DRAFT REMEDIAL INVESTIGATION, INTERIM REMEDIAL MEASURE AND ALTERNATIVES ANALYSIS REPORT

FOR
THE WEBSTER BLOCK
75 MAIN STREET
CITY OF BUFFALO, ERIE COUNTY, NEW YORK
SITE NO. C915270

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ACRONYM LIST

AAR	Alternative Analysis Report
BGS	Below Ground Surface
BCP	Brownfield Cleanup Program
DUSR	Data Usability and Summary Report
HCD	HARBORcenter Development, LLC
IRM	Interim Remedial Measures
NYSDEC	New York State Department of Environmental Conservation
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo-ionization Detector
PPM	Parts Per Million
RI	Remedial Investigation
Site	75 Main Street with sections of Perry and Washington Streets
SCO	Soil Cleanup Objectives
SVOC	Semi-volatile Organic Compounds
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

On November 13, 2012, HARBORcenter Development., LLC ("HCD"), acting as a Brownfield Cleanup Program ("BCP") Volunteer, submitted a BCP Application to remediate and develop one parcel and a portion of Washington Street in the City of Buffalo, New York. This parcel, 75 Main Street, is also known as the Webster Block. HCD and the New York State Department of Environmental Conservation ("NYSDEC") executed a Brownfield Cleanup Program ("BCP") Agreement on March 6, 2013. A work plan for the Remedial Investigation and Interim Remedial Measures was prepared by C&S Engineers on behalf of HCD. The Work Plan was submitted to the NYSDEC for its review and was approved on March 29, 2013.

This report presents the data and findings of the Remedial Investigation, Interim Remedial Measure and Alternatives Analysis for the site for the BCP Site No. C915270 located at 75 Main Street, Buffalo, New York.

This section presents a summary of the Remedial Investigation, Interim Remedial Measure and Alternatives Analysis results.

Remedial Investigation Summary

Soil samples collected for the Remedial Investigation portion of the BCP confirmed that the Site was adversely impacted by historic site activities and the uncontrolled deposition of urban fill. The urban fill contained semi-volatile organic compounds ("SVOC") and metal concentrations above Commercial and Industrial Use Soil Cleanup Objectives ("SCOs"). Test pits excavated in a 50 by 50 foot grid across the site showed that urban fill overlays a native silty clay layer that ranges in depth from 8 to 14 ft BGS. Urban fill was observed to extend horizontally to the site boundaries.

Analytical results for TAL Metals in groundwater exceeded NYSDEC Technical and Operation Guidance Series Standards. These groundwater exceedances do not correlate to metal exceedances in the fill. This indicated that the urban fill may not be the source of elevated metal concentrations in groundwater.

Based on the results of the investigation, the urban fill contained contaminated material that exceeded Commercial Use and Industrial Use SCOs for metals and SVOCs. These fill contaminant concentrations were not compatible with the commercial use planned for the site redevelopment.

Interim Remedial Measures Summary

The Interim Remedial Measures were effective in remediating the Site.

Of the 136 total analytes targeted by the confirmatory sampling only 47 were detected. Of these, only four were detected above an Unrestricted Use SCO.

Those four compounds: acetone, copper, mercury and nickel were detected in native soil at depths ranging from 8 to 16 feet BGS. The four compounds were detected at the following frequency:

- Acetone
  - 22 locations (18 locations after resample)
  - All 18 locations below residential use
- Copper
  - One location
  - Below residential use
- Mercury
  - 2 locations
  - 1 location below residential use
  - 1 location below restricted residential use
- Nickel
  - 12 locations (one location in the fill and 11 locations in native soil)
  - All locations below residential use

The detection frequency of analytes exceeding Unrestricted Use SCO represents a total of 0.55% of all analytes targeted in the confirmatory samples. Based on the groundwater quality and the low number of anomalous concentrations above Unrestricted Use Standards, HCD believes this site qualifies as Track 1 BCP Cleanup, and does not require additional remedial efforts including institutional or engineering controls.

Remedial Alternatives Analysis Summary

The NYSDEC BCP requires all applicants to prepare an Alternatives Analysis Report to evaluate the range of reasonable remedial alternatives and identify the most appropriate remedy for the site (the "Preferred Alternative"). HCD entered the BCP as a volunteer, and therefore, is only required to address on-site contamination. Initial evaluation of the site conditions and potential remedies by HCD identified Commercial Use SCO as the minimum clean up standard for the site. In order to ensure that the most appropriate remedy is selected, the following alternatives were evaluated:

- No Action
- Removal to Bedrock to Guarantee Unrestricted Use SCO
- Interim Remedial Measure ("IRM") - Removal of Contamination Sources

All alternatives assume that following the remedy the redevelopment of the BCP area is constructed as planned, with six floors of parking, two hockey rinks and a hotel.

No Action

The No Action Alternative would be the least expensive alternative, would reduce the amount of contamination and limit potential human exposure to contamination due to the removal of certain impacted soil during construction, and would be easiest to implement.

However, this alternative would leave contamination on-site, thereby missing a rare opportunity to remove it while no structures were in place. Residual materials left on-site would not meet

Commercial Use SCO's, which conflict with the intended use of the site, and would not be a permanent solution to the contamination. Therefore, the No Action alternative was not selected as the Preferred Alternative.

Removal to Bedrock

Excavation to bedrock would ensure removal of all sources of contamination on-site and any impacted material. This would also have a small positive impact on the volume and mobility of contaminated materials. However, this alternative would be the most expensive, and would have only a marginal additional impact on the Site compared to the IRM.

Due to the marginal improvement that would be realized compared to the significant increase in cost from the IRM, this alternative was not selected as the Preferred Alternative.

Removal of Contamination Sources (IRM)

To expedite the site cleanup, an IRM was selected for the site. The IRM was defined to include the removal of contaminant sources with no institutional controls; specifically, removal of the heterogeneous fill until native material. Prior to starting excavation, HCD identified Commercial Use SCO, as the minimum clean up goal to allow for future use as a commercial mixed use facility, while protecting the environment at an additional cost that, while significant, still allowed redevelopment of the site.

Because the IRM activities were so successful in removing both source and impacted material, HCD recommends it be selected as the Preferred Alternative and final remedial measure.

INTRODUCTION

C&S Engineers, Inc. ("C&S") has prepared this Remedial Investigation ("RI"), Interim Remedial Measures ("IRM"), and Alternative Analysis Report ("AAR") on behalf of HARBORcenter Development, LLC ("HCD") for the Webster Block, 75 Main Street, Buffalo, New York, shown on Figure 1-1.

On November 13, 2012, HCD acting as a Brownfield Cleanup Program ("BCP") Volunteer, submitted a BCP Application to remediate and develop one parcel and a portion of Washington Street in the City of Buffalo, New York. This parcel, 75 Main Street, is also known as the Webster Block. HCD and the New York State Department of Environmental Conservation ("NYSDEC") executed a Brownfield Cleanup Program Agreement on March 6, 2013. A RI/IRM Work Plan was submitted to the NYSDEC and was approved on March 29, 2013.

The development parcel (including the Webster Block and a portion of Washington Street) totals 2.01 acres (hereinafter be referred to as the "Site"). Remedial action included the entire 2.01 acre Site, which is the location of the construction by HCD of a multi-use facility that will include multiple floors of above ground parking, two ice rinks, a restaurant, retail space, and a hotel.

The Site has an extensive industrial and commercial history related to its location near the former Erie Canal and Buffalo Harbor. Past uses, such as a brass foundry, oil warehouse, chemical company, and machining company, as well as years of unregulated deposition of fill, have impacted the subsurface soil. The intent of this RI/IRM/AAR Report is to present the results of the Remedial Investigation, the Interim Remedial Measures, and to evaluate what, if any, further remediation is required to meet the previously determined goal of reaching the Soil Cleanup Objective ("SCO") of Commercial Use.

This report is organized in three sections with the results of the RI, a description of the IRM, and the AAR, each of which is presented in separate chapters.

1.0 REMEDIAL INVESTIGATION

1.1 Project Background

1.1.1 Site Description

The Site is comprised of one tax parcel, 75 Main Street, and the western section of Washington Street, both of which were owned by the City of Buffalo prior to development. Figure 1-1 shows the Project Area and Site Boundaries.

The section of Washington Street is a City of Buffalo Street and has no publicly available property information. This section runs concurrently with the eastern property line of 75 Main Street to the intersection of Washington and Perry (418 ft) and extends east 33 ft to the centerline of Washington Street.

At the time of the BCP Application, the project was comprised of a tax parcel (75 Main) and a portion of Washington Street and the sale of these properties to HCD were pending City approval. At the time of the IRM, HCD had completed the property purchases and combined the Site into a single parcel (75 Main Street).

The Site most recently served as a parking lot for the surrounding commercial office buildings and for visitors to the First Niagara Center. The Site is bordered by the following streets:

North- Scott Street

East- Washington Street

South- Perry Street

West- Main Street

The Site is flat with a slight grade to the southwest toward the Buffalo River and has an average elevation of approximately 583 ft (NAD 88 Vertical Datum).

1.1.2 Site History

It is understood that the contamination sources are related to the historical urban and industrial use of the property and the uncontrolled deposition of urban fill that occurred over time prior to the Site's use as a parking lot.

Significant Site development history dates back to the 1820s. Major development began due to its location adjacent to a major harbor and water transportation hub. The Site has been used for warehousing and manufacturing for much of its 192 years of developed history.

Evidence of past uses (and their ancillary supporting uses such as heat and mechanical/forging operations) was verified during the excavation of archeological test pits on the Site in October 2012. These uses include:

- Coal burning: layers of black ash and cinders were observed in several building foundations associated with a former tin shop along Perry Street. These layers are consistent with coal burning for both heat and for the heating/forging of tin and metal.

- Potential tar: black, dense pitch/tar-like material was found in the southern quadrant of the Site. The layer extended for approximately 10 linear feet along one excavation wall and exhibited a strong "naphtha" odor.

- Oil storage: Dark black soil with strong petroleum odor in the central area of the Site near the former "oil storage" area from the 1890s; this soil was approximately three feet thick and was covered by wood planking.

- Black oil sludge: At approximately 10-12 feet below ground surface a clay pipe containing oil sludge was encountered on the eastern side of the Site. This material was reported to NYSDEC Region 9 and was assigned NYSDEC Spill # 1207292.

Historic maps support the presence of past operations that may have deposited the materials observed in the pits. These past operations include:

- Paint/oil Storage
- Machine Shop
- Tin Shop/Ironwork
- Blacksmith
- Engineering Supply
- Copper and Tin Smith
- Nickel Plating Shop
- Chemical Company
- Oil Refining
- Foundry
- Asbestos Warehouse

1.2 Previous Investigations

1.2.1 Confirmed Contamination

Site fill has been impacted by unregulated deposition of material from historic industrial uses over the past 192 years based on samples collected prior to the RI; the most common contaminants are associated with the fill material are semi-volatile organic chemicals ("SVOC") and metal compounds; which are consistent with the industrial uses of the Site. The extent of contamination was difficult to identify due to the heterogeneous nature of the fill material. Past investigations have determined that the vertical extent of fill material across the Site to depths between 8 to 16 ft below ground surface ("BGS"). The majority of the data collected in the previous site investigations was provided in the BCP Application; additional data was collected during the archeological assessment and presented in the RI/IRM Work Plan.

1.2.2 Groundwater

Groundwater is present on-Site in two hydrogeologic zones. The first hydrogelogic zone is a perched surface water trapped within portions of the fill material (old foundations) extending downward to a clay layer that ranges from 8 to 16 ft BGS. This zone is affected by numerous foundations throughout the Site. Water in the zone is discontinuous and limited in its nature both horizontally (by heterogeneous fill areas) and vertically by the confining clay beneath.

Beneath the fill and clay layer is a semi-confined aquifer extending into native material consisting of fine sandy silt overlaying silty clay and bedrock. This zone vertically extends from approximately 20 ft BGS (beneath the confining clay layer) to 40 ft BGS[1].

Previous groundwater monitoring did reveal metal concentrations above NYSDEC standards and guidance values. The presence of metals in groundwater in an urban area may not be Site-specific but may represent regional groundwater conditions.

1.2.3 Fill and Native Material

Previous site investigations identified the extent of soil contamination to be generally limited to the horizontal and vertical extent of the fill layer. Fill deposits were heterogeneous and consisted of a mixture of sand, silt, clay, ash/cinders, organic matter and demolition debris. Layers of ash/cinders were observed to be three to four feet thick, with scattered deposits of coal, slag, coal tar and petroleum impacted soil.

Due to the heterogeneous nature of the fill material, no defined point sources of contamination were identified. General sources of contamination were numerous and related to previous commercial and industrial activities and unregulated depositions of urban fill across the Site. Contamination was observed to be limited to the fill material and laboratory analysis indicates the fill material did not impact the underlying native clay material.

Previous sampling indicated that the fill material contained concentrations of SVOCs and metals exceeding Residential Use SCOs with some Industrial and Commercial Use SCO exceedances. Exceedances of SVOCs typically occurred in discrete deposits of ash or soil intermixed with ash/cinders. Samples indicate that detected SVOCs present in these deposits are classified as polycyclic aromatic hydrocarbons ("PAH"). PAH compounds are usually associated with burning of organic material (i.e. wood, coal or petroleum products). The presence of these compounds is consistent with the historical industrial uses of the Site.

Previous geotechnical and test pit investigations defined the vertical extent of the fill material to range between 8 to 16 feet BGS. Since fill material consisted of a heterogeneous matrix of contaminated and non-contaminated material the horizontal extent cannot be clearly defined; therefore, the horizontal extent was determined to be the limits of the BCP boundary which consists of the entire Site.

[1] "Phase II Environmental Site Investigation for the Webster Block", LiRo Engineers, Inc November 30, 2010. Prepared for Erie Canal Harbor Development Corp.

Previous investigations also determined that underlying the fill is a natural highly organic clay layer. This natural layer of clay has acted as a barrier and contained the impacts from the fill to the soil and groundwater above. Inhibiting the transmission of contaminated material and water through the clay limited the depth and scope of contamination.

1.3 Preparation for Site Development

On March 6, 2013, the Site was accepted into the BCP Program.

The building will be constructed slab-on-grade. Other than pile foundation structures, no sub-grade facilities will be installed. However, because of the contaminated fill on-site, excavation of fill material and installation of engineered fill was required for building construction. In addition, removal and relocation of the underground utilities had to occur on Washington Street.

The perimeter of the Site was shored with steel sheet pile earth retention system consisting of overlapping, interconnected steel plates. The shoring system is sized for an estimated maximum excavation depth of 12 ft BGS and was installed to a depth of 24 feet BGS.

1.4 Investigative Approach

1.4.1 Pre-Mass Excavation Test Pits

The RI Work Plan outlined a plan to determine the horizontal and vertical extent of contamination.

To ensure that the Site was thoroughly investigated a 50 foot by 50 foot grid was superimposed on the Site. As shown on Figure 1-2 each grid section, a total of 42, was given a unique identifier, letters A to K (Grid letter I was excluded) were used from north to south and numbers 1 to 5 were used west to east.

Because previous investigations had identified the fill to be contaminated, the RI focused on the vertical extent of contamination, and the conditions in the underlying clay. The RI Work Plan outlined that samples would be collected beginning at 10 feet below ground surface, and then additional samples every two to three feet, with a maximum anticipated depth of 15 feet.

However, the on-site conditions necessitated a change to the RI Work Plan; in more than half the sampling locations native material was encountered at 10 feet or less, which precluded the need for additional samples. Where fill was not encountered at 10 feet, additional samples were taken every two to three feet until native clay was encountered. Therefore, one to three samples per pit were collected (Test pit logs are provided in Appendix A). All soil samples were analyzed for VOCs, SVOCs, and TAL Metals.

In total 59 samples were collected within the grid; 43 of these samples were also used as confirmatory sampling of clean native soil. The full laboratory reports for the samples are provided in Appendix B.

To develop a profile of the conditions that would remain off-site, samples were collected every 30 linear feet along the BCP boundary. Soil samples were collected during pre-trenching for the earth retention system. A total of 40 "sidewall" samples were collected at the BCP boundary and analyzed for VOCs, SVOCs and TAL Metals. Sidewall samples were collected at various depths ranging from 3 to 10 feet BGS. Figure 1-3 shows the location of each sidewall sample and a general summary of the analytical results.

The RI Work Plan required that 10% of the samples would be collected as blind duplicates and 10% Matrix Spike and Matrix Duplicates for QAQC samples.

1.4.1 Groundwater

Groundwater samples were taken from eight monitoring wells installed during previous investigations. The RI Work Plan stated that samples would be taken using low flow purging and sampling. However, due to the low turbidity of the groundwater, a peristaltic pump was used to directly collect samples.

1.4.2 Results

In total, 100 samples were taken to confirm the horizontal and vertical limits of soil contamination, and 8 groundwater samples were taken. Of these samples, the breakdown as to purpose is as follows:

- 16 samples were taken to further assess the fill material.
- 43 samples were taken to confirm conditions of the native soil/clay
- 41 sidewall samples were taken to confirm the horizontal limits of contamination
- 8 groundwater samples were collected to assess potential impacts from the overlying fill on the groundwater.

Fill

Table 1-1 (following text) presents a comparison of soil samples to SCOs for samples collected from the fill material. Figure 1-4 shows the sample locations and a general summary of the analytical results.

These samples were collected to further assess the nature of the contamination near the bottom of the fill layer. The following observations were noted from the RI sample analyses:

- Several samples had detections of SVOCs or metals that exceeded industrial soil cleanup standards; others had exceedances above Commercial Use SCOs for SVOCs and metals;
- All of the SVOCs that exceed SCOs were PAH compounds, which is consistent with previous sampling and Site history;
- Acetone was detected in 14 of 16 collected. However the method detection limits in the remaining two samples were elevated (above 0.23 mg/kg). Therefore, it is possible that acetone is present in concentrations consistent with the other 14 samples;
- One sample exceeded Unrestricted Use SCO for benzene; and
- As shown on Table 1-1 (following text), most samples exceeded SCOs for at least one metal.

- Three metals (barium, copper, and lead) were detected above Commercial Use SCO.
  - Barium at 1 location
  - Copper at 3 locations
  - Lead at 2 locations
- Three metals were detected above Industrial Use SCOs.
  - Arsenic at 6 locations
  - Lead at 1 location
  - Mercury at 3 locations

Groundwater

Table 1-2 (following text) presents the data for the eight groundwater samples that were collected during the remedial investigation. Groundwater was compared to NYS Groundwater Standards. All of the samples had exceedances for several metals. One location (MW-5) had exceedances of SVOC's, specifically PAH's. Figure 1-5 presents the location of the wells sampled, and a summary of the analytical results.

Metals in Groundwater

Analytical results indicated that ten metals were detected above state standards in the unfiltered samples. Of the ten metals, five were commonly exceeded (in at least five of the eight wells) and included:

- Aluminum (5 of 8 wells)
- Iron (7 of 8 wells)
- Magnesium (8 of 8 wells)
- Manganese (6 of 8 wells)
- Sodium (8 of 8 wells)

Filtered groundwater samples contained four common metals above state standards

- Iron (5 of 8 wells)
- Magnesium (8 of 8 wells)
- Manganese (5 of 8 wells)
- Sodium (8 of 8 wells)

Additionally, the concentrations of these four compounds were consistent with those detected in the unfiltered samples, indicating these metals are primarily dissolved in the groundwater.

In general, the metals concentrations are consistent with urban areas, and may not necessarily be sourced from this Site.

SVOCs and VOCs in Groundwater

Only one well, MW-05, contained SVOCs at concentrations above state standards. The SVOCs (Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Chrysene) were detected in relatively low concentrations ranging from 0.78 ug/l (benzo(k)) to 2.2 ug/l (benzo (b)).

Only three VOCs were detected (all in MW-5), and none in concentrations above state standards. Monitoring well MW-5 was located in the area in which oil fill material was encountered, and historical oil storage took place, and may be related to contaminated fill. However, the concentrations are low (2.2 ug/l and below), and the remaining wells on the perimeter of the Site indicate that the residual SVOCs impacts are limited to a confined area.

Additionally, groundwater in this area is located beneath the confining clay at depths greater than 15 feet from grade. Groundwater is not used for public or private use in the City of Buffalo. City water is sourced from Lake Erie.

Native Clay

Table 1-3 (following text) presents a comparison of native soil samples to SCOs. See also Figure 1-6. The 43 samples taken delineated the vertical extent of the contamination and confirmed clean native soil at depths from generally 8 to 16 feet, with much of the Site having native material at 10 feet.

- No SVOCs were detected above Unrestricted Use SCOs in any of these samples;
- Copper was detected in a concentration above its Unrestricted Use SCO in one of the 43 samples;
- Mercury was detected in two of the 43 samples; once in a concentration exceeding the Unrestricted Use SCO, and once in a concentration exceeding the Restricted Residential Use SCO;
- Nickel was detected at a concentration above its Unrestricted Use SCO in 11 of the 43 samples; and
- All of the samples, excluding one, had detections of acetone; the one sample without acetone had a lab detection limit above acetone's Unrestricted Use SCO.

Analytical results from the native clay indicated that contamination (i.e. material exceeding commercial or industrial use SCO's) was limited to the fill material. Therefore, these clay samples were used as confirmatory samples that documented the remaining soils left in place after fill removal. The analytical results for these samples are discussed in detail in Section 2.4.

Site Perimeter

Table 1-4 (following text) presents the analytical results of samples taken along the perimeter of the Site, which documents the horizontal extent of contamination as well as characterized the fill that would remain off-site following clean-up of the Site.

Figure 1-3 shows the sidewall sample locations and a general summary of the analytical results. The results of the sidewalls were similar to the results of the RI sampling of fill material. The SVOCs that exceeded SCOs were PAH compounds. There were a number of metal exceedances in these samples. Specifically:

- Three metals were detected above Commercial Use SCOs
    - Copper at 2 locations
    - Lead at 3 locations
    - Nickel at 1 location
- Two metals were detected above Industrial Use SCOs
    - Arsenic at 3 locations
    - Mercury at 1 location

1.4.3 Contaminant Fate and Transport

Contamination was present in the urban fill material beneath the Site and surrounding areas. The fill was heterogeneous with variable/discrete contaminant concentrations.

The fill was placed above highly organic clay which separated the fill/contamination with the underlying groundwater table. Minor impacts to groundwater (less than 6 ug/l total SVOCs) were limited to one well in the center of the Site.

Based on the data collected, and the historical sourcing of the fill, the main contaminants of concern (metals and SVOCs), were fairly immobile within the fill area. It should be noted, though, that the urban fill deposits extend off-site for several blocks in the former canal area.

1.4.4 Qualitative Human and Fish/Wildlife Exposure Assessments

The Site was covered by a parking lot and street which limited potential human and wildlife exposure. Some metals were detected in groundwater at depths below 15 feet BGS. This groundwater could flow towards the Buffalo or Niagara River, but due to the lack of naturalized shoreline, impacts are unlikely. Groundwater is not used for drinking water, and therefore, there is no exposure through ingestion.

1.5 Summary

1.5.1 Soil and Fill

The data collected indicates that the Site was impacted by previous uses and heterogeneous urban fill. Contaminants of Concern were generally limited to SVOCs and metals. The sampling also determined that the horizontal limits of contamination generally extend to the Site boundaries, and the vertical limits of contamination extend through the heterogeneous fill, and was contained by the native clay material underlying the fill.

1.5.2 Groundwater Data

The groundwater at the Site contained detections of TAL metals, which is likely attributable to surrounding urban sources, and is not solely related to the fill on-site. One of the eight wells contained minor SVOC impacts; however, based on results from other wells, this area appears to be limited to the center of the Site.

1.5.3 Conclusions

Soil samples collected for the RI portion of the BCP confirmed that the Site was adversely impacted by historic site activities and the uncontrolled deposition of urban fill. The urban fill contained SVOC and Metal concentrations above Commercial and Industrial Use SCOs. Test pits excavated within each grid location showed that urban fill overlays a native silty clay layer that ranges in depth from 8 to 14 ft BGS. Urban fill was observed to extend horizontally to the Site boundaries.

Analytical results for TAL Metals in groundwater exceeded NYSDEC Technical and Operation Guidance Series Standards. These groundwater exceedances do not correlate to metal exceedances in the fill. This indicated that the urban fill may not be the source of elevated metal concentrations in groundwater. Furthermore, groundwater is not used for public or private use in the City of Buffalo. City water is sourced from Lake Erie. Therefore, the minor SVOC contamination in the groundwater and the presence of metals for not represent a risk to human health or the environment.

Based on the results of the RI, the urban fill contained contaminated material that exceeded Commercial Use and Industrial Use SCOs for metals and SVOCs. These fill contaminant concentrations were not compatible with the commercial use planned for the Site redevelopment.

2.0 INTERIM REMEDIAL MEASURES

Introduction

HCD wanted to ensure the remediation of the Site occurred in the most expedient manner that did not sacrifice any aspects of protectiveness to human health or the environment. To facilitate this, an Interim Remedial Measure ("IRM") was proposed, the intent of which was to remediate the Site to a Commercial Use SCO.

The IRM, which was outlined in the RI/IRM Work Plan (Approved March 29, 2013), proposed excavation to native material, landfilling of contaminated material, and treatment and discharge of any groundwater encountered on-site. The specific work that was completed, and any on-site changes, are discussed below.

2.1 Site Preparation

On March 1, 2013, work began at the Site.

Following the demolition of the on-site lighting poles, removal of underground utilities commenced. All utilities that service the Site were disabled prior to removal, and then subsequently removed to the boundaries of the Site. This process included the removal of electric, water and sewer lines.

Once the preliminary site preparation was complete, installation of the earth retention system commenced. The perimeter of the Site was shored with a steel sheet pile wall system consisting of interconnected steel plates. The shoring system was sized for an estimated maximum excavation depth of 12 ft BGS, and extended to a depth of 24 feet BGS.

Concurrent with the installation of shoring, remedial investigation activities including test pits, soil sampling, and groundwater sampling were conducted. These activities and results are presented in Section 1.0 of this report.

Water Collection and Treatment System

A system was constructed to collect and treat any groundwater or stormwater that would be encountered at the Site. The system consisted of a sump located along Washington Street, and two sequential holding tanks. Activated carbon filters were used to remove contaminants prior to discharging the water to the Buffalo sewer system near the intersection of Washington and Perry Streets. An industrial discharge permit was obtained by the contractor, Mark Cerrone Construction, prior to beginning construction.

Groundwater was not encountered during excavation activities. Pockets of water were encountered within limited areas of the fill (i.e. trapped within rubble), and stormwater was also collected within the excavation site. In both instances water was directed to temporary construction sumps. Water from the sumps was then pumped into holding tanks, where it was treated and discharged into the city sanitary sewer under the existing discharge permit (see Figure 2-1, Schematic of Water Treatment System).

2.2 Mass Excavation

Mass excavation began on May 6, 2013. Mass excavation was conducted to achieve two goals: (1) was to remove all material that was unsuitable for construction of the building; (2) was to remove all urban fill to achieve a minimum cleanup to Commercial Use SCOs.

Mass excavation was conducted in two phases. Phase I removed all urban fill in a "rough cut" to an elevation 574.6 (approximately 8 ft BGS).

Phase II used an excavator with a smooth bucket or a bulldozer to "finish grade" the remaining two to six feet of material. Excavation ended at native clay, as specified by the results of the RI sampling.

C&S was onsite to oversee all mass excavation activities; a daily log was completed for each day on-site and copies of these logs are included as Appendix C. Finish grading continued until native material was encountered, and each grid location was approved by C&S prior to discontinuing work.

All urban fill or debris removed from the Site during mass excavation was directly loaded onto dump trucks and disposed of at Modern Landfill in Lewiston, NY, or at Waste Management in Chaffee, NY. Both disposal sites are NYSDEC licensed landfills. Asphalt and concrete from the former parking lot was sent to Bataglia Recycling or Swift River Associates for recycling into commercial aggregate.

A total of 52,839 tons of contaminated material was disposed of off-site during the mass excavation. In addition, 121 truckloads of concrete and asphalt (approximately 1,815 tons) were sent off-site for recycling and disposal during the excavation. Tables identifying the materials that were disposed of or recycled off-site are enclosed in Appendix D.

The native clay layer was used as a marker for final excavation depth. Over the entire Site, the final depth of excavation was generally 10 feet along the northern half of the Site and 11 feet along the southern half of the Site. Example photos of the conditions at the Site are included in the photo log as Appendix E.

Some discrete areas of the Site contained deeper fill deposits, and included:

- Several wood lined "sumps" in the center of the Site;
- Deeper brick filled foundations on the northwestern corner of the Site; and
- Deep foundations for cantilever poles.

Excavation encountered variable conditions that were addressed in the field and are summarized as follows: (See also Figure 2-2)

Grid locations B4 and B5 –

Deep foundations were encountered along the northwest corner. Foundations were estimated to extend past the limit of the shoring design. A wailer system was installed that would allow excavation to 14'. Foundations consisted of brick and wood planks; dark fill and oil sludge was observed above the wood plank floor.

Grid locations C3 and E3 –

Four wood plank and timber pits were filled with black sludge material, and were excavated until only native material remained. Two holes were 13 ft BGS, one was 14 ft BGS and the deepest excavation was 19 ft BGS.

Grid locations C5 & E5 –

Caissons for two cantilever poles for the adjacent light rail line were removed. Soils excavated for caisson removal were sent to the landfill. Excavations were backfilled with a "lean" flowable concrete (no fly ash).

On the border of F4 and G4 –

A 500-gallon metal Underground Storage Tank was encountered in this area. Opening the UST revealed that it was packed with a fine sand/lean concrete mix, and had a strong VOC odor. C&S performed air monitoring around the operator and within the excavation. Photo-ionization Detector (PID) readings from within the UST were above 2700 parts per million (ppm). The sand/concrete and tank were properly broken up, collected, and disposed of at an off-site landfill.

Grid locations F1 and G1 –

VOC odors were identified along the shoring wall. Air monitoring of VOC conditions showed concentrations between 0.6 - 4 ppm that were sustained for less than one minute. No actions were taken.

Section H/J 4 –

Sample H/J was collected to assess a discrete area of black silt that was observed within the silty clay layer and underneath concrete rubble. The data found no detections of metals, VOCs or SVOCs.

Sections F2 – F3 & G2 – G3 –

Black sludge within the soil was encountered at eight feet and extended to approximately 10 feet; the soil impacted with sludge was excavated and disposed of off-site at a landfill

Section F1 –

A pipe was encountered partially filled with black sludge. The pipe was removed from the Site, and soil under the pipe was excavated until native material was exposed

2.3 Groundwater

Groundwater was not encountered during excavation activities.

The one well, MW-5, which contained SVOCs detected above NYS standards was located in the area in which oily fill material was encountered and historical oil storage took place. The oily fill material was excavated as part of the mass excavation, removing the source of contamination.

2.4 Backfilling

Once finished depth was reached, and conditions were documented and surveyed, clean fill (crushed stone) was brought on-site and placed in two to three foot lifts. Backfilling occurred concurrent with excavation activities; as excavation of the Site moved north, backfilling was conducted south to north.

The crushed rock backfill was obtained from Buffalo Crushed Stone's Como Park facility in Cheektowaga, New York, and was approved for use by the NYSDEC on May 8, 2013 (see Appendix F).

2.5 Air Monitoring

Air monitoring was performed at all times when mass excavation was being conducted. Previous sampling results indicated that VOCs were not an air quality contaminant of concern for the Site. Metals and SVOCs contained concentrations above Commercial and Industrial Use SCOs. Dust containing metals and SVOCs from urban fill was a concern during mass excavation.

A Community Air Monitoring Plan (provided in the IRM Work Plan) was developed and implemented for this Site. Two particulate monitors were used at an upwind and downwind location. Measurements of particulate (dust) concentrations were continuously monitored and logged every 15 minutes. Air monitors were moved throughout the day, (as needed) as winds shifted direction.

During excavation, the greatest concern for the production of fugitive dust was from trucks driving across the Site and onto Scott Street. If downwind concentrations exceeded 0.15 mg/m^3 over 15 minutes, or if excessive visible dust on the reads and air were visually observed, dust suppression measures were implemented. These measures included using a water truck to wet the surface of any area that was producing dust and wetting/sweeping sediment from public roadways around the Site.

These measures were successful in limiting exposure to fugitive dust during mass excavation. Appendix G provides concentration summary graphs for each week that mass excavation was conducted. Note that on days there was rain, no air monitoring was conducted.

2.6 Confirmatory Sampling

Confirmatory Samples were taken currently with the RI to determine the required depth of excavation. The results of the sampling were detailed in Section 1.4.2 and in Table 1-4. The full Laboratory Reports are provided in Appendix B.

The excavation of source materials and impacted soils remediated the area to Unrestricted Use SCO, excluding some minor anomalous detections.

A total of 136 analytes were targeted by the confirmatory sampling, of these, only 47 were detected. Of those 47 detected compounds, only five were detected above an Unrestricted Use SCO. Those five compounds (acetone, chromium, copper, mercury and nickel) were detected in native soil at depths ranging from 8 to 16 feet BGS, and are discussed below.

IRM ACTIONS AND ANALYTICAL RESULTS

Acetone

Eight groundwater samples were taken as part of the remedial investigation. Only one sample had detectable amounts of acetone at 8.3 ug/l, which is below the guidance standard of 50 ug/l for groundwater.

Previous sampling of fill material identified the principal contaminates of concern to be SVOCs (PAHs) and Metals. However, the IRM activities included analysis of VOCs, SVOCs, and Metals. Additionally, samples of the fill for the Site found acetone in all but two of the 16 samples ranging from 0.0092 mg/kg to 0.23 mg/kg (Figure 2-3). Of the 16 samples, five exceeded the Unrestricted Use SCO (31%); the method detection limit for the two non-detects were above the Unrestricted Use SCO for acetone of 0.05 mg/kg.

Confirmatory sampling detected acetone in all but one sample of the native clay. (Note: one sample that was a non-detect had a method detection limit above the unrestricted use standard.) Of the 43 closure samples 22 had detections above the Unrestricted Use SCO (50%). This was the only VOC that had detections above Unrestricted Use SCO and the most commonly detected VOC. Detections ranged from 0.007 mg/kg to 0.30 mg/kg. The frequency of the exceedances of the Unrestricted Use SCO was higher in the native clay than in the fill, indicating potentially slightly higher concentrations in the native soil.

Table 2-1: Acetone Detections

	Total # of samples	Detections above Unrestricted Use SCO (>0.05 mg/kg)	Detection below Unrestricted Use SCO (<0.05 mg/kg)	Non-detect above Unrestricted Use SCO (>0.05 mg/kg)	Non-detect below Unrestricted Use SCO (<0.05 mg/kg)
Remedial Investigation Samples	16	5	9	2	0
Confirmatory Samples	43	22	20	1	0

The increase in the detection of acetone from the fill to the native material was considered anomalous and additional sampling was completed to further assess the potential acetone presence. Twelve new samples, approximately 28% of the confirmatory samples, were collected; 5 of 12 the resamples did not have detectable amounts of acetone and the other seven had detections below the Unrestricted Use SCO, with detections ranging from 0.011 mg/kg to 0.028 mg/kg. This presents a considerable reduction in the frequency of detected acetone (98% detection in the initial sampling event vs. 58% in the re-sampling event).

Reduction of acetone concentration was also observed with 51% of original sampling exceeding Unrestricted Use SCO versus 0% of the resampling event. Furthermore, the peak concentration of 0.30 mg/kg in the initial sampling event was markedly higher than the peak concentration in the resample event (0.028 mg/kg). Notably, the resample event had a much smaller range of acetone detections (0.011 mg/kg to 0.028 mg/kg, a range of 0.017 mg/kg). Table 2-2 presents a summary of detection frequencies by sampling event

Table 2-2: Frequency of Acetone Detections

	Total	Number with Detections	% with Acetone Detections	# Exceeding Unrestricted Use	% Exceeding Unrestricted Use	Range of Detections mg/kg	Average
Confirmatory Samples	43	42	98%	22	51%	0.007 to 0.30	0.064
Re-Sample Event	12	7	58%	0	0%	0.011 to 0.028	0.017

<u>Analysis of Acetone Analytical Results</u>

Acetone is a common modern solvent used for cleaning as well as in laboratories. Common industrial uses of acetone include acetylene manufacturing, printing, paint production and manufacturing acetone for commercial sale. None of these activities were known to occur on the Site. Previous on-site investigations did not identify acetone as a contaminant of concern based on either previous site usage or sampling. Furthermore, detectable acetone concentrations between the fill and native clay are consistent for both the minimum and maximum detected values. If acetone were sourced from historical site usage, significantly higher acetone would be expected in the fill material (source layer) than in the underlying clay.

Additionally, subsequent resampling of the clay layer (of approximately 25% of the original locations) resulted in significantly lower frequency of acetone detections and peak concentrations.

These data indicate that the acetone results may not be truly representative of actual Site conditions. The factors supporting that acetone is being falsely detected at artificially high concentrations include:

- No known point source from industrial or commercial processes for acetone on-site or historically on-site.

- Acetone in resampling event resulted in markedly lower detections.

- Acetone is a ubiquitous chemical in laboratories and sampling equipment (and other industries that clean precision equipment).

- Acetone can be created naturally in plants and animals, including bio-degradation of organic matter (such as in organic clays and peat), as well as in the exhaled air of humans[2].

- Acetone is present in vehicle exhaust, and the Site's location near Route 5, Route 190, and the significant construction projects on-site and adjacent, may have artificially contaminated Site samples during the initial sampling.

- Acetone will biodegrade in soil within weeks, and is not commonly persistent in soil[3], unless a continual loading is occurring.

- Acetone can be erroneously detected in some samples as a laboratory contaminant or occur appear due to cross contamination.

Chromium

The sampling protocol completed for the RI and IRM work plan included sampling for total chromium. The results showed total chromium concentrations exceeding the Unrestricted Use SCO for hexavalent chromium for all samples. However, none of the on-site samples had total chromium above 30 mg/kg, which is the Unrestricted Use SCO for trivalent chromium.

C&S consulted with the NYSDEC to develop a protocol to determine if the chromium on-site was hexavalent or trivalent. Twelve (12) additional samples were collected from the native clay to determine the type of chromium, a blind duplicate and a Matrix Spike and Matrix Spike duplicate were also taken, consistent with the QAQC plan for the project. Figure 2-5shows the sample locations and results.

None of the samples had detectable levels of hexavalent chromium. The laboratory data shows that the method detection limits were all below the Unrestricted Use SCO of 1 mg/kg.

Based on the supplemental sampling, the chromium present in the clay was determined to be trivalent chromium, and therefore, chromium concentrations remaining on-site are below the Unrestricted Use SCO.

Metal Results

Of the 43 Confirmatory samples collected, one sample (G1) contained copper at a concentration above its Unrestricted Use SCO. In addition, one of the 43 samples contained mercury above Unrestricted Use SCO (G2) and one above Restricted Residential Use SCO (G1).

Twelve (12) of the 43 confirmatory samples of the native material (27%) contained nickel slightly above Unrestricted Use SCO's (see Table 2-3 below). The Unrestricted Use SCO standard for Nickel is 30 ug/kg. As shown on the table below detections in the native material ranged from 30.2 to 39.8 ug/kg, which is nominally above the Unrestricted Use SCO. The analysis of the fill undertaken for the RI had one detection (6%) above the Unrestricted Use SCO, (location F3 at 30.7 ug/kg). Additionally, the 41 site perimeter samples, which delineated

[2] Draft Screening Assessment; Acetone" Environment Canada, Health Canada, July 2013
[3] ibid

the contamination left outside of the BCP boundary, only had four detections of nickel above Unrestricted Use SCOs (i.e. 10% of perimeter samples exceeded Unrestricted Use SCOs).

The increase in nickel detections in the native clay, compared to the fill and site perimeter, demonstrates that the concentration of nickel is higher in the native clay than in the fill. This indicates that the nickel concentrations in the native clay are naturally occurring in the formation and not related to the contamination deposited above.

Table 2-3 Nickel Detections in Native Clay

Shown in ug/kg

Sample Location	B2	B5	C5	D3	D4	D5	E1	E2	E3	E4	E5	H1
Nickel Detection	31.4	39.8	30.2	35.2	33	31.8	32.1	36.4	32.2	32.7	33.0	30.4

All three metals exceeding Unrestricted Use SCOs (copper [1 detection] mercury [2 detections] and nickel [12 detections]) are naturally occurring in soils and were present at concentrations consistent with regional background concentrations for the Eastern U.S[4].

Organics

No other VOCs or SVOCs were detected in any samples above Unrestricted Use SCOs.

Groundwater

Groundwater below the site is located beneath a confining clay at depths greater than 15 feet from grade. The presence of metals in groundwater is not unusual in an urban area with a long history of industrialization. Additionally the metals detected in groundwater did not correlate to the metals of concern identified in the fill material, indicating the source of the metals in groundwater was regional or natural. The mass excavation removed the oily fill adjacent to MW-05 which had detections of five SVOCs. The wells located along the perimeter of the site did not contain detectable levels of SVOCs. Furthermore, groundwater is banned from public or private use in the City of Buffalo. City water is sourced from Lake Erie. Therefore, the minor SVOC contamination in the groundwater and the presence of metals for not represent a risk to human health or the environment.

2.7 Summary of Interim Remedial Measures

The IRM was effective in remediating the Site.

Of the 136 total analytes targeted by the confirmatory sampling, only 47 were detected. Of the 47 detections, only four were detected above an Unrestricted Use SCO.

[4] Table 2; “Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States”; USGS Paper #1270, 1984.

Those four compounds (acetone, copper, mercury and nickel) were detected in native soil at depths ranging from 8 to 16 feet BGS. The four compounds were detected at the following frequency:

- Acetone:
  - 22 locations (18 locations after resample)
  - All 18 locations below residential use
- Copper
  - 1 location
  - Below Residential Use
- Mercury
  - 2 locations
  - 1 location below residential use
  - 1 location below restricted residential use
- Nickel
  - 12 locations, (one location in the fill and 11 locations in native soil)
  - All locations below residential use

The detection frequency of analytes exceeding Unrestricted Use SCO represents a total of 0.55% of all analytes targeted in the confirmatory samples. Based on the groundwater quality and the low number of anomalous concentrations above Unrestricted Use Standards HCD believes this Site qualifies as Track 1 BCP Cleanup status, and does not require additional remedial efforts, including any institutional or engineering controls.

3.0 QA/QC/DUSR

Quality control samples were collected from the samples to characterize the contamination and document the IRM activities. The IRM Work Plan stated that 20% of the samples would be collected for QAQC.

100 soil samples were collected during the IRM activities; 20 QAQC samples were taken, ten blind duplicates and ten Matrix Spike/Matrix Spike Duplicates; eight groundwater samples were collected as well as one blind duplicate and one Matrix Spike. This meets the 20% criteria.

The Data Usability and Summary Report ("DUSR") was prepared by a third-party data consultant, Data Validation Services, as required in the RI/IRM Work Plan, and is included as Appendix H. The following items were reviewed:

- Laboratory Narrative Discussion
- Custody Documentation
- Holding Times
- Surrogate Standard Recoveries
- Matrix Spike Recoveries. Duplicate Recoveries
- Blind Field Duplicate Correlations
- Preparation/calibration Blanks
- Laboratory Control Samples (LCSs)
- Calibration/Low Level Standards
- ICP Serial Dilution
- Instrument MDLs
- Sample Result Verification

Based on the DUSR some of the data was further qualified. Any required adjustments were incorporated into the summary data tables. Data associated with acetone sampling preformed at Test America's facility in Edison were found to be unusable, because the samples containers had been previously opened and analyzed for hexavalent chromium, this resulted in the possibility of contamination from other sources. These results were reported on report 480-42606-2 and have not been included in any of the analysis, reporting or tables for this report. The original report is included in Appendix B for reference.

4.0 ALTERNATIVES ANALYSIS REPORT

The NYSDEC BCP requires all applicants to prepare an Alternatives Analysis Report ("AAR") to evaluate the range of reasonable remedial alternatives and identify the most appropriate remedy for the Site. The selected alternative does not need to remediate the property to an Unrestricted Use SCO; however, all sites must evaluate this alternative.

HCD entered the BCP as a volunteer and therefore, is only required to address on-site contamination. Initial evaluation of the Site conditions and potential remedies by HCD identified Commercial Use SCO as the minimum clean up standard for the Site. In order to ensure that the most appropriate remedy is selected, the following alternatives were evaluated:

- The No Action Alternative
- Interim Remedial Measure - Removal of Contamination Sources
- Removal to Bedrock to Guarantee Unrestricted Use SCO

All alternatives assume that following the remedy, the redevelopment is constructed as planned, with six floors of parking, two hockey rinks and a hotel.

4.1 No Action

The No Action Alternative would have consisted of HCD excavating only a limited amount of impacted fill to which would have been replaced with a heterogeneous fill to provide a constructible base for the facility.

The fill that would have been removed from the Site would have been contaminated and would have been disposed of at landfills. This would have the effect of a reduction in the presence of contamination but not eliminated the contamination.

Adherence to Standards

Previous Site investigations identified heterogeneous fill, which contains contamination exceeding Industrial Use SCOs to a maximum depth of between 8 and 14 feet BGS. The implementation of the No Action Alternative would have left in place up to ten or more feet of impacted fill. It is likely that the Site would still have soil with SVOC and Metal detections above Commercial and some above Industrial Use SCO's.

Because HCD determined that a Commercial Use SCO was the minimum objective for remediation the Site, the No Action Alternative would not have met this standard.

Public Health and Environment

Removal of several feet of fill would remove some of the contamination, and therefore, reduce potential exposure pathways, either through future excavation or groundwater impacts. Some exposure to contamination would occur during the excavation and site preparation.

Leaving in place several feet of impacted fill would not remove all source materials; however, the construction of the facility, and the six floors of parking would encapsulate the remaining contamination in place. This would limit additional exposure to the contamination and likely keep much of the contamination on-site.

The No Action Alternative would be relatively protective of human health and the environment the facility would act as a barrier to further exposure. However, the source material left would still be contaminated and groundwater that encountered this material could be impacted. Additionally, future maintenance of the building that required excavating through the ground floor could possibly contact the material. Metals exceeding industrial standards and PAH's would have remained under a commercial building.

Standards, Criteria, and Guidance

Removal of some of the source material may reduce the detections of some of the pollutants of concern; however, the Site material was extremely heterogeneous, and therefore, it is difficult to estimate the outcome of removal of a portion of the fill. A linear reduction in contamination cannot be assumed based on a reduction of material; removal of 50% of the material would not equal a 50% reduction in contamination.

Based on the heterogeneous nature of the fill, removal of some of the material would likely reduce the amount of on-site contamination. However, detections of SVOCs and Metals would still likely exceed Commercial and Industrial Use SCOs at depth.

This alternative would likely not remediate the Site to a Commercial Use SCO, and would leave contamination below the building at a concentration incompatible with a commercial facility.

Long Term Effectiveness and Permanence

The removal of the fill from the Site would permanently reduce the amount and volume of the contamination on-site; construction of the building would provide a cap and prevent further direct exposure to contamination for the life of the facility.

Over the long term this would prevent exposure; however, the No Action Alternative would not permanently remove contamination or potential for exposure because impacted fill would still remain on-site and would not be removed or properly contained. The future removal of the fill would be impossible until the building was removed.

Reduction in Toxicity, Mobility, or Volume

Excavation of the fill material from the Site is used to reduce toxicity; however, it may not address all aspects of contamination reduction. Four criteria must be evaluated relative to reduction:

- Destruction, on/off site
- Separation or treatment
- Solidification or chemical fixation
- Control or isolation

The No Action Alternative (like all alternatives being evaluated for the Site) would excavate the material, remove it from the Site, and dispose of it at an appropriate landfill facility. The construction of the facility would provide a barrier for the remaining contamination and possibly isolate it in place. This process would be considered a control or isolation of the contamination, which is a reduction of any potential remaining contamination's mobility.

Due the nature of the source of the contamination, a heterogeneous urban fill, other options to reduce the toxicity or volume of material were not feasible.

Removal and landfilling of some of the contamination, along with fixing in place the remaining material would reduce mobility; however, it would have no impact on volume or toxicity.

Short Term Impacts and Effectiveness

The No Action alternative would reduce a portion of the on-site contamination relatively quickly. However, a majority of the contamination would remain in place and not be addressed until the next time the Site is redeveloped, which has no known timeframe.

Implementability

The No Action Alternative would be easy to implement. Construction required installation of a suitable sub-base, and only the depth required for that sub-base would be removed. This would shorten the excavation period, and eliminate the need for a shoring system to be constructed, thereby reducing the construction time.

Cost Effectiveness

This would be the least expensive alternative. Limiting the depth of the excavation would reduce the cost associated with excavation (equipment, manpower, and environmental oversight), the disposal cost of material, and the cost of the shoring system.

Community Acceptance

The No Action Alternative may have some community objections. The building would fix the remaining material in place and limit exposure but it would also eliminate the ability to remove that material for the life of the facility. Due to the proximity of the Site to the Buffalo and Niagara Rivers, and the relative permanence of the facility failing to adequately remediate the Site at the time of construction, would likely be considered a missed opportunity and could be viewed negatively by the community.

Land Use

The construction of the facility would have been complicated by the implementation of the No Action Alternative. The developer is investing over $180 million of private equity in the new facility.

Leaving contamination in place may affect future equity in the investment through potential effects on future equity lending or sale opportunities. Therefore, leaving contamination on-site may affect the ultimate level of investment/project development at the Site. The presence of contamination had previously dissuaded development on-site for the past 20 years.

Summary

The No Action Alternative would be the least expensive alternative, would reduce the amount of contamination at the Site, would limit potential human exposure to contamination and, it would be easiest to implement.

However, it would leave contamination on-site, missing a rare opportunity to remove it while no structures were in place. Materials left on-site would not meet Commercial Use SCO's, which conflict with the intended use of the Site, and would not be a permanent solution to the contamination. Therefore, the No Action Alternative was not selected as the preferred alternative.

4.2 Removal of Contaminant Sources with no Institutional Controls

To expedite the Site cleanup, an IRM was selected for the Site. The IRM measure included the removal of contaminant sources with no institutional controls, including, removal of the heterogeneous fill until native material. Prior to starting excavation HCD identified Commercial Use SCO as the minimum clean up goal.

The IRM is described in detail in Section 2.0 in this report.

Adherence to Standards

The IRM removed the contaminant source native material beneath the fill which demonstrated constituent concentrations below Commercial Use SCO targets. As discussed in Section 2.0, removal of the source material was so successful that the vast majority of remaining Site soils contain constituent concentrations below Unrestricted Uses SCOs. Therefore, implementation of the IRM adhered to all standards required by the work plan.

Public Health and Environment

Removal of the source material was anticipated to significantly reduce the on-site contamination, and ensure no new impacts occurred. The IRM removed the source material, and was able to remediate the Site to allow all future uses. The IRM removed the possibility of future continuation of water or impacts to humans, and therefore, was fully protective of public health and the environment.

Standards, Criteria, and Guidance

Removal of the source material and impacted soil was intended to, at a minimum, meet Commercial Use SCOs; the IRM was able to meet Unrestricted Use SCO for over 99% of the targeted analytes, which is the most restrictive standard of soil cleanup in the BCP.

Long Term Effectiveness and Permanence

The IRM removed the contaminant impacted fill, and placed the material in a licensed landfill. This is a long-term and permanent solution to the on-site contamination. Groundwater beneath the Site was mildly contaminated in one specific area. The removal of fill ensures future sources of groundwater contamination have been removed.

Reduction in Toxicity, Mobility, or Volume

Excavation of the fill material from the Site is used to reduce toxicity at that site; however, it may not address all aspects of contamination reduction. Four criteria must be evaluated relative to reduction:

- Destruction, on/off site
- Separation or treatment
- Solidification or chemical fixation
- Control or isolation

Removal of the entire contaminant source and other impacted materials would control and isolate the contamination which would reduce its mobility. Due the nature of the source of the contamination, a heterogeneous urban fill, other options to reduce the toxicity or volume of material were not feasible.

This alternative had a positive impact of the mobility of contamination.

Short Term Impacts and Effectiveness

This removal alternative effectively and quickly eliminated contaminant source material and impacted media.

Implementability

This alternative was implemented.

Cost Effectiveness

Of the three options being evaluated for this option, this is the second most cost effective. This required an additional investment over the No Action Alternative, but effectively eliminated the source of contamination, with an additional cost for removal of all fill on-site.

Community Acceptance

The IRM was subject to a public comment period, and was accepted by both the NYSDEC and the public.

Land Use

The IRM was designed to remediate to a standard that would allow construction of the facility as proposed. Therefore, it was consistent with the proposed land use. Because the remediation met a higher standard, other land uses would be allowed; however, no changes to the facility were proposed.

Summary

The IRM was designed to remediate the Site to allow for future use as a commercial mixed use facility while protecting the environment and at an additional cost that, while significant, still allowed redevelopment of the Site. This was selected as the interim remedial measure and because it was so successful in removing both source and impacted material, HCD recommends it be selected as the final remedial measure.

4.3 Complete Removal to Bedrock to Guarantee Remediation to Unrestricted

The BCP regulations require that all projects evaluate a remedy that would meet Unrestricted Use SCO. To ensure that the Site attains Unrestricted Use SCO, excavation to bedrock would be the most conservative means of ensuring that remediation meet the Unrestricted Use SCO Standard.

Prior to the implementation of the IRM, geologic investigations of the Site determined that the subsurface geology was generally:

- Six inches of pavement and sub-base
- Fill (8 to 14 ft BGS)
- Native Material (high organic content)
- Clay
- Unconfined Aquifer
- Bedrock (42 to 50 ft BGS)

Excavation to bedrock would have required similar techniques as the IRM; specifically, the installation of shoring, excavation and disposal, and backfilling. However, to implement the IRM excavation was completed to generally 10-14 feet across the Site, removal to bedrock would have required an additional approximately 35 feet of excavation across the Site.

Excavation to 42 to 50 feet BGS would have required a much more robust shoring system, which would have been installed into the bedrock and would have at minimum doubled the amount of material that was removed from the Site (from 55,000 tons to more than 110,000 tons).

Moreover, significantly more dewatering would have been required; dewatering for the IRM generally related to stormwater and there were limited occurrences of groundwater. Excavation to bedrock would require dewatering all groundwater on the Site.

As with the other alternatives the material removed from the Site would be screened and landfilled, or if appropriate, reused on another site.

<u>Adherence to Standards</u>

Unrestricted Use SCO is the most conservative soil cleanup standard in the BCP Program. Excavation to bedrock would ensure that the Unrestricted Use SCO standard was obtained; therefore this alternative would adhere to all standards.

The excavation would also have required dewatering, which would have removed residual SVOC and VOC contaminants identified in one well on-site.

<u>Public Health and Environment</u>

Removal to bedrock would be the most protective alternative for public health and the environment. All impacted fill and groundwater would be removed and then contained appropriately or reused. This would eliminate any further interaction with contaminated materials.

Standards, Criteria, and Guidance

Cleanup to an Unrestricted Use SCO, including dewatering of Site groundwater, would meet all standards, criteria, and guidance. Removal of all site materials would remove not only the source of contamination, but any media that may have been impacted by the sources even if only marginally.

Long Term Effectiveness and Permanence

This alternative would permanently remove the contaminant source (fill) and any impacted material from the Site. Water removed from the Site would be treated, impacted fill and soil would be disposed of and clean material could be reused. This would be a long-term and permanent solution.

Reduction in Toxicity, Mobility, or Volume

Excavation of the fill material from the Site is used to reduce toxicity at that site; however, it may not address all aspects of contamination reduction. Four criteria must be evaluated relative to reduction:

- Destruction, on/off site
- Separation or treatment
- Solidification or chemical fixation
- Control or isolation

Excavation to bedrock would require dewatering of the area, any water that was removed would be treated prior to discharge, which, if it was impacted, would reduce its toxicity and the total volume of impacted materials.

Removal of the contaminant source and other impacted materials would control and isolate the contamination, which would reduce its mobility. Due to the nature of the source of the contamination, a heterogeneous urban fill, other options to reduce the toxicity or volume of material were not feasible.

This alternative would have a positive impact of the mobility of contamination and some positive impact on volume and toxicity.

Short Term Impacts and Effectiveness

This alternative would effectively and quickly eliminate all contaminant source material and impacted media.

Implementability

This alternative could be implemented. Construction of the shoring system required to excavate to 50 feet would be complex and a significant project expense but could be implemented. The other aspects of this alternative would be similar to those employed as the IRM, excavation and disposal.

Cost Effectiveness

This would be the most expensive option to implement. The installation of a more robust shoring system would significantly increase the cost of the remediation; more material would be removed from the Site and incur disposal costs, more clean backfill would be required, dewatering costs would increase as compared to the other alternatives and the man power costs to implement would more than double. This would remove all contamination at the Site but would be very expensive to implement.

Community Acceptance

The removal of all material to bedrock is the most conservative option, it would therefore, likely be accepted by the community.

Land Use

Cleanup to an Unrestricted Use SCO would allow for construction of any type of facility or reuse, including growing crops, the planned facility would be considered appropriate on land remediated to a Commercial Use SCO. This alternative would allow for the construction of the facility as planned; therefore, it would have no adverse impact on land use.

Summary

Excavation to bedrock would ensure removal of all sources of contamination on-site and any impacted material. This would also have a small positive impact on the volume and mobility of contaminated materials. However, this alternative would be the most expensive and would have only a marginally additional positive impact on the Site compared to the IRM which remediated the Site to concentrations that, except for a few anomalies, met the Unrestricted Use SCO.

Due to the only marginal improvement compared to the significant increase in cost, this alternative was not selected as the preferred alternative.

Summary of Preferred Alternative

Removal of contaminant sources without the use of institutional controls was selected by HCD as the proposed remedy and was implemented as the Interim Remedial Measure. It is the most cost effective solution, it is protective of the environment, and ultimately, was able to remediate the Site soil to concentrations that, excepting a few anomalies, met the Unrestricted Use SCO.

FIGURES

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