to NYSDEC and NYSDOH, and verbal comments were received that addressed the removal of the heating oil USTs, the removal of the former process USTs in Building 7, and the in-place abandonment of the former process vaults in Building 7.

Tenant build-out plans are currently being developed by the various business establishments which will occupy the Site buildings. The Remedial Engineer will review tenant build-out plans as they become available with respect to the extent and nature of any intrusive construction work required. The planned intrusive work will be summarized in the daily emails and verbally described during the phone call notices at the commencement of each intrusive activity.

The NYSDEC and NYSDOH will be notified prior to beginning any intrusive activities to accommodate tenants' operations.

1.8 SUMMARY OF CONTAMINANT FATE AND TRANSPORT AND HUMAN EXPOSURE POTENTIAL

A qualitative human health exposure assessment for the Site was initially presented in the January 2005 RI Report, and was updated in the July 2006 SRI Report that accompanies this RAWP. The purpose of the RI/SRI phase of the project was to conduct a site investigation to:

1. Identify the existence and potential sources of soil, groundwater and soil vapor contamination on the Site;

2. Vertically and horizontally define the nature and extent of contamination in on-site soils, and horizontally define the extent of contamination in on and off-site groundwater and the extent of on and off-site (if any) vapor plumes;

3. Identify potential routes of exposure and potential receptors; and

4. Evaluate fate and transport of contaminants.

The data and information developed during the RI and SRI were used to develop alternatives for remedial action presented in this RAWP based on the commercial end use of the Site, and in accordance with the Environmental Conservation Law Title 14 Brownfield Cleanup Program.

The human health exposure assessment focused on identifying:

- Potential contaminants of concern (COCs) for each environmental media;

- Potential pathways of exposure to those contaminants identified for various human receptors, and

- Whether significant exposures to human health currently exist or will exist under a future commercial site use.

1.8.1 Contaminants of Concern

Potential COCs were identified by analyzing environmental data collected during the RI and SRI as summarized in the SRI Report. For each media, potential exposure pathways and an evaluation of potential human exposure are discussed below.

1.8.2 Receptor Populations

The receptors identified under the current remediation and Site renovation scenario include:

- On-site workers: adult (remediation and construction workers).
- Temporary worker – adult (utility worker/inspector, subcontractors, sampler/remediation inspector).

The receptors identified under the remediation and future site use as commercial development include:

- Adults and children patrons
- On-site workers: adult retail and maintenance workers
- Temporary worker – adult (utility worker/inspector, landscape worker, construction worker).

The receptors identified above are believed to be the primary receptors of interest.

1.8.3 Summary of Contaminant Sources and Fate and Transport

Small, localized pockets of solvent-impacted soil were located beneath the south half of new Building 3, that were concluded to be the sources of the observed PCE/TCE soil vapor plumes beneath Building 3 and the groundwater plume present beneath the Site. These source areas

were uncovered beneath segments of a buried combined sanitary/roof drainage piping network. A break in the pipe was observed where the highest PID readings were observed and clearly VOC-impacted liquids had drained into the soil.

As a result of these former sources, VOCs migrated through more than 50 feet of soil and impacted groundwater quality. The source soils and historic contaminant release mechanism driving the contamination downwards (broken roof drain piping) were removed in conjunction with the investigation. With removal of the source and capping of the entire Site to prevent infiltration, future generation of groundwater contamination has been eliminated. Residual PCE and TCE concentrations in groundwater should continue to improve over time through operation of the planned AS/SVE system and natural attenuation.

1.8.4 Exposure Pathways

An exposure pathway begins with a source and mechanism of contaminant release, resulting in the contamination of a receiving matrix (environmental medium). A complete exposure pathway also requires a point of potential contact with the contaminated matrix (i.e., exposure point), an exposure route (i.e., inhalation, ingestion, or dermal contact), and a receptor population. If an exposure pathway is not complete because it does not include a contaminated matrix, a point of potential contact, an exposure route, or a receptor, then no risk exists.

1.8.5 Human Health Exposure Assessment

The majority of the Site is currently covered with an impermeable surface or paved with asphalt, and will be fully covered once fully developed. Unpaved areas of the site present potential inhalation, ingestion, and dermal exposure pathways for human receptors. However, all unpaved areas of the Site will be fully covered with concrete or asphalt once fully developed.

The fully developed Site will not pose a threat for human receptors as a result of inhalation, dermal or ingestion exposure pathways.

Despite elevated VOCs in sub-slab soil vapor, indoor air samples have indicated that vapor intrusion is not currently significant. However, PCE and TCE vapor concentrations below Building 8, and Building 3 are, in our opinion, elevated in certain locations, therefore, vapor mitigation measures will be installed. An SSDS is also being installed in Building 7 as a precautionary measure.

Construction activities at the Site during remediation and development phases that disturb in place soils were and will continue to be performed pursuant to the original Work Plans, HASP, SMP, etc. and the associated procedures and plans included in this RAWP. In addition, future Site improvement/construction activities will be subject to the final approved Operations, Maintenance and Monitoring (OM&M) Plan as part of the final Site remedy made enforceable through an environmental easement.

Workers on site during remedial activities or future development and post-development utility, landscape, and other intrusive work on the Site will potentially be exposed to hazardous substances from subsurface media, as well as dust. Excavation for site construction and utility work may result in short-term exposure to subsurface soils, soil gas, and groundwater by individuals involved in excavation activities impacting these media. Although it is possible for contaminated soil to become airborne in the form of fugitive dust during remedial excavation work, engineering controls (such as dust suppression) were and will continue to be implemented to mitigate such an exposure.

On one occasion in the first floor of Building 8, soil was stored inside the building to prevent fugitive dust, but this caused dust inside the building for the workers. This incident was discovered by NYSDEC during a site inspection. The soil was removed in short order after this incident to a proper off-site disposal facility. In addition, the Construction Manager re-educated these employees about site hazards.

The institutional control designed to protect site workers in 40 CFR 1910.120 was summarized to site contractors, who are in turn responsible at the Site to apprise and protect those workers with potential to contact contaminated media through training, use of monitoring equipment, engineering controls and personal protective equipment (PPE). Exposure pathways to contaminated soil will be eliminated for Site workers who comply with this OSHA rule. Visitors to the Site during remediation were, and will continue to be, guided to avoid contaminated soils.

All areas of the site will be overlain by engineering controls in the form of asphalt, concrete, or existing building foundations, which will eliminate exposure to soils throughout the Site.

1.9 RECOMMENDATIONS

a. No further additional on-site investigations of soil, soil vapor, or groundwater are recommended.

b. Vapor mitigation is recommended in Buildings 3 and 8 due to the concentrations of PCE and TCE in soil vapor. A sub-slab system will being installed in Building 7 as a precautionary measure.

c. Soil vapors do not appear to extend beyond the Site boundaries at significant concentrations that, in our opinion, require monitoring or mitigation. Off-site and perimeter soil vapor sampling has been conducted to substantiate this conclusion.

d. No additional off-site investigation of groundwater is recommended.

e. Selected groundwater monitoring wells should be monitored following implementation of the on-site remedy to verify that the groundwater plume is being remediated and that the slight off-site exceedances are attenuating. One additional off-site well has been installed to complete the network of wells that will be utilized to monitor the groundwater plume (OSW-5: Sentinel Well).

f. Active on-site remediation of groundwater is recommended to reduce the concentrations of PCE and TCE in the most concentrated portion of the plume.

g. Offsite plume management will be addressed in the Final Engineering Report for Parcel B as part of an operations, maintenance, and monitoring plan (OMMP).

1.10 CERTIFICATIONS

A Professional Engineer registered in New York State, the Remediation Engineer (Joel B. Landes, P.E.), will provide certification that the remediation was completed in substantial conformance with the approved RAWP, and/or approved field changes. In addition, this Professional Engineer will certify that all import of soils from off-site, including source approval and sampling, was performed in a manner consistent with the methodology defined in the Soil Management Plan. This certification will be appropriately signed and stamped.

The Final Engineering Report will include a certification by a the Remediation Engineer that all invasive work done during the remediation and development (i.e. grading cuts, utility trenches, footings, etc.) was performed in accordance with the contaminant field screening methodology described in this RAWP, and other certifications.

2.0 EVALUATION OF REMEDIAL ALTERNATIVES

2.1 INTRODUCTION

Three remediation concepts that conform to the Site's remedial goals and remedial action objectives (RAOs, see Section 2.2 below) are presented and evaluated in this section in accordance with the NYSDEC Brownfield Cleanup Program Guide (draft 2004), and DER-10 (Draft 2002). Although the draft 6 NYCRR Part 375 Subpart 1 and 3 regulations are not considered to be applicable at this time, the second draft of these pending regulations were reviewed to ensure that this RAWP was not inconsistent with the regulations to the extent such regulations become law. Alternative 1 evaluates a BCP unrestricted Track 1 concept using existing TAGM 4046 standards and is described in Section 2.4.1. Alternatives 2 and 3 evaluate a BCP restricted Track 2 and 4 concept using the draft Restricted Commercial Cleanup Standards in Part 375 Subpart 6 and existing site-specific data, and are described in Section 2.4.2 and 2.4.3, respectively.

In response to the soil vapor findings from the RI and SRI, installation and operation of SSDSs are included as a soil vapor mitigation measure for each alternative discussed below, including the Track 1 cleanup Alternative 1 to address all VOC residuals in the vadose zone soil. The SSDSs consist of vapor collection pits (multiple, depending on building construction) installed in the ground floor of each of the buildings. Sub slab piping will connect the vapor collection pits to a header pipe that will rise to the roof. The header pipe will terminate at an air blower on the roof where it will discharge to the atmosphere. It is not known at this time how long these systems will need to be maintained as active systems, but the estimate is five years.

SSDSs are also being installed in Buildings 4 and 6 on Parcel A. Administratively, the Parcel A systems are covered under this RAWP, since the source of the soil vapors was located on Parcel B.

In addition, two of the alternatives (Alternatives 2 and 3) include installation and operation of an AS/SVE system to facilitate remediation of the deep, low-level VOC residuals in soil and the core of the TCE/PCE groundwater plume under the Site. Air sparge and soil vapor extraction

wells will be installed in the areas where VOC source areas in soil were uncovered and removed. Sub-slab piping will connect the SVE wells to a header pipe that will discharge, through a mechanical vacuum pump to the atmosphere. The AS/SVE system is described in more detail in Section 3.13.

The following three remedial alternatives were developed for consideration:

- Alternative 1 – Excavation/removal of soil exceeding NYSDEC TAGM 4046 RSCOs.
- Alternative 2 – Excavation/removal of soil as needed for Site redevelopment, air sparge/soil vapor extraction (AS/SVE) beneath Building 3 (south half), and engineering and institutional controls (EC/IC) including physical barriers over soil exceeding the NYSDEC RSCOs and SSDSs beneath Buildings 3, 7 and 8.
- Alternative 3 – Excavation/removal of soil as needed for Site redevelopment , removal of soil "Hot Spots" exceeding the proposed NYSDEC Section 375 Subpart 6 Restricted Use Soil Cleanup Objectives for Commercial Use, AS/SVE beneath Building 3 (south half), and EC/IC including physical barriers over remaining soil exceeding the NYSDEC RSCOs in Buildings 3 (south half), 7 and 8.

Alternative 1 would lead to a BCP unrestricted (Track 1) cleanup while Alternatives 2 and 3 would ultimately lead to restricted-commercial (Track 4 or 2) cleanups, respectively. These alternatives as presented below were based on the following:

1. Data and information developed during the Remedial Investigation and Supplemental Remedial Investigation;
2. The fact that no drinking water receptors exist downgradient of the Site;
3. Restricted future use of the Site for commercial/retail purposes;

4. NYSDEC TAGM #4046 RSCOs for evaluating the need for and extent of soil cleanup required,

5. As described in earlier Section 1.5.4, the conclusion that the source (in soil) of the groundwater PCE/TCE plume was located and removed in conjunction with investigation of this source. Hence, the PCE/TCE plume will naturally attenuate, and no additional off-site groundwater investigation is recommended at this time, although groundwater monitoring should be initiated to further confirm this conclusion, and

6. As described in earlier Section 1.8.3, the presumption that trapped soil vapors from former historic releases necessitates installation of an SSDS beneath, at a minimum, Building 3, as a mitigation measure. These are not considered engineering controls since there are no contributing soil vapor sources left in-place.

The remainder of this section of the RAWP consists of the following:

- Section 2.2 describes the remedial action objectives applicable to the Site,
- Section 2.3 describes the nine criteria set forth in the BCP statute that were used to compare the three alternatives,
- Section 2.4 describes the three alternatives,
- Section 2.5 presents a comparison of the three alternatives relative to the nine evaluation criteria, and
- Section 2.6 describes the recommended remedy.

2.2 REMEDIAL ACTION OBJECTIVES

In accordance with DER-10 and ECL § 27-1415, the goal for the remedial action is to achieve RAOs that are protective of public health and the environment, provided that the Site is developed into a new retail complex as anticipated.

Definition of the RAOs requires an assessment of the contaminants and media of concern, migration pathways, exposure routes, and potential receptors, as described in the qualitative human health exposure assessment (summarized in Section 1.8 of this RAWP, and the complete, updated assessment presented in the SRI Report that accompanies this RAWP). Based on this assessment, the RAOs of this RAWP include the following:

- Protect on-site workers and the surrounding community from exposure to site-related contaminants during the planned Site redevelopment and implementation of this remedy.
- Establish general guidelines for the proper management and disposal of soil, water, and other wastes that would be generated as part of the implementation of the remedy.
- Establish general guidelines associated with the operation and maintenance of the new development to be constructed, in order to reduce the potential for future exposure of workers and the community to site-related contaminants.

2.3 BCP EVALUATION CRITERIA

The three alternatives described above were evaluated against the following nine remedy selection factors in accordance with the BCP:

2.3.1 Conformance to Standards and Criteria

Conformance with applicable regulatory standards and criteria evaluates the alternatives against the federal, New York State, and local (New York City) standards, criteria and guidance (SCGs) identified for the Site that are generally applicable, consistently applied, and officially promulgated. This evaluation also considers the RAOs developed for the site in Section 1.4.

These standards are considered a minimum performance specification for each remedial alternative under consideration. The following is a list of major SCGs that apply to the site:

- NYSDEC Guidance on Determination of Soil Cleanup Objectives and Cleanup Levels – TAGM #4046, including December 2000 addendum;
- Proposed NYSDEC Section 375 Part 6 Restricted Use Soil Cleanup Objectives for Commercial Use
- New York State Groundwater Quality Standards – 6 Official Compilation of NY State Codes, Rules and Regulations (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;
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan;
- OSHA General Industry Standards – 29 (Code of Federal Regulations) CFR Part 1910;
- OSHA Safety and Health Standards – 29 CFR Part 1926;
- OSHA Recordkeeping, Reporting, and Related Regulations – 29 CFR Part 1904;
- Resource Conservation and Recovery Act (RCRA) – Preparedness and Prevention – 40 CFR Part 264 Subpart C;
- RCRA – Contingency Plan and Emergency Procedures – 40 CFR Part 264 Subpart D;
- Identification and Listing of Hazardous Wastes – 40 CFR Part 261 and 6 NYCRR Part 371;

- NYS Waste Transporter Permits – NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- NYC Building Permit;
- NYC Department of Environmental Protection Limitations for Effluent to Sanitary or Combined Sewers;
- New York State Department of Transportation (NYSDOT) Road Permits (if necessary); and
- Clean Water Act – 33 USC 466 Section 404.

Although not a regulation, NYSDEC's TAGM 4046 serves as current guidance for establishing unrestricted soil cleanup objectives. The soil cleanup objectives contained in TAGM 4046 are based on either reduction of potential human health risks (via exposure to soil) or protection of groundwater quality (via leaching and vertical migration of contaminants) for unrestricted use.

2.3.2 Overall Protectiveness of Public Health and the Environment

Protection of health and the environment is evaluated on the basis of estimated reductions in the potential for both human and environmental exposure to contaminants for each remedial alternative. The evaluation focuses on whether a specific alternative achieves adequate protection under the conditions of the site's future use and how site risks are eliminated, reduced, or controlled through treatment, engineering or institutional controls. An integral part of this evaluation is an assessment of long-term residual risks to be expected after remediation was completed. Evaluation of the human health and environmental protection factor is generally based, in part, on the findings of the exposure assessment.

2.3.3 Short-term Effectiveness and Impacts

Evaluation of short-term effectiveness and impacts of each alternative examines health and environmental risks likely to exist during the implementation of particular remedial alternative. Principal factors for consideration include the expediency with which a particular alternative can be completed, potential impacts on the nearby community, on-site workers and environment, and mitigation measures for short-term risks required by a given alternative during the necessary implementation period.

2.3.4 Long-term Effectiveness and Permanence

Examination of long-term impacts and effectiveness for each alternative requires an estimation of the degree of permanence afforded by each alternative. To this end, the anticipated service life of each alternative must be estimated, together with the estimated quantity and characterization of residual contamination remaining on-site at the end of this service life. The magnitude of residual risks must also be considered in terms of the amount and concentrations of contaminants remaining following implementation of a remedial action, considering the persistence, toxicity, and mobility of these contaminants, and their propensity for bioaccumulation. This evaluation also includes the adequacy and reliability of controls required for the alternative, if required.

2.3.5 Reduction in Toxicity, Mobility, and/or Volume of Contamination

Reduction in toxicity, mobility, and/or volume of contamination is evaluated on the basis of the estimated quantity of contamination treated or destroyed, together with the estimated quantity of waste materials produced by the treatment process itself. Furthermore, this evaluation considers whether a particular alternative would achieve the irreversible destruction of contaminants, treatment of the contaminants or merely removal of contaminants for disposal

elsewhere. Reduction of the mobility of the contaminants at the site is also considered in this evaluation.

2.3.6 Implementability

Evaluation of implementability examines the difficulty associated with the installation and/or operation of each alternative on-site and the proven or perceived reliability with which an alternative can achieve performance goals. The evaluation examines the potential need for future remedial action, the level of oversight required by regulatory agencies, the availability of certain technology resources required by each alternative and community acceptance of the alternative.

2.3.7 Cost Effectiveness

Cost evaluations presented in this document estimate the capital, and operation, monitoring and maintenance (OM&M) costs associated with each remedial alternative. From these estimates, a total present worth for each option is determined.

2.3.8 Community Acceptance

Community acceptance evaluates the technical and administrative issues and concerns that the community may have regarding each of the alternatives.

2.3.9 Land Use

Evaluation of land use examines whether the alternative is suitable for the site, based on current and future use of the site and its surrounding factors, such as:

- Zoning;
- Any applicable comprehensive community master plans or land use plans;
- Surrounding property uses;
- Citizen participation;
- Environmental justice concerns
- Land use designations
- Population growth patterns
- Accessibility to existing infrastructure
- Proximity to cultural resources
- Proximity to natural resources
- Off-site groundwater impacts
- Proximity to floodplains
- Geography and geology of the site; and
- Current institutional controls.

The following sections provide a more detailed description of the remedial alternatives.

2.4 DESCRIPTION OF REMEDIAL ALTERNATIVES

2.4.1 Alternative 1 – Track 1, Soil Source Removal, Groundwater Treatment and Vapor Mitigation

Short Description

- Excavation and Removal of Soil Exceeding NYSDEC TAGM #4046 RSCOs
- Groundwater Treatment to TOGS standards and
- Installation and Operation of Sub Slab Depressurization Systems

Source (Soil) Removal

This alternative includes excavation of all soil that exceeds NYSDEC RSCOs present at the Site, which for purposes of this analysis consists of the entire historic fill layer delineated during the RI and SRI under the buildings, as well as isolated hot spot areas. The historic fill layer exists throughout the Site, and was shown to contain sporadic RSCO exceedances of SVOCs and metals at varying depths. There was no indication in the field (i.e. PID readings, visible evidence such as staining, etc.) whether or not a particular soil sample was impacted and would exceed a RSCO. The historic fill/soil exceeding RSCOs is presumably intermixed and/or inter-layered with TAGM-clean soil. Therefore, it would not be practical to attempt to segregate soil exceeding the RSCOs within the historic fill layer from soil that does not exceed RSCOs.

This alternative would require demolition of the existing buildings in order to access and remove all underlying fill/soil. Based on the RI data, the estimated volume of contaminated soil requiring off-site disposal for this alternative is approximately 57,000 cubic yards (in-place volume), of which an estimated volume of approximately 675 cu yds is assumed to consist of lead-hazardous materials present beneath Building 7 (the southern half of former Building 28) . The 57,000 cu yds estimated volume is based on excavation of the fill layer throughout the entire RI Area to an average depth of approximately 10 feet bgs which also includes the hot spot areas identified during the conduction of the RI and SRI. Soil exceeding TAGM RSCOs extends to as deep as 12 ft bgs (boring B-48, south half of Building 28). However, in most

areas the fill thickness ranges from 8-10 feet thick. Therefore, an average excavation depth of 10 feet was selected, allowing for removal of the fill layer and some over excavation to reach TAGM compliant conditions.

Sheet piling would need to be installed around essentially the entire perimeter of the Site, including the north and west sides bordering the public roadways (Cooper Avenue, 80th Street), the south side bordering the LIRR easement, and the east side bordering Parcel A, the remainder of the development project, to stabilize the excavation as well as to protect the roadways and LIRR track ways. After all targeted materials were excavated from an area, endpoint soil samples would be collected to document TAGM 4046 compliance. Thereafter, the excavation would be backfilled and compacted to the required development grade depth with recycled concrete aggregate (RCA) or clean fill that meets TAGM 4046 criteria obtained from a NYSDEC-registered recycling facility or another NYSDEC-approved off-site source.

Groundwater Treatment

In addition to soil removal, groundwater would require remediation to drinking water standards. This alternative includes installation and operation of a AS/SVE system beneath the south half of Building 3 centered on the core of the PCE/TCE plume in the groundwater.. The primary objective of the AS/SVE will be to substantially reduce the concentrations of constituents of concern in the contaminated zone until either New York State Department of Environmental Conservation (NYSDEC) levels or asymptotic contaminant concentrations are achieved at the Site. Once the AS/SVE system reaches either the applicable cleanup levels or the limit of its effectiveness, the AS/SVE system will be dismantled and allow natural attenuation to remediate any remaining contaminants. The secondary purposes of the AS/SVE system would be to:

- Reduce the VOC mass contributing to sub-slab vapors thereby reducing the required time of operation of the SSD Systems.

- Reduce the potential for incidental soil vapor migration from the vadose zone into the underlying groundwater via vapor-to-liquid phase diffusion.

- Supplement the SSDS beneath Building 3 to maintain a negative pressure below the building floor slab, to prevent soil vapor intrusion.

The groundwater concentrations do not indicate the presence of dense, non-aqueous phase liquid (DNAPL). Therefore, AS/SVE is feasible and is, in fact, a presumptive remedy under these Site conditions.

As described in detail in Section 3.13, the AS/SVE system will consist of AS/SVE wells installed over the core of the PCE/TCE plume. Treatment coverage is illustrated on Figure 6.

Vapor Mitigation

While not a remedial measure, SSD systems would still be required under a Track 1 scenario

No Other Engineering and Institutional Controls

Since all soil exceeding RSCOs would be removed and groundwater would be treated until drinking water standards were achieved, engineering and institutional controls would not be required.

2.4.2 Alternative 2 – Track 4, Soil Excavation for Development, Air Sparge/Soil Vapor Extraction System (Groundwater Treatment), and Vapor Mitigation

Short Description

- Excavation and Removal of Soil as Needed for Development
- Excavation and Removal of Impacted Soil under the VOC piping network In Building 3
- Installation and Operation of Air Sparging and Soil Vapor Extraction System
- Installation and Operation of Sub Slab Depressurization Systems
- Engineering and Institutional Controls

Soil Excavation for Development & Under Building 3 VOC Piping Network

Based on construction plans, excavation is required for construction of building foundations, utilities, and other sub-grade structures in the open, outdoor areas adjacent to and between the existing buildings, and some interior excavation for new Site utilities and required by tenant build-out plans. Excavation is anticipated to range from approximately 3 to 12 ft below ground surface, entirely within the historic fill layer. However, while this excavation will remove some of the fill materials on the Site, due to the presence of pre-existing buildings, which are being preserved for the project, some soil source materials will remain on Site under the pre-existing slabs. Therefore, precautions will be implemented to prevent exposure of construction workers and the general public to excavated materials during construction.

VOC contaminated soil and sediment in a floor drain was also removed under a piping network in Building 3 where three VOC source area were collectively found. One area was associated with a floor drain, which was removed from the southwest corner of Building 3. The other two locations were associated with the piping network located below Building 3. These areas were determined to be the source areas for PCE and TCE soil vapor and groundwater contamination beneath Building 3, where the plume originated. Therefore, the principal source areas of the groundwater plume were eliminated through this activity conducted during the SRI. This also removed the VOC source piping network. [

Backfill of the excavations would be accomplished by using soil removed during the excavation if it is not grossly contaminated, or otherwise exhibits odors, PID readings or visible staining (but may exceed TAGM 4046 criteria), or TAGM-clean imported fill from a NYSDEC-approved source.

Worker Protection

During construction excavation, a minimum 6-inch thick layer of RCA or TAGM-clean fill as well as a layer of 8 mill poly sheeting would be placed on the top layer of soils to prevent exposure to construction workers working in the excavations.

Dust Control

The potential for generation of dust would exist during implementation of this alternative, and as a result, implementation of appropriate controls would be necessary. Air monitoring would be conducted during construction activities in accordance with NYSDEC and NYSDOH requirements to protect the health and safety of on-site workers and the surrounding community. Dust controls would be implemented in conformance with the construction contractor's HASP and CAMP. Standard emission control techniques include:

- Installing gravel pads at vehicle egress points;
- Application of water spray to soil;
- Tarping/covering containers;
- Restricting vehicle speeds to 10 miles per hour on site; and
- Covering of stockpiled soil and inactive excavations.

Engineering Controls

This alternative includes the use of engineering and institutional controls to prevent future exposure to soils exceeding TAGM 4046 RSCOs that will be left in place. Engineering controls would consist of the following:

1) Existing building slabs which are at least 6" thick over contaminated historic fill and soil hot spots containing lead and VOCs (Building 7) and SVOCs (Building 8), and
2) In open, outdoor areas, placement of new asphalt and concrete in roadways or walkways to serve as physical barriers.

Institutional Controls

Since not all contaminated soil would be removed, institutional controls would be required to prevent future exposures to soil exceeding the TAGM levels by workers conducting intrusive

activities relative to Site improvements or maintenance work. These institutional controls would include establishing an environmental easement to ensure appropriate future use/control of the Site and to protect human health and the environment, and would include:

1) Required notifications prior to any ground-intrusive activities that may encounter contaminated materials (notification of NYSDEC and on-site workers);

2) "Notice of Use Restrictions" on the land and groundwater;

3) Development and implementation of a SMP that will include:

    a. A comprehensive Soil Management Plan to address future ground-intrusive activities work on the Site,

    b. A HASP and CAMP for use during future ground-intrusive activities,

    c. An annual inspection program to ensure appropriate use of the Site and minimize the potential for exposures, and

    d. An annual certification program requiring the Owner to certify through a professional engineer that the institutional and/or engineering controls are in place, were not altered, and are still effective.

The environmental easement would reference any institutional or engineering controls that are part of the selected remedy, which would be binding upon all subsequent owners and occupants of the property. The institutional controls would restrict the Site's use to commercial.

Air Sparge/Soil Vapor Extraction System (Groundwater Treatment)

This alternative includes installation and operation of a AS/SVE system beneath the south half of Building 3 centered on the core of the PCE/TCE plume in the groundwater.. The primary objective of the AS/SVE will be to substantially reduce the concentrations of constituents of concern in the contaminated zone until either New York State Department of Environmental

Conservation (NYSDEC) levels or asymptotic contaminant concentrations are achieved at the Site. Once the AS/SVE system reaches either the applicable cleanup levels or the limit of its effectiveness, the AS/SVE system will be dismantled and allow natural attenuation to remediate any remaining contaminants.. The secondary purposes of the AS/SVE system would be to:

- Reduce the VOC mass contributing to sub-slab vapors thereby reducing the required time of operation of the SSD Systems.
- Reduce the potential for incidental soil vapor migration from the vadose zone into the underlying groundwater via vapor-to-liquid phase diffusion.
- Supplement the SSDS beneath Building 3 to maintain a negative pressure below the building floor slab, to prevent soil vapor intrusion.

The groundwater concentrations do not indicate the presence of dense, non-aqueous phase liquid (DNAPL). Therefore, AS/SVE is feasible and is, in fact, a presumptive remedy under these Site conditions.

As described in detail in Section 3.13, the AS/SVE system will consist of AS/SVE wells installed over the core of the PCE/TCE plume. Treatment coverage is illustrated on Figure 6.

2.4.3 Alternative 3 – Track 4, Soil "Hot Spots" Removal, Groundwater Treatment & Vapor Mitigation

Short Description

- Excavation and Removal of Soil as Needed for Development
- Removal of Soil "Hot Spots" above the proposed NYSDEC Section 375 Part 6 Restricted Use Soil Cleanup Objectives for Commercial Use
- Installation and Operation of Subslab Depressurization Systems

Installation and Operation of Air Sparging and Soil Vapor Extraction System

- Engineering and Institutional Controls

Soil Excavation

This alternative is identical to Alternative 2 except an additional volume of soil will be excavated and removed from the Site from areas documented during the RI and SRI to contain soil that exceed the proposed NYSDEC Section 375 Part 6 Restricted Use Soil Cleanup Objectives for Commercial Use (RUSCOC).

In addition to the VOC hot spot that was excavated under Alternative 2, certain other isolated "hot spot" areas are present under the building slabs. These areas contain elevated concentrations of VOCs, SVOCs, lead, and arsenic which exceed the proposed NYSDEC Section 375 Part 6 Restricted Use Soil Cleanup Objectives for Commercial Use. The areas include the following:

- Localized area of significantly elevated lead in soil at a depth of approximately 9 to 10 ft bgs and centered on SRI soil borings B7-1, B7-5, and B7-5E beneath the south side of Building 7;

- Localized area of significantly elevated SVOCs in a shallow layer of ash/cinders within the historic fill layer at RI soil boring B-51 beneath the east side of Building 8;

- Localized area of elevated arsenic below the former process vault/tank area and adjacent pipe trench area in the northern portion of Building 7.

- Localized area of elevated benzo(a)pyrene near the former heating oil UST #1 and below the new Con Edison building in the service corridor adjacent to Building 8.

Lead hot spots were delineated laterally on all sides by SRI soil borings B7-5N, B7-5S, B7-5W, and B7-1S, and vertically by deeper soil samples collected within the hot spot area at SRI soil

borings B7-5 and B7-5E. This area covers approximately 80 sf and the impacted layer is about one foot thick, for a total estimated volume of about three CY. The overlying building slab and the upper 8 ft of soil would first be excavated to access the impacted layer and temporarily stockpiled. The impacted layer would then be excavated, endpoint soil samples collected, and the area backfilled and compacted, and a new concrete cover poured.

As noted above, three VOC Hot spot areas were removed in Building 3 during the implementation of the SRI. One area was associated with floor drain which was removed from the southwest corner of Building 3. The other two locations were associated with the piping network located below Building 3. These areas were determined to be the source areas for PCE and TCE soil vapor and groundwater contamination beneath Building 3. Under this alternative the remaining hot spots would be removed.

The methodology to be used while implementing the removal of the remaining areas would be to excavate the areas, and collect endpoint samples until all of the material exceeding the RUSCOC was removed. The areas would then be backfilled and compacted, and repaved with either concrete or asphalt. Implementation of this alternative would require extensive damage and subsequent repair to the existing historic buildings.

Air Sparge/Soil Vapor Extraction System

This alternative includes installation and operation of an AS/SVE system in the vicinity of Building 3 for the same purposes as described under Alternative 2.

Dust Control, Worker/Public Protection

As with Alternative 1 and 2, dust control measures, air monitoring, and other means to protect construction workers and the public during Site redevelopment activities would be implemented in conformance with the Site HASP and CAMP.

Engineering and Institutional Controls

The same engineering and institutional controls to be included in Alternative 2 also apply to Alternative 3, to prevent future exposure to fill soils that will be left in place.

2.5 COMPARATIVE EVALUATION OF REMEDIAL ALTERNATIVES

Provided below is a comparative analysis of the remedial alternatives with respect to each of the evaluation criteria presented in Section 2.2. Under each evaluation criteria, the analysis for Alternative 1 is presented first, followed by the analyses for Alternatives 2 and 3. Based on this detailed evaluation, a remedial alternative for the Site is recommended in Section 2.6.

The remedial program for the site was selected upon due consideration of the following factors listed in Section 27-1415 of the new BCP law (Article 27, Title 14 of the Environmental Conservation Law):

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

Each of these factors is evaluated below relative to the two remedial alternatives.

2.5.1 Protection of Human Health and the Environment

Under Alternative 1, excavation of Soil to NYSDEC TAGM RSCOs, would be protective of public health and the environment through the removal of all contaminated soil/fill from the Site and the remediation of groundwater to drinking water quality standards. The only potential for exposure to contamination would be for maintenance personnel who could come into contact with contaminated soil during remedial activities. As such, future exposures to site-related contaminants would be eliminated; resulting in unrestricted future Site use and the Site RAOs will be met.

Other than the need for mitigation measures for residual soil vapors trapped under the slabs from historic releases, Alternative 1 would result in the elimination of all pathways of exposure from on-site contaminated media through complete removal of the material. The public health during remediation activities will be protected by implementing dust, odor, and organic vapor control and monitoring procedures as needed. The environment will be protected by implementing the selected soil erosion plans.

Under Alternative 2 and Alternative 3, due to the presence of existing engineering controls in the form of building slabs that prevent access to contaminated soils, there is no current dermal contact or ingestion exposure potential, The only potential for future exposure to contamination would be for utility, construction, or Site maintenance workers who could contact contaminated soil during excavation for site improvements or installation or repair of subsurface utilities. Both alternatives will reduce the potential for exposure of these workers through institutional controls, which would require notification of planned intrusive work to NYSDEC and monitoring and use of appropriate health and safety measures.

All three alternatives provide generally the same overall protection of human health with respect to physical contact with contaminated soil over the long term. Although contaminated soil exceeding NYSDEC RSCOs would remain under Alternatives 2 and 3, engineering controls in the form of surface barriers (e.g., buildings, asphalt, and concrete), the operation and maintenance of SSD Systems, and the implementation of institutional controls would preclude exposure to the remaining sub-slab contamination.

Over the short term, Alternatives 1 and 3 would provide less protection due to potential increased remedial worker exposure and community exposures while the historic fill layer and hot spots, respectively, are removed, loaded, and transported off-site through the neighborhood. In the short and long term, all of the Alternatives provide protection of human health through operation of the AS/SVE to accelerate the remediation of residual soil vapors and contaminated groundwater. Alternatives 1 and 3 are not feasible , however, because these alternatives require the demolition of buildings and building foundations that are being preserved as part of the project.

2.5.2 Compliance with Standards, Criteria and Guidance

Alternative 1 would meet the RAOs for the site, as well as all SCGs, as all contamination would be removed. There would be no need for engineering/institutional controls or environmental easements.

Alternative 2 would meet the RAOs developed for the Site. Remaining on-site contaminated soil that exceeds SCGs would be isolated from contact by surface barriers consisting of the existing structures, new asphalt pavement, and concrete.

Alternative 3 would achieve the soil SCGs to a greater extent than Alternative 2 since a greater volume of soil exceeding the proposed NYSDEC Section 375 Part 6 Restricted Use Soil Cleanup Objectives for Commercial Use (RUSCOC) would be removed from the Site. However, there are greater short term risks associated with the removal of highly-concentrated wastes with no additional environmental benefits other than long term achievement of SCGs in the affected areas. In addition, this Alternative would require the demolition of portions of the building foundations, and jeopardize the building's structural integrity, making this alternative economically infeasible.

Health and safety measures contained in the Site HASP and CAMP that comply with the applicable SCGs would be implemented during Site redevelopment under all alternatives. These measures will protect on-site workers and the surrounding community from exposure to

site-related contaminants. Complying with the HASP and CAMP requirements would be met with significantly greater difficulties for Alternatives 1 and 3 than Alternative 2 due to higher potential risks associated with the sheer volume and/or concentrated nature of the contaminated soil removed, handled, and transported off-site. Once implemented, Alternatives 2 and 3 would continue to conform to the RAOs and SCGs associated with soil through the installation of surface barriers and institutional controls that would protect potential future workers and the community.

In summary, although all alternatives conform to the RAOs established for the Site, Alternatives 2 and 3 would not meet all of the applicable RSCOs, as contamination is left in place at different levels but controlled using institutional and engineering controls. Under Alternative 1, all contamination would be removed. Therefore, this alternative would achieve the greatest compliance with the SCGs. All three alternatives would be expected to meet the NYSDOH soil vapor guidelines for PCE and TCE in short order through operation of the AS/SVE system (Alternatives 2 and 3) and the SSD Systems (all alternatives).

2.5.3 Short-Term Effectiveness and Impacts

Alternative 1 would result in significant short-term impacts given the extensive building demolition work, sheeting installation, and volume of contaminated soil that would be excavated and removed from the site. Greater potential risks would occur to on-site workers for this alternative than Alternatives 2 and 3, through increased demolition activities and direct contact with contaminated soil. Potential risks may occur to on-site workers and the surrounding community through potentially dangerous sheeting/shoring conditions along the adjacent roadways, and exposure to dust and increased vehicular traffic in the area.

Other potential impacts to the community could include construction-related noise and construction-related vehicular traffic associated with removal of soils from the site. The soil to be excavated from the Site under Alternative 1 will require approximately 12,500 30-ton-capacity truck trips, and the incoming backfill will require approximately 12,170 30-ton-capacity

truck trips. Considered together, the large truck volume will result in an increase in diesel emissions, increase in traffic and wear and tear to the local roadways.

Both Alternative 2 and Alternative 3 would be effective on a short-term basis, because only limited contaminated soil would be removed from the ground, and only a minimal volume, would be transported off-site. Potential short-term impacts would be associated with the excavation of contaminated soil, generation of dust, and increased truck traffic which would be required to remove this soil from the Site

For all alternatives, potential exposures could occur to on-site workers through direct contact with contaminated soil during remedial activities, and to on-site workers and the surrounding community through exposure to dust. The excavated soil under Alternatives 2 and 3 would be considerably more manageable than Alternative 1, since less soil will need to be excavated. Alternative 2 has the fewest short-term impacts since only the soils that require removal for development purpose will be handled. The only practical method for remediation under Alternative 1 would be to dig and haul the soil off the Site causing unnecessary short-term impacts. The use of effective dust control measures and truck tarps will minimize short-term impacts from dust generation.

The schedule for completing remedial construction for Alternative 1 would be significantly longer than Alternatives 2 and 3, resulting in a longer period for potential short-term impacts to occur to workers and the community, in the range of 12 to 16 months, or a four-fold increase over Alternatives 2 and 3.

The schedule for completing construction (i.e., the occurrence of potential short-term impacts to workers and the community) under Alternative 3 is approximately 6 months, which is significantly less than Alternative 1. Alternative 2, however, is can be implemented immediately.

In summary, both Alternatives 2 and 3 would be effective in the short-term. Implementation of engineering controls and appropriate health and safety measures would minimize the potential for short-term impacts. However, Alternative 3 is infeasible because it would require

destruction of sections of the on-site buildings. The potential for short-term impacts to the community and on-site workers during construction activities associated with Alternative 1 is significantly greater than Alternatives 2 and 3, due to the extensive remedial timeframe and volume of contaminated soil requiring removal.

2.5.4 Long-Term Effectiveness and Permanence

Alternative 1 would result in removal of all soil and groundwater contamination exceeding the RSCOs providing an effective and permanent remedy over the long-term with respect to a remedy for contaminated soil and groundwater. Additionally, reliance on long-term engineering or institutional controls would not be required after implementation of Alternative 1.

Alternative 2 and Alternative 3 both achieve effective, long-term permanent remedies for exposures to contaminated soil left in place. The magnitude of the remaining risks will be minimal. Soil vapor intrusion will be mitigated with sealed surface barriers, and operation of the SSD Systems (all alternatives) and the AS/SVE system (all alternatives) The long-term effectiveness of these remedies will require proper maintenance of the engineering controls to, for example, ensure the integrity of the soil barriers and, where appropriate, the thickness of the imported soil cover. The institutional controls will be referenced in an environmental easement that will restrict the use of the Site and on-site groundwater. Because the engineering controls are primarily passive, their reliability will be high and maintenance low.

While Alternative 3 would remove more contaminated soil than Alternative 2, specifically hot spots, portions of the on-site buildings would be destroyed and a volume of less contaminated soil comparable to Alternative 2 will still remain in the form of historic fill under the building slabs. Since the potential for exposure to remaining contaminated soil after implementation of Alternatives 2 is minimal due to the surface barrier and institutional controls, Alternative 2 is as equally permanent as Alternative 3. For the same reason, the effectiveness at reducing long-term risk to human health and the environment would be comparable for all three alternatives.

2.5.5 Reduction of Toxicity, Mobility or Volume of Contamination

Alternative 1 permanently reduces the toxicity, mobility, and volume of on-site contamination (other than residual VOC contamination in soil vapor) because all contaminated fill/soil is removed from the site, but also permanently destroys all on-site structures.

Alternative 2 does not reduce the toxicity of some on-site contamination, as some of the contamination, including several sub slab hot spots, remain on-site, and the specific COCs are not particularly amenable to natural degradation which can reduce their overall toxicity (e.g., metals, SVOCs). However, the SVOCs and metals are not readily mobile in the environment and were not detected in groundwater.

Alternative 3 reduces the toxicity of soil contamination in certain areas of the Site, specifically the shallow most significantly contaminated soil containing lead, VOCs, and SVOCs, by removing these contaminated soils for off-site treatment, stabilization, or otherwise proper disposal to meet the proposed commercial cleanup standards. However, contaminated soil will still remain on the Site (in the historic fill) and portions of the on-site buildings will be destroyed through this alternative.

Even if hot spots are removed under Alternative 3, a comparable mass of contamination will still remain on the Site in the historic fill as Alternative 2. The toxicity, mobility, and volume of residual, on-site VOC contamination present at depth in the vadose zone soils will be reduced by capturing and removing these compounds through operation of the AS/SVE system under Alternatives 2 and 3.

The presence of surface barriers throughout the Site, and construction of an engineered stormwater collection system, which together prevent infiltration of rainwater that could lead to leaching of COCs to groundwater, will permanently reduce the mobility of Site-related COCs under all alternatives.

2.5.6 Implementability

Alternative 1 can be implemented using standard construction methods and equipment (e.g., hydraulic excavators), but would destroy all on-site buildings, which is inconsistent with the building reuse redevelopment strategy. Construction methods for Alternative 1 and the other two alternatives are developed and are not anticipated to require further technical development prior to implementation. However, implementation of Alternative 1 would be extremely challenging since it involves demolition of numerous buildings and construction of sheeting along all sides of the Site, and historic fill that would be removed is present throughout the Site.

The administrative feasibility of Alternative 1 is moderate given the availability of experienced personnel and equipment within the New York City area, as this type of remediation is common in the region, and was already implemented on Parcel A. However, as experienced during the Parcel A remediation, it was difficult locating disposal and treatment facilities in the region to receive the contaminated materials removed from the Site, requiring multiple disposal facilities. Other problematic issues stem from the approximately 24,000 high capacity truck trips that may be required to transport the material on and off the Site over the remediation period. The chances of a highway accident or incident of contaminated soil spilled to the roadway increase with the higher number of trucks.

The work under Alternative 1 would likely disrupt local traffic patterns as well as commercial businesses in the area. The potential for community opposition due to the closer proximity of this remediation to the nearby residential neighbors than the prior Parcel A remediation, as well as environmental impacts exists due to the expected volume of diesel emissions, traffic congestion, and other dangers these trucks pose. These factors may lessen the probability that local approvals will be granted or could result in restrictions that could increase the cost of the remedy and/or the length of the remedy construction process. Most importantly, however, this Alternative is not feasible due to its impact on the existing Site buildings.

The technical feasibility of implementing Alternative 2 is high. Alternative 3 would be more difficult because portions of existing buildings would have to be destroyed, and this is inconsistent with the building reuse redevelopment strategy on this Site. Alternative 2 would

consist mostly of limited excavation of soil with standard bucket excavators for construction purposes, on-site soil management, and either re-use or off-site transport and disposal. All necessary experienced labor, equipment and supplies are readily available. Permits associated with this alternative should be easily obtained. There is sufficient capacity at disposal and treatment facilities in the region to receive the limited volumes of contaminated materials removed from the Site.

AS/SVE is a standard, presumptive remedy in the industry. This system can easily be incorporated into the new building design for Alternatives 2 and 3. The AS/SVE wells require access at the surface, and may be located within the buildings outside of the retail areas (e.g., maintenance closet or corridor). The piping would be routed beneath the floor slab and joined to the roof air treatment train.

In summary, implementation of Alternatives 1 and 3 would be significantly more difficult than Alternative 2. The administrative feasibility to obtain specific regulatory approvals is higher for Alternatives 2 and 3 than for Alternative 1, because these alternatives require significantly less transport of soil.. The hot spot removal under Alternative 3 (deep, VOC and lead-impacted layer) would be highly disruptive to the interior of Building 7. Excavation will pose construction challenges, such as requiring shoring to the depths involved (10+ ft bgs), Level B personnel protection, and high vacuum blowers and filters to prevent exposures to workers and the nearby public may be necessary. Therefore, Alternative 3 is considered less easily implemented than Alternative 2, and is inconsistent with the building reuse redevelopment strategy for the Site.

2.5.7 Cost Effectiveness

Tables 1, 2, and 3 present the estimated capital costs for Alternatives 1, 2, and 3, respectively. Tables 2 and 3 include the estimated present worth of long-term (30-year) operation, maintenance, and monitoring (OM&M) costs associated with the engineering controls under Alternatives 2 and 3, respectively.

As the site would be remediated to an unrestricted-use level under Alternative 1, there are no associated OM&M costs, with the exception of maintaining the SSD Systems. The OM&M costs for Alternatives 2 and 3 are associated with maintaining the engineering controls/surface cover, AS/SVE system, and the SSD Systems. The inspection and minor repair of the integrity of the surface, beyond the inevitable replacement costs after the life expectancy has expired, is estimated at $5,000 per year. An annual evaluation will be performed to ensure that all institutional and engineering controls at the Site continue to be protective of human health and the environment. The annual evaluation will be certified by a licensed professional and submitted to the NYSDEC and NYSDOH. The annual review is estimated to cost $5,000 per year. Please note that these costs are order-of-magnitude engineering cost estimates.

The following assumptions were utilized in preparing the cost estimates:

- Under Alternative 1, sheet piling would be installed along Cooper Avenue, 80th Street, and the LIRR easement, and would not be removed.

- All costs (e.g., existing building demolition, impacted soil excavation, backfill, etc.) were estimated based on actual costs for the Parcel A IRM project and Means Site Work Cost Data, Langan's experience in construction, with adjustment for hazardous waste site remediation, and communications with remedial contractors, material suppliers, waste transporters, and disposal facilities.

- The estimated present worth of operation, maintenance, and monitoring is based on 30 years at 5 percent.

- A 25 percent contingency was included.

A more detailed list of explanations and assumptions that apply to the cost estimate is presented on the tables.

The estimated cost for Alternative 1 is approximately $25,300,000, and is predominantly associated with the cost to demolish the existing buildings, install the steel sheeting, the premium costs for removing all of the soil exceeding TAGM RSCOs from the Site, and the

premium costs for managing contaminated soils during excavation, i.e., health and safety protocols, on-site contaminated soil management, characterization, off-site transport and disposal, environmental contractors and field oversight by consultants.

The estimated cost of Alternative 2 is approximately $2,300,000, and is predominantly associated with the installation of the SSD Systems beneath each Site building and the AS/SVE system beneath Building 3, and the premium costs for environmental contractors and field oversight by consultants.

The estimated cost of Alternative 3 is considerably greater than that of Alternative 2, and is presumed to be approximately $4,500,000. This increased cost reflects both the additional price of soil excavation, transport and disposal, as well as the costs related to building demolition and repair.

Alternative 2 is cost effective because the development project requires the planned excavation and construction of asphalt and concrete surfaces, which overlay the entire Site. The buildings, of which the floor slabs would serve as an engineering control to prevent physical contact with the underlying contaminated soil, already exist. Alternative 1 is completely cost prohibitive. This is primarily due to the tremendous volume of soil and building demolition material requiring off-site transport and disposal.. Alternative 3 is also cost prohibitive because remediating the hot spot areas will be difficult to undergo without destroying portions of the buildings. In addition, this alternative does not provide additional environmental benefits for such costs.

2.5.8 Community Acceptance

Alternative 1 should be acceptable to the community once the remedy is completed, because all of the on-site contaminated soil would be removed. However, this alternative would likely meet with community opposition and complaints during implementation given the extended construction time period and disruption to traffic patterns due to the significantly increased truck traffic closer to the residential community than the Parcel A remediation project.

Alternative 2 and Alternative 3 should be equally acceptable to the community because they would have minimal impacts to the community during implementation, the potential for human exposure to on-site contamination will be minimized, and the Site will be redeveloped into an attractive use in a more rapid time frame. Each offers its own proactive element that would be favored by the community, specifically the active approach under Alternative 2 to extract soil vapors, which are presently attracting much attention from regulators and the public, and removal of limited volume of highly-concentrated waste under Alternative 3. However, the removal of highly-contaminated soil hot spots under Alternative 3 may increase community exposures in the short term. This risk is not offset by significantly reducing residual Site risks since contaminated fill soil will also remain on Site but it will be managed through institutional and engineering controls administered through an annually certified SMP.

Alternatives 2 and 3 do not involve the extended construction time period and truck traffic of Alternative 1, but Alternative 3 may involve off-site disposal of hazardous waste that will be transported through the community. Therefore, while both of these alternatives would be more acceptable to the community than Alternative 1, Alternative 2 may actually be more acceptable than Alternative 3 once the community understands the risks of disturbing the on-site hot spots. Public comments that are provided during the public comment period would be evaluated. Based on comments received from the public, this RAWP may be modified.

2.5.9 Land Use

The following land use factors that were required to be analyzed in the BCP application materials are reproduced here. First, the current, intended, and reasonably anticipated future land use of the site and its surroundings are compatible with the selected remedy. The proposed use is commercial/retail, and the remedial alternatives are designed to meet Track 1 using the TAGM 4046 guidance standards, which would allow for unrestricted use (Alternative 1) or Track 4 (Alternatives 2 and 3) site-specific cleanup levels appropriate for a restricted commercial use. The reasonably anticipated future use of the site and its surroundings was documented by the applicant in the application, which led to the following conclusions:

- The planned future use of the Site conforms to applicable zoning laws or maps or the reasonably anticipated future use of the Site. A review of the City Department of Planning website for rezoning studies and proposals, recently approved rezoning and planning projects did not reveal any active City planning activities that would impact the Site.

- The proposed use conforms to the current use and historical and/or recent development patterns in the area.

- The Site is located in a mixed commercial and residential area, but the discovered contamination is not adversely impacting any off-site properties, and any potential impact will be addressed through the planned remedy. This was confirmed by the off-site soil vapor investigation and evaluation of analytical data obtained from soil and groundwater investigation at the boundaries of the Site.

- There are no environmental justice concerns, since the proposed use will not cause or increase a disproportionate burden on the community in which the Site is located, and will not result in a disproportionate concentration of commercial or industrial uses in what historically was a mixed use community. This Site is currently occupied by four abandoned buildings, and will now be improved into a commercial use with an interior park area for public access and two live performance theaters. Before this project, this Site was not accessible to the general public.

- There are no federal or state land use designations.

- The proposed use is supported by population growth patterns and projections.

- The Site is accessible to existing infrastructure.

- The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species.

- The Site is not in close proximity to floodplains.

In addition to the above land use considerations, Alternative 2 would allow for preservation of the existing buildings, while Alternative 1 would include complete demolition and reconstruction of the existing buildings, and Alternative 3 would severely impact the interiors of Buildings 7 and 8.

2.6 RECOMMENDED REMEDIAL ALTERNATIVE

Based on the evaluation of the remedial alternatives described above, all three alternatives would be protective of human health and the environment and meet the remedy selection criteria. Implementation of Alternative 1 provides for removal of all of the shallow on-site soil contamination, and would not rely on long-term engineering or institutional controls as do Alternative 1, 2 and 3. However, unacceptable short-term impacts to the surrounding community would occur for Alternative 1, from the extended period of existing building demolition, installation of sheeting along public roadways, increased truck traffic, construction noise, and potential for exposure to contaminated dust associated with the removal of significantly greater volume of soil.

Additionally, the cost for Alternative 1 is prohibitive compared to Alternatives 2 and 3. Finally, Alternative 1 is inconsistent with the building reuse redevelopment plan for the Site. At the Kliegman Brothers Superfund Site, despite the fact that the source areas are directly under the on-site building, the Feasibility Study recognizes that building destruction is not an appropriate part of the selected remedy since the on-site owner wants to continue to reuse the on-site buildings. Reuse of existing buildings is consistent with brownfield redevelopment goals provided contamination, if present under the building, is mitigated to the greatest extent possible and managed in the future properly. Therefore, Alternative 1 is not a feasible alternative since it would require building destruction.

Alternative 2 can be easily implemented in conjunction with proposed site development. A significant component of the remedy, i.e., engineering controls in the form of improvement of

existing and construction of new impermeable surface cover, is already incorporated into the construction documents. While AS/SVE installation will be challenging during final site construction activities, installation of the planned AS/SVE system is feasible. This system can be operated efficiently, safely, and with little disruption to the commercial operations. The AS/SVE system would facilitate mitigation of the long-term source of sub-slab vapors, thereby resulting in earlier termination of the SSDS operation.

This alternative can be implemented in a cost-effective and safe manner using established methods and providing for the long-term and short-term protection of human health and the environment.

Alternative 3 removes a greater volume of significantly contaminated soil. However, the bulk of these materials (the Building 7 hot spot) are deep lying, isolated from human exposure already due to their depth under the pre-existing concrete floor slab, and are not generating significant soil vapors based on the RI and SRI soil vapor data. In addition, this alternative requires extensive demolition and reconstruction.

Alternative 2 provides the same overall protection of human health and the environment as Alternative 3 due to surface barriers. However, despite the fact that more highly-contaminated soils would be removed under Alternative 3, there are significant short term risks under Alternative 3 associated with removing such soils and significant Building 7 impacts.

Therefore, Alternative 2 is the recommended remedial alternative for this Site.

3.0 DESCRIPTION OF REMEDIAL ACTIVITIES

This chapter presents a description of the proposed remedial activities that will be conducted during implementation of the selected remedial alternative (Alternative 2) at the site.

3.1 GENERAL

The remedial components of the selected remedial alternative are as follows:

- Systematic screening (by visual means, odor, and monitoring with PID) of the sub-slab conditions following any site intrusive work, for indications of USTs or any previously undetected AOCs, or "hot spots";
- Systematic remediation of any USTs or identified AOCs discovered during subslab screening
- As required, collection and analysis of soil samples for waste characterization and end-point samples at UST and AOC locations;
- Field screening (by visual means, PID, and odor) of site fill/soil during foundation excavation;
- Off-site treatment, disposal and/or beneficial re-use of soil/fill at permitted facilities;
- Sealing of existing building foundation slabs;
- Installation of SSD systems beneath Buildings 3, 7, and 8;
- Installation of an AS/SVE system beneath Building 3; and
- Backfill around foundations.

- OM&M through a Site Management Plan of the SSD systems and the AS/SVE system

The following remedial action activities will be conducted:

- Procurement of an Excavation Contractor and, if required, Remedial Contractors;
- Mobilization/site preparation for any earthworks and construction;
- Site security;
- Soil excavation, field screening, soil management, stockpiling (if necessary), sampling for waste characterization, and off-site transport and disposal during all excavation activities;
- Placement and compaction of fill around foundations and new utilities;
- Air monitoring;
- Equipment decontamination and residual waste management;
- Post-removal activities; and
- Demobilization.

A description of each of the remedial action activities is presented below. Supporting documents that will govern field testing, health and safety, and quality control of environmental sampling conducted during construction are provided in Appendix B (HASP), and Appendix C (QAPP).

3.2 CONTRACTOR PROCUREMENT

Given the successful remediation on Atlas Park's Parcel A, Atlas Park intends to utilize the same team for Parcel B.

The specific responsibilities of all involved contractors, subcontractors, and consultants related to remediation activities will be identified in the Site Operations Plan. The Remediation Engineer will ultimately be responsible for submittal of the required project documents to the NYSDEC and the NYSDOH prior to mobilization to the site and during the work (e.g., Site Operation Plan, site-specific HASP, CAMP, and Stormwater Pollution Prevention Plan). Langan will review all submittals required under this RAWP. The critical elements of the required project documents and plans are summarized below and in more detail in subsequent sections of this RAWP. Sufficient detail is provided to allow NYSDEC and NYSDOH to approve this work plan, with review of the contractor-prepared plans to be provided later, so the construction schedule can be met.

3.3 PRE-RA SUBMITTALS

The Excavation Contractor, with the help and oversight of the Remediation Engineer and using the guidance provided in this RAWP, will prepare and submit detailed plans and other documents to NYSDEC and NYSDOH as required by the BCP agreement. All plans and documents will be submitted to NYSDEC before the start of the activity covered in the plans, and most will be adapted from the Parcel A documentation. However, these plans are not required to be approved by NYSDEC or NYSDOH, but will be reviewed by Langan to be consistent with the final RAWP approved by NYSDEC and NYSDOH. These submittals include the following:

- Site Operations Plan (SOP);
- Site Specific HASP (See Section 4.1 and Appendix B);
- (CAMP (See Section 4.2 and the HASP);

- Construction Quality Assurance Plan (CQAP; see Section 5.0);
- Soil Management Plan (SMP; see Section 3.9);
- Stormwater Pollution Prevention Plan (see Section 3.10);
- Records/record drawings;
- Waste (soils and water) disposal information, including disposal facilities, testing requirements, permitting requirements, and pretreatment requirements, if necessary;
- Disposal transportation routes from the site to the nearest major commercial roadway (Interstate 495 - Lincoln Tunnel) leading to the off-site disposal facility(ies), description of containers and covers, modes of transportation, permitting requirements, and expected frequency and schedule of transportation; and
- Listing of all governmental permits and authorizations required for site remediation and development, and the name and contact information for governmental oversight of these permits and authorizations.

3.3.1 Site Operations Plan (SOP)

The SOP provides detailed procedures for the site operations and construction activities to be implemented for the completion of the remediation including the following:

- Work schedule;
- Site security;
- Mobilization and site preparation;
- HASP, CAMP, CQAP, and other plan preparation;
- Traffic control;

- Waste handling and disposal;
- Off-Site waste/soil transportation plan;
- Disposal facility(ies);
- Soil stockpiling/staging area development;
- Import and placement of clean fill;
- Equipment decontamination and residual waste management;
- Site demobilization; and
- Organizational chart of key personnel, including subcontractors and resumes of key personnel.

3.3.2 Site Health and Safety Plan

The Remediation Engineer is responsible for the preparation of the overall site-specific HASP that covers the remediation work, included as Appendix B. Each party performing work on site will comply with the overall site-specific HASP and may, at its discretion, prepare its own task-specific HASP for its organization, which will be consistent with the overall site-specific HASP. Guidance for preparation of the contractor-specific HASP is provided in Section 4.1 of this RAWP. Each task-specific HASP must meet the minimum requirements established in the site-specific HASP and 29 CFR 1910 and 1926. Each party will also agree in writing to abide by requirements set forth in the site-specific HASP.

3.3.3 Community Air Monitoring Plan

This plan provides the real-time air monitoring procedures for VOCs and particulates in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP). Guidance for the CAMP is provided in Section 4.2 of this RAWP.

3.3.4 Construction Quality Assurance Plan

The Remediation Engineer is responsible for the preparation of the CQAP, which will include the construction quality assurance/quality control (QA/QC) procedures for the remediation activities. Guidance for the CQAP is provided in Section 5.0 of this RAWP.

3.3.5 Stormwater Pollution Prevention Plan

This plan identifies measures that may be implemented by the Excavation Contractor to minimize erosion and sedimentation during remediation activities. Measures include physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of site soils. Soil stockpiling, dust control, maintenance, and removal procedures associated with erosion control measures will also be provided in this plan. Guidance for the Stormwater Pollution Prevention Plan is provided in Section 3.9 of this RAWP

3.4 MOBILIZATION AND SITE PREPARATION

Prior to commencing any earthwork, the Excavation Contractor will perform mobilization and site preparation activities. The Remediation Engineer oversees these activities. Descriptions of mobilization and site preparation activities are provided below. The exact methods used by the Excavation Contractor will be specified in the SOP.

The following mobilization/site preparation activities will be conducted by the Excavation Contractor:

- Identifying the location of all aboveground and underground utilities (e.g., power, gas, water, sewer, telephone, etc.), equipment, and structures (as necessary to implement the remediation);
- Mobilizing necessary HazWoper trained remediation personnel, equipment, and materials to the site;
- Constructing one or more stabilized construction entrances consisting of a clean gravel roadway at or near the site exit, which takes into consideration the site setting and site perimeter;
- Constructing materials staging area(s), if required, for overall management and staging of contaminated excavated material, pending characterization testing;
- Preparing an equipment decontamination area for trucks, equipment, and personnel that come into contact with impacted materials during remedial activities;
- Installing erosion and sedimentation control measures in accordance with the provisions of the Stormwater Pollution Prevention Plan;
- Conducting pre-remedial activities including demolition of the existing buildings, building foundations, and other above-grade structures;
- Installing temporary fencing or other temporary barriers to limit unauthorized access to the areas where remediation activities will be conducted.

3.5 SITE SECURITY

Access to the Site is and will continue to be restricted by perimeter fencing that will surround the work area. To further limit access and augment Site security during the remediation

activities, additional measures will be required. These will include the following during performance of the project:

- Security at the Site (including the staging, handling, decontamination, and storage areas) will be maintained during both work and nonworking hours. The level of site security will be dependent on the activities being performed and location of activities. However, the following security measures will be implemented: perimeter fencing, temporary fencing and/or barriers, warning tape, maintenance of sign-in/sign-out sheets, and implementation of safe work practices. Descriptions of Site security measures are provided below. The exact methods used by the Construction Manager will be specified in the SOP;

- Perimeter Fencing - At a minimum, the Site work area will be enclosed with a perimeter security fence, to control access for unauthorized personnel. Access gates will provide ingress and egress access to the Site.

- Temporary Fencing - The perimeter fence will be supplemented by temporary construction fencing as needed to delineate and secure areas of the ongoing remediation activities, particularly during installation of the/AS/SVE system. Such temporary fencing may be 4 feet high, and constructed of orange, high-density polyethylene (HDPE). At a minimum, the following areas will be subject to this requirement:

  - Areas designated as health and safety exclusion zones;

  - Areas utilized for personal or equipment cleaning activities; and

  - Any areas where the remediation activities may cause a disruption to the normal vehicular or pedestrian traffic.

- Posting of Warning Tape and Signs - Warning tape or sign may be installed at certain locations, such as the area where the AS/SVE system is being installed, cleaning areas, and stockpile areas;

- Sign-In/Sign-Out Sheet - For the duration of remediation activities, a sign-in/sign-out sheet will be maintained for the Site at the site trailer. All Site personnel and visitors will be required to sign in upon entering the Site and sign out upon leaving;

- Implementation of Safe Work Practices - Implementation of safe work practices will provide for additional Site security during remediation. Safe work practices that will contribute to overall Site security include the following:

  - Maintaining temporary construction fencing and signage around all open excavations;

  - Parking heavy equipment in a designated area each night and removing keys;

  - Maintaining an organized work area, including maintaining access roads, proper storage of all tools and equipment;

  - Conducting a daily security review and health and safety meetings; and

  - Maintaining covers on staging areas.

3.6 SUBSURFACE SCREENING

This subsection presents the procedures used to field screen soils for previously unknown AOCs, following building demolition and during construction excavation. Unknown AOCs may include potential buried structures and associated impacted soils such as USTs, transformer pads, and other structures that could represent past pathways of chemical or waste disposal to the ground. Field sampling methods and quality control procedures are presented in Appendices B and C, respectively.

3.6.1 Screening during Intrusive Construction Work

Following removal of any existing slab for on-going intrusive construction or planned remedial work, the Remediation Engineer will inspect the exposed sub-slab soils for visual evidence of USTs or other structures such as former floor drains, sumps, drywells, etc. In addition, the exposed soils will be screened for volatile organic compounds using a PID on an approximate 10 ft by 10 ft grid or 10 foot intervals for linear cuts/excavations. Excavation may proceed if no unusual conditions are observed. If positive readings greater than 5 parts per million (ppm) above background levels are detected, procedures described in Section 3.7 below will be implemented. The affected area will then be covered with plastic sheeting, anchored, and flagged with stakes and caution tape to avoid disruption until the area can be further investigated and/or remediated.

During intrusive construction work, soil will be continuously inspected for chemical or petroleum odors or staining, and field screened with a PID. The PID readings will be obtained either from soil contained within the excavator bucket and/or directly off the excavation sidewalls or bottom. The excavated material will then be handled in accordance with the remaining sections of this document.

While no major earthwork is planned for the proposed remedy, if major site earthwork is ultimately required due to an unforeseen discovery, exploratory test pits and/or interim remediation may be performed at these locations as described in Section 3.7.2.

3.6.2 Screening during AS/SVE Installation Activities

During AS/AS/SVE system installation, drill cuttings and any excavated soils will be continuously inspected for chemical or petroleum odors or staining, and field screened with a PID. The PID readings will be obtained from cuttings, soil cores/split spoons, or the auger head itself. If soil registers PID readings above 5 ppm above background levels, or other obvious indications of contamination are observed (odors, staining, etc.), AS/SVE system installation in the area will be

suspended, and the contingency procedures described in the following section will be implemented.

3.7 CONTINGENCY REMEDIATION PLANS

3.7.1 General

While discovery of previously unknown AOCs is not anticipated during implementation of this on-site remedy and given the extensive investigation of the Parcel B Site, contingency remediation may be required if previously unknown AOCs are unexpectedly discovered. Such AOCs may include USTs and hot spots of an unknown nature. The need for additional remediation of any newly discovered AOC will be determined at the discretion of the Remediation Engineer in conjunction with NYSDEC and NYSDOH, and will be completed by a qualified remedial contractor. Exploratory test pits may be excavated first to verify the presence, nature, and size of the potential source area. If conditions are uncovered that must be addressed, remediation will then be completed. Remediation will include excavation of the contamination, collection of end-point soil samples for regulatory close out, and off-site disposal of the materials.

3.7.2 Exploratory Test Pits

Test pits may be excavated using a backhoe or the construction excavator to attempt to delineate/determine the magnitude of a newly discovered potential source area (e.g., size/number of tanks, etc.), and to collect samples for waste characterization. The Remediation Engineer will determine whether the uncovered material can be confidently field identified as material that the current disposal/treatment can accept (e.g., petroleum-contaminated), or if additional waste characterization is warranted to determine a suitable facility. If the latter is conducted, then additional waste characterization will be performed via test pits and the area

will be covered with plastic and flagged pending receipt of the test results and identification of a suitable facility.

Excavated materials will be screened using a PID; inspected for staining, odors, or other indications of contamination; and logged in accordance with the Unified Soil Classification System (USCS). Remediation may be performed at the time of the test pit investigation or at a later time. If the latter, the affected area will then be covered with plastic sheeting, anchored, and flagged with stakes and caution tape.

For waste characterization purposes, samples will be analyzed for TCL VOCs, TCL SVOCs, TAL metals, and/or other waste characterization parameters required by the disposal facility.

If the currently identified disposal/treatment facility(ies) that were utilized by Atlas Park, LLC on Parcel B to date can accept the materials, it will be directly loaded and transported off-site. If the material can not be handled by the currently identified facility(ies), the material may remain in place and subsequently be directly loaded once the analytical data are received and approved by newly identified facility(ies), or it may be excavated and stockpiled pending off-site transport. Stockpiles of this material will generally not exceed 100 cubic yards for proper characterization.

3.7.3 Contingency for Underground Storage Tanks

While discovery of unknown USTs is not anticipated given the extensive investigation of the Parcel B Site, if any USTs are encountered during remedy implementation, these USTs will be decommissioned in accordance with NYSDEC STARS Memo #1, the appropriate SPOTS guidance documents, and other applicable NYSDEC UST closure requirements. If construction allows, the tanks will be decommissioned and abandoned in place following the applicable NYSDEC petroleum storage tank closure regulations. In addition to the waste characterization testing required by the disposal facility, the contents of any USTs uncovered will be tested for fingerprint analysis as well as full characterization testing, if appropriate, and the results will be submitted to NYSDEC and NYSDOH immediately upon receipt. If the tank is removed, only then will post-

excavation soil samples be collected as per the DER-10 requirements. Any associated petroleum-contaminated soils will be removed in accordance with NYSDEC STARS Memo #1 Petroleum-Contaminated Soil and Guidance Policy requirements, SPOTS #14, and the site-specific soil cleanup objectives. Any suspect chemical USTs uncovered will be handled similarly, with the contents and any impacted soils tested for an appropriate suite of chemicals to determine the required removal/disposal procedures.

3.7.4 Contingency for Newly Discovered Hot Spots During Remedy Implementation

If suspect materials are uncovered during remedy implementation that were not previously known and that may not be suitable to be disposed at one of the currently identified disposal facilities, these materials will be investigated through test pits, and samples will be tested for an appropriate suite of analytes. If the currently identified facilities are not permitted to receive the suspect materials, it will be excavated and disposed off-site at a suitable facility.

A hot spot is defined as soil/fill that registers PID readings above 5 ppm, and/or appears to be materially different from the typical soil/fill found previously on the Site. If a hot spot is encountered during any intrusive construction activities, the impacted soil will be removed to the extent required for construction and only then will post-excavation soil samples be collected in accordance with DER-10 requirements. The impacted excavated material will be temporarily staged and characterized through analytical testing. If the material tests chemically-similar to other Site fill/soil, the soil may be re-used on Site. If the material contains TAGM constituents at levels above those previously found on the Site, the material will be disposed off-site as a regulated waste. In either case, the material will be excavated and handled in a controlled manner with oversight provided by the Remediation Engineer. After removal of the hot spot soils within the limits of required excavation, normal excavation may resume.

In addition to the normal waste characterization testing, a sample of the impacted material will be sent for full characterization testing for the NYSDEC TAGM 4046 list parameters and, if

appropriate, fingerprint testing, and the results will be submitted to NYSDEC and NYSDOH immediately upon receipt.

3.8 SOIL MANAGEMENT PLAN

The following activities will be required as part of the soil management plan. The exact methods used are specified in the SOP.

3.8.1 Soil Management and On-Site Re-Use

The RI and SRI soil sampling results indicate that the on-site soil/fill, some of which may be disturbed during the planned remedial work or on-going construction work, contains concentrations of SVOCs and metals that marginally exceed the TAGM 4046 cleanup objectives. In addition, the SRI revealed several localized areas of soil which exceed the proposed restricted commercial use criteria.

While the sources of the VOC vapor and groundwater plume in Building 3 were removed during the source area investigation in that building, the other soil will remain on Site and be covered with a surface barrier pursuant to the selected remedy. As such, and given the Track 4 cleanup approach in the preferred Alternative 2 remedy, excavated soil/fill other than these hot spot areas may be reused for backfill if it is not grossly contaminated, or otherwise exhibits chemical or petroleum odors or staining, sheens, and/or PID response. This fill reuse strategy is consistent with the future land use (e.g., commercial) and use of engineering and institutional controls to prevent future exposure to contaminated soils that remain.

It is not expected that much excess soils will be generated that will need to be characterized and disposed off-site at a suitable facility. The Remediation Engineer will oversee the handling and transport of any material that must still be removed from the Site by the Remedial Contractor to a proper disposal facility(ies) as a regulated waste during on-site remedy implementation. Langan will provide direction in the field to the contractors in identifying

contaminated materials during remedy implementation, selection of samples for waste characterization, and determining the proper off-site disposal facility if not currently identified.

Suitable facilities include, but are not limited to, permitted landfills, RCRA TSDs, and/or facilities covered under a state beneficial re-use approval, such as interim landfill capping material, recycling into asphalt, etc. If necessary, although not anticipated at this time, stockpile areas will be constructed to stage the excavated materials pending scheduling of trucks, additional waste characterization required by the facility, or other reasons preventing the direct loading of the waste for off-site transport.

Disposal facilities which can accept any known soil/fill material generated during the remedy implementation have been identified based on existing data generated during the RI and SRI Site Investigations.

The following subsections describe the more specific related procedures to be used during the remedy implementation.

3.8.2 Continued Use of Truck Wash

Two stabilized Site entrance/exits exist off of 80th Street, consisting of paved roadway. A truck wash pad will continue to be used in the egress path of site vehicles. Manual brushing or, if required, power washing of truck tires, undercarriages, etc. will continue to be completed for all trucks and equipment departing the Site, in outdoor areas of the Site designated for this activity (e.g., the utility corridor). The ground surfaces in these areas will initially be covered with compacted recycled concrete aggregate (RCA), with any wash water generated allowed to infiltrate through the existing soil (historic fill). Eventually, these areas will be paved at which time wash waters will be conveyed to the new stormwater collection system. .

Erosion and sedimentation control measures were constructed in these area in accordance with the provisions of the Stormwater Pollution Prevention Plan (Section 3.10).

3.8.3 Truck Traffic Control

A truck route to and from the site from the nearest major highway (Interstate 495 – Lincoln Tunnel) has been selected considering:

(a) limiting transport through residential areas,

(b) use of defined truck routes,

(c) limiting the total distance to the major thoroughfares, and

(d) safety in access to highways.

The Excavation Contractor will continue to use these transportation routes.

Because of limited volume of soil that must be removed, there will be no need to queue trucks off site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during site remediation and development, and trucks exiting the site will be securely covered.

3.8.4 Construction of Soil Stockpile Areas

If necessary, although not anticipated at this time, soil stockpile areas will be constructed for staging of site fill/soil, pending loading or characterization testing. Separate stockpile areas may be constructed to avoid co-mingling materials of differing types. All stockpile areas will meet the following minimum requirements:

- The excavated soil will be placed onto double layers of a minimum 8-mil low-permeability liner of sufficient strength and thickness to prevent puncture during use.
- Equipment and procedures will be used to place and remove the soil that will minimize the potential to jeopardize the integrity of the liner.

- Stockpiles will be covered at the designated times (see below) with minimum 8 mil plastic sheeting or tarps which will be securely anchored to the ground. Stockpiles will be routinely inspected and broken sheeting covers will be promptly replaced.

- Stockpiles will be covered upon reaching their capacity of approximately 2,000 cu yds until ready for loading. Stockpiles that have not reached their capacity will be covered at the end of each work day.

- Active stockpiles will be covered at the end of each work day.

- Each stockpile area will be encircled with silt fences and hay bales, as needed to contain and filter particulates from any rainwater that has drained off the soils, and to mitigate the potential for surface water run-on.

- The stockpile areas will be sloped wherever possible and equipped with a sump to collect any rainwater that has drained off the stockpiled soils. Drained water will be removed from the sump, as required, and handled in accordance with Section 3.10;

- The stockpile areas will be inspected daily and noted deficiencies will be promptly addressed.

Each soil stockpile will not exceed 2,000 cubic yards. Each pile will be staked and labeled with a number to coincide with labeling on the associated sample container for proper correlation of the analytical results to the pile.

3.8.5 Waste Characterization

Laboratory tests for characterization of a waste stream typically include all or a subset of the following list. The actual testing will be determined by the facility's permit requirements.

- Total petroleum hydrocarbons (TPH) by gas chromatograph/ photoionization device (GC/PID);

- VOCs, Method 8260;
- SVOCs, Method 8270;
- PCBs, Method 8082;
- Metals (14), Method 6010B;
- Ignitability, corrosivity, and reactivity;
- Toxic Characteristics Leaching Procedure (TCLP) VOCs, SVOCs, metals and pesticides and herbicides; and
- Diesel Range Organics (DRO) and Gasoline Range Organics (GRO).

Soil stockpile sampling frequencies and methods (e.g., grab versus composite sampling) will conform to the facility's requirements.

3.8.6 Vapor, Odor and Dust Control

As discussed in Section 3.12, air monitoring will be performed throughout the duration of the work and will dictate action required to control vapor, odor and dust emissions. It is anticipated that dust will be generated during implementation of the remedy. Monitoring of the construction activities for dust generation will be a primary responsibility of the Remedial Engineer and Construction Manager's field inspectors. Observation of visible dust will trigger additional dust control measures to mitigate the dust condition. Dust suppression will be achieved through the continuous use of a dedicated on-site water truck equipped with a water cannon. Preventative measures for dust generation will include construction of an engineered site entrance, truck wash area(s), covering stockpiled contaminated and potentially contaminated soil, and limiting site vehicle speeds.

The means to be considered for minimization of odors during remedial actions include, but are not limited to: (a) limiting the area of open excavations; (b) shrouding open excavations with

tarps and other covers; (c) use of foams to cover exposed odorous soils; (d) use of chemical odorants in spray or misting systems; and, (e) use of staff to monitor odors in surrounding neighborhoods.

The Final Engineering Report will include a certification by a P.E. that vapor, odor, and dust controls were conducted during the RA in accordance with the dust suppression methodologies defined above.

3.8.7 Load Out, Transport and Off-Site Disposal

Due to the limited space available at the site, if possible soils will be direct loaded, in a manner that minimizes the potential for inadvertent releases to the environment, unsafe conditions for onsite personnel, and delays or complications in project implementation. All excavated soil, fill, and solid waste will be handled, transported, and disposed in accordance with applicable Part 360 regulations and other applicable local, state, and federal regulations. The proposed disposal facility(ies) and/or re-use site(s) will be reviewed and approved with NYSDEC before any materials leave the site. Soil that does not meet the TAGM 4046 objectives will not be taken to a recycling facility.

The Contractor will provide the appropriate permits, certifications, and written commitments from disposal facilities to accept the material throughout the life of the contract. All submittals will be reviewed by Langan and submitted to the NYSDEC as required. Commitment letters will be supplied on the facility's letterhead, and include the Clinton Green site as the originating site, the specific analytical data provided to and reviewed by the facility, a statement that the facility is in compliance with its permit, any restrictions on delivery schedules or other conditions that may cause rejection of transported materials, and the accepted daily quantities of soil that may be disposed.

The Remediation Engineer will oversee the load-out of all excavated material. Once the loading of any container, dump truck, or trailer is completed, the material will be immediately transported to the off-site disposal and/or recycling facility. All transport of materials will be

performed by licensed haulers in accordance with appropriate local, state, and federal regulations. Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and NYSDOT requirements (or other applicable transportation requirements). Egress points for truck and equipment transport from the Site will be clean of dirt and other materials during site remediation and development.

Measures to mitigate dust during loading and transport are outlined in a dust suppression plan, as presented in the Stormwater Pollution Prevention Plan (Section 3.10). In accordance with the dust suppression plan, the Remediation Engineer will be responsible for ensuring that all trucks and equipment leaving the Site are washed at the truck wash until all contaminated soil is removed from the Site.

The Final Engineering Report will include an accounting of the final remedy and destination of any material removed from the Site during remedy implementation, including excavated contaminated soil, solid waste, and fluids, and documentation associated with that disposal showing requisite approvals for receipt of the material.

Any hazardous wastes derived from on-site (not anticipated) will be stored, transported, and disposed off-site in full compliance with applicable local, state, and federal regulations.

3.9 STORMWATER POLLUTION AND PREVENTION PLAN

This plan identifies standard and site-specific measures that were and will continue to be implemented by the Remedial Contractor to minimize erosion and sedimentation, and consequently stormwater pollution, during remedy implementation. Measures will include physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of site soils, via wind (dust) or water. This section also contains a dust suppression plan. The erosion and sediment controls will be in conformance with the requirements presented in New York State Guidelines for Urban Erosion and Sediment Control.

3.9.1 Stormwater Pollution Prevention Controls

The stormwater pollution prevention controls for the project have included the following practices. These controls were constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

- Inlet protection and outlet protection using filter fabric and hay bales
- Site perimeter and soil stockpile protection using silt fence
- Stabilized construction entrance/exit pads
- Existing combined city sewer infrastructure

Stormwater runoff is being managed by the new on-site stormwater system. Wash waters from the truck wash area will be conveyed into this system, which are connected to the city's combined sanitary/storm sewer system. No water was nor will it be conveyed directly to the City streets.

3.9.2 Maintain On-Site Storm Water Controls

The Remedial Contractor will be responsible for implementing soil erosion and sediment control measures to maintain stormwater quality and prevent the spread of contamination during remedy implementation. The work will be performed under full time inspection by the Remedial Engineer to ensure quality control. To this end, the Remedial Contractor shall maintain stormwater pollution prevention controls as described herein throughout this plan.

3.9.3 Maintenance of Erosion/Sedimentation Control Measures

The Remedial Contractor shall be responsible for the installation and maintenance of all temporary erosion control measures if required due to unforeseen circumstances. The planned remedy is not anticipated to require such measures. However, if required because of the discovery of a previously unidentified AOC, then all silt fences, inlet protection areas and hay bale checks at catch basins installed on the project Site shall be maintained as follows:

- The barrier and hay bale check condition shall be inspected once a week or after every storm event whichever comes first. Any necessary repairs shall be made immediately.
- Accumulated sediments shall be removed as required to keep the barrier and hay bale check functional.
- All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with backfill materials (e.g., stone).
- Adhere to manufacturer's recommendations for replacing silt fence due to weathering.
- Areas used for Contractor storage of hazardous substances and materials (e.g., fuels) shall be inspected regularly for any leakage of chemicals or fuels to the ground. Any such leakage will be rectified immediately upon discovery.
- Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters
- Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site sediment tracking
- The existing conditions of the adjacent City streets shall be maintained. If necessary, cleaning of the adjacent streets within 100 feet of the site entrance/exit may be performed on an as needed basis as determined by the Remedial Engineer.

3.9.4 Inspections and Reporting

The Remediation Engineer will inspect the Site prior to commencement of construction to ensure that the appropriate erosion and sediment controls were adequately installed or implemented to ensure overall preparedness of the Site for the commencement of remedy implementation. Following commencement, the Remediation Engineer will inspect as appropriate and document site conditions in a log book. The Site log book shall be maintained on site by the on-site field supervisor and be made available to the permitting authority upon request.

3.10 CLEAN FILL

Although not anticipated to be required, soils imported to the site for use as backfill will meet the TAGM 4046 criteria. Before soils are brought onto the site, the Construction Manager will supply Langan with the name, location, a brief history, and certified analytical test results for soils originating at the proposed site or facility for review and approval. No imported soils will be allowed onto the site before they are approved by Langan. Soil materials that exceed TAGM 4046 and solid waste will not be imported onto the site. The fill must be free of organic matter, wood, trash, etc. which cannot be properly compacted. Both the subgrade soils and the clean fill will be compacted following standard construction requirements (to at least 95 % of the maximum dry density as determined by Standard Proctor compaction test, ASTM D698). The fill gradation and surface slope will be such that it is free draining.

3.11 AIR MONITORING

An air monitoring program will be implemented during remedy implementation to protect the health and safety of site workers and the surrounding community. Although odor problems are not expected, monitoring for potential nuisance odors will be completed. This effort will

include both work areas and perimeter air monitoring programs. The onsite air monitoring program is presented in the site specific HASP and the perimeter air monitoring program is presented in the CAMP. These documents contain vapor and dust monitoring and control action levels. Vapor and dust control measures will be initiated if action levels are exceeded.

The work area/breathing zone air monitoring program will be implemented by employing direct-reading survey instruments to identify the appropriate level of PPE needed based on total organic vapor and particulate concentrations.

A perimeter air monitoring program will be established and will consist of air monitoring stations at the perimeter of the site. Perimeter monitoring will include use of hand held direct-reading survey instruments for total organic vapors and dedicated direct-reading survey instruments for particulate monitoring at each perimeter air monitoring sample station.

Action levels will be established for the worker area/breathing zone and perimeter air monitoring program to determine if health and safety protocols or construction technique modifications need to be performed to reduce vapor or dust emissions from the Site.

3.12 EQUIPMENT DECONTAMINATION AND MISCELLANEOUS WASTE MANAGEMENT

3.12.1 Equipment Decontamination

Equipment cleaning will be utilized to prevent the transport of waste materials that may be present on the equipment used for intrusive activities (e.g., excavators, loaders). The Excavation Contractor will select and the Remediation Engineer will approve the methods and approach (as part of the SOP) for equipment decontamination activities. Specific equipment cleaning procedures will be required, at a minimum, to include the following:

- Each transport vehicle will be visually inspected before leaving the loading area. Accumulations of soil on the vehicle tires or other exterior surfaces will be removed

manually or, if necessary, by using a high-pressure water and/or steam spray in the equipment cleaning area.

- Material handling equipment that has come into contact with waste-containing soils will be cleaned in the equipment cleaning area before it enters non-work areas, handles "clean" materials (e.g., backfill), or leaves the site. Equipment cleaning will likely be performed manually, utilizing a high-pressure water spray, and/or steam cleaning.

- Liquid materials, such as decontamination water and other residual material collected during equipment decontamination will be allowed to infiltrate through the soil until the new stormwater collection system is operational, at which time these liquids will be conveyed to this system and ultimately discharged to the city combined sewer system.

3.12.2 Miscellaneous Wastes

Miscellaneous waste generated during the remedy implementation may be classified as general refuse, remediation-related waste material (e.g., used personnel protective equipment), and unanticipated subsurface structures or obstructions, such as old piles and demolition debris. The procedures to manage these wastes are described individually below.

General Refuse

General refuse, i.e., material that has not contacted any impacted site media, including, but not limited to, used disposable equipment, perimeter and temporary fencing will be managed as a non hazardous waste and disposed of at a non hazardous solid waste disposal facility.

Remediation-Related Waste Material

Solid Wastes

Remediation-related equipment and materials that come in contact with impacted site materials will be considered contaminated. This material may include, but not be limited to, used disposable sampling equipment, PPE, equipment decontamination residuals, materials used to construct the materials handling areas and decontamination pads. These materials will be containerized as generated and staged for subsequent disposal by the Excavation Contractor in accordance with federal, state, and local requirements. Characterization samples collected will be submitted to an ELAP-approved laboratory for analysis if required.

Liquid Wastes

As part of the SOP, the Excavation Contractor, with the Remediation Engineer's approval, will select the methods and approach for handling and disposition of water generated during the remedial activities. The Excavation Contractor will be required to obtain and comply with applicable permits required for disposition of wastewater generated during the remedial activities. Water generated as a result of the remediation activities either will be pretreated onsite and discharged to the NYCDEP sewer system in accordance with applicable permits, or be collected for offsite disposition in accordance with applicable federal, state, and local regulations. Water samples collected in accordance with the discharge permit requirements will be submitted to a NYSDOH ELAP-approved laboratory for analysis.

3.13 AIR SPARGE/SOIL VAPOR EXTRACTION (AS/SVE) SYSTEM - SOUTH HALF OF BUILDING 3

3.13.1 General

Elevated concentrations of volatile organic compounds (VOCs) were detected in previously collected soil vapor and sub-slab vapor samples in and around Building 3. Based on previous investigations at the Site, a VOC source area is believed to have been located at the eastern

portion of the building. A Site-wide investigation of the groundwater resulted in the discovery of a PCE/ TCE plume present under the Site.

Air sparging/soil vapor extraction (AS/SVE) in-situ remediation technology has been selected to remediate the impacted soil and groundwater (located approximately 35 feet to 70 feet below grade) on the Site; groundwater is encountered at approximately 60 feet below grade.

3.13.2 Conceptual Remedial Process

The mechanism of contaminant removal by this technology consists of stripping (induced volatilization by sub-surface air injection) and vapor capture via a vacuum throughout the contaminated zone. During air sparging, air is released into the saturated zone through a series of air sparge wells. The released air causes bubbles to form, which allows VOCs in the groundwater to diffuse into the rising bubbles. When the bubbles reach the vadose zone, the contaminants are removed via vapor extraction wells installed in the unsaturated zone. The location and distribution of sparging and extraction wells were determined based on a 34-foot radius of influence (ROI) per air sparge well and 70 foot ROI per soil vapor extraction well. ROIs were determined upon completion of an AS/SVE Pilot Test Study conducted at the Site.

3.13.3 General System Components and Layout

The main system components include:

- Four air sparge injection wells constructed of two-inch diameter schedule 80 PVC, with a 10-slot screen, 3 feet in length, set approximately 82 feet below grade;
- Three vapor extraction wells constructed of two-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 45 feet below grade;
- Four air sparge monitor wells constructed of two-inch diameter schedule 80 PVC, with a 10-slot screen, 2 feet in length, set approximately 82 feet below grade;
- Four vapor extraction monitoring wells constructed of two-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 45 feet below grade;

- An air sparge system that will include a compressor rated for a flow of 120 standard cubic feet per minute (scfm) at a pressure of 25 pounds per square inch (psi); and

- A soil vapor extraction system that will include a:

    - Vacuum blower rated for a flow of 180 scfm at 150 inches of water column vacuum;

    - A moisture separator to protect the vacuum blower from moisture damage; and

    - Two vapor-phase granular-coal activated carbon (VGAC) vessels connected in series.

The air sparge, soil vapor extraction, and monitoring wells will be located along the eastern portion of the south half of Building 3 (over the apparent core of the VOC plume). The AS/SVE blower, compressor, and treatment system will be located on the roof of Building 3 and will be connected to the AS/SVE wells via 2 and 4 inch piping. The well array, compressor selection, and vacuum blower selection were based on the results of the AS/SVE Pilot Test conducted at the Site. Final design documents and as-builts will be provided along with the Final Engineering Report (FER) for Parcel B.

3.13.4 Operation, Maintenance, and Monitoring

The procedures for operating, maintaining, and monitoring the AS/SVE system will be documented in the SMP (to be submitted along with the FER for Parcel B). Maintenance will start 18 months following AS/SVE system start-up and will be performed every 12 to 18 months thereafter. Maintenance will consist of visual inspection of all components of the system (including all pressure, vacuum, and/or flow gauges), identification and repair of any leaks, changing of blower and compressor system filters, and inspection of the exhaust or discharge point to verity that there are no nearby air intakes. As necessary, system components that are worn, damaged, or do not adequately perform the task for which they were designed will be replaced. Non-routine maintenance may also be required during the

operation of the AS/SVE system, such as when an alarm notification indicates the AS/SVE system is not operating properly. Activities conducted during non-routine maintenance visits will vary depending upon the reason for the visit. Repairs or adjustments will be made to the system as appropriate.

Ground water, soil vapor, and system performance sampling events will be conducted as specified in the SMP. The integrity of the monitoring wells will be evaluated during each groundwater sampling event.

3.13.5 Remedial Goal

The overall remedial goal for the project is to substantially reduce the concentrations of constituents of concern in the contaminated zone until either New York State Department of Environmental Conservation (NYSDEC) levels or asymptotic contaminant concentrations are achieved at the SIte. Once the AS/SVE system reaches either the applicable cleanup levels or the limit of its effectiveness, the AS/SVE system will be dismantled and allow natural attenuation to remediate any remaining contaminants. This decision will be made with NYSDEC and NYSDOH.

3.14 POST-REMOVAL ACTIVITIES

Following any soil excavation activities , the foundations will be reconstructed, appropriate utilities installed, and excavations will be backfilled with on-site soils/fill or clean imported backfill.

3.15 DEMOBILIZATION

The Excavation Contractor shall be responsible for demobilizing all labor, equipment, and materials not designated for off-site disposal from the site. The Remediation Engineer will be

required to ensure that the Excavation Contractor decontaminate (in accordance with the SOP) all equipment and materials prior to removal from the Site.

The Remediation Engineer will be responsible to ensure that the Excavation Contractor perform any follow-up coordination and maintenance activities listed below.

- Restoring areas disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], access area), and any other areas identified by DCG;

- Removing any temporary access areas (whether onsite or offsite) and restoring the disturbed access areas to pre-remediation conditions as determined by DCG; and

- Removing sediment and erosion control measures and disposing of the materials in accordance with acceptable rules and regulations as a non-hazardous waste.

4.0 SUB-SLAB DEPRESSURIZATION SYSTEMS

4.1 GENERAL

Since chlorinated volatile organics (VOCs) have been detected in the soil gas beneath the slabs of several buildings at the Site, active sub-slab depressurization systems (SSD) will be constructed to mitigate the potential exposure hazard associated with these compounds. The SSD systems have already been installed in buildings 4 and 6 on Parcel A and 7 and 8 on Parcel B. The system in Building 3 is currently under construction (soon to be completed). The SSD systems will create a low vacuum field beneath the existing building slabs by extracting the sub-slab air using a vacuum blower mounted to the roof of each building. This low vacuum field under the slab will prevent potentially impacted vapors from entering the building.

The design was based on Environmental Protection Agency (EPA) Draft Guidance Document EPA/6251R-92 concerning sub-slab depressurization of large buildings and schools and the proposed New York State Department of Health (NYSDOH) draft document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York." Installation of the systems will be coordinated with the project architect, structural engineer, and mechanical engineer.

The installation of the SSD systems includes the following tasks:

- Filling of existing utility trenches (or building base) with 1 inch stone to create pore space
- Sealing concrete slab joints to maximize suction
- Sealing conduit and pipe penetrations through the slab and sub-grade walls
- Installation of suction pits connected to rooftop blower systems
- Installation of electric roof-mounted blower systems to generate the required sub-slab vacuum

The SSD systems will create the required sub-slab vacuum by utilizing a series of suction pits and suction trenches to draw soil vapor to the roof mounted blowers where the vapor will be discharged to the atmosphere. General calculations for each SSD system are based on the volume of sub-slab soil pore space to be affected, an assumed depth of influence of 3.5 feet below the building slab, and four air changes of the pore space volume per day. Details of each individual system are discussed below.

4.2 Building Systems

Building 4 SSD System (Parcel A)

The Building 4 system consists of one strategically located suction pit connected to a roof mounted blower to cover the buildings footprint of 21,000 square feet. This system was incorporated in the new construction of the building. The calculation for the required vacuum for this system is calculated based on the total pressure losses through the system. We calculated a required sub-slab vent inlet vacuum pressure of 5 inches of water column (wc), piping losses of 10 inches wc, valve losses of 7 inches wc, pre-filter losses of 7 inches wc, silencer losses of 6 inches wc, for a combined required vacuum at the blower system inlet of 5 inches wc. Given these design requirements, the roof-mounted blower system will provide a minimum of 120 cubic feet per minute (CFM) at 35 inches wc.

Building 6 SSD System

The Building 6 system consists of three strategically located suction pits connected to two roof mounted blowers to cover the buildings footprint of 57,000 square feet. This system was incorporated in the new construction of the building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 5 inches of water column (WC), piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 35 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #6-1, and #6-2 (combined with a manifold system to the roof) will provide a minimum of 180 cubic feet per minute (CFM) at 35 inches WC. The blower system

for Suction Pits #6-3 (combined with a manifold system) will provide a minimum of 65 CFM at 35 inches WC.

Building 3 SSD System (Parcel B)

The Building 3 system consists of four strategically located suction pits connected to two roof mounted blowers to cover the building footprint of 57,000 square feet. This system is a partial retrofit to the existing building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 20 inches of water column (WC), piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #3-1, and #3-2 (combined with a manifold system to the roof) will provide a minimum of 100 cubic feet per minute (CFM) at 50 inches WC. The blower system for Suction Pits #3-3 and #3-4 (combined with a manifold system) will provide a minimum of 100 CFM at 50 inches WC.

Building 7 SSD System (Parcel B)

The Building 7 system consists of three strategically located suction pits connected to three roof mounted blowers to cover the buildings footprint of 34,000 square feet. This system is a retro fit to the existing building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 20 inches of water column (WC), piping losses of 5 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower systems for Suction Pits #7-1 and #7-2 (combined with a manifold system to the roof) will provide a minimum of 50 cubic feet per minute (CFM) at 50 inches WC. The blower system for Suction Pit #7-3 (combined with a manifold system) will provide a minimum of 100 CFM at 50 inches WC.

Building 8 SSD System (Parcel B)

The Building 8 system consists of five strategically located suction pits powered by two roof mounted blowers to cover the building footprint of 30,500 square feet. This system is a retrofit to the existing building. The calculation for the required vacuum is based on a required sub-slab vent inlet vacuum pressure of 20 inches of WC, piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #8-1 #8-2 and #8-3 (combined with a manifold system to the roof) will provide a minimum of 70 CFM at 50 inches WC. The blower system for Suction Pits #8-4 and #8-5 (combined with a manifold system) will provide a minimum of 50 CEM at 50 inches WC.

4.3 TESTING OF SSD SYSTEMS

Following installation of the SSD systems, the following tests are performed:

1. With the depressurization system operating, smoke tubes are used to check for leaks through concrete cracks, floor joints, and at the suction points. Any leaks identified are sealed.

2. In buildings where natural draft combustion appliances exist, the building will be tested for backdrafting of the appliances. If necessary, the backdrafting condition will be corrected before the SSD system is placed in operation.

3. The sub-slab pressure field will be tested by operating the SSD system while observing the movement of smoke downward into small holes (e.g., 3/8 inch) drilled through the slab at sufficient locations to demonstrate that a vacuum is created beneath the entire slab. In addition an evaluation will be performed by using a manometer or comparable instrument to ensure that at least 0.1 inches WC of vacuum is being created throughout the buildings footprint. If there is inadequate depressurization, the source or cause (e.g., improper fan operation) will be identified and corrected.

4. The warning device indicating blower malfunction will be tested to confirm proper operation.

5. Thirty to ninety days after installation of the system and completion of building construction, indoor and outdoor air sampling will be performed. Samples will be analyzed for the constituents of concern (i.e. TCE and PCE) to confirm that concentrations are below the air guidance values derived by the NYSDOH. If the sampling results indicate a concentration above the air guidance values, the source or cause (e.g., indoor or outdoor sources, improper operation of the SSD system, etc.) will be identified and corrected as necessary.

Results of this testing as well as as-built drawings for each building system will be submitted along with the FER for Parcel B

4.4 OPERATION, MAINTENANCE, AND MONITORING (OM&M) PLAN

The procedures for operating, maintaining, and monitoring the SSD systems will be documented in an OM&M Plan. Maintenance will start 18 months following SSD system start-up and again will be performed every 12 to 18 months thereafter. Maintenance will consist of visual inspection of all components of the system, identification and repair of any leaks, changing of blower system Filters, and inspection of the exhaust or discharge point to verity that there are no nearby air intakes. As necessary, system components that are worn, damaged or do not adequately perform the task for which they were designed will be replaced. Indoor air monitoring will not be performed unless the system fails to maintain a vacuum beneath the slab for more than one week.

5.0 HEALTH AND SAFETY PLANS

This section presents the major elements of the health and safety plan that will be in place for establishing safe working conditions at the Site and protection for the community during remedy implementation. The HASP is presented in Appendix B.

5.1 SITE SPECIFIC HEALTH AND SAFETY PLAN

- The Remediation Engineer is responsible for the preparation of the Site-specific HASP. It applies to all work performed in compliance with implementation of the preferred remedy and until the Site is covered with either 6"+ inches of building foundation material or asphalt, one foot of clean fill in unpaved area (which will be minimal to non-existent on Parcel B) and all other institutional and engineering controls, and the SSD Systems are in place and functioning. It provides a mechanism for establishing safe working conditions at the Site until the remedy is fully implemented, where safety organization, procedures, and PPE requirements will be established based on an analysis of potential site-related hazards. The site-specific HASP, at a minimum, will meet the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65).

5.2 COMMUNITY AIR MONITORING PLAN

- The CAMP provides monitoring and protection for the community not directly involved in the remediation activities from organic vapors and dust and was prepared in conformance with NYSDEC/NYSDOH requirements. The CAMP is included in the Health and Safety Plan, in Appendix B.

6.0 CONSTRUCTION QUALITY ASSURANCE PLAN

This section presents the anticipated quality assurance/quality control procedures to be in place for ensuring the remedy implementation are conducted in general conformance with this RAWP.

The Remediation Engineer will prepare a CQAP that will describe the site-specific components of construction quality to provide for remedy construction that meets the remediation objectives and specifications. The CQAP will include a program for construction observation and testing to assess whether the AS/SVE remedy construction is performed in accordance with the design specifications. The CQAP will include the following components described below.

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.

- The qualifications of the quality assurance personnel who demonstrate that they possess the training and experience necessary to fulfill project-specific responsibilities.

- The observations and tests that will be used to monitor construction and the frequency of performance of these 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 Owner 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.

The CQAP will provide a detailed description of the observation activities that will be used to monitor construction quality and confirm that remedy construction is in conformance with the remediation objectives and specifications.

7.0 SCHEDULE

Installation of the AS/SVE system began in July 2006 and is expected to be completed in September 2006. Installation of the SSD Systems in the five on-Site buildings are expected to be completed in September 2006. A comprehensive schedule will be presented in the SOP, which will include the development of the SMP, and include the on-site property boundary groundwater monitoring plan post remedy implementation.

8.0 REPORTING

8.1 PROGRESS REPORT

Daily reports will be provided by electronic media to NYSDEC's project manager while invasive work, contaminated materials handling, and placement of fill over contaminated soils is occurring. If significantly contaminated media is encountered during remedy implementation (other than the contamination expected to be encountered), NYSDEC's project manager will be promptly notified. These findings will be included in the daily electronic media reports. Periodic reports, no less than one per week, will be required until the on-site remediation is completed. A monthly progress report describing the activities conducted during the respective month as outlined in this RAWP, will be submitted to the NYSDEC. The progress reports will include the following:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period;
- 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
- Update of schedule including percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

Once the remedy is fully implemented, the progress reports will cease and the OM&M Plan annual reporting requirements will commence.

8.2 FINAL ENGINEERING REPORT

A final engineering report and certification of completion will be submitted to NYSDEC following implementation of the preferred remedy in the RAWP. The final engineering report will include:

- A description of the remedial actions performed;
- A description of the changes to the remedial design;
- Sampling and monitoring results;
- A copy of the applicable Construction Manager records and "as-built" drawings showing changes made during construction; and
- Accounting of the destination of all material removed from the site, including excavated contaminated soil, historic fill and solid waste and fluids, and documentation associated with that disposal showing requisite approvals for receipt of the material.
- Test results demonstrating that all mitigation and remedial systems are functioning properly

A Professional Engineer licensed in New York State will certify in The Final Engineering Report that:

- the construction was completed in substantial conformance with the approved RAWP, and/or approved field changes,
- import of soils from offsite, including source approval and sampling, was performed in a manner consistent with the methodology defined in the Soil Management Plan, and
- invasive work done during the remediation and development (i.e. grading cuts, utility trenches, footings, etc.) was performed in accordance with the subsurface field screening methodology presented in the RAWP.

9.0 PROJECT ORGANIZATION

This Chapter presents the anticipated project organization and associated roles, including key personnel, descriptions of duties, and lines of authority in the management of the RAWP. Information regarding the organizations/personnel and their associated responsibilities is provided below.

9.1 NYSDEC

NYSDEC, Region 2, will serve as the lead regulatory agency for this remediation. The NYSDEC project manager, Mr. Vadim Brevdo, P.E., and Section Chief, Mr. Daniel Walsh, Ph.D., will be responsible for providing and coordinating regulatory oversight and direction.

9.2 NYSDOH

The NYSDOH will work closely with NYSDEC and will provide input from a health and safety perspective. The primary contact for NYSDOH will be Ms. Dawn Hettrick, P.E. and the project manager will be Chris Doroski.

9.3 OWNER/DEVELOPER

As owner of the site, Atlas Park will be responsible for implementing the brownfield cleanup of the site. General responsibilities of Atlas Park are set forth in the BCP agreement. To assist in the remediation implementation, Atlas Park will contract a Construction Manager and a Remediation Engineer.

9.4 REMEDIATION ENGINEER

The Remediation Engineer will coordinate the work of other contractors and subcontractors to Atlas Park for the services associated with the site preparation, soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services (if necessary), and management of waste transport and disposal. The Remediation Engineer selected by Atlas Park for this project, Mr. Joel B. Landes, P.E., of Langan Engineering and Environmental Services, PC, will provide full-time engineering observation services for the duration of the remedial activities. The Remediation Engineer will document that the remedial activities are conducted in accordance with this RAWP and associated plans submitted by the Construction Manager. The Remediation Engineer will be responsible for certifying the construction was completed in substantial conformance with the approved RAWP, and/or approved field changes. In addition to oversight and final engineering certification, the Remediation Engineer may prepare and/or review pre-remedial plans such as the SOP, HASP, CAMP, CQAP, Erosion and Sedimentation Control Plan, and other appropriate plans.

9.5 ANALYTICAL LABORATORY

A NYSDOH-certified laboratory will provide analytical services required for this project. The laboratory will be provided with the necessary information to complete the QAPP and will follow the procedures required in the QAPP.

9.6 OFF-SITE DISPOSAL FACILITIES

Any contaminated excavated materials will be transported to and disposed of at licensed disposal facilities. Transportation to these facilities will be via legally permitted (such as permits required in NYCRR Part 364 and NYCRR Part 360) and NYSDEC-acceptable methods.

Clean soils (soils not exceeding the NYSDEC soil cleanup objectives) and construction and demolition debris will be segregated from contaminated materials and may be disposed of separately from contaminated materials. Construction and demolition debris that is visually

uncontaminated per 6 NYCRR Part 360-7 will be taken to a licensed construction and demolition (C&D) facility.