January 2007

Alternatives Analysis Report

Environmental Restoration Project
Clean Water/Clean Air Bond Act of 1996

ERP Site No. E-510020
Durkee Street Parking Lot
Operable Unit 1
(Office Building/Parking Deck)
City of Plattsburgh
Clinton County, New York

Prepared for:

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ENVIRONMENTAL RESTORATION PROJECT
ALTERNATIVES ANALYSIS REPORT
DURKEE STREET PARKING LOT OPERABLE UNIT 1
(OFFICE BUILDING/PARKING DECK)
CITY OF PLATTSBURGH, NEW YORK

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1.0 INTRODUCTION

1.1 Purpose and Organization

The intent of this Alternatives Analysis Report (AAR) is to present site specific remediation alternatives based on the findings and conclusions of the Remedial Investigation (RI) Report for Operable Unit 1 (OU1) and Interim Remedial Measure (IRM) of the Durkee Street Parking Lot Environmental Restoration Project (ERP) prepared by C.T. Male Associates, P.C., dated February 2006. The overall goal of the AAR is to develop and evaluate feasible remedial action(s) to either achieve compliance with established regulatory clean up guidance levels and/or to protect human health and the environment from contaminated media present at the subject site. The AAR is the technical support document for the NYSDEC's Proposed Remedial Action Plan (PRAP), which solicits public comments on the proposed remedy. The AAR and PRAP will be placed in the document repositories to allow a 45-day public comment period. Any public comments on the PRAP will be addresses by the NYSDEC in a Responsiveness Summary prior to the NYSDEC issuing a Record of Decision (ROD).

This AAR is organized and prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) DRAFT DER-10 Technical Guidance for Site Investigation and Remediation, issued December 25, 2002. The AAR consists of three (3) main sections. Section 1 is an introduction which presents the purpose of the project and background information including a site description, site history, nature and extent of site contamination, and contaminant fate and transport. Human and ecological exposure pathways are also discussed in this section. Section 2 identifies remedial alternatives available for addressing the on-site contamination and their objectives. Section 3 presents an individual and comparative analysis of each of the alternatives discussed within the report.

1.2 Project Background

The City of Plattsburgh (the City) submitted an application to the New York State Department of Environmental Conservation (DEC) for participation in the NYS Environmental Restoration Program (ERP) in relationship to the Durkee Street Parking Lot located along the east side of Durkee Street within the City of Plattsburgh, Clinton

County, New York (herein "the Site"). A Site Location Map is presented as Figure 1. NYSDEC subsequently notified the City of its eligibility to participate in the ERP and the City executed a State Assistance Contract (SAC) which required the submission, review, approval and implementation of investigative work plans under the ERP. Because southern portions of the site were slated for near future development into an office building and parking deck, the site was subdivided into two Operable Units (OU1 and OU2) to accelerate the investigation of the southern portion of the parking lot. OU1, which is the focus of this AAR, consists of the southern portions of the parking lot which is currently being redeveloped with an office building and parking deck, while OU2 makes up central and northern portions of the existing parking lot. To date, the RI, inclusive of an IRM, has been completed for OU1. The analysis of remedial alternatives for OU2 has been prepared under separate cover (AAR-Durkee Street Parking Lot Operable Unit 2 (Parking Lot and Farmer's Market)).

The ERP investigation of OU1 generally involved the collection and analysis of near-surface soil samples; conducting soil borings; collection and analysis of subsurface samples from the soil borings; installation of groundwater monitoring wells; collection and analysis of groundwater samples from the installed monitoring wells; collection and analyses of subsurface soil gas samples to aid in a vapor intrusion survey for the proposed office building; a survey of public and private wells; and a Data Usability Summary Report (DUSR).

Additional tasks that were performed as a result of discoveries made during the remedial investigation included a NYSDEC approved IRM. The focus of the IRM was for the removal and off-site disposal of site source contaminated soils/fill and groundwater.

Results of the site investigation were incorporated in a Remedial Investigation (RI) Report. The RI describes both the investigations conducted at the site for defining the nature and extent of contamination in surface soil, subsurface soil, groundwater, soil gas and the IRM. From this data decisions regarding the need for additional remedial actions were made and remedial options were evaluated based in part on the intended use of the Site, thus constituting the AAR. The target goals of the RI were to identify contaminants of concern, define the horizontal and vertical extent of such contamination, and to produce data of sufficient quantity and quality to support the development and analyses of remedial alternatives analysis.

1.2.1 Site Description

OU1 is located adjacent to and east of Durkee Street in the City of Plattsburgh, Clinton County, New York. The site is approximately 1.31 acres in size, and makes up southern portions of an approximate 4.38 acre City parking lot with associated open air Farmers Market Pavilion. The site boundaries are depicted on the Site Plan in Figure 2 (which was excerpted from the January 2007 OU1 RI Report) and consist of a former surface parking area that has been the subject of recent redevelopment with an office building and parking deck. Removal of the contaminated media in support of the office building and parking deck were completed as part of the IRM for the site. The focus of the IRM was for the removal and off-site disposal of site source contaminated soils/fill and groundwater. The site is located in a commercially developed area within the City of Plattsburgh.

1.2.2 Site History

A review of historical Sanborn mapping depicted past usages of the site to consist primarily of residential dwellings, tenements and an auto top and upholstery shop until as late as 1927. Thereafter, manufacturing activities began to gain a foothold on the site. The 1935 Sanborn map depicted two manufacturing buildings on northern portions of the site with an "oil filter" depicted alongside one of the buildings. A building used in part for rug cleaning and dry cleaning was also depicted on the site. The 1965 map depicted site usage as similar to that shown in the 1935 map with the exception of the addition of a sign painting entity in the same building that contained the rug cleaning and dry cleaning operations.

1.2.3 Potential Historical Contaminants of Concern

Potential historical contaminants of concern are affiliated with past manufacturing activities on the site that included dry cleaning, rug cleaning, sign painting, and automotive repair activities. Additionally, an "oil filter" was affiliated with a former factory building on the site and fill materials of unknown origin underlie the entirety of the site at thicknesses ranging from four (4) to 16 feet below grade.

1.2.4 Summary of the Remedial Investigation

The goal of the RI of the site was to identify and assess potential sources of contamination, and to develop a comprehensive strategy to remediate the identified contamination, as necessary to protect the environment and human health. A report entitled "Remedial Investigation/Alternatives Analysis Report, Durkee Street Parking Lot, Operable Unit 1, City of Plattsburgh, New York"; dated February 2006 details the investigative activities which were completed and is available for review within the document repositories. The following tasks were completed as part of the RI for the site:

- Site Survey;
- Near-Surface and Subsurface Soil Sampling and Analysis;
- Test Boring and Monitoring Well Installations;
- Groundwater Sampling and Analysis;
- Soil Gas Sampling and Analysis;
- Survey of Private and Public Wells; and
- Data Usability Summary Report (DUSR).

In addition to the investigative steps listed above, the following tasks were performed as a direct result of findings discovered during the course of the RI.

A non-emergency IRM was conducted within areas of the site where known site contaminants were present. The focus of the IRM was for the removal and off-site disposal of site petroleum and solvent contaminated soils/fill and groundwater. Confirmatory soil and fill samples were collected from the end points of the various excavations for laboratory analysis to aid in determining the nature and extent of residual contamination beyond the excavated areas. These samples were analyzed for volatile organic compounds (VOC's) and semi-volatile organic compounds (SVOC's) per the approved IRM Work Plan as the primary contaminants of concern were related to petroleum and solvent related organic compounds.

1.3 Nature and Extent of Contamination

1.3.1 General

Sampling and analysis of several media types was conducted during the RI and IRM to determine the nature and extent of contamination at the subject site. These media types included near-surface soils, subsurface soils/fill, groundwater and soil gas.

Table 1.3.1-1 lists the frequencies (i.e., 3 of 7 sampling locations) for the contaminants of concern (COCs) in each media type. The table summarizes the samples collected as a function of the RI and IRM of OU1. The table presents compounds and analytes that were detected at concentrations which exceeded the project Standards, Criteria and Guidance Values (SCGs) which included NYSDEC TAGM 4046 guidelines for soils; NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) for groundwater; and NYSDOH air guidance values and the EPA BASE Data Background Levels, as provided in the NYSDOH February 2005 Public Comment Draft entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York". Compounds and analytes detected in the media samples at concentrations which exceeded the laboratory detection limit, but at concentrations below SCGs are not included on the table. It should be noted that three surface soil and two soil boring/monitoring well sampling locations were located within the boundaries of OU2 during the RI of OU1, as the boundaries separating OU1 and OU2 had not yet been developed. The surface soil and soil boring/monitoring well locations which fall within the boundaries of OU2 are surface soil locations SDURKEE-SS8 through SDURKEE-SS10 and boring/monitoring well locations SDURKEE-SB10 and SDURKEE-SB11. Although the analytical results for media sampled at these locations were incorporated within the OU1 RI report, they are not included within this AAR, but are included in the RI and AA Reports for OU2.

TABLE 1.3.1-1: Summary Table of Compounds and Analytes Exceeding SCGs

Media	Class	Contaminant of Concern	Detected Concentration Range	Frequency of Exceeding SCG	Applicable SCG(1) (3)	Eastern USA Background (2)
Near-Surface Soils (mg/kg)	Metals	Calcium	51,900 to 201,000	3 of 7	SB	130 to 35,000
		Iron	4,320 to 11,900	7 of 7	2,000 or SB	2,000 to 550,000
		Magnesium	5,080 to 44,200	3 of 7	SB	100 to 5,000
		Zinc	20.1 to 29.0	3 of 7	20 or SB	9 to 50

TABLE 1.3.1-1: Summary Table of Compounds and Analytes Exceeding SCGs						
Media	**Class**	**Contaminant of Concern**	**Detected Concentration Range**	**Frequency of Exceeding SCG**	**Applicable SCG(1) (3)**	**Eastern USA Background (2)**
Subsurface Soil/fill (mg/kg)	**VOCs**	Acetone	0.53 to 1.2	5 of 82	0.2	NA
		Benzene	0.26	1 of 82	0.06	NA
		m/p-Xylenes	1.7 to 4.6	2 of 82	1.2	NA
		o-Xylene	1.4	1 of 82	1.2	NA
	SVOCs	Phenanthrene	52	1 of 82	50.0	NA
		Benzo(a)anthracene	0.25 to 16	31 of 82	0.224 or MDL	NA
		Benzo(a)pyrene	0.085 to 15	38 of 82	0.061 or MDL	NA
		Benzo(b)fluoranthene	1.3 to 16	13 of 82	1.1	NA
		Benzo(k)fluoranthene	1.2 to 5.9	5 of 82	1.1	NA
		Chrysene	0.42 to 15	23 of 82	0.4	NA
		Indeno(1,2,3-cd)pyrene	3.8 to 7.9	2 of 82	3.2	NA
		Dibenzo(a,h)anthracene	.051 to 1.1	11 of 82	0.014 or MDL	NA
	Metals	Arsenic	11.1	1 of 10	7.5 or SB	3 to 12**
		Barium	318	1 of 10	300 or SB	150 to 600
		Beryllium	0.215 to 0.436	6 of 10	0.16 or SB	0 to 1.75
		Calcium	42,400 to 55,300	3 of 10	SB	130 to 35,000
		Copper	82.6	1 of 10	25	1 to 50
		Iron	3,890 to 36,700	10 of 10	2,000 or SB	2,000 to 550,000
		Lead	2,590	1 of 10	SB	200 to 500***
		Magnesium	5,940 to 6,820	2 of 10	SB	100 to 5,000
		Mercury	0.19 to 0.38	3 of 10	0.1	0.001 to 0.2
		Nickel	13.2 to 13.8	3 of 10	13 or SB	0.5 to 25
		Selenium	2.06 to 3.58	2 of 10	2 or SB	0.1 to 3.9
		Zinc	32.4 to 258	8 of 10	20 or SB	9 to 50
Ground Water (ug/L)	**VOCs**	Vinyl Chloride	16	1 of 10	2	NA
		Cis-1,2-Dichloroethene	75	1 of 10	5	NA
	SVOCs	Bis(2-Ethylhexyl) phthalate	5.1 to 7.3	7 of 10	5	NA
	Metals	Iron	1,470 to 34,100	10 of 10	300	NA
		Lead	33.9 to 47.1	2 of 10	25	NA
		Magnesium	37,400 to 131,000	10 of 10	35,000 (GV)	NA
		Manganese	370 to 1,280	7 of 10	300	NA
		Sodium	194,000 to 2,150,000	10 of 10	20,000	NA
Soil Gas (ug/m^3)		Benzene	12 to 17	3 of 3	1.2 to 3.7	NA
		Toluene	64 to 120	3 of 3	5.9 to 16	NA
		Ethylbenzene	5.6 to 12	3 of 3	<1.4 to 1.6	NA
		Xylene (m,p)	23 to 48	3 of 3	<3.6 to 7.3	NA
		Xylene (o)	5.6 to 14	3 of 3	<1.4 to 2.6	NA
		1,3,5-Trimethylbenzene	1.6 to 2.1	2 of 3	<1.4	NA
		1,2,4-Trimethylbenzene	4.8 to 6.9	2 of 3	<1.6 to 3.1	NA

TABLE 1.3.1-1: Summary Table of Compounds and Analytes Exceeding SCGs						
Media	**Class**	**Contaminant of Concern**	**Detected Concentration Range**	**Frequency of Exceeding SCG**	**Applicable SCG(1) (3)**	**Eastern USA Background (2)**
Soil Gas (ug/m³) (3)		1,3-Butadiene	1.1 to 7.5	3 of 3	0.44	NA
		Carbon Disulfide	1.7	1 of 3	1.6	NA
		Cyclohexane	2.8 to 5.5	3 of 3	0.69	NA
		4-Ethyltoluene	2.9 to 7.4	3 of 3	0.98	NA
		2,2,4-Trimethylpentane	4.1 to 8.9	3 of 3	0.93	NA
		n-Hexane	11 to 13	3 of 3	1.6 to 6.4	NA
		n-Heptane	5.7 to 8.2	3 of 3	0.82	NA
		Xylenes (total)	30 to 61	3 of 3	1.7	NA

Table Notes:

(1) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994, Revised April 1995 for soil. NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Effluent Limitations, June 1998 for groundwater and surface water.

(2) Eastern USA background concentrations as reported in a 1984 survey of reference material by E. Carol McGovern, NYSDEC.

(3) The SCG for Soil Gas is the highest reference value promulgated in either the NYSDOH Air Guidance Values, the EPA BASE Data Background Levels or the Ambient Analytical data obtained during the sampling event.

GV Guidance Value

NA Not Applicable

MDL The Laboratory Method Detection Limit (MDL)

SB Site Background

** New York State Background

*** Background levels for lead vary widely. Average background levels in metropolitan areas near highways are much higher and typically range from 200 to 500 mg/kg or ppm. The EPA's Interim Lead Hazard Guidance (7/14/94) establishes a residential screening level of 400 mg/kg or ppm.

Near-Surface Soils

Four (4) metals were detected at concentrations exceeding SCGs with calcium and magnesium the only metals detected at concentrations exceeding their respective Eastern USA Background levels.

Subsurface Soils and Fill Material

Remedial Investigation

Five (5) semi-volatile organic compounds were detected at concentrations exceeding their respective SCGs at two (2) sampling locations. All five (5) SVOCs were detected above SCGs from the soil sample collected from 8 to 10′ bgs at SDURKEE-SB4. Two (2) of the five SVOCs were detected above SCGs from the soil sample collected from 10 to 12′ bgs at SDURKEE-SB8.

Twelve (12) metals were detected at concentrations exceeding their respective SCGs. Of the 12 metals detected above SCGs, six (6) metals (calcium, copper, lead, magnesium, mercury and zinc) were detected at concentrations exceeding their respective Eastern USA Background levels.

Interim Remedial Measure

Four (4) VOCs and eight (8) SVOCs were detected at varying frequencies at concentrations exceeding SCGs from sampling locations throughout the site during the IRM. Acetone was detected above SCGs at 5 of 72 IRM sampling locations in soil/fill from samples collected from western and central trenches of the parking deck. The remaining VOCs (benzene and xylenes) were detected above SCGs at 1 of 72 sampling locations (benzene) and 2 of 72 sampling locations (xylenes) in soil/fill from two samples collected in the vicinity of the northern excavation wall of the office building.

The SVOCs were detected at different frequencies that ranged from 1 of 72 sampling locations for phenanthrene to 36 of 72 sampling locations for benzo(a)pyrene from samples collected throughout the site, thus signifying that soils remaining at the site may be impacted to some degree by these parameters.

Groundwater

Two chlorinated volatile organic compounds (CVOCs) (vinyl chloride and cis-1,2-dichloroethene) were detected at concentrations slightly above their respective SCGs at SDURKEE-MW9 only. These compounds were not detected at any of the other monitoring well locations within OU1.

One (1) semi-volatile organic compound (bis(2-Ethylhexyl)phthalate) was detected in groundwater above its applicable SCG at 7 of 10 sampling locations. Bis(2-Ethylhexyl)phthalate is a common laboratory contaminant that was also detected in the equipment blank.

Five (5) metals were detected at concentrations exceeding their respective SCGs. These included iron (10 of 10 sampling locations), lead (2 of 10 sampling locations), magnesium (10 of 10 sampling locations), manganese (7 of 10 sampling locations) and sodium (10 of 10 sampling locations). Lead was detected above its SCG at SDURKEE-MW7 (located on upgradient portions of the site near Durkee Street) and SDURKEE-

MW12 (located within the approximate footprint of former manufacturing buildings). It should be noted that sampled groundwater from five (5) of the 10 monitoring wells had turbidity values greater than 50 NTU's. High turbidity levels can alter analytical results for water samples, causing spurious increases in analytical metal concentrations, as ionic metals adsorb to the fine particles within the water column and become a part of the analyzed groundwater matrix.

Soil Gas

Petroleum related organic vapors were detected in soil gas, as would be expected in relation to the site's current usage as a parking lot due to minor vehicle drips and releases of motor fuels and oils. Chlorinated soil vapors were not detected above SCGs.

The NYSDOH has verbally indicated that the elevated soil gas concentrations would require a sub slab vapor barrier system be constructed and maintained beneath future inhabitable site structures.

Summary

Calcium and magnesium were the only metals detected above SCGs and Eastern USA Background levels in near-surface soils. Four (4) VOCs, eight (8) SVOCs and six (6) Metals were detected above SCGs in subsurface fill at isolated sampling locations during the RI and IRM of the site.

The VOCs in subsurface soils were confined to the northern excavation wall in the area of the office building and to the central and western excavation trenches in the area of the parking deck following the completion of the IRM. Low level CVOCs and one SVOC, and metals were detected in groundwater. The CVOCs were confined to SDURKEE-MW9.

1.3.2 Contaminant Fate and Transport

The primary contaminants of concern at the site are VOCs, SVOCs and metals in near-surface and subsurface soils and fill material; two CVOCs, one SVOC and metals in groundwater; and petroleum related organic vapors in soil gas. It should be noted that sampled groundwater from five of the 10 monitoring wells had turbidity values greater than 50 NTU's. High turbidity levels can alter analytical results for water samples, causing spurious increases in analytical metal concentrations, as ionic metals adsorb to the fine particles within the water column and become a part of the analyzed groundwater matrix. Additionally, as part of the IRM for the site, approximately 9,614 tons of VOC, SVOC and metal impacted soil and urban fill and 12,360 gallons of impacted groundwater was removed and disposed of off-site. Removal of this media has significantly reduced the contaminant source media at the site. The reduction in the contaminant source should improve the site's groundwater quality.

The SVOCs and metals in near-surface and subsurface soil/fill will tend to adhere to surrounding soil and fill particles and not readily leach into underlying groundwater. This is exemplified by the presence of only three (3) of the 12 metals and none of the SVOCs detected above SCGs in the near-surface soil and subsurface soil/fill sampling event being detected above SCGs within the sampled groundwater. SVOCs in subsurface soils may volatilize to the atmosphere should the soils/fill be disturbed or leach into groundwater. The VOCs in subsurface soils/fill will tend to volatilize and migrate vertically upwards to the open atmosphere, but may dissolve in groundwater if the water table rises into areas of soil/fill impacted by these compounds. The VOCs detected in the subsurface soil/fill were not detected in the sampled groundwater, with the exception of acetone. Acetone was detected at concentrations above the laboratory detection limit, but below SCGs at three (3) groundwater sampling locations.

The CVOCs and SVOC in groundwater are in a dissolved phase and will tend to migrate with groundwater towards the Saranac River. As discussed previously, the SVOC (Bis(2-Ethylhexyl)phthalate) is viewed as a laboratory contaminant. The two CVOCs (vinyl chloride and cis-1,2-dichloroethene) were detected at concentrations slightly above their SCGs at SDURKEE-MW9 only, and are viewed as "daughter" products of more persistent solvents that have degraded over time under anaerobic conditions. Should current and future anaerobic conditions be similar to those that have degraded the principal chlorinated contaminants to their current state, then CVOCs remaining in groundwater should further bio-attenuate into ethene, which is considered a non-toxic end product. Metals in groundwater (except sodium, which dissolves in water) are expected to adhere to surrounding soil and fill particles but may migrate in the direction of groundwater flow.

The transport mechanisms for the contaminants present at the site are migration within the groundwater and/or volatilization into the atmosphere. The VOCs in soil/fill may volatilize and migrate vertically upwards and disperse into the atmosphere, but may dissolve in groundwater should they exist within the aquifer. If this were to occur, the VOCs would tend to concentrate in the upper portions of the aquifer (i.e. densities less than one) and migrate in the direction of groundwater flow towards the Saranac River. The chlorinated compounds, with the exception of vinyl chloride if found within the saturated portions of the aquifer, tend to migrate in the lower portions of the aquifer due to their densities being greater than 1. The SVOCs are currently confined to the soil and fill materials and could be dispersed to the atmosphere should this media be disturbed. However, should the SVOCs migrate downwards into the groundwater, they will tend to sink to the bottom of the aquifer to a less permeable soil type (glacial till) and migrate in the direction of groundwater flow and/or the surface of the less permeable unit. Most metals are strongly held, reducing their migration and extent of contamination, with the exception of calcium and sodium, which readily dissolve in groundwater. CVOC contaminants within the groundwater and vadose zone will volatilize into the unsaturated soils above the water table, and eventually will diffuse into the atmosphere.

1.4 Human Exposure Pathways

Exposure pathways are means by which contaminants move through the environment from a source to a point of contact with humans. A complete exposure pathway must have five (5) parts: 1) a source of contamination; 2) a mechanism for transport of a substance from the source to the air, surface water, groundwater and/or soil; 3) a point where people come in contact with contaminated air, surface water, groundwater or soil (point of exposure); 4) a route of entry (exposure) into the body; and 5) a receptor population. Routes of entry include ingesting contaminated materials, breathing contaminated air, or absorbing contaminants through the skin. If any part of an exposure pathway is absent, the pathway is said to be incomplete and no exposure or risk is possible. In some cases, although a pathway is complete, the likelihood that significant exposure will occur is small.

The potential site related contaminants were identified as those contaminants detected in various media at the site above SCGs. The potential site related contaminants that have been identified in various media at the site are presented in Table 1.4-1.

TABLE 1.4-1: Potential Site Related Contaminants			
Compound	Near-Surface Soil	Subsurface Soil	Groundwater
Volatile Organic Compounds:			
Acetone	No	Yes	No
Benzene	No	Yes	No
m/p-Xylenes	No	Yes	No
o-Xylene	No	Yes	No
Vinyl Chloride	No	No	Yes
Cis-1,2-Dichloroethene	No	No	Yes
Semi- Volatile Organic Compounds:			
Bis(2-Ethylhexyl)phthalate	No	No	Yes
Phenanthrene	No	Yes	No
Benzo(a)anthracene	No	Yes	No
Benzo(a)pyrene	No	Yes	No
Benzo(b)fluoranthene	No	Yes	No
Benzo(k)fluoranthene	No	Yes	No
Chrysene	No	Yes	No
Indeno(1,2,3-cd)pyrene	No	Yes	No
Dibenzo(a,h)anthracene	No	Yes	No
Metals:			
Arsenic	No	Yes	No
Barium	No	Yes	No
Beryllium	No	Yes	No
Calcium	Yes	Yes	No
Copper	No	Yes	No
Iron	Yes	Yes	Yes
Lead	No	Yes	Yes
Magnesium	Yes	Yes	Yes
Manganese	No	No	Yes
Mercury	No	Yes	No
Nickel	No	Yes	No
Selenium	No	Yes	No
Sodium	No	No	Yes
Zinc	Yes	Yes	No
Soil Gas:			
Benzene	No	Yes	No
Toluene	No	Yes	No
Ethylbenzene	No	Yes	No
Xylene (m,p)	No	Yes	No
Xylene (o)	No	Yes	No
1,3,5-Trimethylbenzene	No	Yes	No
1,2,4-Trimethylbenzene	No	Yes	No
1,3-Butadiene	No	Yes	No
Carbon Disulfide	No	Yes	No
Cyclohexane	No	Yes	No

TABLE 1.4-1: Potential Site Related Contaminants			
Compound	**Near-Surface Soil**	**Subsurface Soil**	**Groundwater**
4-Ethyltoluene	No	Yes	No
2,2,4-Trimethylpentane	No	Yes	No
n-Hexane	No	Yes	No
n-Heptane	No	Yes	No
Xylenes (total)	No	Yes	No

Potential exposure pathways for site contaminants are a function of the contaminant, the affected media, contaminant location and the potentially impacted population. The potential exposure routes and pathways for the site include dermal contact and/or ingestion of potentially contaminated near-surface and subsurface soils; inhalation of potentially contaminated dust or vapors emanating from near-surface soils and from subsurface soils should these soils be disturbed; and dermal contact and/or ingestion of potentially contaminated groundwater.

It is the intent of the City of Plattsburgh to prepare the site, as demonstrated by completion of the ERP, for future commercial (office building and parking deck) development. The majority of the contaminants of concern were detected in near-surface soil, subsurface soil, soil gas and at select groundwater sampling locations. At the Durkee Street Parking Lot (OU1) site and its surroundings, potential impacted populations include employees and residents of nearby commercial, residential and institutional entities, site visitors, trespassers on the site, and workers that may be engaged in excavation work during site development. The following details the site COCs per media type on a site wide basis and their likelihood of impacting receptor populations.

- Several volatile and semi-volatile organic compounds and metals were detected in near-surface and subsurface soils and fill materials at concentrations exceeding SCGs. Disturbance of the subsurface soils and fill materials during construction activities could potentially create airborne contaminants that may be inhaled and/or ingested. The potential for dermal contact, inhalation and ingestion of the impacted subsurface soil and fill material is, therefore, anticipated to be high during construction activities but remains low at present, as excavations advanced during the IRM have been backfilled with clean fill and the remainder of the site is covered with asphalt.

- Several metals, VOCs, and one SVOC were detected in groundwater at concentrations exceeding SCGs. Considering that the depth to groundwater is greater than 4 feet below grade, the potential for dermal contact through exposure to groundwater and the associated impact is anticipated to be low, unless groundwater is encountered and subsequently disturbed during construction activities, where it will need to be evacuated and treated. Ingestion of the contaminated groundwater is unlikely since the area surrounding and down gradient of the site is serviced by public water and no private water supply wells are known to exist.

- Several petroleum related vapors were detected in soil gas beneath the footprint of the proposed office building. Because the building will be occupied upon its completion, there is a potential for future occupants to be exposed to the vapors. The NYSDOH has indicated that a vapor mitigation system will need to be installed as part of the office building's construction.

1.5 Ecological Exposure Pathways

In general, the value of the fish and wildlife resources located within the study area is low. The project site was developed with various commercial and industrial structures back to as late as 1884 before becoming a surface parking lot in as early as 1966. Surrounding commercial and residential areas have eliminated much of the natural habitat in the area and have replaced it with urban wildlife habitats consisting primarily of mowed lawns with trees, paved roads, parking lots and urban structure exteriors.

The value of fish and wildlife resources to humans is very limited within the study area. Access to the Saranac River is restricted by the residential and business properties and fences; there is no hunting allowed within the City of Plattsburgh. As a result, the value of these resources to humans was determined to be low.

2.0 DEVELOPMENT OF ALTERNATIVES

2.1 Introduction

The RI of the site included intrusive and non-intrusive investigations to determine the nature and extent of COCs within near-surface soils, subsurface soils, groundwater and subsurface soil gas. The RI also included an IRM that involved the excavation and disposal of impacted soils/fill and buried tanks/vessels. The results of the RI and IRM were used to develop and evaluate the remedial alternatives described within this report.

Feasible remedial action(s) are identified to achieve compliance with established regulatory cleanup guidance levels and/or to protect human health and the environment. The remedial alternatives for the site are developed based on published literature and current knowledge of the technologies commonly employed in similar situations and circumstances.

2.2 Remedial Action Objectives

Table 2.2-1 summarizes the COCs within each medium and the remedial action objectives (RAOs) identified for each medium. The COCs include compounds and analytes which exceeded their respective SCGs. Affected populations described in the table include employees and residents of nearby residential and commercial entities, site visitors, trespassers on the site, and workers engaged in excavation work during construction activities.

Table 2.2-1: Contaminants of Concern for Site Media and Remedial Action Objectives

Media Type	COCs	Remedial Action Objectives
Near-Surface Soils	Metals	Prevent affected populations from direct contact and ingestion of contaminated surface soils should they be disturbed.

Table 2.2-1: Contaminants of Concern for Site Media and Remedial Action Objectives		
Media Type	**COCs**	**Remedial Action Objectives**
Subsurface Soils/Fill	VOCs, SVOCs and Metals	Prevent affected populations from contact, ingestion and inhalation of vapors/dust that may emanate from subsurface soils/fill that may be disturbed during site construction.
Groundwater	VOCs, Metals and one SVOC	Prevent affected populations from contact and ingestion of groundwater should it be encountered during development of the site.
Soil Gas	Organic Vapors	Prevent future occupants of the office building from inhalation of organic vapors that may migrate from the subsurface into the building structure.

As depicted on the table, metals are the primary contaminants of concern in near-surface soils while VOCs, SVOCs and metals are the contaminants of concern within subsurface soils and fill material. CVOCs, one SVOC and metals are contaminants of concern within groundwater while petroleum based organic vapors are the contaminants of concern in soil gas.

The remedial action objectives are to control and possibly eliminate COCs present in the various areas and media within the site, with the ultimate goal of protecting human health and the environment.

2.3 General Response Actions

The project site is impacted by varying concentrations of VOCs, SVOCs, metals and petroleum based organic vapors above SCGs. As such, general response actions were developed for addressing COCs present within the site through site specific remedial alternatives. The intent of the general response actions is to address contamination and mitigate the potential for exposure to the contamination and to a lesser extent potential off-site impacts from the subject site. The following provides the approximate areas to which treatment, containment, or exposure reduction technologies may be applied to the site.

- Soils and fill material underlying the site are impacted by VOCs, SVOCs and metals. The site has an approximate area of 1.31 acres (57,063 square feet) and is underlain with soils/fill at depths that range from the surface to 18 feet bgs for an average thickness of 9 feet of soils/fill. Multiplying the total site area by the average soil/fill thickness equates to approximately 19,021 cubic yards or 33,250 tons of impacted fill material. During the IRM of the site, approximately 9,614 tons of impacted fill was excavated and transported off site; leaving approximately 23,636 tons of impacted fill material. It should be noted that the IRM was successful at removing and disposing of impacted fill/soil within the planned building foundation locations. As such, potential exposure to the impacted fill/soil by construction workers at the site was significantly reduced.

- Groundwater is impacted by metals, CVOCs and one SVOC. The CVOCs were detected at monitoring well SDURKEE-MW9 only. The metals and SVOC were detected at different frequencies within all of the monitoring wells within the boundaries of OU1. Because groundwater was collected at discreet locations across the site, an assumption is made that all groundwater beneath the site is impacted to varying degrees by metals and to a lesser degree by the one SVOC, and that CVOC groundwater impacts are confined in the vicinity of SDURKEE-MW9. Therefore, groundwater will need to be evacuated, stored and treated should the remedy for the site require the excavation and off-site disposal of remaining impacted soils and fill. Should excavation and disposal of impacted soils/fill not be the selected remedy, long-term monitoring of groundwater would then be necessary and additional monitoring wells would need to be installed on the site to replace existing monitoring wells that were destroyed during the IRM for the site. Five monitoring wells are planned for the long-term monitoring and will include two monitoring wells on downgradient portions of the site, two monitoring wells on central portions of the site, and one monitoring well on upgradient portions of the site.

- The soil gas survey depicted petroleum related organic vapors above SCGs within soils/fill interstitial spaces beneath the planned office building. The NYSDOH has indicated that a soil vapor mitigation system will need to be installed within occupied structures.

In developing remediation goals for the subject site, the following design considerations were evaluated relative to economical and feasible solutions for addressing the site contaminants:

- It is the intent of the City and consistent with current zoning to develop the site into a multi-story office building and open-air parking deck. Hence, the remedial action needs to reduce and possibly eliminate potential exposure to the COCs for workers associated with development of the site and future office building occupants.

2.4 Development of Alternatives

The following sections present a selection of remedial alternatives that may be implemented to address the general response actions discussed in the previous section of this report. The alternatives under consideration include:

1. No action and groundwater monitoring;

2. Implementation of existing site features as a barrier to contact, institutional controls, establishment of a Site Management Plan (SMP), and abandonment of monitoring wells;

3. Implementation of existing site features as a barrier to contact, institutional controls, establishment of a SMP, and long-term groundwater monitoring; and

4. Excavation and disposal of impacted soils and fill material and replacement with clean fill, dewatering and treatment of impacted groundwater, institutional controls, and abandonment of monitoring wells.

As current plans for the site include the construction of an office building and parking deck with associated asphalt-paved entrances, concrete sidewalks and landscaped areas, the footprints of the office building, parking deck, entrances and sidewalks will serve as barriers to contact.

2.4.1 Alternative No. 1 - No Action and Groundwater Monitoring

The No Action Alternative is evaluated as a procedural requirement and is a requirement of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This alternative would leave the site in its present condition (with office building and parking deck) and would not provide any additional protection to human health and the environment. Because of known groundwater impacts, the site would require groundwater monitoring.

2.4.2 Alternative No. 2 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

This alternative would implement the site's existing features (office building and parking deck, and asphalt, concrete and landscaped areas) as a barrier to contact with the addition of an institutional control, which would be placed on the site to restrict future land use and notify future owners or prospective purchasers of the presence of contamination. The institutional control would be in the form of an environmental easement granted to the NYSDEC, who would enforce the terms of the easement. The institutional control would also call for the development of a Site Management Plan (SMP) should the site undergo any other future development and the installation of a soil vapor mitigation system to protect occupants of the office building from subsurface organic vapors that may infiltrate the building. The monitoring wells would be abandoned, which would eliminate the ability to perform long-term groundwater monitoring.

2.4.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

This alternative would include the same features as those presented in Alternative No. 2 except that long-term groundwater monitoring would be conducted to evaluate the persistence of known site contaminants.

2.4.4 Alternative No. 4 – Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells

This alternative would involve the excavation and disposal of remaining contaminated soil/fill at the site and would also include the evacuation, treatment and disposal of all impacted groundwater encountered during the excavations. Upon completion of the remedy, the site would be backfilled with clean fill and an institutional control would be implemented in regards to residual contaminants that may remain on the site. The institutional control would restrict future land use and notify future owners or prospective purchasers of the potential presence of residual contamination at the site. The institutional control would be in the form of an environmental easement granted to the NYSDEC, who would enforce the terms of the easement.

The remedy would also require the installation of a soil vapor mitigation system to protect occupants of the proposed office building from residual subsurface organic vapors that may infiltrate the building.

3.0 DETAILED ANALYSIS OF ALTERNATIVES

3.1 Introduction

Each remedial alternative was evaluated based on specific criteria set forth in 6NYCRR Part 375-1.10. The evaluation criteria will be used by the NYSDEC in the selection process for the most appropriate remedy considering the site conditions, level of implementation, and cost-effectiveness. From this AAR and the RI Report, the Department will prepare a Proposed Remedial Action Plan (PRAP) to be submitted to the public with the RI Report and the AAR. The Department will address issues raised by the public in a Responsiveness Summary. The final remedy for the site will be documented in the Record of Decision (ROD) prepared by NYSDEC after a 45 day public comment period.

The first seven (7) of the following eight (8) criteria form the basic components of the detailed analysis of each alternative whereby each criteria is compared to the others to determine the most cost effective, protective remedy. The Department will use criteria #8 in their evaluation once the public comment period has ended.

1. Overall protection of public health and the environment;
2. Compliance with Standards, Criteria, and Guidance (SCGs);
3. Short-term effectiveness;
4. Long-term effectiveness and permanence;
5. Reduction of toxicity, mobility, or volume with treatment;
6. Implementability;
7. Cost; and

8. Community acceptance.

The remedial alternative approach of "No Action" could be applied to most sites where low level contamination is present and fully delineated, and does not pose a significant threat to human health or the environment. This alternative is best suited for low level contamination, but could also be applied if higher levels of contamination are present and there is no significant threat to the human health or the environment.

Institutional controls are means of attaching restrictions to the property to limit site activities and future use of the property, and to assure due diligence in notification of prospective purchasers and the public. These restrictions could also include installation of fencing or other means to limit access to the site or a particular area of the site. The site's current and future land use plays a significant role in selecting the most effective institutional controls. Examples of institutional controls typically include land use and groundwater use restrictions, deed restrictions, and notification in public registries of excavation and construction work activity, and appropriate posting of informational signs at the site. Depending on the severity of contamination, institutional controls could be required along with other feasible remedial alternatives. For the purpose of analyzing the alternatives below, specific examples of institutional controls (as discussed above) are not referenced, but would ultimately be crafted based on the selected remedy.

3.2 Overall Protection of Human Health and the Environment

3.2.1 Alternative No. 1: No Action and Groundwater Monitoring

Overall protection of human health and the environment would not be improved in the short term by implementing the No Action alternative. The level of protection to human health and the environment would be evaluated over time by periodically assessing the contaminant concentrations through long-term groundwater monitoring. However, metals and SVOCs detected in soils and fill material above the water table will more than likely persist over time. Impacts to the environment may be slightly mitigated with respect to CVOCs in groundwater, as these may diminish in concentration over time through natural attenuation and/or migrate with groundwater flow direction towards the Saranac River.

3.2.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

Limited overall protection of human health and the environment would be achieved through implementation of Alternative No. 2 as existing site features (office building and parking deck, and asphalt, concrete and landscaped areas) would serve as a barrier to contact. A Site Management Plan would serve to dictate the preferred methods to be utilized during any other future construction and site maintenance activities and institutional controls would establish restrictions for groundwater, soil, and fill material usage and disturbance restrictions on potential future site owners and/or developers.

The installation of the soil vapor mitigation system would serve to protect occupants of the proposed office building from subsurface organic vapors that may infiltrate the building. The abandonment of the monitoring wells would effectively eliminate the ability for long term monitoring of contaminant persistence.

3.2.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

Protection of human health and the environment would be similar to Alternative No. 2. Protection to human health and the environment would be evaluated over time by periodically assessing the contaminant concentrations in groundwater through long-term groundwater monitoring.

3.2.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells

Protection of human health and the environment would effectively be realized through the implementation of Alternative 4 as the contaminated soil, fill and groundwater in excess of SCGs would be remediated through the excavation and disposal of impacted soil and fill material and the evacuation, treatment and disposal of impacted groundwater.

Institutional controls would be implemented in the event that residual contaminants remain, and for groundwater usage.

The installation of the soil vapor mitigation system would serve to protect occupants of the proposed office building from residual subsurface organic vapors that may infiltrate the building.

3.3 Compliance with Standards, Criteria, and Guidance (SCGs)

3.3.1 Alternative No. 1: No Action and Groundwater Monitoring

Compliance with SCGs will not be attained if the No Action alternative is implemented because the remaining impacted media will not be addressed through any forms of site control or remedial efforts, and will be allowed to remain on site. Additionally, no protection will be afforded to affected populations relative to COCs in near-surface and subsurface soils/fill, and to a lesser degree, groundwater. The level of protection to human health and the environment would be evaluated over time by periodically assessing the contaminant concentrations through long-term groundwater monitoring.

3.3.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

Compliance with SCGs will not be attained through implementation of Alternative No. 2 because remaining impacts within soil, fill, soil gas and groundwater will remain in place.

Abandonment of the monitoring wells would eliminate the ability to perform long term monitoring of contaminants in groundwater thereby not allowing compliance to SCGs to be evaluated over time. The potential exists for volatile organic compounds to naturally attenuate over time and may eventually meet SCGs. Metals concentrations in soil and groundwater would not tend to break down and will not meet SCGs in the future.

3.3.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

Compliance with SCGs will not be attained through implementation of Alternative No. 3 because remaining impacts within soil, fill, soil gas and groundwater will remain in place. Contaminant persistence would be evaluated over time through groundwater sampling and analysis. The potential exists for volatile organic compounds to naturally attenuate over time and may eventually meet SCGs. Metals concentrations in soil and groundwater would not tend to break down and will not meet SCGs in the future.

3.3.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells

Compliance with SCGs would effectively be realized through the implementation of Alternative 4 as the contaminated soil, fill, soil gas and groundwater in excess of SCGs would be remediated.

Institutional controls would be implemented in the event that residual contaminants remain in soil/fill, and for groundwater usage. The installation of the soil vapor mitigation system would reduce exposure to occupants of the proposed office building from residual subsurface organic vapors that may infiltrate the building.

3.4 Short Term Effectiveness

3.4.1 Alternative No. 1: No Action and Groundwater Monitoring

The effectiveness of the No Action Alternative will be realized in the short term and could be implemented within three months. There would be no short term reduction in the potential for impacts to human health. There will be no impact to the community or the environment during implementation of the No Action Alternative.

Installation of the monitoring wells could be completed within one week by local contractors and their installation should have no short term adverse effects on the site.

3.4.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of SMP, and Abandonment of Monitoring Wells

The short term effectiveness of this remedy will be realized upon implementation of the institutional controls, installation of the soil vapor mitigation system and inspection and certification of the existing barrier to contact. The legal documents for the institutional control can be quickly drafted and filed, and become binding upon affected populations in a short period of time. The soil vapor mitigation system can be installed during, and as part of, the construction of the office building.

There are no foreseen short term adverse impacts to affected populations concerning implementation of this alternative. Existing monitoring wells can be abandoned with little physical disturbance to the site.

3.4.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

The short-term effectiveness would be similar to Alternative No. 2 except that the installation of the monitoring wells would have no short term adverse effects on the site. Additionally, there will be only minimal impact to the community and the environment during groundwater sampling events. There are no short term adverse impacts to affected populations concerning implementation of this alternative.

3.4.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells

The short-term effectiveness of the excavation and disposal of impacted soils/fill and dewatering, treatment and disposal of impacted groundwater will be immediate in that affected populations will no longer be exposed to contaminants underlying the site once the work is completed. The soil vapor mitigation system can be installed during, and as part of, the construction of the office building.

Implementation of this alternative will involve the disturbance of underlying impacted soils/fill through excavation of the impacted media and the subsequent dewatering and treatment of the impacted groundwater. Affected populations will be protected during implementation of the selected remedy by establishing a work zone that excludes unauthorized individuals and by employing effective dust suppression techniques (application of water) and community dust monitoring during earthwork activities. Institutional controls will also be implemented to limit future development of the site.

3.5 Long Term Effectiveness and Permanence

3.5.1 Alternative No. 1: No Action and Groundwater Monitoring

There will be limited long term effectiveness if the No Action remedy is chosen. Some reduction in contaminant persistence may be achieved by natural attenuation. However, metals and SVOCs in surface and subsurface soils and metals in groundwater will more likely persist for an undefined period of time. The remedy will not meet RAOs in that there will be little protection to affected populations to site contaminants. The groundwater monitoring will serve to gage the persistence of site contaminants in groundwater over time.

3.5.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

The long term effectiveness and permanence of Alternative 2 is based on the frequency that the barrier to contact is inspected and maintained/certified, and if the institutional controls are implemented by current and future site owners and developers. If the barrier is maintained and institutional controls are followed, then the long-term effectiveness of this alternative is good (i.e. protection from underlying site contaminants). The abandonment of the monitoring wells will eliminate the ability for long-term groundwater sampling and analysis, thereby not allowing contaminant persistence to be evaluated over time.

3.5.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

In addition to the long-term effectiveness described in Alternative No. 2 above, long-term groundwater monitoring would aid in evaluating contaminant persistence over time.

3.5.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater; Institutional Controls; and Abandonment of Monitoring Wells

Implementing Alternative No. 4 is a long term and permanently effective means of remediating contamination at the site. There should be no residual risks remaining upon completion of this alternative. This alternative is considered to be a reliable means of reducing the potential impacts to human health and the environment and will be further accentuated by implementation of institutional controls. Residual soil vapor will be addressed through installation of the soil vapor mitigation system.

3.6 Reduction of Toxicity, Mobility or Volume with Treatment

3.6.1 Alternative No. 1: No Action and Groundwater Monitoring

This remedy will not reduce the toxicity, mobility or volume of the site contaminants, although some reduction in contaminant persistence may be achieved by natural attenuation, which will be observed through long-term groundwater monitoring.

3.6.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

This remedy will not readily reduce the toxicity, mobility or volume of the site contaminants, although some reduction in contaminant persistence may be achieved by natural attenuation. Abandonment of the monitoring wells would eliminate the ability for long-term groundwater monitoring for contaminant persistence.

3.6.3 Alternative No. 3 – Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

This alternative will not reduce the toxicity, mobility or volume of the site contaminants, although some contaminant reduction (for VOCs, not metals) may be achieved by natural attenuation. Long-term groundwater monitoring will aid in evaluating contaminant reduction over time.

3.6.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater; Institutional Controls; and Abandonment of Monitoring Wells

Implementation of Alternative No. 4 will effectively eliminate the toxicity, mobility and volume of the site contaminants.

3.7 Implementability

3.7.1 Alternative 1: No Action and Groundwater Monitoring

Alternative No. 1 can be easily implemented as no action will be taken relative to protecting affected populations and the environment from site contaminants.

The location and condition of existing monitoring wells remaining at the site would be assessed for long term groundwater monitoring. In the event that the existing wells are not located within areas of the site that would be representative of site groundwater conditions or if the wells are destroyed, then new monitoring wells will need to be installed. Installation of monitoring wells could be completed within one week by local contractors. Sampling of the monitoring wells and laboratory analysis of the groundwater samples is a routine service provided by most engineering consultants and/or environmental testing laboratories.

3.7.2 Alternative No. 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells

The implementation of institutional controls involves only the drafting of legal documents that will be binding on future site owners and developers.

The soil vapor mitigation system can be installed during building construction. A specialty contractor is not necessary for installation of this system as the contractor building the structure can properly install it with engineering assistance.

Remaining monitoring wells installed during the RI will be abandoned by a drilling contractor that is locally available, which would only take two to three days.

3.7.3 Alternative No. 3: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring

In addition to the implementability of Alternative 2 described above, the installation of monitoring wells could be completed within one week by local drilling contractors. Sampling of the monitoring wells and laboratory analysis of the groundwater samples is a routine service provided by most engineering consultants and/or environmental testing laboratories.

3.7.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater; Institutional Controls; and Abandonment of Monitoring Wells

This alternative is the most difficult to implement, as it will involve additional coordination and excavation of impacted soils/fill beneath the site and groundwater extraction and treatment. The underlying soil/fill is non-cohesive, as demonstrated by the collapse of excavation walls during the IRM. Sheeting and shoring would be necessary to avert excavation collapse and comply with safety standards.

The implementation of institutional controls involves only the drafting of legal documents that will be binding on future site owners and developers.

The soil vapor mitigation system can be installed during construction of the office building. A specialty contractor is not necessary for installation of this system as the contractor building the structure can properly install it with engineering assistance.

3.8 Cost

The associated costs for each of the remedial alternatives are presented in detail in Table 3.8-2 in Appendix A. The following Table 3.8-1 presents the approximate lump sum costs for each of the alternatives.

TABLE 3.8-1: Lump Sum Costs Per Alternative

Description of Alternative	Estimated Lump Sum Cost
Alternative 1: No Action and Groundwater Monitoring	$59,565
Alternative 2: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells	$79,500
Alternative 3: Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring	$131,565
Alternative 4: Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells	$3,234,302

3.9 Comparative Analysis

Utilizing the evaluation criteria, each remedial alternative is compared to the other on the basis of cost and effectiveness as a means to identify the most cost effective, protective remedy. For comparative purposes the criteria are based on a high, moderate and low basis.

Four (4) remedial alternatives were presented for the site. These included 1) No Action and Groundwater Monitoring, 2) Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells, 3) Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring, and 4) Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls, and Abandonment of Monitoring Wells.

The No Action alternative is the least expensive and least effective alternative for the protection of human health and the environment. Contaminant persistence at the site would be assessed through long-term groundwater monitoring. The evaluation criterion for Alternative 1 is low.

Alternative 2 would be more effective and more costly than the No Action alternative in that it would include the inspection, maintenance and certification of the existing barrier to contact, and impose institutional controls that would restrict groundwater and land use and notify future owners or prospective purchasers of the presence of site contamination. The evaluation criterion for Alternative 2 is moderate.

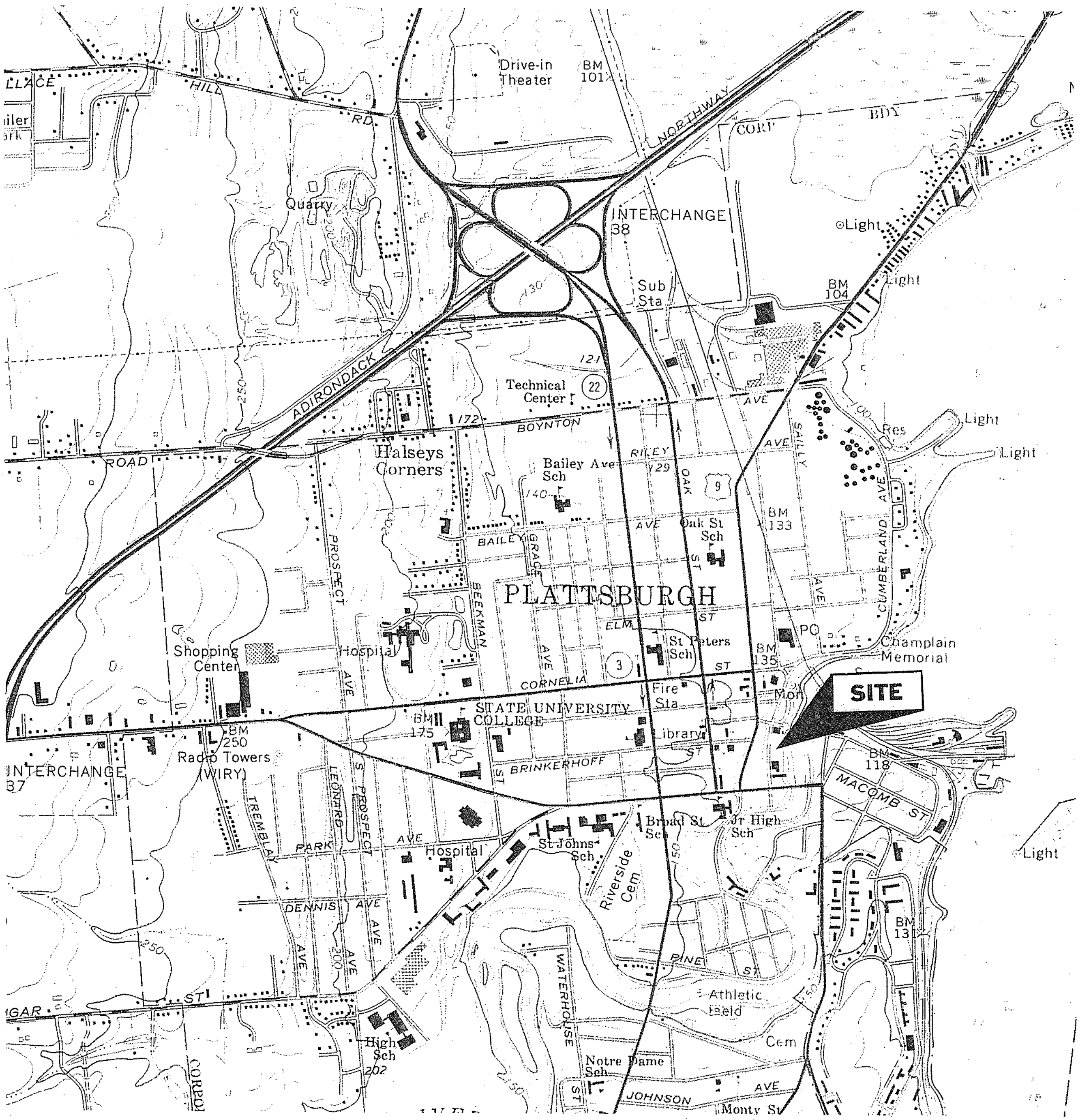
Alternative 3 would be more effective and slightly more costly than Alternative 2 in that it would provide for long-term monitoring to evaluate contaminant persistence in groundwater. The evaluation criterion for Alternative 3 is moderate to high.

Alternative 4 is the most costly and least implementable of the alternatives as it involves the excavation and disposal of impacted soils/fill above SCGs and replacement with clean fill material, and the evacuation, treatment and disposal of impacted groundwater beneath the entire site. Implementing this alternative will be difficult due to the site's limited space constraints, existing traffic congestion on Durkee and Broad Streets, and the potential to compromise the integrity of the adjacent Farmer's Market and north parking area.

Based on the foregoing, Alternative 3 appears to be the most cost effective remedy for the site.

FIGURE 1

SITE LOCATION MAP



MAP REFERENCE

United States Geological Survey
7.5 Minute Series Topographic Map
Quadrangles: Plattsburgh, NY
Date: 1966

ARCHITECTURE & BUILDING SYSTEMS ENGINEERING
CIVIL ENGINEERING
ENVIRONMENTAL SERVICES
SURVEY & LAND INFORMATIONAL SERVICES

C.T. MALE ASSOCIATES, P.C.

50 CENTURY HILL DRIVE, PO BOX 727, LATHAM, NY 12110
PHONE (518) 786-7400 FAX (518) 786-7299

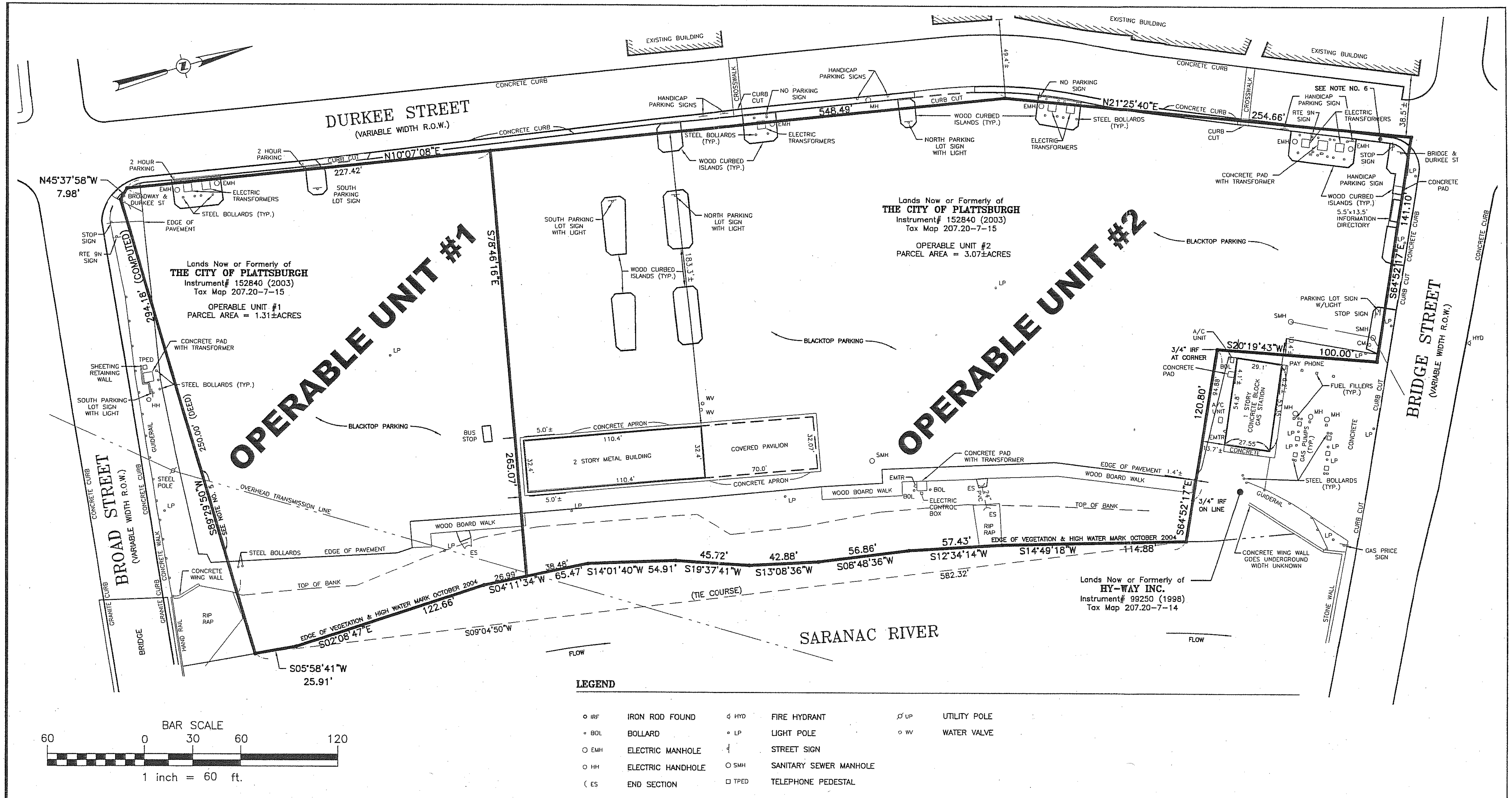
SITE LOCATION MAP

DURKEE STREET PARKING LOT

CITY OF PLATTSBURGH	CLINTON COUNTY, NY
SCALE: 1" = 2000'	
DRAFTER: SHB	
PROJECT No. 04.9498	

FIGURE 2

SITE PLAN



NOTE:
1. THE LOCATIONS AND FEATURES DEPICTED ON THIS MAP ARE APPROXIMATE AND DO NOT REPRESENT AN ACTUAL FIELD SURVEY.

MAP REFERENCE:
1. SHEET SP-1, PREPARED BY RABIDEAU ARCHITECTS OF BURLINGTON, VT, DATED 12/15/03, LAST REVISED 3/17/04.

2. BOUNDARY SURVEY, PORTION OF LANDS OF CITY OF PLATTSBURGH DURKEE STREET PARKING LOT, PREPARED BY C.T. MALE ASSOCIATES, P.C., DWG NO. 04-0670, DATED OCTOBER 5, 2004, REVISED 11/30/04.

CAD DWG. FILE NAME: WP MAPS_REV.DWG

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : J.MARX
CHECKED : SB
PROJ. NO: 04.9498
SCALE : ±1"=60'
DATE : OCTOBER 2004

FIGURE 2
SITE PLAN

PLATTSBURGH GATEWAY PROJECT
DURKEE STREET PARKING LOT

CITY OF PLATTSBURGH — CLINTON COUNTY, NY

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING * CIVIL ENGINEERING
ENVIRONMENTAL SERVICES * SURVEY & LAND INFORMATION SERVICES

SHEET 1 OF 3
DWG. NO: 04-0684

APPENDIX A

TABLE 3.8

ALTERNATIVE ANALYSES COST ESTIMATES

C.T. MALE ASSOCIATES, P.C.

TABLE 3.8: Alternatives Analysis Cost Estimate
Durkee Street Parking Lot (OU1), Plattsburgh, New York
C.T. Male Project No.: 04.9498

Bid Item #	Work Item	Units	Est. Units		Unit Rate		Estimated Fee
Alternative 1	**No Action and Groundwater Monitoring**						
1	Legal and Filing Fees (Institutional Controls)	LS	1	$	5,000.00	$	5,000.00
2	Installation of Five Monitoring Wells	LS	1	$	15,885.00	$	15,885.00
3	Long Term Costs						
3a	Groundwater Sampling and Analyses (Years 1 - 5, 10 & 15) (Present Value)						
	Analytical	Each	7	$	2,925.00	$	16,490.00
	Data Validation	Each	7	$	550.00	$	3,100.00
	Field Work	Each	7	$	960.00	$	5,415.00
	Equipment	Each	7	$	480.00	$	2,705.00
	Disposal of Drummed Purge Water	Each	7	$	250.00	$	1,410.00
	Reporting	Each	7	$	1,500.00	$	9,560.00
	Subtotal - Long Term Costs (Annual & Present Value)			**$**	**6,665.00**	**$**	**38,680.00**
		Total Cost (Alternative 1)				**$**	**59,565.00**
Alternative 2	**Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Abandonment of Monitoring Wells**						
1	Legal and Filing Fees (Institutional Controls)	LS	1	$	5,000.00	$	5,000.00
2	Site Management Plan	LS	1	$	10,000.00	$	10,000.00
3	Sub Slab Vent System (Developer Responsibility)	LS	1	$	10,000.00	$	10,000.00
4	Abandonment of Five Monitoring Wells	LS	5	$	500.00	$	2,500.00
	Long Term Costs						
5	Site Management Plan Requirements (30 years)						
5a	Periodic Site Inspection and Certification by an Environmental Professional (Present Value)	EACH	30	$	720.00	$	11,000.00
5b	Periodic O&M-Cover Maintenance and Repair (Present Value)	EACH	30	$	1,500.00	$	23,000.00
5c	Miscellaneous Site Work (2 days annually-Present Value)	EACH	30	$	1,200.00	$	18,000.00
	Subtotal - Long Term Costs (Annual & Present Value)			***$***	***3,420.00***	***$***	***52,000.00***
		Total Cost (Alternative 2)				**$**	**79,500.00**
Alternative 3	**Implementation of Existing Site Features as a Barrier to Contact, Institutional Controls, Establishment of a SMP, and Long-Term Groundwater Monitoring**						
1	Legal and Filing Fees (Institutional Controls)	LS	1	$	5,000.00	$	5,000.00
2	Site Management Plan	LS	1	$	10,000.00	$	10,000.00
3	Sub Slab Vent System (Developer Responsibility)	LS	1	$	10,000.00	$	10,000.00
3	Installation of Five Monitoring Wells	LS	1	$	15,885.00	$	15,885.00
	Long Term Costs						
4	Site Management Plan Requirements (30 years)						
4a	Periodic Site Inspection and Certification by an Environmental Professional (Present Value)	EACH	30	$	720.00	$	11,000.00
4b	Periodic O&M-Cover maintenance and Repair (Present Value)	EACH	30	$	1,500.00	$	23,000.00
4c	Miscellaneous Site Work (2 days annually- Present Value)	EACH	30	$	1,200.00	$	18,000.00
5	Groundwater Sampling and Analyses (Years 1 - 5, 10 & 15) (Present Value)						
	Analytical	Each	7	$	2,925.00	$	16,490.00
	Data Validation	Each	7	$	550.00	$	3,100.00
	Field Work	Each	7	$	960.00	$	5,415.00
	Equipment	Each	7	$	480.00	$	2,705.00
	Disposal of Drummed Purge Water	Each	7	$	250.00	$	1,410.00
	Reporting	Each	7	$	1,500.00	$	9,560.00
	Subtotal - Long Term Costs (Annual & Present Value)			**$**	**10,085.00**	**$**	**90,680.00**
		Total Cost (Alternative 3)				**$**	**131,565.00**
Alternative 4	**Excavation and Disposal of Impacted Soils and Fill Material and Replacement with Clean Fill; Dewatering and Treatment of Impacted Groundwater, Institutional Controls and Abandonment of Monitoring Wells**						
1	Legal and Filing Fees (Institutional Controls)	LS	1	$	5,000.00	$	5,000.00
	Abandon Existing Monitoring Wells	Each	5	$	500.00	$	2,500.00
	Sub Slab Vent System (Developer Responsibility)	LS	1	$	10,000.00	$	10,000.00
	Excavation of Fill and Replacement with Clean Imported Backfill						
2	Mobilization/Demobilization	LS	1	$	5,000.00	$	5,000.00
3	Site Preparation, Clearing and Decon Pad	LS	1	$	2,000.00	$	2,000.00
4	Remove Existing Asphalt and Subbase	LS	1	$	2,500.00	$	2,500.00
5	Disposal of Asphalt and Subbase	TON	600	$	12.00	$	7,200.00
6	Sheeting Installation (remaining northern excavation wall, western wall and one-third of southern wall))	SF	5,000	$	25.00	$	125,000.00
7	Sheeting and Piling Installation (eastern wall and two-thirds of southern wall	SF	7,100	$	75.00	$	532,500.00
8	Excavator, 2.0 CY	DAY	50	$	909.80	$	45,490.00
9	Payloader	DAY	50	$	600.00	$	30,000.00
10	Transportation and Disposal of Impacted Soil (assume non-hazardous)	TON	23,636	$	60.00	$	1,418,160.00
11	Supply and place general fill to increase site grade (to replace the fill removed)	CY	19,000	$	20.00	$	380,000.00
12	Dozer to spread fill	DAY	30	$	925.00	$	27,750.00
13	Compactor to compact fill	DAY	30	$	850.00	$	25,500.00
14	Soil Dewatering & Treatment	DAY	50	$	1,000.00	$	50,000.00
15	Placement of Type 2 Stone Subbase, 1' Thick	CY	1,960	$	28.00	$	54,880.00
16	Placement of Type 3 Binder Course, 3" Thick	SY	5,900	$	11.50	$	67,850.00
17	Placement of Type 6 Top Course, 1" Thick	SY	5,900	$	7.00	$	41,300.00
18	Supply and Install a Demarcation Layer Beneath Cover Material	MSF	53	$	250.00	$	13,250.00
	Consulting						
19	Site Survey (topography)	LS	1	$	5,000.00	$	5,000.00
20	Field Oversight and Air Monitoring	DAY	80	$	900.00	$	72,000.00
21	Soil Analytical	EACH	60	$	300.00	$	18,000.00
22	Engineering (10%)					$	293,422.00
		Total Cost (Alternative 4)				***$***	***3,234,302.00***