4.0 DESCRIPTION OF REMEDIAL ACTION PLAN

4.1 Evaluation of Remedial Alternatives

This section includes a review of remediation alternatives that were considered for the remedy phase of the BCP. The purpose of completing the alternatives analysis is to identify, evaluate, and select a remedy to address the contamination identified. The RAOs for soil and groundwater include source removal and treatment to prevent the potential for exposure and contaminant migration. The RAOs for soil vapor include preventing soil vapor from entering the proposed new Site building. The following performance measures were used to complete the evaluation of remedial alternatives:

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

The following remedial SCGs apply to the project and are the performance criteria used to determine if the RAOs have been met.

- 6 NYCRR Part 375-6 Soil Cleanup Objectives;
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010 (or later version if available);
- *Sampling, Analysis, And Assessment of Per- And Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs* (April 2023)
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan;
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- NYSDEC DER-23 Citizen Participation handbook for Remedial Programs (January 2010);
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998);
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998);
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998);

- 6 NYCRR Part 375 – Environmental Remediation Programs (December 2006);
- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992);
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992);
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks;
- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response;
- 40 CFR Part 144 – Underground Injection Control Program;
- NYSDOH Soil Vapor Intrusion Matrices – NYSDOH Sub-Slab Vapor Concentration which may require monitoring or mitigation as presented in the Matrix A, Matrix B, Matrix C, Matrix D, Matrix, E, and Matrix F tables of the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006), update February 2024 ("NYSDOH SVI Guidance"); and
- NYSDEC DER-31 – Green Remediation (January 2011)

Additional regulations and guidance may be applicable, relevant, and appropriate to the remedial alternatives and will be complied in connection with implementation of the remedial program. However, the list above is intended to represent the principal SCGs, which should be considered in evaluating the remedial alternatives for the Site.

Remedial Alternative 1 – Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs)

Remedial Alternative 1 would include demolition of the existing buildings and removal of all contaminated soil and soil vapor to comply with UUSCOs. This would include, but is not limited to, excavation of all soil above the UUSCOs, including excavation below the groundwater interface and/or down to bedrock as needed.

1. Protection of Human Health and the Environment – Satisfied; as the contaminated soil would be removed, and concentrations of chlorinated solvents and petroleum compounds in soil vapor would be significantly reduced.
2. Compliance with SCGs – Satisfied; all soil above UUSCOs and RRSCOs would be removed, and any on-site soil vapor concentrations would be reduced as a result of removing the soil.
3. Short-term Effectiveness and Impacts – Satisfied; this alternative would be effective in reducing soil contamination in the short-term since all contaminated soil will be removed from the Site. There is, however, a risk of short-term impacts to Site workers and the community, as the process of excavating contaminated soil to comply with UUSCOs may cause the release of particulates and organic vapors. This risk can be controlled by employing health and safety procedures during remediation and construction.
4. Long-term Effectiveness and Permanence – Satisfied; as the RAOs will be achieved.
5. Reduction of Toxicity, Mobility, or Volume of Contaminated Material – As all contaminated soil at the Site would be removed, concentrations of VOCs in soil vapor would be significantly reduced, and the toxicity, mobility, and the on-site volume of contaminants would be greatly reduced.
6. Implementability – Complicated, but implementable. This alternative would require excavation to bedrock and/or below the water table site-wide. Extensive Support of Excavation (SOE) and dewatering would be required.
7. Cost Effectiveness – Not cost-effective; this alternative would require site-wide excavation to bedrock, approximately 1 to 16 feet below grade. Based on the dimensions of the Site, to

achieve Track 1 UUSCOs, it is assumed that approximately 19,500 tons (13,000 cubic yards) of soil would need to be excavated and disposed of as non-hazardous regulated soil at a rate of $55 per ton for transportation and disposal (T&D). Using these estimates, the soil disposal cost is expected to be approximately $1,072,500. Additionally, it is estimated that approximately 17,320 cubic yards (25,980 tons) of clean fill would then be imported to backfill the excavated areas and raise the Site grade to meet the design flood elevation. Using a market rate of $40 per cubic yard of clean fill, backfill import costs would equal approximately $692,800. Although there are no known registered tanks at the Site, an allowance of $25,000 is included to account for any unknown/unregistered tanks encountered during excavation. Demolition and abatement costs are estimated at $500,000. Inspection, oversight, reporting, and engineering design services is estimated to be $500,000. To perform an excavation of this magnitude, shoring and sheeting, and dewatering would have to be performed for an estimated cost of $2,300,000. Laboratory analysis and data validation of waste characterization samples, endpoint samples, and import samples is estimated to be $200,000. This assumes the remedial work would be performed concurrently with the planned redevelopment of the Site and is not inclusive of demolition or abatement costs. The total estimated cost for Remedial Alternative 1 is $5,290,300.

8. Community Acceptance – Partially satisfied; this alternative would be protective of human health and the environment in the long term; however, the extended construction schedule would increase the time for potential construction-related disruptions to the surrounding community and cause increased noise and traffic disturbances.
9. Land Use – Satisfied; this alternative would result in the cleanup of the Site for unrestricted use, which would allow for redevelopment of the Site.
10. Environmental Footprint Analysis – Partially satisfied, as this alternative would incorporate only limited/standard green and sustainable remediation principles. An environmental footprint analysis for this alternative was performed in accordance with the NYSDEC guidelines, the methodologies used in the EPA Spreadsheets for Environmental Footprint Analysis (SEFA) tool, and the requirements of the Climate Leadership and Community Protection Act (CLCPA), and is provided in Appendix L. A Track 1 alternative would result in a significant fuel and energy use due to the longer construction duration and significant production of waste. Additionally, the greenhouse gas emissions are anticipated to be approximately 586 metric tons of CO_2 for a Track 1 cleanup, compared to 219 metric tons of CO_2 for a Track 4 cleanup. Therefore, this alternative does not maximize green and sustainable remediation practices as compared to Remedial Alternative 2.
11. Climate Change Vulnerability Assessment – Satisfied, the impact of climate change on the Site and the proposed remedy under this alternative was evaluated. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise were identified, and this alternative would incorporate measures to minimize the impact of climate change on potential identified vulnerabilities. The remedy is not expected to be affected by the projected increase in temperature, precipitation levels, or sea level rise. The climate vulnerability assessment for this alternative is included in Appendix L.

Remedial Alternative 2 – Track 4 Restricted Residential Use Soil Cleanup Objectives (RRSCOs)

Remedial Alternative 2 would include demolition of the existing buildings, excavation and off-site disposal to a minimum of 2 feet below grade plus hotspot removal, construction of a Site cover system, and installation of a sub-slab depressurization system (SSDS) under the proposed new building. The Site cover system would include importation of clean fill material as required to install a minimum 2-foot clean soil cover in unpaved areas outside the building footprint,

construction of a concrete building foundation underlain by a minimum 20-mil vapor barrier membrane, which doubles as a demarcation barrier, in areas within the building footprint, and paved surfaces underlain by a demarcation barrier in roadway and sidewalk areas. The SSDS would be installed beneath the proposed building slab.

The Track 4 remedy would allow for ECs and ICs to be implemented for long-term management of the Site and to prevent future exposure to residual contamination. As such, an Environmental Easement (EE) would be recorded for the Site to implement appropriate ECs and ICs, and a Site-specific Site Management Plan (SMP) would be prepared to specify future soil handling requirements, include management and inspection of the ECs that may be necessary, maintenance of Site access controls, Department notification, and land use restrictions. Periodic inspection and reporting would be required to verify that the restrictions and requirements included in the EE remain in place and continue to be effective.

1. Protection of Human Health and the Environment – Satisfied; as on-site contamination would be covered by a permanent Site cover system. Removal of source material from the Site would also reduce residual contaminant mobility into groundwater and soil vapor. Additionally, an active SSDS would be installed beneath the building slab to prevent vapor intrusion into the newly constructed building.
2. Compliance with SCGs – Satisfied; as RAOs would be achieved by preventing the potential for human and environmental exposures to chemical constituents above RRSCOs and the SSDS would mitigate vapor intrusion into the proposed building.
3. Short-term Effectiveness and Impacts – Satisfied; mitigation measures, including a HASP and CAMP, would protect and limit the exposure of workers and the surrounding community to contaminated soil, particulates, and/or vapors during Site redevelopment.
4. Long-term Effectiveness and Permanence – Satisfied; as the implementation of Engineering Controls (ECs) (including a Site cover system and active SSDS) and Institutional Controls (ICs) would address residual contamination and limit the exposure of future occupants to contaminated soil and/or soil vapor in the long term, thus achieving the RAOs.
5. Reduction of Toxicity, Mobility, or Volume of Contaminated Material – Satisfied; as the active SSDS would prevent contaminated soil vapor from migrating into the proposed building.
6. Implementability – Satisfied; contaminated soil removal could be completed in a relatively short timeframe and the equipment and personnel needed to perform the proposed remedial actions are readily available. The equipment and materials necessary to implement the groundwater treatment program are readily available, and each could be performed concurrent with development.
7. Cost Effectiveness – Satisfied; this alternative is the most cost-effective while being implementable. Under this alternative, based on data gathered to date, it is estimated that approximately 3,630 tons of soil will be excavated and disposed of off-site. Using an estimated rate of $55 per ton, soil disposal is estimated to cost $199,650. Approximately 4,900 cubic yards of clean fill will be needed to install the Site cover system and backfill hotspots. Using a market rate of $40 per cubic yard of clean fill, backfill import costs would equal approximately $196,000. The SSDS is estimated to cost $319,860, including underground and aboveground components. Demolition and abatement costs are estimated at $500,000. SOE for hotspot excavation and localized dewatering is estimated to cost $200,000. Although there are no known registered tanks at the Site, an allowance of $25,000 is included to account for any unknown/unregistered tanks encountered during excavation. The concrete building slab as part of the Site cover is estimated to cost $54,600. This assumes the remedial work would be performed concurrently with the planned redevelopment of the Site. Inspection, oversight,

reporting, and engineering design services is estimated to be $390,000, and laboratory analysis and third-party data validation for waste characterization samples, endpoint samples, and import/reuse samples is estimated to cost $100,000. The total estimated cost for Remedial Alternative 2 is $1,985,110.

8. Community Acceptance – Satisfied; this alternative would be protective of human health and the environment.
9. Land use – Satisfied; this alternative would result in the cleanup of the Site for restricted-residential use, which would allow for redevelopment of the Site.
10. Environmental Footprint Analysis – Satisfied; as this alternative would incorporate more green and sustainable remediation principles compared to a Track 1 cleanup, by requiring fewer truck trips for soil disposal and import, and a shorter period during which heavy equipment is used to complete the work. An environmental footprint analysis for this alternative was performed in accordance with the NYSDEC guidelines, the methodologies used in the EPA SEFA tool, and the requirements of the CLCPA, and is provided in Appendix L. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction, and material use were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, were incorporated. A Track 4 cleanup would result in less fuel usage and waste, in comparison to the Track 1 alternative. Additionally, the shorter construction duration for Track 4 indicates that there would be less energy consumption and fewer co-pollutant emissions.
11. Climate Change Vulnerability Assessment – Satisfied, the impact of climate change on the Site and the proposed remedy under this alternative was evaluated. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise were identified, and this alternative would incorporate measures to minimize the impact of climate change on potential identified vulnerabilities. The remedy is not expected to be affected by the projected increase in temperature, precipitation levels, or sea level rise. Additionally, erosion and sediment controls that will be implemented during construction, will be resilient to the current rainfall levels. The climate vulnerability assessment for this alternative is included in Appendix L.

4.2 Selection of the Preferred Remedy

Remedial Alternative 2 (Track 4) achieves the RAOs while being cost-effective. After careful consideration with respect to the evaluation criteria listed, Remedial Alternative 2 is determined to be the preferred remedy, since it adequately addresses the subsurface contamination with the most cost-effective approach and would incorporate more green and sustainable remediation practices.

4.2.1 Zoning

The Site is currently zoned as R7-2 (residential) and C2-4 (commercial) and is located within the Special Harlem River Waterfront District and Inclusionary Housing Designated Area. The Site was rezoned from manufacturing use as part of the Lower Concourse Rezoning in 2009.

4.2.2 Applicable Comprehensive Community Master Plans or Land Use Plans

The Site is located within an Inclusionary Housing Designated Area and the Special Harlem River Waterfront District, which promotes the growth of permanent affordable housing and to maintain and reestablish physical and visual public access to and along the waterfront.

4.2.3 Surrounding Property Uses

The Site is abutted to the north by East 138th Street, followed by the Madison Avenue Bridge; to the south by the Padded Wagon® moving company warehouse and associated parking; to the east by East 135th Street, followed by the Major Deegan Expressway; and to the west by a freight train rail line, followed by the Harlem River. The surrounding area is comprised predominantly of commercial and industrial uses, with some parkland to the east.

4.2.4 Citizen Participation

A Citizen Participation Plan (CPP) was prepared by AKRF in February 2023 and approved by NYSDEC in May 2023. The contemplated remedy complies with the CPP. The NYSDEC-approved CPP is included as Appendix I.

4.2.5 Environmental Justice Concerns

The Site is located in a Potential Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

4.2.6 Land Use Designations

There are no federal or state land use designations.

4.2.7 Population Growth Patterns

The population of the Bronx is expected to increase in the future. This project will help provide necessary affordable housing units to meet that need.

4.2.8 Accessibility to Existing Infrastructure

The Site is located within walking distance of the 138th Street-Grand Concourse MTA subway station, and the Bx1 and Bx33 public bus stops. The Major Deegan Expressway (I-87) and Madison Avenue Bridge are located adjacent to the Site to the east and north, respectively. The surrounding area is supplied with municipal sewers and water, electric, telephone, natural gas, and fiber-optic lines.

4.2.9 Proximity to Cultural Resources

There are no cultural resources located adjacent to the Site. The nearest cultural resources include Yankee Stadium, the Hip Hop Museum, and Hostos Center for the Arts & Culture, which are easily accessible by public transportation.

4.2.10 Proximity to Natural Resources

Nearby parks and natural resources include Weston Park, St. Mary's Park, Franz Sigel Park, and Mill Pond Park.

4.2.11 Off-Site Groundwater Impacts

Due to tidal fluctuations and the presence of a bulkhead along the western Site boundary and variations in depth to bedrock, it is unknown if groundwater contamination is migrating off-site. The contaminants identified in groundwater primarily consisted of

SVOCs, PFOA, and PFOS. Groundwater is not used for drinking or other potable purposes in the Bronx. The Site is served by a public water supply that is not affected by Site contamination.

The SVOCs detected in groundwater may be related to sediment entrained in the groundwater samples. The PFOA/PFOS exceedances in groundwater were generally detected site-wide, indicating that the concentrations observed may be indicative of the surrounding area and not of an on-site source; however, it is unknown whether any products containing PFAS were historically used at the Site.

4.2.12 Proximity to Floodplains

The western and southern portions of the Site are located within a Zone A flood zone which is defined as "areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage." This is considered a high-risk flood zone.

4.2.13 Geography and Geology of the Site

Based on a 2021 architectural survey of the Site by Montrose Surveying Co., LLP, the Site lies at an elevation of 9 to 12 feet above the North American Vertical Datum of 1988 (NAVD88).

The stratigraphy of the Site, from the surface down, generally consists of a surficial layer of asphalt and/or concrete underlain by fill material comprised of sand, silt, and gravel with varying amounts of brick extending from grade to approximately 3 to 20 feet below grade. The fill material is underlain by apparent bedrock in the eastern portion of the Site, and varying amounts of apparent native sand, silt, clay and gravel in the western portion of the Site to boring termination depths (up to 20 feet below grade). Apparent bedrock was encountered at depths ranging from approximately 1 to 16 feet below grade in borings RI-SB-05, RI-SB-09, RI-SB-16, RI-SB-17, RI-SB-18, RI-SB-19, RI-SB-20, SB-08, and SB-11.

Based on Site-specific well point measurements, groundwater beneath the Site ranges from elevation -0.31 to elevation 2.70 (NAVD88), or approximately 7.18 to 12.27 feet below grade surface across the Site.

Regional groundwater flow is westerly. Based on the site-specific well elevation survey, groundwater flow direction was in a generally easterly direction beneath the Site, but the measurements were likely tidally influenced since the Harlem River is located west-adjacent to the Site and due to variations in depth to bedrock.

4.2.14 Current Institutional Controls

Currently, there are no Institutional Controls (ICs) or Engineering Controls (ECs) at the Site.

4.3 Summary of Selected Remedial Actions

Remedial activities will be performed at the Site in accordance with this RAWP and the Department-issued Decision Document (DD). All deviations from this RAWP and/or the DD will be promptly reported to NYSDEC for approval and will be fully explained in the Final Engineering Report (FER). The selected remedial actions include:

1. The proposed remedy is a Track 4 Restricted Residential cleanup.
2. The existing on-site buildings will be demolished and materials that cannot be beneficially reused on-site will be taken off-site for proper disposal in order to implement the remedy.

3. Excavation and off-site disposal of soil to a minimum of 2 feet below grade across the Site plus hotspot removal in two areas.
4. Installation of support of excavation (SOE) necessary to enable excavation of deeper contaminated soil/fill. SOE installation will comply with applicable local and state-controlled inspections.
5. Any unknown/unregistered tanks and associated piping, other structures associated with a source of contamination, and/or grossly contaminated soil/fill, if encountered, will be removed in accordance with applicable regulations.
6. A Site-specific HASP and CAMP will be implemented during all ground-intrusive Site activities, which includes soil disturbance and loading activities, to monitor levels of VOCs and airborne particulates within the active work zones and around the perimeter of the Site.
7. Screening for indications of contamination (by visual means, odor, and monitoring with a photoionization detector (PID) of soil during all ground-intrusive Site work, including soil disturbance and loading activities.
8. Characterization and off-site disposal of all materials removed from the Site in accordance with all federal, state, and local rules and regulations for handling, transport, and disposal. Waste disposal facilities will be selected based on the data collected to date and the results of the planned waste classification sampling.
9. Importation of clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) to raise the Site grade for the proposed building, construct the Site cover, and as needed for use as backfill. Fill material that does not exceed RRSCOs for any compound may be used on-site to backfill the Site. Soil exceeding the UUSCO for 1,4-dioxane will not be imported, per DER-10: Appendix 5 - Allowable Constituent Levels for Imported Fill or Soil, Subdivision 5.4(e). If PFOA or PFOS are detected in any sample at or above the NYSDEC Restricted Residential guidance values, it will also be tested by the Synthetic Precipitation Leaching Procedure (SPLP). If the SPLP concentrations of PFOA and PFOS are at or above 10 ppt, the soil will not be reused or imported. Analytical results will be compared to Table 375-6.8(b) of 6 NYCRR Part 375 and submitted to NYSDEC via a *Request to Import/Reuse Soil or Fill* form for review and approval prior to importation and placement on-site. All imported soil or soil proposed for reuse requires NYSDEC review prior to on-site placement.
10. Collection and laboratory analysis of confirmatory documentation samples across the Site at a minimum of 2 feet below grade, and endpoint samples from any hotspot areas to document remaining concentrations of contaminants in soil/fill after remedial excavation is complete. Endpoint sampling will occur around hotspots and any additional Areas of Concern (AOCs) identified during the remedial action based on the sampling frequency outlined in Section 5.4 of DER-10. Endpoint samples will not be collected in areas that are excavated down to the bedrock surface.
11. Installation and operation of an active sub-slab depressurization system (SSDS) below the foundation slab of the proposed new building to prevent vapor intrusion.
12. Construction and maintenance of a Site cover to prevent human exposure to residual contaminants in soil/fill remaining under the Site, which will consist of: (1) a minimum of 2 feet of clean fill material placed in landscaped and permeable areas; (2) concrete building foundation underlain by a minimum 20-mil vapor barrier membrane, which doubles as a demarcation barrier, in areas within the building footprint; and (3) paved surfaces underlain

by a demarcation barrier in roadway and sidewalk areas. Any fill material brought to the Site will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

13. Dewatering to enable remedial excavation in hot spots that extend below the water table (approximately 7 to 12 feet below grade). Dewatering will be conducted in compliance with city, state, and federal laws and regulations. Extracted groundwater will be either containerized for off-site licensed and permitted disposal or will be treated under a permit from New York City Department of Environmental Protection (NYCDEP) to meet pre-treatment requirements prior to discharge to the sewer system.
14. Recording of an Environmental Easement (EE) with the New York City Register to prevent future exposure to any residual contamination remaining at the Site. The EE will: require the remedial parties/Site owners to complete and submit a periodic certification of ECs and ICs to the Department in accordance with Part 375-1.8 (h)(3); allow the use and development of the Site for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws; restrict the use of groundwater as a source of potable or process water without necessary water quality treatment, as determined by NYSDOH; and require compliance with a Site-specific NYSDEC-approved SMP.
15. Preparation of an SMP for long term management of residual contamination as required by the EE including plans for: (1) ECs and ICs, (2) monitoring, (3) operation and maintenance, and (4) reporting. Inclusion of soil management provisions in the SMP, including an Excavation Work Plan.