CITY OF ROME
DRAFT ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES
FORMER ROME-TURNEY RADIATOR COMPANY SITE

NYSDEC SPILL No. 8802056
109 Canal Street
City of Rome, New York

December 7, 2015

1.0 INTRODUCTION

Analysis of Brownfield Cleanup Alternatives (ABCA)

The City of Rome has prepared this Draft Analysis of Brownfield Cleanup Alternatives, considering site characteristics, surrounding environment, land-use restrictions, potential future uses, and cleanup goals. The final ABCA will be signed by an authorized representative of the grant recipient and the ABCA must include:

i) information about the site and contamination issues (e.g., exposure pathways, identification of contaminant sources, etc.), cleanup standards, applicable laws, alternatives considered, and the proposed cleanup;
ii) effectiveness, implementability, and the cost of the proposed cleanup;
iii) evaluate the resilience of the remedial options in light of reasonably foreseeable changing climate conditions (e.g., sea level rise, increased frequency and intensity of flooding and/or extreme weather events, etc.);
iv) an analysis of reasonable alternatives including no action. For cleanup of brownfield petroleum-only sites, an analysis of cleanup alternatives must include considering a range of proven cleanup methods including identification of contaminant sources, exposure pathways, and an evaluation of corrective measures. The cleanup method chosen must be based on this analysis; and
v) the alternatives may consider the degree to which they reduce greenhouse gas discharges, reduce energy use or employ alternative energy sources, reduce volume of wastewater generated/disposed, reduce volume of materials taken to landfills, and recycle and re-use materials generated during the cleanup process to the maximum extent practicable.

1.2 REPORT AND PLAN ORGANIZATION

This document is organized as follows:

Section 1.0	ABCA report introduction;
Section 2.0	Site background information and a description of areas of concern (AOCs);
Section 3.0	Discussion of the contaminants in the Site soil and groundwater along with potential exposure routes and migration pathways;
Section 4.0	Presents the identification and development of potential remedial alternatives;
Section 5.0	Presents a detailed analysis of the alternatives;
Section 6.0	Presents the selected alternative and recommendations;

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2.0 SITE BACKGROUND AND SETTING

Targeted Community Description

The City of Rome has been known historically as the industrial and manufacturing center of Oneida County. Its history is defined by geographic feature, including the Mohawk River, the Erie Canal and its location in the "center" of New York State. Known as the "Copper City", Rome was home to numerous metal industries such as Revere Copper, Rome Cable and General Cable. From 1950-1995, Rome was the home of Griffiss Air Force Base which closed in 1995 causing Rome and the region to suffer notable economic and demographic declines.

Rome is participating in the Brownfield Opportunity Area Program(BOA), which is funded, administered and overseen by the New York State Department of State(DOS) and Department of Environmental Conservation(DEC). Rome's first BOA is the Downtown Rome BOA, which us a 513 acre site that includes a mixture of residential, industrial, commercial and retail land uses. This BOA has been divided into nine subareas to assist with the completion of the inventory and analysis and to ensure that recommendations address neighborhood-specific issues and opportunities.

The target of this application is the Former Rome-Turney Radiator Company. This site is identified in the Nomination Study, prepared under Step 2 of the BOA Program and dated September 2012, as one of two strategic site within the Erie Boulevard Gateway Subarea. This area serves as the primary gateway from the south across the Erie Canal. This underdeveloped corridor is a prime area for business development, green infrastructure improvements, streetscape enhancements as well as traffic calming measures to create a positive first impression of the city.

Description of Brownfields

The Downtown Rome Brownfield Opportunity Area (BOA) is composed of 513 acres and has 92 brownfield sites. The Erie Boulevard Gateway Subarea, one of 9 within the BOA, is 31.9 acres and of the 86 parcels that comprise it, 32 are brownfields. Given the statistics, many of these are one acre or less and are within close proximity of one another.

The target site is one of two sites within this subarea identified in the Nomination Study under the NYS BOA Program as a strategic site. Because this site has a highly visible location near the intersection of Black River Boulevard and Erie Boulevard, it is a catalyst site that could ultimately play a role in the revitalization of the Downtown Rome Brownfield Opportunity Area. The site is currently vacant and includes several structures. It was owned and operated by the Rome-Turney Radiator Company from 1905 until the mid-1990s as a manufacturing plant for radiators. In June 1988, it was given a petroleum Spill No.(8802056) when a release of petroleum from fuel storage tanks was discovered and reported to the New York State Department of Environmental Conservation. Subsequently, it has been used for light manufacturing and storage by several different companies. Because of past use and known petroleum contamination, reuse of this site in its current condition is limited and is a real detriment to the revitalization of the area.

2.2 SITE HISTORY

Basic Site Information

(a)The site is known as the Former Rome-Turney Radiator Company Site. (b)The site address is 109 Canal Street, Rome, NY, 13440. The tax ID is 242.066-0001-001.(c) The City of Rome is the current owner. (d) Not applicable.

Status and History of Contamination at the Site

(a) This site is contaminated by petroleum and hazardous substances. (b) The site was the location of the Rome-Turney Radiator Company that manufactured radiators from 1905 until the early 1990s, when the company went out of business. From 1992 through 1995, the property was operated by Lynch Realty, The Music Factory (an internet search indicated that this was an asphalt company), the Rome-Turney Radiator Co., and Serway Brothers Inc.-Plastic Laminating Division (an internet search indicated that this was a cabinet making company). From 1999 through 2003, the property was operated by The Music Factory and the Rome-Turney Radiator Co. In 2008, the property was operated by Elegrace Casket Inc. (an internet search indicated that this was a casket making company), Rofin LLC (an internet search indicated that this was a global supplier of industrial coolers who purchased all of the assets of the Rome-Turney Radiator Co.), and the Rome-Turney Radiator Company. In 2013, the property was operated by The Music Factory. The site is currently vacant and not actively used. (c) Soils and ground water have been contaminated by petroleum and other hazardous substances.(d) The site was given a NYSDEC Spill No.(8802056) in June 1988 when a release of petroleum from fuel storage tanks was discovered and reported to NYSDEC. Site investigation indicates that petroleum has impacted the soils at levels that exceed the New York State standards. The source of this petroleum contamination is from former on-site bulk storage and leaking underground storage tanks.

2.3 PREVIOUS ENVIRONMENTAL SITE INVESTIGATIONS

A Phase l environmental Site Assessment and Site Investigation has been completed during September through December 2015.

2.4 RECOGNIZED ENVIRONMENTAL CONDITIONS AND AREAS OF CONCERN

Based on a review of the Site history and previous environmental investigations, several areas of concern (2- AOCs) were identified on-site include:

- Underground gasoline storage tanks (AOC 1),
- Former underground fuel oil tanks (AOC 2),

3.0 SITE INVESTIGATION SUMMARY

The former Rome-Turney Site located at 109 Canal Street was issued a NYSDEC Spill No.

8802056 in June 1988 when a release of petroleum from fuel store tanks was discovered and reported to NYSDEC. The Site Investigation completed during October and November 2015 by Bergmann Associates was based on the recommendations in the Phase I Environmental Site Assessment Report (Bergmann, August 24, 2015). The Phase I Environmental Site Assessment Report recommended a Site Investigation to evaluate the known petroleum contamination associated with leaking underground storage fuel oil tanks and other recognized environmental conditions.

The Site Investigation has revealed petroleum impacted soil at levels that exceed NYSDEC CP-51 Soil Cleanup Objectives (SCOs) and NYSDEC 6 NYCRR Part 375-6.6 Soil cleanup objectives. These petroleum impacted soils require remediation under the supervision of NYSDEC. The source of the petroleum contamination is from former on-site bulk petroleum storage and leaking underground storage tanks. The EPA Brownfield Cleanup Grant will be used to clean up the petroleum impacted soils to meet NYSDEC SCOs and remove remaining underground storage tanks.

The Site Investigation included:

- A Geophysical Survey EM-61 that located metallic anomalies
- Excavation of 8 test Pits at suspected USTs locations and metallic anomalies
- Installation of 8 soil borings competed as groundwater monitoring wells
- Field Soil screening for total VOC vapor with Photoionization detector ranged from non-detect to 730 ppm
- Floating petroleum product was not observed – Stained soils and petroleum odors were noted from test pit soils and soils encountered in soil borings.
- Laboratory soil and groundwater analysis of 101 samples for: VOCs, SVOCs, Metals, Pesticides, and PCBs
- Coordination with NYSDEC

Soil Sample Summary

- PCBs are not a chemical of concern (COC) - Non-detection for PCBs

- Pesticides are not a COC - Non-detection of Pesticides

- VOCs low levels of Gasoline Chemical Compounds do not appear to be COC and were detected in the following ranges: Naphthalene in the 0.445 to 5 ppm range, 1,2,4-Trimethylbenzene 0.0895 ppm (TP-5), 1,3,5 –Trimethylbenzene 0.0322 ppm, n-Butylbenzene 0.0327, n-Propylbenzene 0.035 ppm, sec-Butylbenzene 0.0247, Methylcyclohexane 0.0474 ppm to 1.3 ppm, m,p, Xylenes 0.0228 ppm and other low level gasoline VOCs.

- Low levels of Acetone detected (0.0509 ppm to 0.115 ppm range)

- Chlorinated VOCs non-detection are not a COC.

- SVOCs are a COC with petroleum chemical compounds that exceed NYSDEC CP-51 SCO for fuel oil / diesel compounds. See Summary Tables and Figures that present the SVOCs that exceed standards.

- Limited SVOC – PAH compounds detected that exceed NYSDEC CP-51 SCOs. See Summary Tables and Figures that present the distribution of SVOCs that exceed standards.

- Metals are a COC with several metals that exceed Part 375 SCOs. See Summary Tables and Figures that present the distribution of metals that exceed standards.

The suspected sources of petroleum COCs is the former underground storage tanks that released to the subsurface and former bulk storage of petroleum products on Site. The source of Metals COC is likely form the use of these metals on the Site. Although Background concentrations of metals should be evaluated to confirm the elevated detections.

Groundwater Sample Summary

- PCBs are not a chemical of concern (COC) - Non-detection for PCBs

- Pesticides are not a COC - Non-detection of Pesticides

- VOCs low levels of Gasoline Chemical Compounds do not appear to be COC and were detected in the following ranges less than 5 ppb:
  1,2,4- Trimethylbenzene, 1,3,5 –Trimethylbenzene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, Methylcyclohexane, m,p, Xylenes and other low level gasoline VOCs.
- Low levels of Acetone detected (38.4 ppb to 0.115 ppm range)

- 2-Butanone 5.5 ppb, Chloroform 4.8 ppb

- Chlorinated VOCs non-detection are not a COC

- SVOCs low ppb levels but higher levels when TICs added into values and maybe a COC

- Metals are a COC, See Summary Tables and Figures that present the distribution of metals that exceed standards.

The suspected sources of petroleum VOCs and SVOCs COCs in groundwater is the former underground storage tanks that released to the subsurface and former bulk storage of petroleum products on Site. The source of Metals COC is likely form the use of these metals on the Site. Monitoring wells should be resampled due to very turbid samples that were analyzed during the site Investigation. Background concentrations of metals should also be evaluated to

confirm the elevated detections.

Remediation of petroleum impacted soil and groundwater associated with the release of petroleum from the underground storage tanks is required. Other investigations maybe required to address other impacts to the sub-surface.

3.3 POTENTIALLY EXPOSED POPULATIONS AND EXPOSURE ROUTES

Potential human receptors under current conditions are limited to occasional persons that may trespass on the vacant field area of the Site. During construction and remediation activities, receptors will include construction and remediation workers, and workers on adjoining properties. Under the planned future land use, the selected remedial alternative will prevent human exposure to Site contaminants.

Exposure Pathways — On-Site *Current Conditions*

Site contains petroleum VOC and SVOCs and metals in surface and subsurface soil.

Human exposure to impacted groundwater at the Site by ingestion is not an exposure pathway. Since, the Site is supplied by the City of Rome Bureau of Water.

Overburden groundwater beneath the Site contains low levels petroleum chemical compounds, some metals, and some SVOCs, above applicable NYSDEC Class GA 703.5 groundwater standards. Since, overburden groundwater.

Construction/Remediation Activities

Remediation activities and future earthwork construction at the Site will result in potential exposures to Site contaminants by remediation contractors and future contractors. An excavation work plan will be required in areas of residual contamination as part of a site management plan to prevent this exposure pathway in the future. The proposed activities include excavation and removal of the most impacted soil and site-wide cover system. Therefore, the potential exists for exposure of soil contaminants of concern (COCs) to construction workers via dermal absorption, ingestion, and inhalation. A CAMP will be implemented and actions will be taken to provide a measure of protection for the surrounding community from potential airborne contaminant releases as a direct result of remedial work activities.

Proposed Future Conditions

The Site is targeted for re-development restricted residential or commercial use. While complete details regarding the proposed development have not yet been generated.

Following completion of the selected remediation activities and site re-development, the groundwater will be sampled to evaluate potential effects from remediation and soil excavation.

Summary

Depending on the remedial alterative implemented, complete on-site exposure pathways may exist between the petroleum impacted soil and groundwater with human receptors during future Site use, future remediation and construction activities. Potential pathways include direct contact (dermal absorption), ingestion, and inhalation of soil and groundwater contaminants. Complete off-site exposure pathways are not thought to exist between the Site media and human receptors during current conditions and after future Site remediation and construction is complete. During future remediation activities and earthwork construction precautions will be required to protect remediation/construction workers and the general public on adjoining properties.

4.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

4.1 INTRODUCTION

The purpose of identifying remedial alternatives for the Site is to identify and evaluate the most appropriate remedial action for a contaminated AOC or specific media at the Site. The goal of all remedial alternatives evaluated is to eliminate or mitigate significant threats to public health and the environment presented by the contaminants identified at the Site through proper application of scientific and engineering principles.

Remedial action objectives (RAOs) form the basis for identifying remedial technologies and developing remedial alternatives. This section identifies RAOs for surface soils, subsurface soil and groundwater. General response actions (GRAs) are provided to address the RAOs and the extent of soil and groundwater contamination requiring remedial action. Site-specific RAOs were developed with consideration for the contaminant concentrations, chemical and toxicological properties of the COCs, existing or potential exposure pathways, and anticipated future land use.

4.2 LOCAL LAND USE FACTORS

The current and possible future land uses of the Site are critical to the development of current and future human exposure scenarios. Exposure evaluations such as type of exposure, exposure frequency, and exposure duration were determined based upon current land use, current zoning and planning, local populations, and future land use plans.

The Site is located in an area of a mixed commercial/industrial setting. The Site has a history of commercial/industrial manufacturing activity and is currently vacant. The City of Rome is working to cleanup this Site for future re-development for commercial use.

4.3 IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES

The RAOs for the Site are medium-specific or AOC-specific objectives, which are established for the protection of human health and the environment. Based on the results of the remedial investigation, and the current and potential future use of the Site and surrounding areas, the following general RAOs were developed to reduce, to the extent feasible:

- Potential ingestion, dermal contact, inhalation, and direct contact exposures of persons or workers at or around the Site to Petroleum VOCs and SVOCs in soil or groundwater; and,
- Potential ingestion and inhalation exposures of persons or workers at or around the Site to Petroleum VOCs and SVOCs in dust (soil dust) that may migrate off-site by wind.

These RAOs will be accomplished by implementation of a Petroleum spill cleanup for commercial use protective of public health and the environment through:

- Removal, to the extent practicable, or in-situ treatment of the two AOC petroleum soil source areas;
- Removal of petroleum impacted groundwater from source area excavations
- Use of confirmatory soil and groundwater samples to demonstrate the effectiveness of the cleanup.

The screening and evaluation of remedial action technologies and alternatives will focus on the ability to achieve these general RAOs.

4.4 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES (RAOs)

4.4.1 On-site Soil

As discussed in the Site Investigation report, select VOCS and SVOCs and metals exceed the SCOs in surface soils, subsurface soils and groundwater at the Site. The extent of contamination at the Site appears to be due primarily to the releases of Petroleum from tanks

Identified potential exposure pathways for on-site soil include ingestion, inhalation of contaminated dust, and dermal contact. Under current conditions, there is the potential for exposure to the contaminants contained within the Site surface soils by trespassers and Site workers through dermal contact, ingestion, and/or inhalation.

Due to the intended future restricted residential or commercial use of the Site, the amount of soil and groundwater which will be covered by future building / pavement, and the lack of volatile contaminants in the Site soil/groundwater, remedial actions are warranted to eliminate the potential for direct human exposure for the anticipated future Site development scenario.

Therefore, further exposure of the contamination to potential environmental and human receptors will be reduced.

4.4.2 On-site Groundwater

Overburden groundwater is impacted with concentrations of low levels of petroleum chemical compounds, some metals and SVOCs that marginally exceeded the class GA groundwater standards.
Groundwater is not used or planned to be used at the Site or in the vicinity of the Site for drinking water purposes and the Site vicinity is serviced by municipal water supply. Therefore,

exposure routes for ingestion or adsorption from groundwater is considered to be an incomplete exposure pathway after development and its future use will be restricted through an institutional control use restriction, which shall run with the land. As a result, remedial objectives to reduce potential human and environmental exposure associated with the impacted groundwater will include engineering and institutional controls. The remedial objective for groundwater at the Site will be to reduce contact and eliminate any use of groundwater. The overall RAO for the groundwater media is protection of human health and the environment.

4.5 GENERAL RESPONSE ACTIONS (GRAs)

After establishing the RAOs for the Site, several general response actions (GRAs) were evaluated based upon the ability of the response to address the remedial RAOs. These actions are intended to mitigate potential exposure to Site COCs, control the migration of the COCs on the Site, and/or remediate the COCs to the extent practicable. The purpose of establishing GRAs is to begin to evaluate basic methods of protecting human health and the environment, such as removal, treatment, and/or containment of the Site contaminants. The GRAs may then be combined to form alternatives, such as treating contaminated media (if necessary) and providing barriers, containment, or post- treatment monitoring of residual contaminants.

The following list summarizes the GRAs that were considered for remediation of the contamination that is present at the Site:

- No Further Action - Institutional and Administrative Controls
- In-Situ Treatment
- Removal with Off-site Disposal

Each of the GRAs will be analyzed for each remedial alternative in Section 5.0 below.

5.0 EVALUATION OF REMEDIAL ALTERNATIVES

5.1 DEVELOPMENT OF ALTERNATIVES

A number of alternatives were evaluated and screened based on the RAOs, cost, implementability, and effectiveness. The screening determined application of a single remedial technology will not be considered sufficient as the sole remedial option based on the physical Site setting and the nature and extent of contamination. As a result, remedial alternatives were combined to provide an effective, implementable, and cost-effective approach to remediating the Site.

The following five remedial alternatives for the Site have been evaluated utilizing the general response actions retained from the initial screening:

Alternative 1: No Action with Institutional and Engineering Controls

- No Remedial Action
- Natural Attenuation and 30 Year Groundwater Monitoring Plan
- Institutional Control to prevent groundwater use
- Engineering Control to control physical access to the site to prevent direct human contact with the historic fill

Alternative 2: Removal of All Historic Fill to Meet Track 1 Standards and Placement of Controlled Backfill with Restoration of Ground Surface.

- Removal of all historic fill to Track 1 unrestricted levels
- Placement of controlled backfill to eliminate the potential for direct human exposure
- Restoration of ground surface
- Post closure compliance groundwater monitoring if required (annual monitoring for three years)

Alternative 3: Site-Wide Engineered Cover System over Historic Fill with Soil Vapor Extraction System for *In Situ* Treatment of Black Stained Sandy Soils Source Area

- Site-Wide Engineered Cover System to eliminate the potential for direct human exposure
- Soil vapor extraction system for in-situ remediation of Black Stained Sandy soils source area
- Compliance Ground Water Monitoring (quarterly to annual monitoring for a minimum period of 5 years)
- Engineering and Institutional controls

A detailed analysis of these three remedial alternatives for remediation and management for the contaminants in the impacted environmental media present at the Site is provided in the following section.

5.2 ANALYSIS OF ALTERNATIVES

The purpose of the following sections is to provide a detailed analysis of several remedial alternatives for managing the contaminants present at the Site. Section 5.3 provides a detailed analysis of each alternative, while Section 5.4 is used to compare the alternatives to each other.

After the description of each alternative in Section 5.3, an assessment of the alternative is made, evaluating the alternative relative to the following criteria:

- Overall Protection of Human Health and the Environment
- Compliance with SCGs
- Long-term Effectiveness & Permanence
- Reduction of Toxicity, Mobility, or Volume

- Short-term Effectiveness
- Implementability
- Cost
- Land Use
- Green Sustainable Remediation

A summary of each alternative is summarized in Section 5.3.1 through 5.3.5. Cost estimates for each alternative are summarized in Table 1 – Estimated Total Present Worth.

5.3 INDIVIDUAL ANALYSIS OF ALTERNATIVES

5.3.1 Alternative 1 - No Action with Engineering and Institutional Controls

Description of Alternative

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It allows the Site to remain in an un-remediated state but would be secured with a physical barrier to limit access, such as a fence. This alternative would leave the site in its present condition and would provide minimal protection to human health or the environment.

The No Action Alternative was retained as a basis for comparison of other remedial alternatives. Natural processes, including degradation, dispersion, dilution, adsorption, volatilization, etc., would provide the only source of contaminant removal. As a result, there would be no active reduction in toxicity, mobility, or volume of the contaminants. The cost estimate associated with this alternative includes institutional and engineering control costs. Site engineering controls would include site access restrictions through fencing and signage. The institutional controls would include a groundwater use restriction. The capital cost to implement the no action alternative will be $40,000.

Assessment of Alternative 1

An analysis of the feasibility of the No Action Alternative relative to the Site is summarized in the following table:

Evaluation of Alternative 1

Criterion	Discussion
Protection of Human Health & the Environment	*Advantages:* • No Action - Natural attenuation will continue to slowly decrease the concentration of the organic contaminants in soils and groundwater. *Disadvantages:* • Natural attenuation will not decrease or mitigate impact from the concentration of the inorganic (metals) contaminants in soils. • May take decades for Site contaminants to attenuate. • Remedial objectives not met. Unacceptable exposure levels to workers and community would remain for planned redevelopment only protected by institutional controls and engineering controls.
Compliance with SCGs	Does not meet SCGs and will not likely meet them for several years (potentially in excess of 30 years).
Long-Term Effectiveness & Permanence	*Advantages:* • No significant advantages other than saving of remedial costs and limiting Site access. *Disadvantages* • Not effective in meeting SCGs within a reasonable length of time. • Not effective in reducing future exposure levels to human health and the environment. • There is no long-term protection from contaminants and redevelopment of Site for public access would not be feasible. Vacant land use and no green remediation.
Reduction in Toxicity, Mobility, & Volume	*Advantages:* • Eventually, residual organic contamination may reach SCGs. *Disadvantages:* • All contaminated media remains on Site. • Reduction in toxicity, mobility, or volume of organic contaminants through natural attenuation is very slow (probably over 30 years). • There would be no reduction of inorganic (metals) contaminants through natural attenuation.
Short-Term Effectiveness	*Advantages:* • Site activity is limited to erection of the fence to prevent access to the Site. There is minimal to no increased risk to workers other than during fence construction, and no risk to the community or the environment, which would need to be managed during the implementation of fence erection as compared to the other remedial alternatives. (i.e. fugitive dust emissions, storm water management, open trench hazards, and hauling of contaminated soils through residential communities). *Disadvantages:* • Offers no increased protection to human health or the environment.
Implementability	*Advantages* • Easily implemented. *Disadvantages:* • Offers no increased protection to human health or the environment.
Costs	• Capital costs - $40,000 • Annual costs (groundwater monitoring and repairs to fence)- $1,500 • Present worth - $40,000

5.3.2 Alternative 2 - Removal of Petroleum Impacted soils in source area with limited groundwater removal and Backfill with Restoration of Ground Surface.

Description of Alternative
Alternative 2 summary of proposed remedial action will consist of:

- Implementation of a Citizen Participation Plan.
- Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds / odors.
- Achievement of petroleum source area cleanup to address the current NYSDEC petroleum spill through implementation of a source area soil removal excavation with limited groundwater removal and long term Engineering and Institutional Controls required pursuant to an SMP and EE.
- Collection and analysis of confirmatory end-point samples in the petroleum source soil removal areas to determine the performance of the remedy with respect to attainment of applicable levels of remediation.
- Import of materials to be used for excavation backfill in compliance with remediation requirements and in accordance with NYSDEC DER-10 guidance. Potential re-use of Site soils as backfill and re-cycled crushed concrete in accordance with NYSDEC DER-10 and DER-34 guidance.
- Excavation and removal of petroleum impacted soils with disposal at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal. Sampling and analysis of excavated media as required by disposal facilities and NYSDEC. Appropriate segregation of excavated soils and materials on-Site.
- Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
- Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
- Submission of an approved Site Management Plan (SMP) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, sampling, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
- Recording of an Environmental Easement (EE) that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following:

(1) use of groundwater without treatment rendering it safe for the intended use; (2) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (3) higher level of land usage without EPA, NYSDEC and NYSDOH approval.

Assessment of Alternative 2

The following table provides a summary of the detailed assessment for the **Removal of Petroleum Impacted soils in source area with limited groundwater removal and Backfill with Restoration of Ground Surface.**

Evaluation of Alternative 2

Criterion	Discussion
Protection of Human Health & the Environment	*Advantages:* • Removal of all Site source area petroleum soils to levels to prevent any future potential exposure risks to human health and the environment after remediation is complete. • Achievement of cleanup goals that will provide the highest protection of human health and the environment. *Disadvantages:*
Compliance with SCGs	Remedial objectives and compliance with SCGs would be met following remediation because all contaminated media will be removed and replaced with clean soil.
Long-Term Effectiveness & Permanence	*Advantages:* • Effective. Threats posed by Site contaminants removed from Site. • Remedy is permanent because soils are disposed off-site and replaced with clean soils. Land can be redeveloped. *Disadvantages:* • Contaminated soils relocated rather than treated. Highest energy cost. • Lengthy dust exposure risk during long term excavation activities.
Reduction in Toxicity, Mobility, & Volume	*Advantages:* • Toxicity, mobility, and volume of contaminants at the Site are reduced in a relatively short-time frame. *Disadvantages:* • Increased potential for contaminant mobility from dust and vapors during excavation would need to be managed. • The overall volume and toxicity of the contaminants is reduced on-site but not from existence since they are transferred to a disposal facility.

Criterion	Discussion
Short-Term Effectiveness	*Advantages:* • Highest degree of protection of human health and the environment, since contaminated soils would be eliminated at the Site. *Disadvantages:* • Has potential to generate significant fugitive dust emissions and some limited volatile emissions to air for a lengthy period of time.
Short-Term Effectiveness (cont'd)	*Disadvantages:* • Large volume approximately 2,000 tons of excavated soil would result in increased truck traffic
Implementability	*Advantages* • No long-term maintenance, easement or utilities required. *Disadvantages:* • Implementing a large scale excavation operation of this magnitude would be similar to an open mining operation. A large scale dewatering system would need to be implemented to allow for excavation to depths below the groundwater table and would result in very large amounts of water that would need to be managed by storage, treatment, and/or proper discharge. Removal of contaminated media below 15 feet would be difficult. • Significant engineering controls required during excavation to reduce exposure to humans and the environment from fugitive dust, deep excavation hazards, storm water runoff control, etc. • Removing large quantities of soil off-site and importing clean fill would result in significantly increased truck traffic through local communities. • The cost to perform this type of remedial alternative is prohibitive.
Costs	• Capital costs - $240,000 • Annual cost - $0.00 • Present worth - $240,000

5.3.4 Alternative 3- Soil Vapor Extraction System for *In Situ* Treatment of Petroleum Soils Source Area

Description of Alternative 3

Alternative 3 a soil vapor extraction system will be implemented for In Situ (in-place) on-site treatment instead of physical soil removal for off-site disposal of the petroleum soils source areas.

Alternative 3 includes a soil vapor extraction (SVE) system for the removal of volatile organic compounds and SVOCs from the area identified as Black Stained Sandy soil source area. A network of 18 soil vapor extraction wells would be installed in the Black Stained Sandy soil source area and connected to a vacuum blower motor to provide the design vacuum required to remove the contaminants over time. The extraction wells are installed to the design depth that is determined based on the depth of the groundwater table and the vertical extent of impacts. Each extraction well is located in the impacted area based on the spacing required from determination of the effective extraction well radius of influence. The size of the Black Stained Sandy soil source area is approximately 35 ft. X 35 ft. and extends deeper than 20 feet. These historic fill soils have elevated organic vapors, which were detected during test pit explorations. A Site Management Plan, which will include ICs and ECs, and an environmental easement will also be prepared and recorded, to be implemented by current and future owners, developers, contractors and Site operators for management of potential exposures to human health and the environmental receptors. Existing building and future building will not be built in the vicinity of the petroleum soil areas to reduce the potential for future vapor intrusion issues. This remedy may create a lower short-term carbon footprint impact than Alternative 3. However, there is a long-term carbon footprint impact. Since, electricity is required to operate the SVE system.

Assessment of Alternative 3

The following table provides a summary of the detailed assessment for a **Soil Vapor Extraction System for *In Situ* Treatment of Petroleum Soils Source Area.**

Evaluation of Alternative 3

Criterion	*Discussion*
Protection of Human Health & the Environment	*Advantages:* • The Site contaminants will be remediated in-place, preventing direct human direct contact and off-site migration of soils by erosion and windblown soil particles. • The Excavation Work Plan contained in the future Site Management Plan will provide guidance for contactors and developers for proper management of future exposed contaminated soils during excavations that potential exposure to human health and the environmental receptors are minimized and protected. • The petroleum soils source areas will be treated In Situ and concentrations of volatile organic compounds (VOCs) and SVOC will be reduced at a rate quicker than natural attenuation, thus decreasing the time to achieve protection of human health and environmental receptors. • Long-term protection from petroleum COCs and future redevelopment of the Site for public access would be feasible. • Potential worker exposures during the implantation of this alternative are less than alternatives 2. Since, this alternative is implemented without an excavation for soil removal where exposure risks to impacted soils during excavation are higher when compared to installation of a soil vapor extraction system (in-situ) that are lower for workers. *Disadvantages:* • Residual petroleum contamination is more likely with this alternative.
Compliance with SCGs	*Advantages:* • Is protective of human health and the environment and is a proved EPA cleanup method. *Disadvantages:* • May require extended time to complete the cleanup. • Some petroleum COCs will remain in groundwater.
Long-Term Effectiveness & Permanence	*Advantages:* • Petroleum source areas soils would be remediated for VOCs and the majority of SVOCs with the *In Situ* soil vapor treatment system. • Remedy is permanent in area of *In Situ* treatment system because majority of contaminants are *destro*yed rather than transferred to a disposal facility. • Reduces the amount of organic vapors contaminants that could potentially migrate off-site or cause potential vapor intrusion issues in the existing and future Site buildings. • Land can be redeveloped.

Criterion	*Discussion*
Long-Term Effectiveness & Permanence (cont'd)	*Disadvantages:* • Some residual petroleum COCs will remain in the soils and groundwater below the Site. • Some petroleum COCs will remain in the groundwater. • Soil Vapor Extraction system equipment for *In Situ* treatment will require long term operation and maintenance (O&M) and significant electric power use. High electric energy cost. • ECs and ICs would be necessary to ensure long-term protection of human health. environment.
Reduction in Toxicity, Mobility, & Volume	*Advantages:* • Eventually, COCs in groundwater would stabilize and should not increase in concentration. • The petroleum soil source area would be treated, reducing the volume of and concentration of contaminants at the Site. • The potential vapor intrusion issues for the existing and or future Site buildings would be low risk. Less risk of potential off-site migration of COCS as fewer petroleum COCs would remain. *Disadvantages:* • Reduction in toxicity, mobility, or volume of VOC and SVOC petroleum contaminants in remaining soils through natural attenuation is very slow and may take decades. • Pockets of petroleum impacted soils may remain.
Short-Term Effectiveness	*Advantages:* • Development for public access and Site reuse would be possible without significant Site disruption or exposure to adjoining properties from dust. *Disadvantages:* • ECs and ICs would need to be implemented to reduce potential human health and environmental exposures but less short term impacts. Since, there will be extraction wells drilled in place of an open excavation for the remediation of the petroleum source area soils. Monthly and annual O&M required for the soil vapor extraction system.
Implementability	*Advantages:* • Readily implemented. • Large excavations are not required, no soil to be transported off-site, dewatering system not required. *Disadvantages:* • ECs and ICs required during and after physical remediation are competed. • Energy consumption will be high due electric power required to operate the Soil vapor extraction system for several years. • Constructions of surface structures are required to house soil vapor extraction equipment that may impact future redevelopment of the Site. • Long-term Routine operation and maintenance (O&M) will be required for the soil vapor extraction system. • Active remediation (soil vapor extraction) will be on-going during the future construction for redevelopment. • Long-term groundwater monitoring program would be required.

Criterion	*Discussion*
Cost	• Capital costs – $400,000 • Annual costs - $18,335 • Present worth - $400,000

The following assumptions have been made regarding Alternative 3:

- It is assumed that the SVE system will operate for 10 years and can be purchased for costs described in Table 1.
- At this time, plans for redevelopment are not known.

5.4 COMPARATIVE ANALYSIS

The following subsections provide a brief comparison of the alternatives relative to the same nine criteria used to evaluate the alternatives individually. As previously identified in this AAR, the alternatives have been compared based upon the following nine criteria:

1. Overall protection of human health and the environment
2. Compliance with Standards, Criteria, and Guidance (SCGs)
3. Long-term effectiveness and permanence
4. Reduction in toxicity, mobility, and volume
5. Short-term effectiveness
6. Implementability
7. Cost estimate
8. Land Use
9. Green Sustainable Remediation Principles

5.4.1 Protection of Human Health & the Environment

Alternative 1 Comparisons - Protection of Human Health & the Environment

As previously discussed, Alternative 1 - No Action, combined with an Institutional Control (groundwater use prohibition) and engineering controls (Site fencing), was maintained for a baseline comparison of the alternatives. However, is not considered sufficiently protective of human health and environment. Therefore, Alternative 1 will not be selected as the preferred alternative for managing the contamination at the Site.

Alternative 2 Comparisons - Protection of Human Health & the Environment

Soil and groundwater removal with off-site disposal of petroleum impacted source areas described in Alternative 2 would provide the greatest overall protection for potential human health and environmental receptors.

Alternative 3 Comparisons - Protection of Human Health & the Environment

Alternative 3 includes a **soil vapor extraction system for *In Situ* treatment of petroleum source areas.**

This alternative includes a vapor extraction system to use as an in-situ remediation technology to remove the petroleum contaminants that include: elevated organic vapors, VOCs, SVOCs, and petroleum odors from the two petroleum source areas at a rate faster than natural attenuation. This In-situ treatment technology will take longer to achieve results which have the potential to be less protective of human health and the environment than Alternative 2, and over a much longer period of time.

5.4.2 Compliance with SCGs

Alternative 1 Comparison - Compliance with SCGs

Alternative 1 does not meet the requirements to remediate a petroleum spill and SCGs since source removal of the soil and groundwater from the areas of contamination at the Site is not addressed. Human exposure can result from surface soils and impacted groundwater that would not be addressed. Therefore, implementation of Alternative 1 would not reduce the contamination and would not result in compliance to respond to a petroleum spill and would not meet all SCGs. This alternative would be completed with the lowest level of compliance for SCGs when compared to Alternatives 2 and 3.

Alternative 2 Comparisons - Compliance with SCGs

Alternative 2 would achieve petroleum spill remediation requirements and remedial goals, which is the highest level of remediation. Since, essentially all of the petroleum contaminants in soils above standards would be removed from the Site down to a depth of approximately 12 to 15 feet in some locations during the active remediation phase. Alternative 2 would result in a permanent reduction of petroleum contaminants of concern. Therefore, after completion of the remediation tasks described for this Alternative the SCGs would be achieved. Implementation of Alternative 2 would achieve the highest level of compliance with SCGs when compared to Alternatives 1, and 3.

Alternative 3 Comparisons - Compliance with SCGs

Alternative 3 would use a combination of a In Situ soil vapor extraction to actively remediate the petroleum soils source areas, which would result in reduced concentrations of organic vapors, gasoline and diesel organic compounds and other petroleum contaminants in the Site soils. Although this remedial alternative would be intended to result in compliance with SCGs the anticipated reduction would be less certain when compared to Alternatives 2 and in greater compliance compared to Alternative 1.

5.4.3 Long-Term Effectiveness and Permanence

Alternative 1 Comparisons- Long-Term Effectiveness and Permanence

Alternative 1 provides no active remedy for the petroleum contaminants at the Site, and therefore, provides no long-term effectiveness in reducing exposure of the Site contaminants to human Health and the environment, other than limiting access to the Site with fencing and

a locked gate. Alternative 1 provides the lowest level of long-term effectiveness and permanence when compared to alternatives 2 and 3.

Alternative 2 Comparisons- Long-Term Effectiveness and Permanence

Alternative 2 provides the most long-term effective and permanent remedy for the Site contamination because essentially all contaminated soil from the sources areas is disposed of off-site reducing potential exposure to humans and the environment after the remediation is complete. By removing the sources of petroleum impacted soil and backfilling the excavations with clean imported soils, the impacts to groundwater quality would be significantly reduced, which would ultimately reduce the potential exposure to humans through contact with groundwater. This alternative also includes a limited removal of petroleum impacted groundwater from the soil removal excavations. Therefore, this alternative provides the greatest level of long-term effectiveness and permanence when compared to Alternatives 1and 3.

Alternative 3 Comparisons- Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence for Alternative 3 is less certain when compared to Alternatives 2. Since, residual concentrations of contaminants may permanently remain in the petroleum source areas after the remediation is complete for Alternative 3 and are removed for off-Site disposal in Alternatives 2. Anticipated residual concentrations of petroleum left on Site would be higher for Alternative 2 due to inherent pockets of soils between the vapor extraction wells that may not be remediated by the vacuum of these wells at fixed locations in the source soils being remediated. Long-term effectiveness and permanence of Alternative 3 would be higher when compared to Alternative 1.

5.4.4 Reduction in Toxicity, Mobility, and Volume

Alternative 1 Comparisons- Reduction in Toxicity, Mobility, and Volume

Alternative 1 provides no reduction in toxicity, mobility or volume of petroleum contaminants at the Site. The alternative would only include EC and IC that include fencing and a locking gate. There is no action for physical remediation for this alternative.

Alternative 2 Comparisons- Reduction in Toxicity, Mobility, and Volume

Alternative 2 provides the greatest reduction in the toxicity, mobility, and volume of contaminants by removing petroleum contaminants from the source areas at the Site followed by limited groundwater removal and backfilling with imported clean soils. Therefore, alternative 2 provides the highest level for this comparison when compared to each of the other alternatives.

Alternative 3 Comparisons- Reduction in Toxicity, Mobility, and Volume

Alternative 3 would reduce the toxicity and mobility of petroleum contaminants (petroleum COCs – VOCs and SVOCs) at the source area. The reduction of toxicity of impacted soil would result from the removal of volatile organic compounds and limited SVOCs from the petroleum

source areas that is the area of greatest contamination for organic vapors, VOCs and SVOCs. The overall volume of impacted soils would generally not be reduced since these soils would be remediated in place by the in situ vapor extraction system in contrast to physical soil removal of containments in Alternative 2. Cleanup of the petroleum soil source areas would be less than Alternative 2 due to residual petroleum concentrations and isolated pockets of soil that may not be remediated by this soil vapor extraction system.
Cleanup of the petroleum soil source areas would be greater than Alternative 1.
Therefore, Alternative 3 would provide a greater degree of reduction in toxicity and mobility, and volume of petroleum COCs when compared to Alternative 1 and less certainty regarding the reduction of these elements when compared to Alternatives 2.

5.4.5 Short-Term Effectiveness

Alternative 1 Comparisons- Short-Term Effectiveness

Alternative 1 provides no active remedy for the petroleum contaminants at the Site, and therefore, provides no short-term effectiveness in reducing exposure of the Site contaminants to human Health and the environment, other than limiting access to the Site with fencing and a locked gate. Alternative 1 provides the lowest level of short-term effectiveness when compared to Alternatives 2 and 3.

Alternative 2 Comparisons- Short-Term Effectiveness

The timeframe required to complete this alternative to achieve petroleum source area soil removal and the SCGs would require approximately 1.5 to 2 years and is relatively a short period of time when compare to Alternative 3 that would require approximately 10 years to complete the remediation. Therefore, during a relatively short period of time the highest level of cleanup would be reached. The high level of short-term effectiveness would be realized at the end of the source area soil removal (active remediation). Since, essentially all of the petroleum containments above standards would be removed from the soil source areas and replaced with clean backfilled soils imported to the Site. Short-term effectiveness of Alternative 2 is considered high when compared to Alternatives 1 and 3. Alternative 2 would result in the short term effectiveness in terms of protection of human health (worker exposure) and the environment. In addition to worker safety around excavations, this task has the potential to generate the greatest amount of fugitive dust emissions and would cause the greatest increase in the amount of short term (three weeks) truck traffic within local area of the City of Rome during active remediation. Alternative 2 is considered to pose the greatest potential safety threat to workers during the active remediation due to the excavation areas and large excavation equipment associated with Alternative 2, and the hazards of working with this equipment.

Alternative 3 Comparisons- Short-Term Effectiveness

The timeframe required to complete this alternative and to achieve remediation of the petroleum source areas and SCGs would require approximately 10 years to complete active remediation and approximately 5 years to demonstrate that the SCGs have reached. Therefore, several years will be required to complete the remediation and demonstrate the short-term effectiveness when compared to Alternative 2 that would be competed in shorter timeframe and

with greater effectiveness with respect to reduction of petroleum COC in the source areas. Alternative 3 would likely have a lower short-term effectiveness when compared to Alternative 2 and would have higher short-term effectiveness than Alternative 1.

The soil vapor extraction system would need to be operated over an estimated period of approximately 10 years, and will reduce the impacts to soils by removing a majority of petroleum COCs (VOCs and SVOCs) contaminants in the petroleum source areas of the Site.

5.4.6 Implementability

Alternative 1 Comparisons- Implementability

Alternative 1 is the quickest to implement and also the simplest alternative to implement. Since, this alternative includes no active remediation with only ECs and ICs that would require additional fencing and a secure access gate to limit access to the Site to protect human health, even if the Site was not redeveloped.

Alternative 2 Comparisons- Implementability

Alternative 2 is technically implementable and the least complicated over the 1.5 to 2 year period of time to complete due to the excavation and disposal requirements to address the petroleum spill source areas. This alternative could be integrated with the City of Rome's or private developer's future re-development plans and could be completed prior to any future re-development construction work, or concurrent with future redevelopment. The risks associated with worker health and safety, Site security, elevated noise level, increased truck and construction equipment traffic, and potential off-Site migration of dust contaminants is also the highest for this alternative during the active remediation when compared to the other alternatives. This alternative also includes a limited groundwater extraction from the open excavation areas during the soil removal.

Therefore, this alternative would be the easier to implement than alternative 3 due to the shorter duration of active remediation requirements to physically complete the work. Alternative 2 is the easiest remediation to implement over the shortest period of time when compared to Alternative 3. Alternative 1 is easiest to implement but does not remediate the petroleum impacts.

Alternative 3 Comparisons- Implementability

Alternative 3 is technically implementable and can be implemented prior to future re-development or concurrently with redevelopment. The level of potential risks associated with worker health and safety, Site security, elevated noise level, lack of construction equipment traffic, and less risk of potential off-Site migration of dust contaminants is lower for this alternative during the active remediation when compared to Alternative 3. Alternative 3 is more difficult to implement when compared to Alternative 2. Since, extraction wells need to be installed with electric power supply and enclosures for the soil vapor system equipment. The soil vapor extraction system wells and trenches for In Situ remediation is more difficult to implement when compared to Alternative 2. Alternative 1 is easiest to implement but does not remediate the petroleum impacts.

5.4.7 Estimated Cost

A comparison of the estimated cost to complete each of the alternatives is presented in the following text. The preliminary cost estimates for each alternative are list in Table 1.

Alternative 1 Comparisons- Estimated Cost

Implementation of alternative 1 would result in the lowest cost when compare to the other alternatives. However, this alternative only includes ECs and ICs without active remediation. Therefore, without active remediation remedial goal for petroleum source area cleanup and protection of Human Health and the Environment would not be achieved after implementation of this alternative. The estimated cost includes additional fencing and a locking gate to limit Site assess with signage and a Site groundwater restriction. The estimate capital cost for alternative 1 is $40,000 with annual cost of $1,500. The total present worth is $40,000. In addition, the Site could not be developed for commercial use, and this remedy would substantially reduce the value of this Site and as a result would be adversarial to future re-development in this BOA designated zone.

Alternative 2 Comparisons- Estimated Cost

Alternative 2, which includes an excavation of soils from two petroleum impacted source areas to depths ranging from 12 to 15 feet would be required to remove essentially all of the impacted soils. The estimated cost also includes transportation and off-Site disposal of impacted soils and groundwater. Clean imported soil will be used to backfill the source area excavations. The estimated capital cost for this alternative is $240,000 and total present worth is the same. This alternative is the less expensive than alternative 3 and more expansive compared to Alternative 1. This alternative is the cost effective when compared to the other alternatives.

Alternative 3 Comparisons- Estimated Cost

The estimated capital cost for Alternative 3, which includes a soil vapor extraction for treatment of petroleum impacted soil in two source areas with ECs and ICs, is $400,000 with annual cost of $18,335. Therefore, the total present worth is $400,000. This Alternative includes a soil vapor extraction system for In Situ treatment of the petroleum impacted soils in soil source area. The cost estimate has been calculated with this alternative implemented for the existing conditions at the Site. Since, re-development plans are not known at this time. The estimated cost to implement Alternative 3 is greater than Alternatives 1 and 2.

5.4.8 Land Use

The City of Rome encourages economic development and re-development land use of vacant urban lands and brownfield to be put back on the tax rolls. A comparison of the land use criteria for each of the alternatives is presented in the following text.

Alternative 1 Comparisons-Land Use

Since Alternative 1 may not permit any reuse of the Site due to surface petroleum contamination, this Alternative is inconsistent with the land use criteria.

Alternative 2 Comparisons-Land Use

This alternative would allow land use to occur prior to or during future re-development. The active remediation would require approximately three weeks and the complete cleanup would require approximately 1.5 to 2 years to demonstrate groundwater compliance.

Alternative 3 Comparisons-Land Use

This alternative would allow land use to occur prior to or during future re-development. The active remediation would require approximately 10 years and 5 years would be required to demonstrate groundwater compliance.

5.4.9 Green and Sustainable Remediation Principles

Planning and comparisons for Green and sustainable remediation principle comparisons were evaluated for Alternatives 1 through 3. Significant benefit to the environment with application of green remediation concepts can be realized at the remedy selection phase. Several factors are considered when selecting a remedy and sustainability/green remediation is an aspect of one or more of the existing criteria. Therefore, green and sustainable concepts are used to support selection of the best remedy for a site. The consideration of sustainability in remedy selection is consistent with existing statutes, regulations, and guidance.

Green remediation concepts and techniques will be considered during all stages of the proposed remediation program, to long-term site management obligations with the goal of improving the sustainability of the cleanup. The major green remediation concepts and green remediation techniques below will be considered and used to the extent feasible by remedial parties, EPA and NYSDEC staff.

Green Remediation Concepts

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term when choosing a site remedy;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

Green Remediation Techniques

City of Rome has evaluated and incorporated green remediation concepts as part of the ABCA remedies evaluation and will attempt to implement the green remediation techniques below that may apply to the planned remediation.

- An attempt to use of renewable energy and/or the purchase of renewable energy credits (RECs) or a combination of the two techniques to offset 100% of the electricity demand at the site.[1]
- Reduce vehicle idling. All vehicles, both on and off road (including construction equipment) will be shut off when not in use for more than 5 minutes, consistent with 6 NYCRR Part 217 Motor Vehicle Emissions, Subpart 217-3 Idling Prohibition for Heavy Duty Vehicles.
- Beneficially reuse materials that would otherwise be considered a waste (e.g. crushed clean concrete as excavation backfill soil).
- Use of Ultra Low Sulfur Diesel (ULSD).
- Minimize habitat disturbance and create or enhance habitat or usable land
- Prevent long-term erosion, surface runoff, and off-site water quality impacts
- Encourage development and evaluation of low energy alternatives such as enhanced bioremediation, phytoremediation, permeable reactive barriers (PRBs), source removal with monitored natural attenuation (MNA), enhanced attenuation of chlorinated organics (EACO), engineered wetlands, and remedies which can be driven to MNA or monitoring only (e.g., remedies which will not need external power indefinitely)
- Address sources more aggressively to reduce long-term operation and maintenance of treatment or containment systems
- Reuse and Recycle construction and demolition (C&D) debris and other materials Maximize beneficial use of materials that would otherwise be considered a waste
- Integrate remedial design with contemplated reuse of site

A comparison of the land use criteria for each of the alternatives is presented in the following text.

Alternative 1 Comparisons-Green and Sustainable Remediation

Since Alternative 1 may not permit any reuse or enhancement of ecological habitat, social goals, and economy due to continued vacant use and surface soil contamination. Therefore, this alternative ranks last for green and sustainable remediation as compared to the others.

Alternative 2 Comparisons-Green and Sustainable Remediation

This alternative would use the most fuel energy in the excavation equipment and during truck transportation to remove soils that are petroleum impacted and import clean soils for backfill. Emissions to the air from the same construction and transportation equipment would also results in the highest carbon foot print for this remedy. An attempt will be made to use re-cycled crushed concrete in place of natural gravel backfill in the excavations. This completed

[1] Purchase of "green Power" through an energy services company (ESCO) generally costs less than 0.5% of the overall operation and maintenance cost of a remedy. This cost may be off-set by more efficient designs.

remedy would allow for Site reuse, and enhancement of ecological habitat, social goals, and local economy. This alternative ranks below Alternative 3 as compared for green and sustainable remediation.

Alternative 3 Comparisons-Green and Sustainable Remediation

This alternative would require the greatest use of electric power consumption and O&M during the long term operation of the soil vapor extraction system during an approximate 10 year duration. Therefore, Alternative 3 ranks below Alternatives 1 and 2 as compared for green and sustainable remediation.

6.0 RECOMMENDATIONS

6.1 ALTERNATIVE RECOMMENDATION

The City of Rome has evaluated the remedial alternatives in this ABCA, the implementation of these technologies, and the resources required. Based on the results of the analysis, Alternative 2 is considered the most technically feasible and cost effective alternative, which achieves cleanup of the petroleum source areas, protection of human health and the environment with ease of long-term maintenance. Alternative 2 includes: excavation and off-Site disposal of petroleum impacted soils from two source areas with long term ECs and ICs.

This proposed remedial program will reduce potential short term and long-term exposures to the on-Site contaminants by removing the petroleum soil source areas from the Site and limited impacted groundwater during the active remediation. This will significantly eliminated potential exposure to pathways. The removal of the petroleum source soils also reduces the volume and toxicity of the most contaminated soils and coupled with ECs and ICs provides a high degree of reduction of both potential migration and reduction of contaminants.

While low level contaminants will remain at the Site, the remedial objectives will be met to the extent practicable in a cost effective manner through the implementation of Alternative 2 and this alternative will be protective of human health and the environment.

Alternative 2 will also provide an effective long-term and permanent remedy for the Site by a reduction of volume of contaminants. The proposed excavation and off-site disposal will reduce the amount of petroleum contaminants at the Site that could result in potential soil vapor intrusion concerns in the existing building and or future Site buildings. The Alternative 2 scenario is the most effective in the comparative analysis and excessive cost associated with Alternative 3.

Under Alternative 2, excavation activities will extend to approximately 12 to 15 feet below the ground to remove the accessible portion of the petroleum source area soils. The ECs and ICs, will be protective of groundwater by reducing further potential contribution of petroleum contaminants into the groundwater.

The use of ECs and ICs to protect human health and the environment against the residual petroleum contaminants is also required for this Alternative. ICs would include implementation of an environmental easement to restrict land use to ground floor commercial operations,

prohibit the use of groundwater beneath the Site, and require the development and implementation of a Site Management Plan, which would include an Excavation Work Plan to be implemented during any future intrusive (excavation) activities. The primary EC would be controls during Site active remediation that would be recommended to include: (1) dust control measures as detailed in the community air monitoring plan (CAMP), (2) limiting access and construction hours during redevelopment activities, and (3) installing fencing and signs around the Site to deter trespassers from the Site while the remedial work is being implemented.

Since low level petroleum contaminants may remain at the Site, it will also be necessary to institute a groundwater monitoring program to monitor the Site for a period of 6 months after the active remedial activities are complete. If there are no significant increases to current conditions after this monitoring period, then an evaluation will be undertaken to determine if the groundwater monitoring program can be discontinued. Existing wells will be used to perform monitoring unless wells are destroyed during the cleanup. The need to install new wells will be evaluated during remedy design phase for this project. The proposed remedial Alternative 2 is consistent with the proposed end use of the Site, which includes commercial or restricted residential development. Alternative 2 will be protective of human health and the environment.

Therefore, Alternative 2 summary of proposed remedial action will consist of:

- Implementation of a Citizen Participation Plan.

- Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds / odors.

- Achievement of petroleum source area cleanup to address the current NYSDEC petroleum spill through implementation of a source area soil removal excavation with limited groundwater removal and long term Engineering and Institutional Controls required pursuant to an SMP and EE.

- Collection and analysis of confirmatory end-point samples in the petroleum source soil removal areas to determine the performance of the remedy with respect to attainment of applicable levels of remediation.

- Import of materials to be used for excavation backfill in compliance with remediation requirements and in accordance with NYSDEC DER-10 guidance. Potential re-use of Site soils as backfill and re-cycled crushed concrete in accordance with NYSDEC DER-10 and DER-34 guidance.

- Excavation and removal of petroleum impacted soils with disposal at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal. Sampling and analysis of excavated media as required by disposal facilities and NYSDEC. Appropriate segregation of excavated soils and materials on-Site.

- Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.

- Performance of all activities required for the remedial action, including permitting

requirements and pretreatment requirements, in compliance with applicable laws and regulations.

- Submission of an approved Site Management Plan (SMP) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, sampling, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

- Recording of an Environmental Easement (EE) that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) use of groundwater without treatment rendering it safe for the intended use; (2) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (3) higher level of land usage without EPA, NYSDEC and NYSDOH approval.

Table 1 - Estimated Total Present Worth: Alternatives 1 through 3

Alternative	Description	Capital Cost	Annual Costs Projected For 30 Years	Total Present Worth
1	No Further Action	$40,000	$1,500	$40,000
2	Excavation and off-Site disposal of contaminated media. Import clean soils.	$240,000	$0.00	$240,000
3	Site-wide engineered cover system and soil vapor extraction system for source area soil in-situ treatment with institutional and engineering controls	$400,000	$18,335	$400,000

Table 2 – Evaluation Criteria Rank: Alternatives 1 through 3

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Removal of Petroleum Contaminated Soils From Source Areas	Alternative 3 Soil Vapor Extraction for Treatment of Source Area Soils
Protection of Human Health and the Environment	1	5	2
Compliance with SCGs	1	5	2

Long-term Effectiveness and Permanence	1	5	2
Reduction of Toxicity, Mobility, or Volume	1	5	2
Short-term Effectiveness	1	2	3
Implementability	5	1	2
Cost	5	1	4
Land Use	1	5	2
Green and Sustainable	1	2	3
Totals	17	31	22

Ranking Scale: 5 equals the highest level that meets criteria and 1 equals lowest level

Note: Alternative 2 has the highest rank based on the evaluation criteria and is the selected alternative for the remedy.