# Draft Analysis of Brownfield Cleanup Alternatives

Mariners Marsh Park
4.75-Acre Site in Former Active Recreation Area
3418 Richmond Terrace
Staten Island, New York

Prepared by BRS, Inc. for the City of New York

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ATTACHMENTS

A. Site Location Map
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# 1 INTRODUCTION

This report was prepared by Brownfield Redevelopment Solutions, Inc. for the New Jersey Institute of Technology Technical Assistance to Brownfields Program (NJIT TAB). The NJIT TAB program is a technical assistance program funded through a grant provided by the United States Environmental Protection Agency (USEPA), which provides free assistance to government agencies and non-profit organizations seeking to identify, assess, remediate, and redevelop brownfields. The New York City Department of Parks and Recreation (NYCDPR) requested NJIT TAB assistance with preparation of this ABCA.

The City of New York ("the City") is committed to re-opening a 4.75-acre portion of Mariners Marsh Park located at 3418 Richmond Terrace, Staten Island, New York. Mariners Marsh Park ("the Park") is located near the northern shore of Staten Island. Identification and remediation of environmental issues is a key factor in preparing the site for reuse.

The USEPA has awarded the City with Brownfield cleanup grant funds in the amount of $200,000 to assist with the environmental remediation of the Park. In addition, the City has received a USEPA Brownfield Revolving Loan Fund (RLF) grant, from which it intends to direct up $650,000 to support this project. The City and the USEPA have entered into Cooperative Agreements Nos. BF 97259006 and BF 96295712, which provide the terms and conditions for the City's use of the Brownfield cleanup grant and RLF funds, respectively. The terms and conditions include a commitment by the City to provide for community involvement in the site remediation process. The City intends to use these funds to perform a remedial action on the 4.75-acre parcel of the Park along Richmond Terrace ("the Site"), which is described below. This remedial action is being carried out by NYCDPR.

The purpose of this Analysis of Brownfields Cleanup Alternatives (ABCA) is to:

- Identify reasonable brownfields cleanup alternatives considered for addressing the contamination identified at the site;
- Analyze the various factors influencing the selection of a preferred cleanup method, including effectiveness, implementability, sustainability, and costs; and to
- Select the preferred cleanup method, based on the analyses performed.

The City will continue to promote and facilitate community involvement with this environmental cleanup and site redevelopment project with activities itemized below.

- The City will perform targeted outreach to notify the community of the availability of this Draft ABCA. The City will publish a notice of availability of this Draft ABCA in one or more major local newspapers with general circulation.
- The City will provide an opportunity for members of the public to provide comments regarding the ABCA in a public meeting. Additional detail regarding the public notification process is presented in the Community Relations Plan for the site.

- The City will prepare written responses to the comments received and document any changes made to the cleanup plans and to the ABCA as a result of the comments.

A Brownfields Cleanup Decision Memo will be prepared at the end of the public comment process, which will describe the cleanup options selected by the City. The ABCA and the Decision Memo will be included with the Administrative Record. The Administrative Record repository is located at the headquarters of the NYCDPR.

The expected outcome of the project is a remedial action completed to the extent that the 4.75-acre Site is prepared for reuse as public parkland, by means of attainment of the Soil Cleanup Objectives (SCOs) for Restricted-Residential Use, specified by at 6 NYCRR §375-6.4(b)2.

## 1.1 SITE DESCRIPTION AND HISTORY

Mariners Marsh Park, consists of a total of approximately 107 acres of land, portions of which were historically used for a variety of industrial purposes prior to being designated parkland. Mariners Marsh Park is owned by the City and managed by NYCDPR.

Information regarding park history, summarized herein, was obtained from Phase 1 Environmental Site Assessment reports addressing Mariners Marsh Park, completed in 2001 and 2005. A portion of the Park of "over 6 acres …located in the northeast corner of the property was used for recreational purposes sometime after the purchase of the property by the City in 1974 and includes two baseball fields." This section is referred to in this report as the "Former Active Recreation Area". A portion of the Former Active Recreation Area along Richmond Terrace, known as "the Site", has been selected for remediation utilizing the USEPA Cleanup Grant and the Revolving Loan funds, and is the subject of this ABCA.

Currently, the entire Mariners Marsh Park, including the Site, is closed to the public. The Former Active Recreation Area had two baseball fields constructed prior to the establishment of the park. A gravel covered trail/road traverses the Former Active Recreation Area forming a loop. A gate is located along Richmond Terrace which provides authorized vehicle access to the park. The Site contains the undeveloped area within the looped path inside the Former Active Recreational Area and an area along Richmond Terrace that is currently overgrown with vegetation. Based on information provided by the New York State Department of Environmental Conservation and the USEPA, there is currently no federal- or state-designated wetland within the Site. No utility services are currently connected to the Site. See the Site Location Map in Attachment A.

While the Phase I ESA reports describe the history of industrial usage of the property that became Mariners Marsh Park no industrial uses were identified within or adjacent to the Site.

- Prior to 1903, the property was undeveloped, most likely consisting of freshwater and forested scrub/shrub wetlands.

- In approximately 1903, Milliken Brothers Structural Steel and Rolling Mill was constructed and operated in the western portion of the property.
- By 1910, various industrial operations were situated on the southern and western portions of the property, including, for example:
  - several gas production sites;
  - a large traveling crane;
  - an open hearth mill, shear mill, blooming mill, and a rolling mill;
  - a powerhouse, at which power and heat were generated from coal, coke and gas; and
  - a sherardizing building, machine shop, and a blacksmith.
- Downey Shipbuilding Yard operated on the southern portion of the property from 1917 to 1931. During this period, rail lines and roadways were constructed, traversing the property. Several ponds, apparently man-made, were evident along the southern half of the property.
- Ownership and land use from 1931 to the mid 1970's is unknown. Varying degrees of demolition of the building structures, as evidenced in a review of available aerial photographs, appears to have taken place up to the 1970's.
- The property was acquired by the City in 1974. It was designated City parkland in 1997 and is managed by NYCDPR.
- Over six acres of the Mariners Marsh Park located in the northeast corner of the property was used for recreational purposes sometime after the purchase of the property by the City in 1974 and includes two former baseball fields. The remainder of the property has reverted back to a natural state that includes both indigenous and invasive plant species, ponds and freshwater wetlands.

## 1.2 SURROUNDING LAND USE(S)

The 4.75-acre Site is located in the Port Ivory section of the Borough of Staten Island. Port Ivory is a coastal area situated in the northwestern corner of Staten Island, and it is located on Newark Bay near the Kill van Kull to the north and Arthur Kill to the west. The area became locally known as Port Ivory after Ivory Soap™, which was produced at a former Proctor and Gamble factory on a property near the Site from 1907 until 1991. As of the 2010 Census, the Port Ivory zip code included more than 26,000 residents. The area surrounding the Park is densely developed with residential, commercial and industrial land uses.

The 4.75-acre Site is surrounded by the following land uses:

- To the north by a New York City Department of Transportation Bridge Maintenance yard, and vacant land that includes Arlington Marsh;

- To the east by the Former Active Recreation Area and residential and commercial properties along Holland Avenue;
- To the south by the Former Active Recreation Area and the Staten Island Rail Line; and
- To the west by the Former Active Recreation Area, the former Proctor and Gamble factory currently owned by the Port Authority of New York and New Jersey and the New York Container Terminal.

## 1.3 FUTURE LAND USE CONSIDERATIONS

The City intends to remediate and re-open Mariners Marsh Park. An early vision for the Park, supported by the community, included active and passive recreation that was compatible with the site's natural elements and that emphasized the preservation of natural features and habitat values. The NYC DPR intends to update that vision for the re-activated park with additional community input. Potential plans for the Site, the subject of this remediation, include the development a greeting garden with sitting area. No dwelling, facility, or other built structure is planned for the completed park development.

# 2 SITE ENVIRONMENTAL CONDITIONS

## 2.1 IDENTIFICATION OF CONTAMINANTS AND CONTAMINANT SOURCES

Investigation of site environmental conditions has included a series of studies to date. The results of studies are presented below.

### 2.1.1 Phase I Environmental Assessments

The New York City Economic Development Corporation ("EDC") retained the firm of Lawler, Matusky & Skelly, LLP ("LMS") in 2001 to perform a Phase I Environmental Site Assessment of the six-acre Former Active Recreational Area located near the northeastern corner of Mariners Marsh Park. The Site is located on the northern portion of this six-acre tract. LMS concluded that primary concern within the six-acre Former Active Recreational Area would be from direct contact exposure and ingestion of material containing semi-volatile organic compounds (SVOCs) and inorganics (Metals) from historical fill material used to backfill the former reservoirs within the area.

The New York City Department of Design and Construction ("DDC"), Bureau of Environmental and Geotechnical Services ("BEGS") retained Metcalf & Eddy in 2005 to complete a Phase I ESA of the entire 107-acre Mariners Marsh Park. The Phase I ESA report concluded that there were a number of areas of concern requiring additional investigation. These Areas of Concern (AOCs) included, for instance:

- Potential soil contamination associated with the former steel manufacturing operations, including:
  - *Coal tar residue from former manufactured gas operations… on an approximate 5,000 square foot area of the ground surface in the northwest portion of the site.*
  - *The …discolored… soils surrounding the former Sherardizing Building located along the eastern portion of the site;*
  - *Soil in the vicinity of the existing trails and former rail spurs along the southern portion of the property*
  - *The potential for volatile organic compound (VOC), SVOC and metals contamination in soils in various form operations areas, e.g.:*
    - *The former Turning Mill, Machine Shop and Blacksmith buildings;*
    - *The former Cooling Rack area*
    - *The former Soaking Pit contamination exists.*
  - *The potential for environmental impacts to surface water and sediments at the onsite ponds, from various sources:*
    - *Log Pond - Concrete debris and treated wood telephone poles;*
    - *Downey Pond - Former onsite operations and potential impacts from the former Proctor and Gamble facility, and;*
    - *Muskrat Pond – Discharge of water from Arlington Yards.*

Importantly, none of these areas of concern were located in or near the 4.75-acre Site that is the subject of this Plan. Regarding the Former Active Recreation Area, including the Site, the report concluded that the issues of concern were limited to "*Fill material,* containing *SVOCs (more specifically polyaromatic hydrocarbons [PAHs]) and Metals above the applicable* New York State Department of Environmental Conservation *(NYSDEC) … criteria.* This conclusion was based on the results of the Phase II ESA of the Former Active Recreational Area, performed by M&E in 2003, and described in the following subsection. Additional investigation was recommended to "*delineate the extent and depth of historical fill."*

### 2.1.2 Phase II Environmental Assessments

In 2003, the EDC retained Metcalf & Eddy (M&E) to perform a Limited Phase II Environmental Site Assessment within the six-acre Former Active Recreational Area, including the Site.

The Limited Phase II ESA included a "geophysical survey and a series of soil borings"…. Ten (10) surface soil and fifteen (15) subsurface soil samples were collected and analyzed for SVOCs, polychlorinated biphenyls ("PCBs") and Metals. Subsurface samples were also analyzed for VOCs. In addition to the soil samples,

four (4) shallow groundwater samples were collected from select boring locations and samples analyzed for VOCs, SVOCs and total and filtered metals.

The results of the geophysical survey identified numerous areas containing possible disturbed areas, and possible fill.

The surface soil sample results revealed the presence of elevated SVOCs (consisting of PAHs and Metals above the applicable NYSDEC and NJDEP criteria in seven of the ten samples collected; and subsurface soil sample results revealed the presence of elevated SVOCs (PAHs) and Metals above the applicable criteria in ten of the fifteen borings advanced.

Elevated levels of both Total and Dissolved Metals were detected above the applicable NYSDEC and NJDEP criteria in all of the grab groundwater samples collected from the site. The inorganic compounds detected are likely related to the presence of ash, cinder, and coal fill present within the Former Active Recreational Area of the Park.

In 2007, the DDC, with the cooperation of the DPR, and with funding and technical assistance from the USEPA, retained M&E to perform Phase II ESA activities to address all the previously identified AOCs throughout Mariners Marsh Park. The scope of work of the Phase II ESA included further investigation of soil and groundwater within the Former Active Recreational Area, including the Site. M&E's findings pertinent to the Site include:

- The historic fill material is approximately 2- to 5-foot thick and mainly consists of sand with gravel, brick, concrete, ash, and cinder till. Though the origin of this material cannot be identified, the presence of ash and cinders in the fill is likely attributed to a primary fuel source, such as coal. Ash and cinder residue was typically mixed with construction debris, sand, silt, and was used to fill in low-lying areas.
- Surface and subsurface soil samples from the Former Active Recreation Area contained SVOC and metals at concentrations similar to those found in historical fill materials, throughout New York City and at concentrations above one or more of the reference cleanup standards.
- Metals, including arsenic, copper, lead and zinc were found at concentrations above one or more of the reference cleanup standards, in surface samples collected from the Former Active Recreation Area.

### 2.1.3 Supplemental Phase II Environmental Assessments

ATC Associates, Inc. (ATC) prepared a Supplemental Phase II ESA for the Former Active Recreation Area, dated August 23, 2010.

ATC reviewed and summarized the findings of the 2003 and 2007 M&E studies and the NJIT analysis as part of this Phase II ESA, and performed an onsite subsurface

investigation. Based on these previous studies, the objectives of this subsurface investigation were to:

- Confirm whether groundwater in the Former Active Recreation Area is impacted from historic fill or from the Coal Tar Area.
- Determine if there is risk related to vapor intrusion within the Site.

The following was concluded.

- No VOC or PCB impacts detected indicating no commingling of waste materials from historic operations or fill.
- Chlorinated VOCs were detected in four (4) of the nine (9) groundwater samples at low concentrations above applicable drinking water standards but below concentrations detected by M&E in 2007. Such exceedances were mainly on the northern portion of the Site. This difference in concentration could be due to natural attenuation and/or different sampling techniques. Since VOCs were not detected in three (3) of the four (4) down-gradient monitoring wells from the Coal Tar Area, the presences of such chlorinated VOCS on the northern portion of the Site is likely due to historic operations or illegal dumping and not from the migration of contaminated groundwater from the Coal Tar Area.
- Due to the presence of DCA, TCE, and VC in the groundwater samples and TCE and DCA in soil vapor samples, indoor air quality in future on-site buildings may be a concern.
- Elevated metals concentrations were detected within the on-site monitoring wells which are likely due to background levels and/or historic fill placed at the Site. Such elevated metals are not anticipated to impact the proposed Site development.

### 2.1.4 Summary of Data for the 4.75-Acre Site

Soil samples located within the Site boundary showed that fill was present to a depth of at least four feet. Contaminants exceeding NYSDEC Part 375 Restricted Residential Soil Cleanup Objectives (SCOs) were observed in the surface soil samples for metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, and mercury) and PAHs (Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k) fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Chrysene, Phenanthrene, Fluoranthene, Pyrene, and Indeno(1,2,3-cd)pyrene).

Individual PAH and metal concentrations were slightly elevated compared to the applicable Restricted Residential SCOs. Overall, the soil quality data from the Site is consistent with that from the remainder of the Former Active Recreation Area. Elevated metal and PAH concentrations are consistent with typical findings for historic fill and are

comparable to the reported chemistry of historic fill on hundreds of properties throughout New York City. These results are unremarkable and do not suggest the need for a removal action and consequent of disposal of hazardous or petroleum waste, or the presence of a significant contamination source area.

Monitoring wells were installed within the Site. Groundwater sample results showed that several VOCs (cis-1,2-dicholorethylene, trichloroethylene, and dichloroethane) were detected at concentrations slightly above the applicable NYSDEC groundwater quality guidance values. These compounds were not detected in the soil samples and are independent of the historic fill. Based on the limited impact of historic fill in groundwater quality elsewhere in the park and the limited thickness of fill materials found on Site, the Site does not present a risk to groundwater quality. No structures are currently planned on this portion of the property and, therefore; there is no risk of soil vapor intrusion. The potential for groundwater contamination at the Site is relatively low.

## 2.2 PHYSICAL SETTING

Based on review of the Phase I and Phase II ESA reports described above:

- The elevation of Mariners Marsh Park is approximately 10 to 20 feet above mean sea level. The topography of the region in the vicinity of the Park slopes down to the north toward Newark Bay with local depressions and mounds in topography.
- Groundwater is found at approximately two to three feet below grade in the vicinity of the Site, and generally flows towards the northeast.
- There are several areas of wetlands and of elevated flood hazard risks on the Mariners Marsh Park. There are no wetlands on the 4.75-acre Site.
- The area that includes the Site is underlain by the Upper Triassic and Lower Jurassic aged Newark Supergroup, of the Stockton Formation. The rocks consist of red and brown shales and sandstones, which dip to the northwest. Bedrock is overlain by glacial deposits.

## 2.3 EXPOSURE PATHWAYS

A qualitative human health exposure assessment (EA) was prepared (LiRo, 2012) for the Site in accordance with the NYSDEC Environmental Restoration Program requirements and the Draft DER-10 Guidance Document (December, 2002). The objective of the EA is to evaluate the presence of completed or potential exposure pathways in order to determine if site contamination poses an existing or potential hazard to current or future site users. The EA identifies the potential for human exposures, if any, associated with chemical constituents detected in environmental media at the Site. The EA addresses on-site and off-site receptors for current use, future site construction, and future use scenarios. The

anticipated future use of the Site is for passive recreation. This subsection summarizes the findings of the EA.

The EA consists of five elements to document exposure pathways (listed below). An exposure pathway is complete when all five elements are documented:

i. Identified contaminant sources, affected media, and chemicals of potential concern (COPCs) from site-specific data collected during site investigations.

ii. Identified contaminant release and transport mechanisms (e.g., vaporization, migration, etc.).

iii. Identified points of exposure for current and future site use (e.g., on-site soil, potable wells, etc.).

iv. Identified exposure routes (i.e., inhalation, ingestion, dermal contact).

v. Identified receptor population(s) (e.g., construction workers, future site workers).

### 2.3.1 Contaminant Sources and COPCs

Site investigation data indicate that contaminated fill is present at the Site. Residual affected media include soil and groundwater.

COPCs for soil and groundwater were identified based on exceedances of Part 375 SCOs or TOGS 1.1.1 groundwater criteria, respectively. COPCs include:

- Metals: arsenic, barium, cadmium, chromium, copper, lead, manganese, and mercury.
- PAHs: Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k) fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Chrysene, and Indeno(1,2,3-cd)pyrene.
- Chlorinated VOCs in groundwater only in localized areas in the vicinity of the Site.

COPCs for the Site are shown on Figure 2 (soil) and Figure 3 (groundwater).

### 2.3.2 Contaminant Release and Transport

Metals and PAHs in soil are the COPCs identified at the Site and are attributed to the historic fill material. The primary mechanism for soil transport is through dust production and overland runoff. The Site is vegetated and dust and runoff transport rates are low, if present at all. Groundwater chlorinated VOC and other impacts were localized within the Former Active Recreation Area.

### 2.3.3 Points of Exposure

The points of exposure to site COPCs are the surface soil and the near surface soil, and groundwater, at a depth of approximately 3 to 5 feet.

### 2.3.4 Potentially Exposed Receptors

Planned future use of the Site is for passive recreation. There are no personnel currently working at the Site. The property is partially fenced, and the area is closed, however, access can be obtained as the fencing and gates can be breached. Residences are located in areas adjacent to the Site.

Under the current use scenario, potentially exposed receptors include trespassers and nearby residents. In the absence of remediation, the Site would remain closed and potentially exposed receptors for future use scenarios are the same as those for the current use scenario and include trespassers and nearby residents, in both cases, vegetation at the Site minimizes production and off-site transport of dust and runoff.

During the remedial action, on-site workers associated with the remedial action are considered potentially exposed receptors. However, this exposure will be minimized by the adherence of these workers to the health and safety plan and procedures established for site remediation and site contaminants. Under future use conditions, cover would be required to eliminate potential exposure of future Site users to soil and groundwater. No on-site structures are planned and there is no potential for soil vapor intrusion.

Groundwater is not utilized for potable purposes and will not be exposed at the Site under current remedial action or future use conditions. All residents nearby the Site obtain their potable water from municipal sources, obtained outside of New York City. Therefore, under the current and future use scenarios, there are no potentially exposed groundwater receptors at the Site.

### 2.3.5 Exposure Pathways

Under the current use scenario, trespassers on the Site would have a potentially complete pathway through dermal contact or ingestion of contaminated soil. Nearby residents could potentially be exposed through inhalation from wind dispersion of fugitive dust from the Site to off-site areas. In both cases, vegetation at the Site minimizes potential exposures.

Under the future use scenario with no remedial action, trespassers on the Site would have a potentially complete pathway through dermal contact and ingestion of contaminated fill. Nearby residents could potentially be exposed through inhalation of wind dispersion of fugitive dust from the Site to off-site areas.

During the remedial action, exposure pathways are completed for onsite workers and nearby residents, due to the potential for direct contact and dust transport. However, implementation of the Health and Safety Plan, dust and storm water control measures, and other remedial management measures will minimize the potential for exposures. Under future use conditions, use of a soil cover will eliminate all potential direct contact and secondary exposures to dust and storm water runoff.

Under the current and future use scenarios, groundwater will not be exposed and is prohibited for use as potable supply under the New York City law; therefore, the groundwater ingestion exposure pathway is considered incomplete.

### 2.3.6 Summary and Recommendations

The following completed potential exposure pathways have been identified for the Site.

- Under the current and remedial action scenarios, exposure via inhalation of fugitive dust and contact with stormwater runoff is considered a potentially complete exposure pathway for nearby residents.
- Under the current and remedial action scenarios, exposure via dermal contact and ingestion of soil is a potentially complete exposure pathway for trespassers, and onsite workers.
- Under the future use scenario without remedial measures, exposure via dermal contact and ingestion of soil is a potentially complete exposure pathway for Site maintenance workers and park users.
- Under the future passive use scenario with a remedial action that includes a protective cover, exposure pathways are eliminated.

Potential exposure pathways for remedial workers could be readily mitigated through appropriate health and safety measures implemented during construction activities. These measures might include air monitoring during excavation activities to limit exposure, protective clothing to limit dermal contact, and training/good work practices to limit incidental ingestion. Remedial measures such as wetting and/or foaming the soil may be used to limit the generation of fugitive dust.

Remedial measures should be undertaken at the Site to mitigate exposure pathways associated with the future recreational use scenario.

## 3 REMEDIAL ACTION OBJECTIVES

The goal of this remedial action is to return the 4.75-acre Site to productive and safe passive recreational use, by means of technologies and design that promote the following objectives:

1) **Protection of Public Health and the Environment.** The environmental and public health risks associated with the contaminants in soil at the Site will be abated by preventing exposure to the existing contaminants. The remediation, upon completion, shall meet the SCOs for Restricted Residential Use, specified by at 6 NYCRR §375-6.4(b)2.

2) **Regulatory Compliance**. The remediation will be performed as a voluntary cleanup, and not under the order of, or direct oversight of, NYSDEC or other regulatory agencies. However, the applicable statutes, regulations and guidance of the State of New York and NYSDEC will be referenced to provide the Standards, Criteria and Guidance (SCGs) for the project. NYSDEC regulations for site remediation are codified at 6 NYCRR § 375

et. seq. The cleanup will attain the SCOs for Restricted Residential Use, specified at §375-6.4(b)2.

The City will also reference NYSDEC's "DER-10 / Technical Guidance for Site Investigation and Remediation" for guidance in planning and implementing the remedial actions.

The effective implementation of the NYSDEC regulations will be managed by a qualified environmental professional, to be retained by the City.

3) **Beneficial Reuse.** The remediation will provide for a reuse of the Site that meets the stated needs and desires of the local community – passive recreational use, based on solicitation of community involvement.

## 4 CLEANUP ALTERNATIVES

The City considered several feasible alternatives for remediation of soil at the Site. Remediation of groundwater is not funded by this USEPA cleanup grant and is not considered by this ABCA. Qualitative human health exposure assessment of data and information obtained during the prior investigations indicate that there are no current or future exposure pathways for groundwater and thus groundwater remediation is not required for the protection of public health for the proposed park use at the Site. The effectiveness, implementability, and costs associated with the following potential cleanup alternatives are considered in this section:

Alternative No. 1) Clean Soil Cover

Alternative No. 2) Soil Excavation and Offsite Disposal

Alternative No. 3) No Action

The following evaluation criteria were considered in comparing the remedial alternatives.

- Effectiveness in providing compliance with NYSDEC regulations and increased protectiveness to public health and the environment;
- Implementability of the considered alternative;
- Sustainability considerations, including the degree to which each remedial alternative may reduce greenhouse gas discharges, reduce energy use, employ alternative energy sources, reduce volume of wastewater to be disposed, reduce volume of materials to taken to a landfill, and/or allow for the reuse or recycling of materials during cleanup;
- Cost of the considered alternative;
- Operation and Maintenance; and
- Institutional Controls.

## 4.1 Alternative No. 1 - Clean Soil Cover

Under this alternative, the remedial action will consist of the placement of clean soil cover, as an engineering control, over existing soil. No existing soils will be removed from the Site. The tasks involved in this scenario include:

- Placement of an engineered soil cover, to be designed in accordance with DER-10 Section 4.1(f) over the entirety of the Site. The cover shall consist of:
  - two feet of screened sand providing a barrier to the residual contaminants (PAHs and metals) in site soils, and
  - six inches of topsoil with seeding.
- Institutional Controls, including a Deed Notice, to document the extent of residual soil contamination, the engineering controls that have been constructed, and the procedures for ongoing inspection, maintenance, and corrective actions for the engineering controls.

### 4.1.1 Effectiveness

The Clean Soil Cover alternative complies with restricted-use remediation standards and achieves project remediation goals by:

- Achieving compliance with the project SCGs, including DER-10 and 6 NYCCR Part 375 regulations.
- Providing an effective barrier to prevent human exposure to residual site soil contaminants.
- Providing an institutional control, by means of a deed notice, to notify future site owners, occupants, and the general public of the presence of residual contaminants in soils at depth, and the presence and need for maintenance of the engineered soil cover.
- Providing a site management plan to govern inspection of the site cover at the Site and identify maintenance requirements to ensure the soil cover continues to perform as designed.

### 4.1.2 Sustainability

The Clean Soil Cover alternative compares favorably to the other active remediation approaches considered, with respect to the various sustainability criteria. For example:

- The approach avoids excavation of site soil and transport by truck to offsite disposal facilities, thereby reducing the fossil fuel energy use, and associated greenhouse gas discharges associated with that task.

- The approach avoids the dewatering and wastewater treatment and disposal that would likely be needed if a site-wide excavation of historic fill to approximately 5 feet below grade were selected.
- The approach avoids the need for landfill disposal of approximately 55,000 tons of contaminated historic fill, and the approximately 1,800 truck round trips from the site to the selected landfill and clean fill source site, if a site-wide excavation of historic fill to 5 feet below grade were selected.

### 4.1.3 Implementability

The Clean Soil Cover alternative is easily implementable because it involves relatively simple technology and equipment. This type of remedy is a widely used and readily accepted alternative for remediating the light to moderately contaminated soils observed in the Site. The City or its consultant will retain a site work contractor that is licensed, qualified, and OSHA-certified to perform the remedial action work.

### 4.1.4 Cost

The costs for completing remediation under this approach were estimated using the following elements and assumptions:

1) Project and Grant Management tasks;
2) Prepare a Remedial Action Plan ("RAP") including dust control measures and a Community Action Monitoring Plan ("CAMP") and Health and Safety Plan ("HASP");
3) Prepare project specifications and bid documents;
4) Conduct procurement process;
5) Install site security fencing for duration of project activities;
6) Emplacement of a soil cover over the approximately 4.75-acre extent of the Site;
7) Site restoration, including smoothing, grading and re-seeding;
8) Prepare Institutional Controls;
9) Prepare Remedial Action Report; and
10) Prepare a Site Management Plan

The estimated cost for this cleanup alternative is approximately $830,000.

### 4.1.5 Operations and Maintenance

Operation and Maintenance considerations for the installed clean soil cover should include the following:

- Written Operations and Maintenance Plan describing procedures on inspection and maintenance of the soil cover;

- Routine inspections;
- Vegetation maintenance (grass mowing and weed control); and
- Written Site Management Plan containing a discussion including but, not limited to; soil cover maintenance.

### 4.1.6 Institutional Controls

This approach should include preparation and recording of a Deed Notice, as an Institutional Control, to document the extent of residual contamination and the engineering controls, to any future site owners, occupants, or other stakeholders.

## 4.2 Alternative No. 2 - Soil Excavation and Offsite Disposal

Under this alternative, the remedial action will consist of removal of historic fill materials down to native soil and replacement with certified clean fill materials.

Removed historic fill materials will be disposed at an appropriately licensed offsite facility.

The tasks involved in this scenario include:

- Excavation of historic fill at the Site to the depth of native soils, which have been measured to be approximately 5 feet below grade;
- Dewatering of the excavation area to complete the remediation;
- Replacement of excavated materials with clean fill from offsite sources;
- Site restoration, including smoothing, grading and re-seeding; and
- Prepare Remedial Action Report.

### 4.2.1 Effectiveness

The Soil Excavation and Offsite Disposal alternative would attain an unrestricted use remediation standard by:

- Removal of the potential continuing contaminant sources associated with the presence of historic fill from the site;
- The area would be made available for reuse on an unrestricted basis.

### 4.2.2 Sustainability

The Soil Excavation and Offsite Disposal alternative, when implemented successfully, allows for the property to be reused in an unrestricted manner. Compared to the other remedial alternatives considered, however, energy and resource usage, tends to be intensive and front-loaded. Resources will be expended at a more intensive rate in the first year of the project, for instance, but the project will then be completed, conservative of future resource usage, and the land will again be available for reuse.

### 4.2.3 Implementability

The Soil Excavation and Offsite Disposal of historic fill alternative is implementable; however, it would require more time, planning, and expenses for certain tasks. For example, the excavation on this Site will be complicated by the likelihood that shallow groundwater (less than 3 feet below grade) will tend to flood the excavations, which are to extend to approximately 5 feet. A program of engineering controls, including dewatering and shoring systems, will need to be designed by the City's engineering consultant.

### 4.2.4 Cost

The costs for completing remediation under this approach were estimated using the following elements and assumptions:

1) Project and Grant Management tasks;
2) Prepare a RAP including dust control measures and a CAMP and a HASP;
3) Prepare project specifications and bid documents;
4) Conduct procurement process;
5) Install site security fencing for duration of project activities;
6) Collection of in-situ samples of historic fill for waste classification for disposal by an accredited laboratory;
7) Excavate, transport and dispose of approximately 36,500 cubic yards or 54,750 tons of contaminated historic fill material;
8) Site restoration, including vegetative cover; and
9) Prepare Remedial Action Report.

The estimated cost for this cleanup alternative is approximately $2,900,000. Operations and Maintenance

Upon completion of this alternative, the Site will be available for use on an unrestricted basis. No ongoing operations and maintenance will be required.

### 4.2.5 Operations and Maintenance

Upon completion of this alternative, the Site will be available for use on an unrestricted basis.

### 4.2.6 Institutional Controls

Upon completion of this alternative, the Site will be available for use on an unrestricted basis. No institutional controls or post-remediation care will be required.

## 4.3 Alternative No. 3 - No Action

If no environmental cleanup remedy were performed at this Site, the no-action alternative would not be consistent with remedial action standards, criteria, and guidance established by the NYSDEC, and would not be re-opened for public use.

### 4.3.1 Effectiveness

The "no action" alternative is not effective in that it does not provide for consistency with NYSDEC regulations and would not provide for re-use of the property that is protective of public health.

### 4.3.2 Sustainability

The "no action" approach would not meet project SCGs because the contamination would remain in place, and without a barrier to prevent public exposures. Based on failure to meet this threshold criteria, evaluation of this alternative with regards to other evaluation criteria is not necessary.

### 4.3.3 Implementability

The "no action" alternative is technically feasible, although the presence of untreated soil and groundwater contaminants would not be consistent with NYSDEC regulations, and would not allow for protective public recreational reuse of the site.

### 4.3.4 Cost

The cost would be limited to $5,000 to finishing a no-action RAP.

### 4.3.5 Operations and Maintenance

There would be no ongoing site management to protect public health.

### 4.3.6 Institutional Controls

There would be no institutional controls to protect public health. The public recreational re-use of the site will not be available.

## 4.4 PREFERRED ALTERNATIVE

The preferred alternative is the Clean Soil Cover (Alternative No. 1). The selected approach for the planned end use involves proven technologies, is easily implementable, environmentally effective, cost-effective and provides for protection of public health and the environment. Appropriate equipment and qualified contractors are readily available to perform all required work. This remedy can be readily completed within the timeframe of the USEPA Brownfields Cleanup Grant and the Revolving Loan Fund.

**Attachment A**

**Site Location Map**


BRS
Brownfield
Redevelopment
Solutions, Inc.

**ATTACHMENT B**

**Summary of Public Comments and Responses**