November 2007

DRAFT Alternatives Analysis Report

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

ERP Site No. 411015
Former Hettling Farm Site
US Route 9
Town of Clermont
Columbia County, New York

Prepared for:

The Town of Clermont
Town Hall
1795 US Route 9
Clermont, New York 12526

Prepared by:

C.T. MALE ASSOCIATES, P.C.
50 Century Hill Drive
P.O. Box 727
Latham, New York 12110
518.786.7400
FAX 518.786.7299
C.T. Male Project No.: 06.6084

ENVIRONMENTAL RESTORATION PROJECT
ALTERNATIVES ANALYSIS REPORT
FORMER HETTLING FARM SITE
TOWN OF CLERMONT
COLUMBIA COUNTY, NEW YORK

TABLE OF CONTENTS

Page

ENVIRONMENTAL RESTORATION PROJECT
ALTERNATIVES ANALYSIS REPORT
FORMER HETTLING FARM SITE
TOWN OF CLERMONT
COLUMBIA COUNTY, NEW YORK

TABLE OF CONTENTS

ENVIRONMENTAL RESTORATION PROJECT
ALTERNATIVES ANALYSIS REPORT
FORMER HETTLING FARM SITE
TOWN OF CLERMONT
COLUMBIA COUNTY, NEW YORK

TABLE OF CONTENTS

ENVIRONMENTAL RESTORATION PROJECT
ALTERNATIVES ANALYSIS REPORT
FORMER HETTLING FARM SITE
TOWN OF CLERMONT
COLUMBIA COUNTY, NEW YORK

TABLE OF CONTENTS

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 the Former Hettling Farm Environmental Restoration Project (ERP) prepared by C.T. Male Associates, P.C., dated October 2007. 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, historical contaminants of concern, nature and extent of site contamination, and the contaminant fate and transport. Human and ecological exposure pathways are also discussed in this section. Section 2 identifies remedial action objectives, general response actions and 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 Town of Clermont (the "Town") 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 property known as the

Former Hettling Farm Site located along the western side of U.S. Route 9, approximately 1,100 feet north of this route's intersection with County Route 6, in the Town of Clermont, Columbia County, New York (herein "the Site"). A Site Location Map is presented as Figure 1. NYSDEC subsequently notified the Town of its eligibility to participate in the ERP and the Town executed a State Assistance Contract (SAC) which required the submission, review, approval and implementation of investigative work plans under the ERP.

The ERP investigation generally involved the collection and analysis of surface, near-surface and subsurface soil samples; sediment and surface water samples; groundwater samples; an electromagnetic (EM) survey investigation; a private well survey; a Fish and Wildlife Impact Analysis (FWIA); and a Data Usability Summary Report (DUSR). The investigation also included a non-emergency Interim Remedial Measure (IRM) for the removal and disposal of stockpiled railroad ties and telephone poles at the site's surface. IRM near-surface confirmatory soil samples were collected upon removal of the railroad ties and telephone poles.

Results of the site investigation were incorporated in a Remedial Investigation (RI) Report. The RI describes the investigations conducted at the site for evaluating the nature and extent of contamination in surface soil, IRM near-surface soil, subsurface soil, surface water, sediment and groundwater. 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, evaluate 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

The site is approximately 20.5 acres in size and is located along the western side of U.S. Route 9, approximately 1,100 feet north of this route's intersection with County Route 6, in the Town of Clermont, Columbia County, New York (Figure 1). The site is identified as a subdivision of southern portions of the Hettling Farm and is identified as Columbia County Tax Map Parcel I.D. number 181.00, Block 1 Lot 25.1. The site was subdivided from remaining portions of the Hettling Farm in 2003 when it was conveyed to the Town. Access to the site is from the western side of U.S. Route 9. A site plan, which also depicts all of the media sampling locations as part of the RI, is included as Figure 2 (Site Boundary and Sampling Locations Map).

The site presently consists of vacant land that has historically been used for agricultural purposes. The site rises gradually in elevation from its eastern border with U.S. Route 9 to its property boundary to the west. A drainage/irrigation ditch passes through the approximate central portions of the site and flows in a northerly direction. Site conditions east of the drainage/irrigation ditch consist primarily of vacant land that is overgrown with shrubs and long grasses. Previous land usage on this portion of the site reportedly included the cultivation of row crops and vegetables as well as fruit trees. Land usage to the west of the drainage/irrigation ditch consists of rows of fruit trees that historically served as an orchard.

1.2.2 Site History

The site has historically been utilized for agricultural purposes. An active fruit orchard operated on western portions of the site while the cultivation of row crops, vegetables and fruit trees took place on eastern portions of the site. Remaining portions of the Hettling Farm located to the north and east of the site underwent a NYSDEC Emergency Response Action in regards to illegal dumping to the north of the site and underground storage tanks and drums to the east of the site. The dumped items were subsequently removed by the NYSDEC Division of Solid Waste for off-site disposal and the underground tanks were closed to NYSDEC standards.

Interviews with persons familiar with the site did not reveal the occurrence of dumping on the site with the exception of the burial by the Town of Clermont of tree stumps, brush and decayed natural wood at the northwestern toe of a knoll located on southeastern portions of the site, and the stockpiled railroad ties and telephone poles on northeastern portions of the site. The interviews further revealed that filter sand, which was used to purify fruit juices at nearby fruit processing plants, had historically been spread out over the site surface.

A review of historical aerial photographs depicted discarded materials in the vicinity of the site's western and northwestern property lines with open land on northwestern portions of the site appearing to provide access for the transport of materials beyond the site's western property line. The discarded materials are assumed to be affiliated with the off-site portions of the Hettling Farm that underwent the NYSDEC Emergency Response Action.

1.2.3 Potential Historical Contaminants of Concern

Various pesticides and herbicides may have been applied to the fruit trees and row crops during the site's past usage for agricultural purposes. Suspected pesticides used within the site are lead and arsenic based compounds, and organophosphate and organochlorine pesticide compounds. Aerial application of some chemicals may have been performed in the past.

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 human health and the environment. A report entitled "Remedial Investigation/Alternatives Analysis Report, Former Hettling Farm Site, Town of Clermont, New York"; dated October 2007 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/AAR for the site:

- Site Survey;
- Private Well Survey;
- Electromagnetic (EM) Survey;
- Surface and Near-Surface Soil Sampling;
- Surface Water and Sediment Sampling;
- Exploratory Test Pitting;
- Test Boring and Monitoring Well Installations;
- Subsurface Soil Sampling;
- Groundwater Sampling;

- Community Dust Monitoring;
- Fish and Wildlife Impact Analysis; and
- Data Usability Summary Report (DUSR).

In addition to the tasks listed above, a non-emergency IRM was conducted on the site for the removal and off-site disposal of stockpiled railroad ties and telephone poles located on northeastern portions of the site.

1.3 Nature and Extent of Contamination

1.3.1 General

Sampling and analysis of several media types was conducted during the RI to evaluate the nature and extent of contamination at the subject site. These media types included surface soils, near-surface soils, subsurface soils, surface water, sediment and groundwater.

Table 1.3.1-1 lists the frequencies (i.e., 3 of 15 sampling locations) for the contaminants of concern (COCs) in each media type. The table presents compounds and analytes that were detected at concentrations which exceeded the project Standards, Criteria and Guidance Values (SCGs) which included NYSDEC Part 375 Restricted Use Soil Cleanup Objectives (SCOs), Commercial Protection of Human Health for soils; NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) for surface water and groundwater; and the NYSDEC Technical Guidance for Screening Contaminated Sediments for sediments. It should be noted that the SCGs for sediments are divided into two categories; the Lowest Effect Level (LEL) and the Severe Effect Level (SEL). According to the NYSDEC Technical Guidance, the LEL indicates a level of sediment contamination that can be tolerated by the majority of benthic organisms, but still causes toxicity to a few species; and the SEL indicates the concentration at which pronounced disturbance of the sediment dwelling community can be expected.

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. The table summarizes all of the samples collected during the RI.

TABLE 1.3.1-1: COMPOUNDS AND ANALYTES EXCEEDING SCGs PER MEDIA TYPE					
Media	**Class**	**Contaminant of Concern**	**Detected Concentration Range**	**Frequency of Exceeding Standard**	**Applicable SCG (1)**
Surface Soils (mg/kg)	**VOCs**	None Detected Above SCGs			
	SVOCs	None Detected Above SCGs			
	PESTs	None Detected Above SCGs			
	PCBs	None Detected Above the Laboratory Detection Limit			
	Metals	Arsenic	18.5 to 50.2	10 of 28	16
IRM Near-Surface Soils (mg/kg)	**VOCs**	None Detected Above the Laboratory Detection Limit			
	SVOCs	Benzo(a)anthracene	14	1 of 2	5.6
		Benzo(a)pyrene	8.9	1 of 2	1
		Benzo(b)fluoranthene	17	1 of 2	5.6
	PESTs	None Detected Above SCGs			
	PCBs	None Detected Above SCGs			
	Metals	Arsenic	25.0 to 36.9	2 of 2	16
Subsurface Soils (mg/kg)	**VOCs**	None Detected Above SCGs			
	SVOCs	None Detected Above SCGs			
	PESTs	None Detected Above SCGs			
	PCBs	None Detected Above the Laboratory Detection Limit			
	Metals	Arsenic	24.2 to 62.6	3 of 15	16
Ground Water (ug/l)	**VOCs**	None Detected Above SCGs			
	SVOCs	Benzo(a)anthracene	2	1 of 7	0.002
		Benzo(a)pyrene	2	1 of 7	Non Detect
		Benzo(b)fluoranthene	3	1 of 7	0.002
		Chrysene	3	1 of 7	0.002
		Indeno(1,2,3-cd)pyrene	1	1 of 7	0.002
	PESTs	None Detected Above the Laboratory Detection Limit			
	PCBs	None Detected Above the Laboratory Detection Limit			
	Metals	Iron	330 to 2,280	5 of 7	300
		Manganese	329	1 of 7	300
		Sodium	44,200	1 of 7	20,000
Surface Water (ug/l)	**VOCs**	None Detected Above the Laboratory Detection Limit			
	SVOCs	Phenol	37	1 of 3	5
		(3+4)-Methylphenol	160	1 of 3	5
	PESTs	None Detected Above the Laboratory Detection Limit			
	PCBs	None Detected Above the Laboratory Detection Limit			
	Metals	Aluminum	155 to 8,690	3 of 3	100
		Copper	18.0 to 33.4	2 of 3	13.6
		Iron	2,230 to 15,600	3 of 3	300
		Manganese	791 to 6,970	3 of 3	300
		Zinc	147 to 168	2 of 3	118
Sediments (mg/kg)	**VOCs**	None Detected Above the Laboratory Detection Limit			
	SVOCs	None Detected Above the Laboratory Detection Limit			
	PESTs	None Detected Above the Laboratory Detection Limit			

TABLE 1.3.1-1: COMPOUNDS AND ANALYTES EXCEEDING SCGs PER MEDIA TYPE						
Media	**Class**	**Contaminant of Concern**	**Detected Concentration Range**	**Frequency of Exceeding Standard**	**Applicable SCG (1)**	
Sediments (continued) (mg/kg)	**PCBs**	None Detected Above the Laboratory Detection Limit				
	Metals				**LEL**	**SEL**
		Arsenic	6.1 to 9.1	2 of 5	6	33
		Cadmium	1.6 to 1.8	4 of 5	0.6	9
		Copper	24.9 to 40.7	3 of 5	16	110
		Lead	35.1	1 of 5	31	110
		Nickel	18.2 to 23.6	5 of 5	16	50
		Zinc	479	1 of 5	120	270
	TOC	None Detected Above SCGs				

Table Notes:

(1) NYSDEC 6 NYCRR Part 375 Environmental Remediation Programs, Subpart 375-6 Restricted (Commercial) Use Soil Cleanup Objectives for soils. NYSDEC Technical Guidance for Screening Contaminated Sediments, for sediments. 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.
GV Guidance Value
NA Not Applicable
MDL The Laboratory Minimum Detection Limit (MDL)
mg/kg denotes milligrams per kilogram or parts per million (ppm)
ug/l denotes micrograms per liter or parts per billion (ppb)

As depicted in the table, the contaminants of concern at the site are arsenic in surface, near-surface and subsurface soils, SVOCs in near-surface soils, SVOCs and metals in groundwater and surface water, and metals in sediments. The following summarizes the nature and extent of contamination for the project site per media type.

Arsenic in Surface, IRM Near-Surface and Subsurface Soils and SVOCs in IRM Near-Surface Soils

Arsenic was detected above its SCG in surface soils (10 of 28 locations), IRM near-surface soils (2 of 2 locations) and subsurface soils (3 of 15 locations) at concentrations that ranged from 18.5 ppm to 62.6 ppm. The Arsenic detections were in the eastern portion of the site that has historically been utilized for the cultivation of row crops and fruit trees. Arsenic detected above SCGs in the subsurface soils was in the test pitting portion of the RI and are believed to be attributed to the in-place co-mingling of surface soils with the subsurface soils. The approximate horizontal boundaries of the Arsenic impacts are depicted on the Horizontal Extent of Impacts (Area of Concern) to Surface and Near-Surface Soils Locations Map, Figure 3. The extent of the impacts have been extended from the sampling points where Arsenic was detected above SCGs to the site's northern, southern and eastern property lines, and in a westerly direction to the nearest sampling locations where Arsenic was not detected above SCGs. As depicted on Figure 3, the inferred area of Arsenic impacts in soils encompasses approximately 325,000 square feet or 7.46 acres.

Three (3) SVOCs were detected in near-surface soils (soils collected from beneath the stockpiled railroad ties and telephone poles) above SCGs at one of the IRM soil sampling locations located within the Horizontal Extent of Arsenic Impacts discussed above. The SVOCs may be attributed to the co-mingling with near-surface soils of materials (i.e. creosote) used to coat the former stockpiled railroad ties and telephone poles in this area.

SVOCs and Metals in Groundwater

Five (5) SVOCs and three (3) metals were detected in groundwater at concentrations exceeding SCGs.

The SVOCs and the metal Manganese were confined to groundwater sampled from monitoring well MW-4 only (Fig. 2), which is located on the northern portion of the site in the vicinity of a man-made bridge that traverses the drainage/irrigation ditch. SVOCs were not detected above the laboratory detection limit in groundwater sampled at any of the other monitoring wells and Manganese was detected at concentrations below SCGs at the remaining sampled monitoring wells. Manganese is a naturally occurring element in groundwater and is often present in conjunction with Iron (also naturally occurring), which was detected in groundwater above SCGs at five of the seven sampled monitoring wells.

Sodium was detected in groundwater above its SCG at monitoring well MW-1 only (Fig. 2). Monitoring well MW-1 is located along U.S. Route 9. The Sodium in groundwater at this monitoring well location may be attributed to the application of road salt on Route 9.

SVOCs and Metals in Surface Water

Two (2) SVOCs and five (5) metals were detected at concentrations above SCGs in surface water sampled from the off-site pond and the on-site drainage/irrigation ditch (Fig. 2).

The SVOCs phenol and (3+4)-methylphenol were detected above their SCGs in surface water sampled from the off-site pond. Phenol and (3+4)-methylphenol were not detected above the laboratory detection limit in surface water sampled from the on-site drainage/irrigation ditch.

Five (5) metals were detected at varying frequencies above SCGs in surface water sampled at two locations from the on-site drainage/irrigation ditch. Aluminum, Copper, Iron and Manganese were detected above SCGs at surface water sampling location SW-2 (upstream) while Aluminum, Iron, Manganese and Zinc were detected above SCGs at surface water sampling location SW-3 (downstream). Metals detected above SCGs in surface water from the drainage/irrigation ditch were similar to those metals detected above SCGs in surface water from the off-site pond.

Metals in Sediments

Six (6) metals were detected above SCGs in sediments sampled from the off-site pond and the on-site drainage/irrigation ditch (Fig. 2). Arsenic, Cadmium, Copper and Nickel were detected in sediments sampled from the off-site pond at concentrations above the LEL SCGs but below the SEL SCGs.

Arsenic, Cadmium, Copper, Lead and Nickel were detected in sediments sampled from the on-site drainage/irrigation ditch at varying frequencies above the LEL SCGs, but below the SEL SCGs. Zinc was detected above the SEL SCG at sediment sampling location SD-5, which was collected from the northernmost portion of the on-site drainage/irrigation ditch.

The metals of concern in on-site and off-site sediment include Arsenic, Cadmium, Copper, Nickel, Lead and Zinc, which were detected at varying frequencies from sediment samples collected from the off-site pond and the on-site drainage/irrigation ditch.

1.3.2 Contaminant Fate and Transport

The site related contaminants include Arsenic and SVOCs in soils; SVOCs and metals in groundwater; SVOCs and metals in surface water; and metals in sediment.

Arsenic in surface, near-surface and subsurface soil and SVOCs in near-surface soils will tend to adhere to surrounding soil particles and not readily leach into underlying groundwater. This is exemplified by Arsenic not being detected above the laboratory detection limit within the sampled groundwater. The SVOCs detected above SCGs in near-surface soils at the single sampling location were not detected at concentrations exceeding SCGs in groundwater sampled from hydraulically downgradient monitoring wells. SVOCs detected above SCGs in groundwater at monitoring well MW-4 (Fig. 2) are not believed to be affiliated with the SVOCs above SCGs in near-surface soils at IRM-2, as MW-4 is located hydraulically upgradient of this sampling location.

The SVOCs and metals in surface water will tend to migrate in the direction of surface water flow, which is generally towards the north. Metals in the pond and drainage/irrigation ditch sediments may be suspended in the surface water column should this material be subject to natural disturbances (i.e., precipitation events causing increased flow velocities) and/or man-made disturbances (disturbance of the drainage/irrigation ditch bottom). The SVOC contaminants in the off-site pond surface water may diffuse to the atmosphere with the rate of diffusion into the atmosphere dependent on the differential in vapor saturation and atmospheric pressure.

The SVOCs in groundwater would migrate in the direction of the groundwater flow, but could also be influenced by the fracture and joint patterns within the underlying bedrock. The metals in groundwater are for the most part insoluble in water and would tend to adsorb and absorb to soil particles, thus making it difficult for the metals to migrate with groundwater. Metals that are soluble in water (such as sodium) would readily migrate with groundwater.

The transport mechanisms for the contaminants present at the site are migration within the surface water, groundwater and/or volatilization into the atmosphere. The SVOCs and metals in surface water will tend to migrate in the direction of surface water flow, although the SVOCs may also volatilize to the atmosphere. The metals in sediment would tend to migrate in the direction of surface water flow should they become suspended in the water column through natural and/or man-made disturbances to the bottom of the off-site pond and/or the on-site drainage/irrigation ditch. The SVOCs in groundwater would tend to migrate in the direction of groundwater flow, but could be influenced by the fracture and joint patterns within the underlying bedrock. The metals (except sodium) in groundwater are for the most part insoluble in water and would tend to adsorb and absorb to soil particles. The metal (Arsenic) in soils does not exhibit volatility and therefore would not likely enter the atmosphere unless site soils were disturbed such that dust particles with Arsenic adhered to them enter the atmosphere. SVOCs in soils exhibit some level of volatility and may enter 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: PARAMETERS DETECTED ABOVE SCGs

Compound	Surface, Near-Surface and Subsurface Soil	Surface Water	Sediment	Groundwater
Semi - Volatile Organic Compounds:				
Benzo(a)anthracene	Yes	No	No	Yes
Benzo(a)pyrene	Yes	No	No	Yes
Benzo(b)fluoranthene	Yes	No	No	Yes
Chrysene	No	No	No	Yes
Indeno(1,2,3-cd)pyrene	No	No	No	Yes
Phenol	No	Yes	No	No
(3+4)-Methylphenol	No	Yes	No	No
Metals:				
Aluminum	No	Yes	No	No
Arsenic	Yes	No	Yes	No
Cadmium	No	No	Yes	No
Copper	No	Yes	Yes	No

TABLE 1.4-1: PARAMETERS DETECTED ABOVE SCGs				
Compound	Surface, Near-Surface and Subsurface Soil	Surface Water	Sediment	Groundwater
Iron	No	Yes	No	Yes
Lead	No	No	Yes	No
Manganese	No	Yes	No	Yes
Nickel	No	No	Yes	No
Sodium	No	No	No	Yes
Zinc	No	Yes	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 inhalation, dermal contact and/or ingestion of potentially contaminated soil on-site; dermal contact and/or ingestion of potentially contaminated groundwater on-site; and dermal contact and/or ingestion of potentially contaminated surface water and sediments on-site.

The potential impacted populations at the site and vicinity include residents in the neighboring community, site visitors and trespassers on the site, and workers which may be engaged in work that would disturb the surface soils.

The metal Arsenic was detected in surface, IRM near-surface, and subsurface soils and three (3) SVOCs were detected in near-surface soils at concentrations exceeding SCGs. The concentrations of these contaminants of concern may warrant remedial action in portions of the site identified, as they are present within soil that is readily accessible to dermal contact and ingestion. Furthermore, disturbance of these soils could create airborne contaminants that may be inhaled. The potential for dermal contact (including ingestion and inhalation) with exposure to the impacted soil and the associated impact is, therefore, anticipated to be high.

Groundwater impacts consisted of several semi-volatile organic compounds and metals which were detected at concentrations above NYSDEC groundwater standard and guidance values. The SVOCs and two of the metals were detected at isolated sampling locations (MW-4 and MW-1 on Fig. 2) while Iron was detected at 5 of 7 sampling locations. Considering that the depth to groundwater is greater than 3 feet below grade, the potential for dermal contact through exposure to groundwater in the area of the SVOC detections and the associated impact is anticipated to be low, unless groundwater in this area is encountered. The site vicinity is not served by public water and relies on private wells for its potable water source. Potable water wells are not currently located on the project site. Ingestion of contaminated groundwater may occur if potable water wells are installed on the site in the vicinity of the SVOC and metals contaminants. As such, the potential for dermal contact/ingestion of impacted groundwater in relation to current site conditions is considered to be low. The potential for site contaminants to impact future site wells that may be installed in the vicinity of the currently impacted monitoring wells is considered to be moderate, as the contaminants of concern were detected in the groundwater within the overburden soils. The occurrence of groundwater in bedrock was not assessed as a function of the RI. Additionally, the separation distance between the nearest private potable water well and the on-site monitoring well (MW-4) exhibiting the low-level SVOCs is approximately 1,050 feet. Based upon this separation, the site's hydraulic gradient and groundwater flow direction, the physical and chemical properties of these compounds, and the absence of SVOCs in groundwater at the two monitoring wells (MW-1 & 2) down-gradient of monitoring well MW-4, the potential for impacts to off-site private potable water wells is considered to be low.

Surface water impacts consist of SVOCs and several metals in the off-site pond and several metals in the on-site drainage/irrigation ditch. The drainage/irrigation ditch flows off-site in a northerly direction. There exists a moderate potential for off-site human exposure to the surface water through dermal contact and ingestion.

Sediments in the off-site pond and on-site drainage/irrigation ditch are impacted by several metals. There exists the potential for the sediment to become suspended in the water column and be carried off-site where human exposure may occur. The potential for the ingestion/dermal contact by human populations of the sediment contaminants is considered to be low.

1.5 Ecological Exposure Pathways

The value of the fish and wildlife resources located within the study area is considered moderate. Agricultural and residential areas have eliminated much of the natural habitat in the study area and have replaced it with rural wildlife habitats consisting primarily of mowed lawns with trees, paved roads, urban structure exteriors and active agricultural fields surrounding the site. Overall, many of the covertypes in the study area have been heavily influenced by human activities.

1.6 Exposure Pathways Summary and Identification of Areas of Concern

Of the human exposure pathways examined in Section 1.4, the Arsenic and SVOCs in surface soil and near surface soil are the only COCs that pose a direct exposure pathway to receptor populations in the form of dermal contact (including ingestion and inhalation) with exposure to the impacted soil. The potential pathways to on-site receptor populations for the remaining COCs was considered to be low; with the exception of the moderate receptor population impact regarding obtaining future potable water from private water wells installed in the immediate vicinity of the on-site monitoring well exhibiting low level SVOCs above SCGs (monitoring well MW-4).

In view of the above, the area depicted on the Horizontal Extent of Impacts (Area of Concern) to Surface and Near-Surface Soils Locations Map (Fig. 3) will constitute the Area of Concern (AOC) for the site and will be the focus of the remedial action objectives for the site. No further remedial action will be required for portions of the site located to the west of the AOC and therefore remedial action objectives will not be developed for COCs identified within these portions of the site (i.e. low level SVOCs and metals in groundwater, and SVOCs and metals in surface water and metals in sediment in the off-site pond and on-site drainage/irrigation ditch). Rather, long-term monitoring of on-site groundwater and surface water will be conducted to gauge the persistence of the contaminants above SCGs within this media and to determine if the SVOC contaminants will decrease in persistence over time through natural attenuation.

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 surface soils, near-surface soils, subsurface soils, surface water, sediment and groundwater. The results of the RI 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. Potentially affected populations described in the table include residents in the neighboring community, site visitors and trespassers on the site, and workers which may be engaged in subsurface excavation during any future site development.

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

Media Type	COCs	Remedial Action Objective
Surface and Near-Surface Soil	Arsenic and SVOCs	Prevent affected populations from direct contact and ingestion of the contaminated soils and inhalation of airborne dust that may emanate from the soils should they be disturbed.
Surface Water	SVOCs and Metals	Conduct long-term surface water monitoring to gauge contaminant persistence and to measure decreases in persistence through natural attenuation.

Table 2.2-1: Contaminants of Concern for Site Media and Remedial Action Objectives		
Media Type	**COCs**	**Remedial Action Objective**
Sediments	Metals	No further action.
Groundwater	SVOCs and Metals	Conduct long-term groundwater monitoring to gauge contaminant persistence and to measure decreases in persistence through natural attenuation.

The remedial action objectives are to control and possibly eliminate COCs present in the various areas and media within the site and off-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 Arsenic and SVOCs in surface and near-surface soils located on the eastern portion of the site; which has been defined as an AOC (Section 1.6). COCs which are present in remaining portions of the site located to the west of the AOC are not viewed as having a significant potential to impact receptor populations and the environment and will be subjected to long-term monitoring.

The general response actions are developed for addressing COCs present within the site through site specific remedial alternatives. The intent of the general response action 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.

- Surface and near-surface soils are impacted by Arsenic and SVOCs. The horizontal extent of the soil impacts is approximately 325,000 square feet and the vertical extent of the soil impacts is approximately 1 foot below the ground surface (bgs) for an approximate total impacted area of 325,000 cubic feet or 12,037 cubic yards or 20,465 tons (using 1.7 as a multiplier to convert cubic yards to tons).

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:

- The Town of Clermont is considering use of the site for commercial (Town Highway Garage) and passive recreational use. The remedial action should reduce and possibly eliminate potential exposure to COCs by site visitors and workers should the site undergo future development activities.

2.4 Development of Alternatives

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

1. No further action and long-term monitoring;
2. Implementation of institutional controls, site management plan (SMP) and long-term monitoring;
3. Emplacement of cover material with institutional controls, SMP and long-term monitoring; or
4. Excavation and disposal of impacted soils and replacement with clean fill, institutional controls and long-term monitoring.

2.4.1 Alternative No. 1 – No Further Action and Long-Term Monitoring

The No Further Action and Long-Term Monitoring Alternative is evaluated as a procedural requirement and is a requirement of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This alternative would require no further action beyond the IRM that was conducted on the site during the RI which involved the removal for off-site disposal of approximately 115.85 tons of stockpiled telephone poles and railroad ties. Long-term monitoring of the site's surface water and groundwater would be conducted on an annual basis for a period of five (5) years to gauge contaminant persistence.

2.4.2 Alternative No. 2 – Implementation of Institutional Controls, SMP and Long-Term Monitoring

This alternative would implement institutional controls to restrict future land use and notify future owners or prospective purchasers of the presence of contamination. The institutional controls would be an environmental easement granted to the NYSDEC, who would enforce the terms of the easement and to notify future owners and/or developers of the restricted use of the property. Implementation of the SMP would provide specific requirements for site development, use and occupation.

Long-term monitoring of the site's surface water and groundwater would be conducted on an annual basis for a period of five (5) years to gauge contaminant persistence.

2.4.3 Alternative No. 3 - Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

This alternative would involve the emplacement of a 12-inch soil cover or comparable cover (i.e. building concrete floor slabs, asphalt pavement, concrete walkways) for the entirety of the AOC, inclusive of the re-establishment of appropriate vegetative cover. The institutional controls would be an environmental easement granted to the NYSDEC, who would enforce the terms of the easement and to notify future owners and/or developers of the restricted use of the property. Implementation of the SMP would provide specific requirements for site development, use and occupation.

Long-term monitoring of the site's surface water and groundwater would be conducted on an annual basis for a period of five (5) years to gauge contaminant persistence.

2.4.4 Alternative No. 4 - Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

This alternative would involve the excavation and disposal of contaminated soil within the boundaries of the AOC. Upon completion of the remedy, the AOC would be backfilled with clean fill and institutional controls would be implemented to address residual contaminants that may remain within the AOC. The institutional controls would restrict future land use and notify future owners or prospective purchasers of residual contamination at the site, if any. The institutional controls would be an environmental easement granted to the NYSDEC, who would enforce the terms of the easement.

Long-term monitoring of the site's surface water and groundwater would be conducted on an annual basis for a period of five (5) years to gauge contaminant persistence.

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 any 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 with 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 drinking water 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 selected based on the results of remedial action selected/performed.

3.2 Overall Protection of Human Health and the Environment

Each alternative will require sampling and analysis of surface water and groundwater monitoring over an extended period of time (5 years) to gauge contaminant persistence within these media.

3.2.1 Alternative No. 1: No Further Action and Long-Term Monitoring

This remedy would not provide overall protection of human health and the environment.

3.2.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

The institutional controls and SMP would serve as a mechanism to protect human health from the contaminants.

3.2.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

The cover material, institutional controls and SMP would serve as a mechanism to protect human health from the contaminants.

3.2.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

Protection of human health and the environment would effectively be realized through the implementation of Alternative 4 as the contaminated soil in excess of SCGs would be remediated through the excavation and disposal of impacted soil and replacement with clean fill. Institutional controls would be implemented in the event that residual contaminants remain in the AOC site media.

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

Each alternative will require surface water and groundwater monitoring to gauge the persistence of contaminants in these media over time.

3.3.1 Alternative No. 1: No Further Action and Long-Term Monitoring

Compliance with SCGs will not be attained if Alternative No. 1 is implemented because the impacted media will remain on-site and would not be addressed through any forms of site control.

3.3.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

Compliance with SCGs will not be attained through implementation of Alternative No. 2 because remaining impacts within soils will remain in place.

3.3.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

Compliance with SCGs will not be attained through implementation of Alternative No. 3 because remaining impacts within soils will be allowed to be left in place. The community would be protected from contaminants through placement of the cover material with institutional controls and SMP.

3.3.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

Compliance with SCGs would effectively be realized through the implementation of Alternative 4 as all of the AOC contaminated soil in excess of SCGs would be remediated. Institutional controls would be implemented in the event that residual contaminants remain in the media.

3.4 Short Term Effectiveness

For each of the alternatives, the monitoring wells for groundwater sampling were installed during the RI and are protected with guard pipes and are easily accessible. There are no access restraints to the proposed surface water sampling locations.

3.4.1 Alternative No. 1: No Further Action and Long-Term Monitoring

The effectiveness of Alternative No. 1 will be realized in the short term and could be implemented immediately. 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 this alternative, other than what may be currently present at the site.

3.4.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

The short term effectiveness of this remedy will be immediate. The legal documents for the institutional control and development of the SMP can be quickly drafted and filed, and become binding upon affected populations in a short period of time. There are no short term adverse impacts to affected populations concerning implementation of this alternative.

3.4.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

The short term effectiveness of this remedy would be realized upon installation of the cover material and implementation of the institutional controls and SMP.

Short term adverse impacts to affected populations during implementation of this alternative include the possible ingestion, dermal contact and inhalation of contaminants during application of the cover material. To minimize these impacts, dust suppression techniques in the form of the application of water and community dust monitoring at a minimum will need to be conducted.

3.4.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

The short term effectiveness of this Alternative will be immediate in that contaminated soils will be removed and disposed of off-site.

The community would be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by employing effective dust suppression techniques (application of water) and community dust monitoring. There would be no significant environmental impacts as a result of implementing this alternative.

This alternative would have the greatest potential for short term impacts to site workers and the community because a large volume of soils would be excavated and transported off-site.

3.5 Long Term Effectiveness

Each of the alternatives will require long-term monitoring (5 years) of the site's surface water and groundwater to gauge contaminant persistence in related media.

3.5.1 Alternative No. 1: No Further Action and Long-Term Monitoring

There will be no long term effectiveness if this remedy is chosen. The AOC contaminants (arsenic and SVOCs) will likely persist for an undefined period of time and will likely not decrease in severity over time through natural attenuation.

3.5.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

The long term effectiveness and permanence of Alternative 2 is based on if the institutional controls and SMP for controlling site usage, development and maintenance practices are implemented by current and future site owners and developers.

3.5.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

The long term effectiveness and permanence of Alternative No. 3 would be achieved by placing a cover material that would protect the community from site contaminants and by providing a SMP and institutional controls controlling site usage and development and maintenance practices. There should be minimal long-term risks to human health if 1) the cover material remains intact and is inspected annually, 2) the SMP is adhered to by all related personnel during any future site development activities, and 3) institutional controls are implemented and followed by future site owners and developers.

The contaminants remaining within the AOC would be segregated from the community once the placement of the cover material is completed. The cover material would be an effective means of protection from site contaminants if it is consistently inspected to ensure that it has not been breached by naturally occurring and/or man made incidents. Additionally, if future site development should occur, then buildings, parking lots, walkways and landscaped areas would also serve as additional protective surface covers.

3.5.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Dewatering Institutional Controls and Long-Term Monitoring

Implementing Alternative No. 4 is a long term and permanently effective means of remediating soil 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 and possibly eliminating the potential impacts to human health and the environment and will be further accentuated by implementation of institutional controls for remaining impacts, if any.

3.6 Reduction of Toxicity, Mobility, or Volume with Treatment

Each alternative will require sampling and analysis of surface water and groundwater monitoring over an extended period of time (5 years) to gauge contaminant persistence within these media.

3.6.1 Alternative No. 1: No Further Action and Long-Term Monitoring

This remedy would not reduce the toxicity, mobility or volume of the AOC contaminants and would not provide overall protection of human health and the environment.

3.6.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

This alternative would not reduce the toxicity, mobility or volume of the AOC contaminants.

3.6.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

This alternative would not reduce the toxicity, mobility or volume of the AOC contaminants.

3.6.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

Reduction of the toxicity, mobility or volume of the AOC contaminants would effectively be realized through the implementation of Alternative 4 as the contaminated soil in excess of SCGs would be remediated through the excavation and disposal of impacted soil and replacement with clean fill.

3.7 Implementability

For each of the alternatives, monitoring wells for groundwater sampling are currently located on the site and are protected by guard pipes and the surface water sampling locations are easily accessible.

3.7.1 Alternative 1: No Further Action and Long-Term Monitoring

Alternative No. 1 can be easily implemented as no action will be taken relative to reducing contaminants that exist at the site.

3.7.2 Alternative No. 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring

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

3.7.3 Alternative No. 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring

Implementing Alternative No. 3 is feasible in that the cover material can be successfully installed employing common engineering and construction practices.

The implementation of institutional controls involves only the drafting of legal documents and procedures that will be binding on future site owners and developers. The institutional controls would be developed to protect affected populations during implementation of the remedial alternative and as guidance for future land owners and developers.

3.7.4 Alternative No. 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring

The technical difficulties that are anticipated during implementation of this alternative are considered minor and include the surveying and staking of adjoining property boundaries to ensure that the remedy does not encroach on adjoining properties; the installation and maintenance of silt fencing between the AOC and adjoining properties for erosion control; construction and maintenance of a temporary road into the site for the anticipated high volume of excavation equipment and truck traffic that will be entering and exiting the site; and obtaining permits (if necessary) for the anticipated high volume of excavation equipment and truck traffic that will be entering and exiting the site along US Route 9.

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

3.8 Cost

The associated costs for each of the remedial alternatives are presented in detail in Table 3.8-2, which is located within the Tables section of the report. The following Table 3.8-1 presents the approximate lump 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 Further Action and Long-Term Monitoring.	$38,403
Alternative 2: Implementation of Institutional Controls, SMP and Long-Term Monitoring.	$126,403
Alternative 3: Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring.	$682,550
Alternative 4: Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring.	$2,015,045

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. Each alternative is therefore ranked as either low, moderate or high in terms of being a cost-effective protective remedy.

Four (4) remedial alternatives were presented for the site. These included 1) No Further Action and Long-Term Monitoring, 2) Implementation of Institutional Controls, SMP and Long-Term Monitoring, 3) Emplacement of Cover Material with Institutional Controls, SMP, and Long-Term Monitoring and 4) Excavation and Disposal of Impacted Soils and Replacement with Clean Fill, Institutional Controls and Long-Term Monitoring.

Alternative 1 (No Further Action and Long-Term Monitoring) is the least expensive, yet least effective alternative for the protection of human health and the environment. This alternative would require no further action beyond the IRM conducted during the RI. Potentially affected populations would not be protected from contaminants within the boundaries of the AOC. Long-term surface water and groundwater monitoring will serve to gauge contaminant persistence within these media. Based on the foregoing, Alternative 1 is ranked as low.

Alternative 2 would be more effective and more costly than Alternative No. 1 in that it would implement institutional controls to restrict future land use and notify future owners or prospective purchasers of contamination and the implementation of the SMP would provide specific requirements for site development, use and occupation. Long-term surface water and groundwater monitoring would serve to gauge contaminant persistence within these media. However, there exists the potential for dermal contact of site contaminants identified within the boundaries of the AOC as their will be no protective measures separating the potentially affected population from the contaminants. Based on the foregoing, Alternative 2 is ranked as low.

Alternative 3 would be more effective and more costly than Alternative 2 because in addition to the institutional controls, SMP and long-term monitoring identified in Alternative 2, Alternative 3 will include a cover material over the entirety of the AOC to protect the potentially affected population from contaminants within this area. As such, Alternative 3 is ranked as moderate to high.

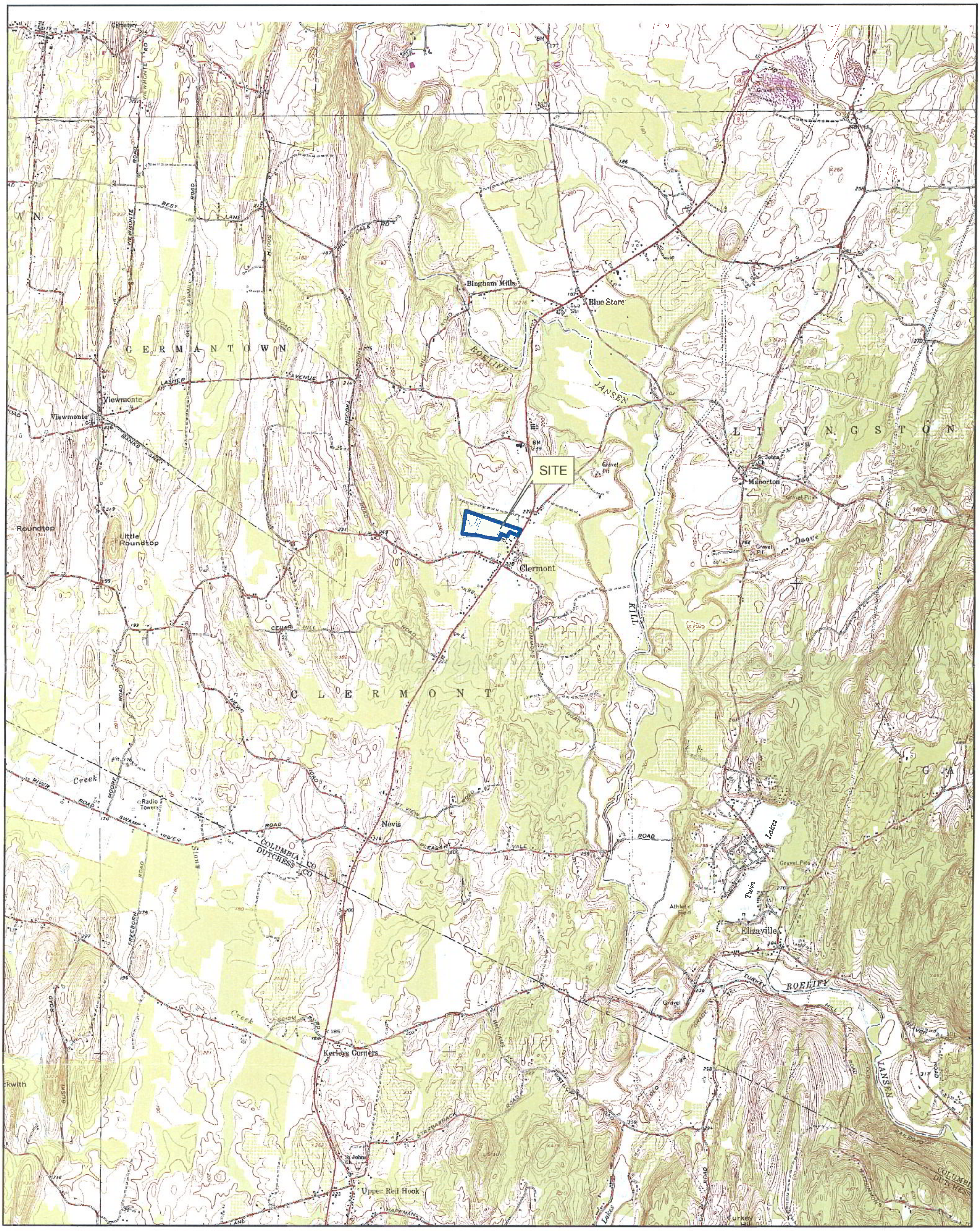
Alternative 4 is the most costly and least implementable of the alternatives as it involves the excavation and disposal of impacted soils on the eastern portion of the site (approximately 7.46 acres) and replacement with clean fill. Implementing this alternative will be difficult due to the anticipated high truck traffic volume entering and exiting the site's east adjoining U.S. Route 9, construction and maintenance of a temporary road into the site, and potential dust and noise nuisance problems to adjoining neighbors. As such, Alternative 4 is ranked as low to moderate.

Based on the evaluation of each alternative, Alternative 3 appears to be the most cost effective and protective remedy for the site.

FIGURE 1

SITE LOCATION MAP

Figure 1 - Site Location Map



Former Hettling Farm Site - Route 9

Town of Clermont

Columbia County, New York

Legend

Site Boundaries

C.T. Male Associates, P.C.

50 Century Hill Drive, Latham, NY 12110

Phone: 518-786-7400 Fax: 518-786-7299

Scale: 1" = 3,000 feet

Project Number: 06.6084

Data Source: CUGIR

Ref: USGS 7.5' Clermont, NY Quad

Projection: NAD83, UTM18N

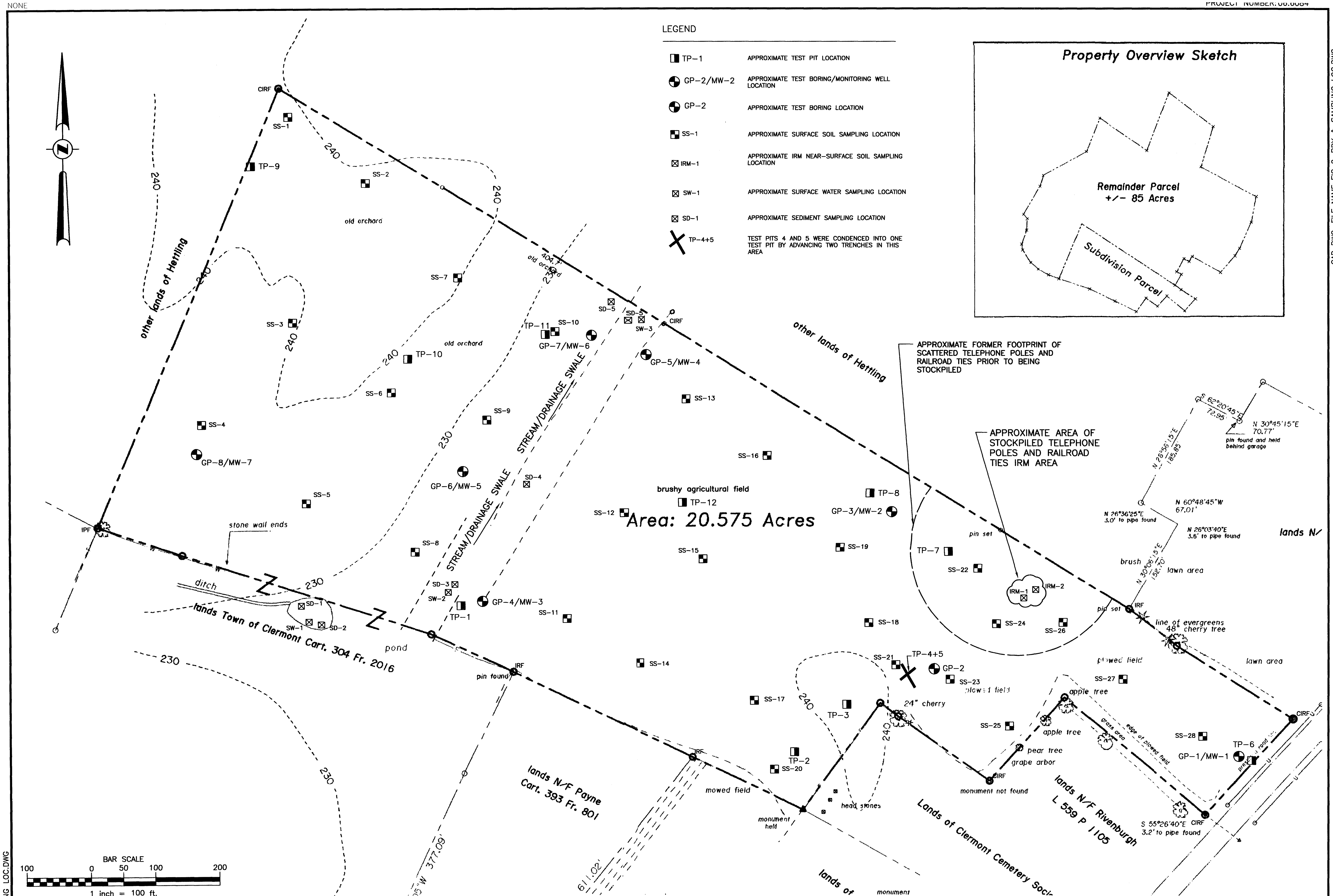
GIS User: DJP

FIGURE 2

SITE BOUNDARY AND SAMPLING LOCATIONS MAP

NONE

PROJECT NUMBER: 06.6084



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

MAP REFERENCE:
1. SUBDIVISION OF LANDS OF: CATHERINE HETTLING (SITE SURVEY), PREPARED BY ROBERT J. IHLENBURG, LAND SURVEYOR OF HUDSON, NEW YORK, MAP NO. 88-119-03, DATED MAY 20, 2003.

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

DESIGNED:
DRAFTED : S.WUNSCH
CHECKED : S.BIEBER
PROJ. NO: 06.6084
SCALE : 1"=100'
DATE : MAY 2007

FIGURE 2
SITE BOUNDARY AND SAMPLING LOCATIONS MAP

FORMER HETTLING FARM SITE
NYSDEC ENVIRONMENTAL RESTORATION PROJECT

TOWN OF CLERMONT — COLUMBIA COUNTY, NEW YORK

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

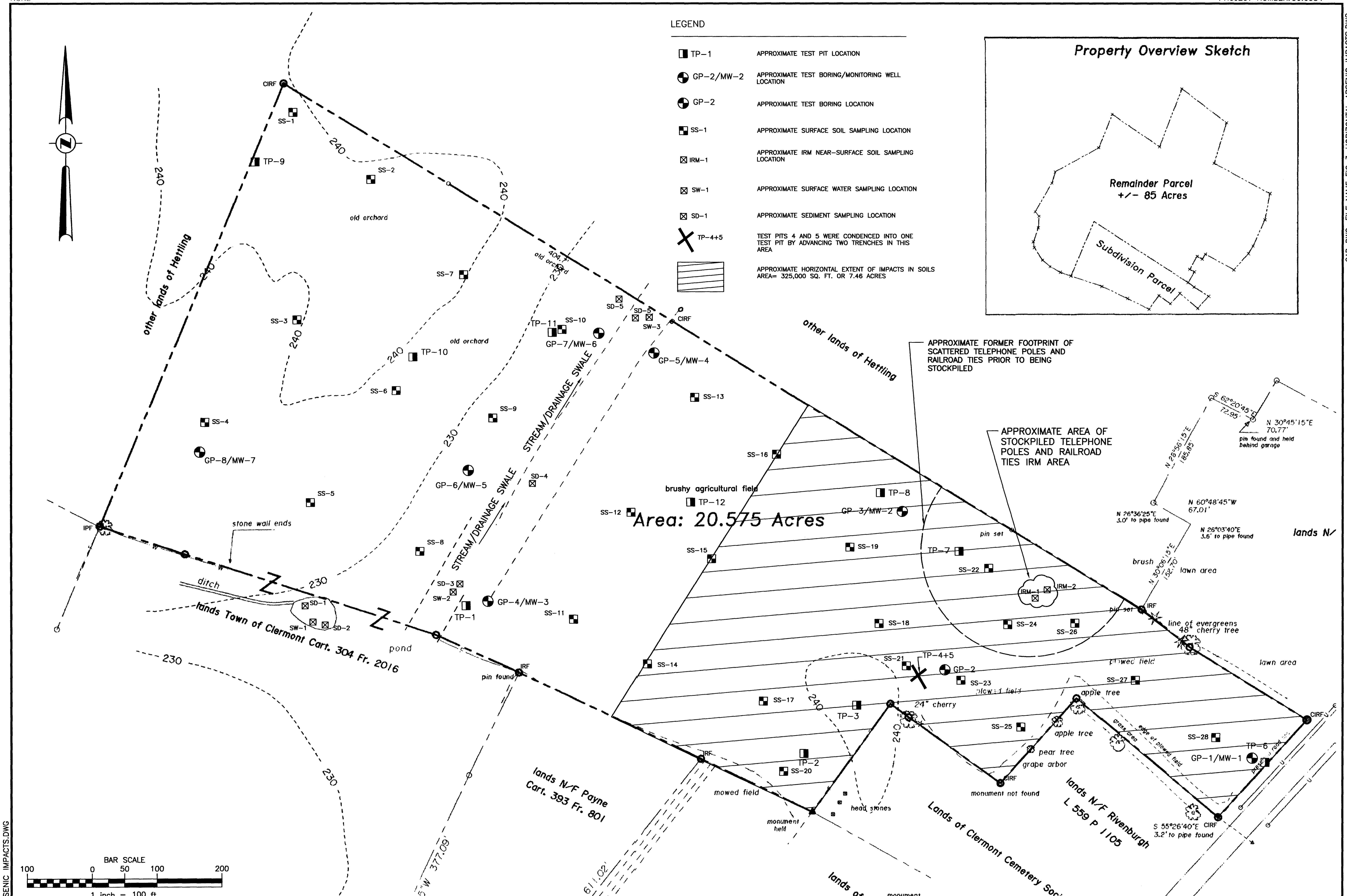
FIG-2
SHEET 1 OF 1
DWG. NO: 06-0304

CAD DWG. FILE NAME: FIG 2-BDY & SAMPLING LOC.DWG

FIGURE 3

HORIZONTAL EXTENT OF IMPACTS (AREA OF CONCERN) TO SURFACE AND NEAR-SURFACE SOILS LOCATION MAP

NONE



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

DESIGNED:
DRAFTED : S.WUNSCH
CHECKED : S.BIEBER
PROJ. NO: 06.6084
SCALE : 1"=100'
DATE : MAY 2007

FIGURE 3
HORIZONTAL EXTENT OF IMPACTS (AREA OF CONCERN) TO SURFACE AND NEAR-SURFACE SOILS LOCATIONS MAP

FORMER HETTLING FARM SITE
NYSDEC ENVIRONMENTAL RESTORATION PROJECT

TOWN OF CLERMONT — COLUMBIA COUNTY, NEW YORK

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

FIG-3
SHEET 1 OF 1
DWG. NO: 06-0304

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

MAP REFERENCE:
1. SUBDIVISION OF LANDS OF: CATHERINE HETTLING (SITE SURVEY), PREPARED BY ROBERT J. IHLENBURG, LAND SURVEYOR OF HUDSON, NEW YORK, MAP NO. 88-119-03, DATED MAY 20, 2003.

CAD DWG. FILE NAME: FIG 3-HORIZONTAL ARSENIC IMPACTS.DWG

APPENDIX A

ALTERNATIVE ANALYSES COST ESTIMATES

C.T. MALE ASSOCIATES, P.C.

ALTERNATIVES ANALYSIS COST ESTIMATES
Former Hettling Farm ERP Site
C.T. Male Project No.: 06.6084

Bid Item #	Work Item	Units	Est. Units		Unit Rate		Estimated Fee
Alternative #1	**No Further Action and Long-Term Monitoring**						
	Long Term Costs						
1	Surface Water and Groundwater Sampling and Analyses (Years 1 - 5) (Present Value)						
	Analytical for 6 Surface Water samples (SVOCs and Metals)	EACH	5	$	1,800.00	$	7,869.00
	Analytical for 11 Groundwater (VOCs, SVOCs and Metals)	EACH	5	$	4,125.00	$	18,035.00
	Field Work	EACH	5	$	800.00	$	4,000.00
	Equipment	EACH	5	$	500.00	$	2,187.00
	Disposal of drummed purge water	EACH	5	$	300.00	$	1,312.00
	Reporting	EACH	5	$	1,000.00	$	5,000.00
					Total	***$***	***38,403.00***
Alternative #2	**Implementation of Institutional Controls, SMP and Long-Term Monitoring**						
	Institutional Controls						
1	Legal and Filing Fees	LS	1	$	5,000.00	$	5,000.00
2	Site Management Plan	LS	1	$	10,000.00	$	10,000.00
	Subtotal - Institutional Controls and SMP			**$**	**15,000.00**	**$**	**15,000.00**
	Long Term Costs						
3	Site Management Plan Requirements (30 years)						
3a	Periodic Site Inspection and Certification by an Environmental Professional (Present Value)	EACH	30	$	600.00	$	9,000.00
3b	Periodic O&M such as Cover maintenance and Repair (Present Value)	EACH	30	$	3,000.00	$	46,000.00
3c	Miscellaneous Site Work (2 days annually- Present Value)	EACH	30	$	1,200.00	$	18,000.00
3d	Surface Water and Groundwater Sampling and Analyses (Years 1 - 5) (Present Value)						
	Analytical for 6 Surface Water samples (SVOCs and Metals)	EACH	5	$	1,800.00	$	7,869.00
	Analytical for 11 Groundwater samples (VOCs, SVOCs and Metals)	EACH	5	$	4,125.00	$	18,035.00
	Field Work	EACH	5	$	800.00	$	4,000.00
	Equipment	EACH	5	$	500.00	$	2,187.00
	Disposal of drummed purge water	EACH	5	$	300.00	$	1,312.00
	Reporting	EACH	5	$	1,000.00	$	5,000.00
	Subtotal - Long Term Costs (Annual & Present Value)			***$***	***8,525.00***	***$***	***111,403.00***
					Total	**$**	**126,403.00**
Alternative #3	**Emplacement of Cover Material with Institutional Controls, SMP and Long-Term Monitoring**						
	Institutional Controls						
1	Legal and Filing Fees	LS	1	$	5,000.00	$	5,000.00
	Placement of Cover Material						
2	Mobilization/Demobilization	LS	1	$	5,000.00	$	5,000.00
3	Site Preparation, Fencing and Decon Pad	LS	1	$	2,000.00	$	2,000.00
4	Site Clear and Grub	LS	1	$	2,000.00	$	2,000.00
5	Dust Suppression	DAY	10	$	813.00	$	8,130.00
6	Supply and install a demarcation layer beneath clean imported fill and soil cover	MSF	325	$	250.00	$	81,250.00
7	Supply and place general fill (12"), preliminary grade, and final grade soil cover to contact including topsoil	CY	12,037	$	30.00	$	361,110.00
8	Apply hydro seed to the cover material and protect until establishment of vegetative cover acceptable to Engineer	MSF	325	$	150.00	$	48,750.00
					Subtotal	***$***	***513,240.00***
9	Engineering (10%)					$	26,907.00
10	Site Management Plan	LS	1	$	10,000.00	$	10,000.00
11	Site Survey (topography pre cover and post cover)	LS	1	$	5,000.00	$	5,000.00
12	Field Oversight and Air Monitoring	DAY	10	$	1,600.00	$	16,000.00
					Total Capital Costs	***$***	***571,147.00***
	Long Term Costs						
13	Site Management Plan Requirements (30 years)						
13a	Periodic Site Inspection and Certification by an Environmental Professional (Present Value)	EACH	30	$	600.00	$	9,000.00
13b	Periodic O&M such as Cover maintenance and Repair (Present Value)	EACH	30	$	3,000.00	$	46,000.00
13c	Miscellaneous Site Work (2 days annually- Present Value)	EACH	30	$	1,200.00	$	18,000.00
13d	Surface Water and Groundwater Sampling and Analyses (Years 1 - 5) (Present Value)						
	Analytical for 6 Surface Water samples (SVOCs and Metals)	EACH	5	$	1,800.00	$	7,869.00
	Analytical for 11Groundwater samples (VOCs, SVOCs and Metals)	EACH	5	$	4,125.00	$	18,035.00
	Field Work	EACH	5	$	800.00	$	4,000.00
	Equipment	EACH	5	$	500.00	$	2,187.00
	Disposal of drummed purge water	EACH	5	$	300.00	$	1,312.00
	Reporting	EACH	5	$	1,000.00	$	5,000.00
	Subtotal - Long Term Costs (Annual & Present Value)			***$***	***8,525.00***	***$***	***111,403.00***
					Total	***$***	***682,550.00***

C.T. MALE ASSOCIATES, P.C.

Alternative #4	**Excavation and Disposal of Impacted Soil and Backfill with Clean Imported Fill, Institutional Controls and Long-Term Monitoring**						
	Institutional Controls						
1	Legal and Filing Fees	LS	1	$	5,000.00	$	5,000.00
	Excavation of Fill and Replacement with Clean Imported Backfill						
2	Mobilization/Demobilization	LS	1	$	5,000.00	$	5,000.00
3	Site Preparation, Fencing and Decon Pad	LS	1	$	2,000.00	$	2,000.00
4	Site Clear and Grub	LS	1	$	2,000.00	$	2,000.00
5	Dust Suppression	DAY	20	$	813.00	$	16,260.00
6	Excavator, 2.0 CY	DAY	20	$	909.80	$	18,196.00
7	Loader	DAY	20	$	1,223.00	$	24,460.00
8	Transportation and Disposal of Impacted Soil (assume non-hazardous)	TON	20,465	$	60.00	$	1,227,900.00
9	Supply and place general fill to increase site grade (to replace the impacted soil removed) including topsoil	CY	12,037	$	30.00	$	361,110.00
10	Apply hydro seed to the soil cover and protect until establishment of vegetative cover acceptable to Engineer	MSF	32	$	100.00	$	3,200.00
					Subtotal	***$***	***1,660,126.00***
11	Site Survey (topography)	LS	1	$	5,000.00	$	5,000.00
12	Field Oversight and Air Monitoring	DAY	20	$	1,600.00	$	32,000.00
13	Soil Analytical	EACH	450	$	300.00	$	135,000.00
14	Engineering (10%)					$	139,516.00
					Total Capital Costs	***$***	***1,971,642.00***
	Long Term Costs						
15a	Surface Water and Groundwater Sampling and Analyses (Years 1 - 5) (Present Value)						
	Analytical for 6 Surface Water samples (SVOCs and Metals)	EACH	5	$	1,800.00	$	7,869.00
	Analytical for 11Groundwater samples (VOCs, SVOCs and Metals)	EACH	5	$	4,125.00	$	18,035.00
	Field Work	EACH	5	$	800.00	$	4,000.00
	Equipment	EACH	5	$	500.00	$	2,187.00
	Disposal of drummed purge water	EACH	5	$	300.00	$	1,312.00
	Reporting	EACH	5	$	1,000.00	$	5,000.00
	Subtotal - Long Term Costs (Annual & Present Value)			***$***	***8,525.00***	***$***	***38,403.00***
					Grand Total	***$***	***2,015,045.00***