Intended for
New York State Department of Environmental Protection

Document type
Report

Date
October 2019

FEASIBILITY STUDY
FORMER K&K STRIPPING SITE

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FORMER K&K STRIPPING SITE

Project name	**K&K Stripping**
Project no.	**8653/61247**
Recipient	**NYSDEC**
Document type	**Report**
Date	**October 29, 2019**

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I Douglas M. Crawford certify that I am currently a NYS registered professional engineer and *that this Feasibility Study Report was prepared in accordance with the applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that the activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.*

Douglas M. Crawford, P.E.
Vice President

October 29, 2019
Date

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CONTENTS

List of Tables

List of Figures

LIST OF ACRONYMS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CCR	Construction Completion Report
CFR	Code of Federal Regulations
COPC	Constituent of Potential Concern
cy	cubic yards
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DER	Division of Environmental Remediation
FS	Feasibility Study
ft	feet or foot
FWRIA	Fish and Wildlife Resources Impact Assessment
GRA	General Response Action
IRM	Interim Remedial Measure
IRMWP	Interim Remedial Measure Work Plan
LDR	Land Disposal Restriction
MEK	Methyl-ethyl ketone
MtCO2e	metric tons of carbon dioxide equivalent
NCP	National Oil and Hazardous Substances Contingency Plan
6 NYCRR	Title 6 New York Codes, Rules and Regulation
NY	New York
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OBG	O'Brien & Gere
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
QHHEA	Qualitative Human Health Exposure Assessment
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SCR	Site Characterization Report
SMP	Site Management Plan
SVOC	Semi-volatile Organic Compound
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WA	Work Assignment

1. INTRODUCTION

The purpose of this report is to present the Feasibility Study (FS) for the former K&K Stripping site located at 1920 Buell Avenue in the Town and Village of Lima, Livingston County, New York (New York State Department of Environmental Conservation [NYSDEC] Site # 826021). A site location map is provided as **Figure 1-1**. This FS Report has been developed by O'Brien & Gere Engineers, Inc. (OBG) under contract by Parsons Engineering of NY, Inc. and on behalf of the NYSDEC under Engineering Services Standby Contract Work Assignment (WA) #D007623-18. The FS was performed in accordance with the following regulations and guidance documents:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA)
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USEPA 1990)
- United States Environmental Protection Agency's (USEPA's) *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA 1988)
- NYSDEC Division of Environmental Remediation (DER) *Technical Guidance for Site Investigation and Remediation (DER-10)* (NYSDEC 2010a)
- New York State's regulations for Environmental Remedial Programs (6 New York Codes, Rules and Regulation (NYCRR) Part 375).

This FS Report contains six sections. **Section 2** presents a brief description of the Site and its history. **Section 3** presents a summary of Remedial Investigation (RI) activities, the risk assessments and description of geologic and hydrogeologic conditions. The nature and extent of Site-related constituents in soil is also documented in **Section 3**. The development and screening of remedial alternatives and the detailed analysis of alternatives are documented in **Sections 4 and 5**, respectively. The alternative that represents the best balance with respect to the evaluation criteria is presented in **Section 6**.

2. SITE DESCRIPTION AND HISTORY

2.1 Site Description

The Site is located at 1920 Buell Avenue in Lima, New York (**Figure 1-1**). The Site property (**Figure 1-2**) is zoned for residential use and is approximately 0.4 acres in size (tax parcel id 37.14-1-21.2). An approximate 3,300 square foot vacant one-story commercial building occupies the Site.

The current owner, Livingston County, acquired the property after abandonment by the former owner. Previously, the commercial building operated as a furniture stripping business. The property is located in an area surrounded by properties of mixed use generally comprising residential and commercial uses. Properties immediately adjacent to the north and east (across Buell Ave) are residences, wooded property exists to the west, and a commercial business is located to the south, separated by an intermittent drainage ditch.

The on-Site topography is primarily flat with elevated topography at the western and northern property boundaries. Site drainage is assumed to be to the south towards a drainage ditch along the southern property boundary that drains into an intermittent unnamed stream that discharges to Spring Brook (east of Site).

2.2 Site History

The commercial building reportedly operated as a furniture stripping business until October 2000. Solvents reportedly used during operations included acetone, toluene, methyl-ethyl ketone (MEK), methanol, and methylene chloride (NYSDEC 2015).

This site has been the subject of two NYSDEC criminal investigations (1997-1998 and 2009-2010) and a hazardous waste removal action by NYSDEC in 2009 (Spill #0900191). Reportedly the operator/owner released wastes into the village sewer system causing waste water treatment plant upsets. Samples collected in the sanitary sewer upstream of the municipal sewer main indicated that volatile organic compounds (VOCs) and metals were being discharged to the sewer system. Data also showed mishandling of hazardous waste with evidence of solvent spillage on the concrete floors and the presence of elevated lead levels in the gravel driveway. (NYSDEC 2015)

2.3 Interim Remedial Measures

As requested by NYSDEC, an Interim Remedial Measure (IRM) was completed to remove soil located outside the building identified as exhibiting lead concentrations exceeding the Commercial Use soil cleanup objective (SCO) and to remove a concrete elevated oil/water separator located within the building.

The original Scope of Work (SOW) identified three IRM areas (Area 1 through Area 3). A revised SOW, eliminated Area 1 from the scope, however the two remaining IRM areas continue to be referred to as Area 2 and Area 3. An *Interim Remedial Measure Work Plan (IRMWP)* (OBG 2015) outlined removal actions to remove soil located outside the building (Area 2) and remove a concrete elevated oil/water separator located within the former furniture stripping facility (Area 3). The *IRMWP* was implemented between March 2016 and October 2016. A Construction

Completion Report (CCR) documenting the excavations is included as **Appendix B** of the *RI Report* (OBG 2018). The locations of the IRM areas are depicted on **Figure 1-2**.

During development of the *IRMWP*, Commercial SCOs were identified for Area 2 with the understanding that the Village was agreeable to revising the zoning from Residential to Commercial. However, it was confirmed after implementation of the *IRMWP* that the Site would remain zoned Residential. As the *IRMWP* implementation was completed with excavation limits defined to remove soil exceeding Commercial SCO, soils containing lead concentrations that exceed Residential SCO remain.

The Area 2 excavation (to a depth of approximately 2 feet (ft) below ground surface (bgs)) involved the removal and off-site disposal of approximately 67 tons of material with concentrations of certain metals above commercial SCOs. Area 2 restoration included placement of snow fence material as a demarcation identifier prior to backfill with run-of-crusher stone material.

The Area 3 removal of the concrete elevated oil/water separator located within the building involved removal of liquids and sediment from the elevated oil/water separator, demolition of the concrete structure, removal of the soil and stone fill around a steel tank (steel tank presence unknown until demolition) and removal of the steel tank inside the structure. Demolition resulted in disposal of approximately 71 tons of material with concentrations of certain metals above commercial SCOs and 38 tons of demolition debris (wood and concrete). The Area 3 restoration included installation of snow fence as a demarcation indicator and placement of 6 inches of run-of-crusher stone material (brought to the surrounding floor grade).

3. SITE CHARACTERIZATION

3.1 Site Investigations

As described in **Section 2.2**, investigations at the Site were completed between 2009 and 2017. Previous investigations identified VOCs and metals in soil and groundwater at concentrations exceeding applicable NYSDEC screening criteria. The following environmental investigations were conducted at the Site:

- Site characterization was completed for NYSDEC in 2011 by Shaw Environmental & Infrastructure Engineering of NY, P.C. (Shaw) and documented in a Site Characterization Report (SCR) (Shaw 2012). The purpose of the SCR was to evaluate if the Site posed a significant threat to public health and environment and whether site conditions warranted further assessment or remedial action. Documentation pertaining to these investigations and activities is provided in Attachment 1 of the RI Report.
- A RI was performed by OBG in accordance with the Engineering Services Standby Contract WA #D007623-18 and the Schedule 1 Scope of Work (NYSDEC 2015). The RI Report was developed by OBG and submitted to NYSDEC in February of 2018. The objectives of the RI activities conducted in the RI study were to:
  - Collect data necessary to evaluate:
    - Nature and extent of lead (and other inorganic constituents) that had been detected previously in soil.
    - Further assess the potential presence of VOCs in groundwater and soil
  - Evaluate potential exposure pathways
  - Evaluate the linkages between the contaminant source(s) and potentially exposed human receptor populations through a Qualitative Human Health Exposure Assessment (QHHEA)
  - Perform a qualitative evaluation of actual or potential impacts to fish and wildlife resources from site-related constituents as part of a Fish and Wildlife Resources Impact Assessment (FWRIA)
  - Identify preliminary remedial action objectives (RAOs)
  - Gather data to support the FS.

3.2 Geologic and Hydrogeologic Conditions

3.2.1 Geologic Conditions

The Site is located within the Central Lowland physiographic region of New York. These lowlands border the Great Lakes and are generally represented by flat topography near Lake Ontario with increasingly gently rolling hilly terrain further south. Regionally the surficial geology consists of recent alluvium, lacustrine silt and clay, lacustrine sand, glacial outwash sand and gravel, till and exposed bedrock (Muller and Cadwell, 1987). The till is a well graded, heterogeneous deposit consisting of clays, silts, sands, gravels, cobbles and boulders deposited beneath the glacier ice during the advancement of the continental ice sheet during the Wisconsin Glaciation. Overlying the till are glacial outwashes, kame deposits, lacustrine clays, silts, sands, and more recent alluvium. Deposition of these materials mainly occurred during the glacial retreat, while alluvium deposition continues today. Overall thickness of the unconsolidated deposits is unknown as bedrock was not encountered in the borings. According to the Geological Map of New York State (Fisher, D.W., Y.W. Isachsen, and L.V. Rickard, 1970), the bedrock beneath the Site is mapped as the Skaneateles shale (Hamilton Group).

The uppermost unconsolidated material underlying the Site generally consists of fill that ranged in thickness from approximately 0.6 ft to 9.6 ft. The composition of the fill was characterized by varying amounts of silt, sand, gravel, small amounts of clay and at times ash and metal fragments. The fill is underlain by clay-rich glacial till with variable gravel and silt content. Overall thickness of the unconsolidated deposits is unknown as bedrock was not encountered in the borings. According to the Geological Map of New York State (Fisher, D.W., Y.W. Isachsen, and L.V. Rickard, 1970), the bedrock beneath the Site is mapped as the Skaneateles Shale (Hamilton Group).

3.2.2 Hydrogeologic Conditions

Regional groundwater flow through the overburden is to the southeast towards Spring Brook. The water table occurs between 4 and 6 ft bgs on-Site and between 8 and 10 ft bgs off-Site. Drinking water is supplied to the area by the City of Rochester Water Bureau and there are no known uses of groundwater as drinking water in the area.

3.3 Nature and Extent of Contamination

This section presents a summary of the nature and extent of contamination of surface and subsurface soil at the Site to be addressed in the FS. For the purpose of identifying areas to be addressed in this FS, and to support the development and evaluation of remedial alternatives, reasonably anticipated land use has been considered. Analytical results presented in the RI Report were compared to the respective SCOs in 6 NYCRR 375 for residential land use in consideration of anticipated future land use. In addition, for purposes of developing an alternative to evaluate pre-disposal conditions, analytical results were compared to the 6 NYCRR 375 SCOs for unrestricted land use. Based on these considerations, the nature and extent of contamination discussion below is presented in the context of these land uses.

- ***VOCs.*** VOCs were not detected in surface soil samples. VOCs were detected in subsurface soil samples above Unrestricted SCOs at on-Site locations only. VOCs with at least one exceedance of Unrestricted SCOs were noted at depths up to 8 ft bgs. None of the VOC detections exceeded Residential SCOs.
- ***SVOCs.*** Limited semi-volatile organic compound (SVOC) data was collected for the Site. SVOCs were not detected above Unrestricted SCOs in surface or subsurface soil samples.
- ***Metals.*** Lead was detected above the Unrestricted Use SCO in surface and subsurface soil across the Site and in off-Site samples at two locations. Lead was detected above the Residential Use SCO in one surface soil sample along the southern property boundary near the drainage ditch edge. Lead exceeded the Residential SCO at five subsurface soil locations in two Site areas generally described as:
  - Along the southern property boundary at the end of the sump discharge pipe, at depths up to 4 ft bgs
  - Northwest corner of the property, at depths up to 2 ft bgs

  Zinc was detected at concentrations above Unrestricted SCOs in surface soil at two sample locations. Other metals which exceeded SCOs in subsurface soil at the site included arsenic, cadmium, copper, mercury, and zinc. Exceedance of SCOs by these metals were coincident with an exceedance of the lead SCO at the same or deeper depth.

- ***PCBs, Pesticides and Herbicides.*** Total polychlorinated biphenyls (PCBs) and pesticides (4,4- Dichlorodiphenyldichloroethylene (DDE) and 4,4- Dichlorodiphenyltrichloroethane (DDT)) slightly exceeded Unrestricted SCOs in the one surface soil sample. No other pesticides exceeded SCOs. Herbicides were not detected in the surface soil. Subsurface soil was not analyzed for PCBs, pesticides and herbicides

Additionally, paint chips were observed in several soil samples at the site and in off-Site drainage ditch samples. The observation of paint chips was often coincident with exceedance of the lead SCO.

3.4 Summary of Exposure Assessments

As part of the RI, a QHHEA and a FWRIA were performed for the Site to evaluate potential human health and fish and wildlife resources exposures to Site-related contaminants. A summary of the exposure assessments is provided below. The FWRIA and QHHEA Reports are included in **Appendices K and L**, respectively, of the RI Report.

3.4.1 Qualitative Human Health Exposure Assessment

A QHHEA was completed to evaluate potential human exposure to Site-related contaminants under current and reasonably anticipated future use scenarios. Based upon the results of the RI and SCR, the QHHEA identified constituents of potential concern (COPCs) for human health. COPCs were designated for detected constituents in each medium if they exceeded screening criteria corresponding with current and reasonably anticipated future land use.

Based on current facility zoning as residential and the likelihood that the zoning will not change given the setting, it is reasonable to anticipate that the on-Site building will continue to be vacant and any future use would need to conform to residential zoning. Potential receptors and potentially complete exposure pathways under the current and reasonably foreseeable future use scenario include:

- Current and future trespassers that may be exposed to human health COPCs in Site surface soil through incidental ingestion, dermal contact, and inhalation of soil dust
- Current and future utility workers and future construction workers that may be exposed to human health COPCs in Site surface and subsurface soil through incidental ingestion, dermal contact, inhalation of soil dust, and to human health COPCs in groundwater via incidental ingestion and dermal contact
- Future residents that may be exposed to COPCs in Site surface soil through incidental ingestion, dermal contact, and inhalation of soil dust, and to subsurface-derived soil vapors that may infiltrate the interior space of a future residence.
- Current and future users of the southern drainage ditch that may be exposed to human health COPCs in drainage ditch soil through incidental ingestion, dermal contact, and inhalation of soil dust (under dry conditions). Exposures to drainage ditch users are de minimis given that no human health COPCs were identified in ditch soil.
- Current and future ditch maintenance workers that may contact ditch soils via incidental ingestion, dermal contact, and inhalation of ditch soil dust. Exposures to ditch workers are de minimis, as no human health COPCs were identified in ditch soil.

3.4.2 Fish and Wildlife Resources Impact Assessment

A *FWRIA* Report was completed for the Site in accordance with DER-10 and the *Fish and Wildlife Impact Analysis* for Inactive Hazardous Waste Sites guidance document (NYSDEC 1994). The FWRIA report presents the results of Part 1, Resource Characterization, of DER-10 Section 3.10.1. The objective of the Resource Characterization is to describe the Site and study area in terms of topography, vegetative covertypes, drainage, fish and wildlife resources and value, and to identify actual or potential impacts to the identified fish and wildlife resources from potential exposure to Site-related constituents. The Site contains a vacant one-story commercial building with gravel and grass covered areas. Surrounding land uses are also reflective of development and include commercial and residential properties. No wetland habitat is present on or in the immediate vicinity of the Site. A Ditch with intermittent surface water flows exists immediately south of the Site and an unnamed stream is present further south, west and east of the Site.

The commercial nature of the Site (*i.e.*, presence of a building and gravel surfaces) minimizes the parcel's habitat value. Although some mowed lawn and trees exist, these areas are directly adjacent to structures and paved areas thereby minimizing their availability and suitability for wildlife use, such as for nesting, foraging and cover.

Given the presence of Site-related constituents in surface soil exceeding ecologically-based standards and guidance values and complete exposure pathways to ecological receptors exposed to these media, potential for ecological risk from metals, primarily lead, exists to ecological receptors inhabiting or otherwise utilizing the Site and the adjacent Ditch.

4. DEVELOPMENT OF REMEDIAL ALTERNATIVES

This section documents the development of remedial alternatives for Site media. Consistent with the *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (USEPA 1988) and *DER-10*. As part of the development of remedial alternatives, RAOs and general response actions (GRAs) were identified for the FS. In addition, the areas and volumes of media to be addressed by the remedial alternatives and specific remedial technologies that, following screening, were used to develop the range of remedial alternatives evaluated in this FS are documented. Consistent with NYSDEC's *DER-31* – Green Remediation (NYSDEC 2011) and USEPA's *Superfund Green Remediation Strategy* (September 2010), green remediation concepts were considered during the development of alternatives in this FS.

4.1 Development of Remedial Action Objectives

RAOs are media-specific goals for protecting human health and the environment. RAOs form the basis for the FS by providing overall goals for site remediation. The RAOs are considered during the identification of appropriate remedial technologies and development of remedial alternatives for the Site, and later during the evaluation of remedial alternatives.

RAOs are based on engineering judgment, potential exposure pathways identified in the QHHEA presented in **Appendix L** of the RI Report, potential Standards, Criteria and Guidance (SCGs), and migration potential. Additionally, the current, intended and reasonably anticipated future land use of the Site and its surroundings (residential and/or commercial use) and the nature and extent of Site-related contaminants exceeding chemical-specific SCGs were considered during the development of the RAOs. Documentation of the rationale employed in the development of RAOs for Site media is presented below.

4.1.1 Identification of Potential Standards, Criteria, and Guidance

There are three types of SCGs: chemical-specific, location-specific, and action-specific. Chemical-specific SCGs are health- or risk-based numerical values, or methodologies which when applied to site-specific conditions result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Location-specific SCGs set restrictions on activities based on the characteristics of the site and immediate environment on which the activity is to be performed. Action-specific SCGs set controls or restrictions on particular types of remedial actions once the remedial actions have been identified as part of a remedial alternative. The identification of potential SCGs is documented in **Table 4-1**. The rationale for the selection of chemical-specific SCGs related to New York State's 6 NYCRR 375 SCOs and land use is further described below.

4.1.2 Land Use and Selection of Soil Cleanup Objectives

Consistent with 6 NYCRR Part 375-1.8(f) and *DER-10* 4.2(i), the current, intended and reasonably anticipated future land use of the Site are considered when selecting SCOs. The property is located in an area surrounded by properties of mixed commercial and residential uses and contains a single story commercial-use structure. The property is zoned for residential use.

Given that the reasonably anticipated future use for the Site may include residences, the following 6 NYCRR Part 375 Restricted Use SCO is identified as appropriate for the Site, and further described below:

- 6 NYCRR Part 375 SCOs for Residential Use: Residential use, as defined in 6 NYCRR Part 375-1.12(b)(1) allows a site to be used for any use(s) other than producing animal products for human consumption. Residential use is the land use category intended for single family housing and requires the fewest restrictions on the use of the site. The residential use category:
    i. does not allow for the use of a Site Management Plan (SMP) or other institutional or engineering controls to manage any remaining soil contamination on the site, although engineering controls without an institutional control, may be used to address:
        1) on-site soil vapor intrusion; or
        2) off-site impacts to other media attributable to site soil; and
    ii. allows only two restrictions on the use of the site:
        1) a groundwater use restriction; and/or
        2) a prohibition against producing animal products for human consumption; and
    iii. will require an environmental easement or deed restriction, except when the remedial program achieves the residential use SCOs set forth at 6 NYCRR 375-6.8 to a depth of fifteen feet below the developed ground surface or to bedrock, if shallower. This will only apply, where DER determines that the:
        1) protection of ecological resources SCOs are not applicable;
        2) groundwater beneath the site is not contaminated above standards, or if there is a groundwater concern, there is a municipal prohibition on the extraction of groundwater for potable purposes; and
        3) property will not be used for producing animal products for human consumption, either by:
            (A) an existing restriction on such use; or
            (B) by the site's location in an area which precludes such use.

Consistent with *DER-10*, for purposes of evaluating a pre-disposal conditions alternative, analytical results for subsurface soil were also compared to SCOs for Unrestricted Use.

As detailed in Section 3.3, surface soil and subsurface soil data were screened against 6 NYCRR Part 375-6.8(a) unrestricted use SCOs and 6 NYCRR Part 375-6.8(b) restricted use SCOs for residential use in the *RI Report*.

4.1.3 RAOs for Soil

Potential chemical-specific SCGs and human health exposure pathways identified for soil at the Site were considered during the development of RAOs. As described in **Section 3.3**, soil samples exhibit concentrations above chemical-specific SCGs in certain areas of the Site. Potentially complete human exposure pathways to Site-related contaminants in soil, including drainage ditch soil, were identified for current and future trespassers, drainage ditch users, and utility/ditch maintenance workers; and future residents and construction workers. Accordingly, the following RAOs were developed.

RAOs for Public Health Protection

Based on consideration of potential chemical-specific SCGs, nature and extent of contamination, potentially unacceptable risks, and the current, intended and reasonably anticipated future use of

the Site and its surroundings, the following RAOs for soil were developed for the protection of human health:

- Prevent, to the extent practicable, potential current and future ingestion/direct contact with metals contaminants in soil in excess of Residential Use SCOs.
- Prevent, to the extent practicable, current and future inhalation of or exposure from VOCs potentially volatilizing from contaminants in soil.

RAOs for Environmental Protection

Based on consideration of potential chemical-specific SCGs, nature and extent of contamination, potentially unacceptable risks, and the current, intended and reasonably anticipated future use of the Site and its surroundings, the following RAOs for soil were developed for protection of the environment:

- Prevent, to the extent practicable, potential erosion and/or migration of contaminants in soil that could result in groundwater or surface water contamination.

4.2 Development of General Response Actions

GRAs are media-specific actions which may, either alone or in combination, form alternatives to satisfy the RAOs and SCOs. GRAs for soil are identified on **Table 4-2** and are summarized as follows:

- ***No further action.*** No further action must be considered in the FS, as required by the NCP (40 Code of Federal Regulations (CFR) Part 300.430) and DER-10 Sections 4.1(d) and (b), as a baseline against which other actions are evaluated.
- ***Institutional controls/limited actions.*** Actions that provide site access and use restrictions and provisions for continued operation of the remedy.
- ***Containment actions.*** Actions that minimize the potential for direct contact with and erosion of surface soil.
- ***In-situ treatment actions.*** Actions that treat soil in place to reduce mobility or toxicity.
- ***Removal actions.*** Actions to excavate soil.
- ***Ex-situ treatment actions.*** Actions that treat soil following removal, to reduce mobility or toxicity.
- ***Disposal actions.*** Actions that dispose of soil on-Site or off-Site.

4.3 Identification of Volumes or Areas of Media

Volumes and areas of soil to be addressed in this FS were estimated based on Site conditions, the nature and extent of contamination, RAOs, and potential chemical-specific SCGs. The areal extents of these media are described below.

As described in **Section 3.3**, soil throughout the 0.4 acre site area exhibited lead concentrations in exceedance of the Unrestricted Use SCO ranging between 0 and 4 ft bgs. Areas exceeding the corresponding Residential Use SCO are limited to approximately 700 square feet total from two areas. As described in Section 2.3, approximately 138 tons of this material has been excavated and disposed of off-Site through the completion of IRMs in Area 2 and Area 3.

In total, it is estimated that approximately 1,100 cubic yards (cy) of soil exceeding Unrestricted Use SCOs remains at the site. Approximately 60 cy of soil exceeding Residential Use SCOs remains on-Site.

Additionally, lead impacts to off-Site drainage ditch soils have been estimated along approximately 130 linear feet of drainage ditch alignment. For purposes of the FS, a quantity of 50 cy of drainage ditch soils has been assumed.

4.4 Identification and Screening of Remedial Technologies and Process Options

Potentially applicable remedial technologies and process options for each GRA were identified and then screened on the basis of technical implementability. Technical implementability for each identified process option was evaluated with respect to contaminant information, physical characteristics, and areas and volumes of affected media summarized in **Section 4.3**.

Descriptions for technologies and process options identified for the FS are presented in **Table 4-2**. Technologies and process options that were viewed as not implementable were not considered further in the FS. The technologies and process options retained for further consideration for Site soil are presented below.

- No further action
- Access/use restrictions/administrative control(s) (Institutional controls)
- Site controls (*i.e.*, SMP)
- Periodic reviews (periodic Site reviews)
- Cover Systems
- *In-situ* treatment
  - Chemical via soil flushing
  - Biological via phytoremediation
  - Physical via solidification/stabilization
- Removal (mechanical excavation)
- *Ex-situ* treatment
  - Physical via solidification/stabilization
- Disposal (off-Site commercial facility).

4.5 Evaluation of Remedial Technologies and Process Options

The remedial technologies and process options remaining after the initial screening were evaluated further according to the criteria of effectiveness, implementability, and cost. The effectiveness criterion included the evaluation of:

- Potential effectiveness of the process option in meeting the RAOs and handling the estimated areas, and/or volumes of media summarized in **Section 4.3**
- Potential effects on human health and the environment during implementation (including, as appropriate, construction and operation)
- Reliability of the process options for Site-related contaminants and conditions.

Technical and institutional aspects of implementing the process options were assessed for the implementability criterion. The capital and operation and maintenance (O&M) costs of each process option were evaluated as to whether they were high, medium, or low relative to the

other process options of the same technology type. Based on the evaluation, the more favorable process options of each technology type were chosen as representative process options. The selection of representative process options simplifies the assembly and evaluation of alternatives, but does not eliminate other process options for consideration. The representative process option provides a basis for conceptual design during the FS, without limiting flexibility during the remedial design phase. An alternative process option may be selected during the remedial design phase as a result of design evaluations or testing. The screening and evaluation of technologies is summarized in **Table 4-2.**

As a result of the screening and evaluation of technologies for soil (**Table 4-2**), the following technologies/process options were not retained:

- Cover systems
- *In-situ* biological treatment via phytoremediation
- *In-situ* chemical treatment via soil flushing
- *In-situ* physical treatment via solidification/stabilization
- *Ex-situ* physical treatment via solidification/stabilization

Cover systems were generally not retained because of limited implementability due to site grades in relation to the existing building/slabs and site slopes or the need to remove the existing building. In-situ and ex-situ technologies were generally not retained because of limited implementability and/or effectiveness.

4.5.1 Representative Process Options

A description of the representative process options for retained technologies, by GRA and technology for soil, is presented in the following sections.

No Further Action

The no further action was identified as a representative process option for soil. The no further action alternative must be considered in the FS, as required by the NCP (40 CFR Part 300.430) and DER-10 Section 4.4(b)3. Under this alternative, no remedial actions addressing Site soil would be conducted.

Institutional Controls/Limited Actions

Institutional controls, SMP, and periodic Site reviews were identified as representative process options associated with the institutional controls/limited actions GRA for soil.

- ***Institutional controls.*** Access/use restrictions (*e.g.*, institutional controls) would be recorded for the Site documenting land use restrictions and requiring that activities that would potentially expose contaminated materials (and require health and safety precautions) be performed in accordance with the SMP. The institutional controls would also provide provisions to evaluate and address, if necessary, potential soil vapor intrusion related to potential future use of the existing building and/or if buildings are constructed at the Site.
- ***Site management plan.*** A SMP would document Site institutional controls and engineering controls and any physical components of the selected remedy requiring operation, maintenance, and monitoring to provide for continued effectiveness of the remedy. The SMP would also present provisions for periodic Site reviews.

- ***Periodic Site reviews.*** Periodic reviews are required by 6 NYCRR Part 375 where institutional controls and engineering controls, monitoring, and/or O&M activities are required at the Site. The purpose of the periodic reviews is to evaluate the Site with regard to the continuing protection of human health and the environment and to document remedy effectiveness. In accordance with 6 NYCRR Part 375-1.8(h)(3), the frequency of periodic reviews should be annual, unless a different frequency is approved by NYSDEC. Periodic site reviews would also include the performance of Five Year Reviews in accordance with 40 CFR 300.430(f)(4)ii.

  Monitoring was also identified as a representative process option associated with the institutional controls/limited actions GRA for soil.

- ***Monitoring.*** Monitoring of groundwater would involve periodic sampling and analysis of groundwater to provide a means of detecting changes in constituent concentrations in groundwater. Groundwater monitoring also provides a means of evaluating the effectiveness of the selected remedies.

Removal

Mechanical excavation was identified as the representative process option associated with the removal GRA for soil.

- ***Mechanical excavation.*** Mechanical excavation of soil is generally implemented using construction equipment such as backhoes and front-end loaders. Excavated areas are backfilled, graded, and restored based on restoration requirements. Sloping techniques, benching, and/or engineering controls would be necessary during excavation to maintain stability of excavation walls.

Disposal

Off-Site commercial treatment/disposal was identified as a representative process option associated with the disposal GRA for soil.

- ***Off-Site commercial treatment/disposal facility (soil).*** Coupled with mechanical removal, excavated soil would be transported to regulated, commercial off-Site facilities for subsequent disposal. Waste characterization sampling and analysis would be completed, and a Waste Manifest would be submitted to, and approved by the landfills prior to disposal.

4.6 Assembly of Remedial Alternatives

Three remedial alternatives were developed by assembling GRAs and representative process options into combinations that address RAOs for soil. A description of each alternative is included in the following subsections.

4.6.1 Alternative 1 – No Further Action

Alternative 1 is the no further action alternative. The no further action alternative is required to be considered by the NCP and *DER-10* Section 4.4(b)3 and serves as a benchmark for the evaluation of action alternatives. This alternative provides for an assessment of the environmental conditions if no further remedial actions are implemented. Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the Site be reviewed at least once every five years. If justified by

the review, remedial actions may be implemented to remove, treat, or contain contaminated media

4.6.2 Alternative 2 – Targeted Soil Removal

Alternative 2 includes targeted excavation of soil exhibiting concentrations above Residential Use SCOs. The conceptual extent of excavation is depicted on **Figure 4-1**.

This alternative would also include institutional controls, a SMP, and periodic reviews. Based on the descriptions and assumptions below, it is anticipated that Alternative 2 would be constructed in one construction season.

Targeted Soil Removal with Off-Site Disposal

Soils exhibiting concentrations above Residential Use SCOs would be excavated and disposed of off-Site in an appropriate facility. Soil excavation would also be performed off-Site in portions of the drainage ditch on the southern boundary of the Site where paint chips were observed during the RI. The back portion of the existing building (including the building slab), adjacent to the IRM excavation Area 2, would require demolition in order to remove those soils exceeding the Residential Use SCOs. Approximately 750 square foot of building is assumed to be removed, for the purpose of estimating costs.

Soil excavation areas would be backfilled with clean material in accordance with DER-10 Section 5.4(e)4. The excavated drainage ditch areas would be restored with light rip rap.

Institutional Controls

Administrative control(s) such as an IC (*e.g.*, environmental easements, deed restrictions, and environmental notices) would be recorded for the Site to require the continued management of engineering controls to maintain protectiveness of human health and the environment. The institutional controls would limit groundwater use and require groundwater monitoring. Evaluation and possible mitigation of potential vapor intrusion would be required under provisions specified in the institutional controls. Where necessary, preventative measures may be included in the design and construction of buildings at the Site to mitigate the potential for exposure to constituents that may be present in soil vapor. Such measures may include the use of a vapor barrier or the installation of a venting system. Restrictions would preclude activities that would potentially expose soil and soil vapor that might cause vapor intrusion, without prior review and approval by NYSDEC. As described above in Section 4.1.2, the reasonably anticipated future land use for the Site is residential. The institutional controls would reflect this Site use.

Site Management Plan

A SMP would guide future activities at the Site by documenting institutional controls and engineering controls and by developing requirements for periodic Site reviews, the implementation of required O&M activities for the selected remedy, and future development on the Site. In addition, consistent with 6 NYCRR Part 375-1.8(h)(3), annual certification of institutional controls and engineering controls would be required in the SMP.

Periodic Site Reviews

Periodic site reviews would be conducted in accordance with the SMP to evaluate the Site with regard to continuing protection of human health and the environment as evidenced by

information such as documentation of field inspections. 6 NYCRR Part 375-1.8(h)(3) specifies that the frequency of periodic site reviews should be annual, unless a different frequency is approved by NYSDEC; it is assumed that annual reviews would be conducted at the Site. Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the Site be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

4.6.3 Alternative 3 –Soil Removal (including full building demolition)

Alternative 3 includes excavation of soil exhibiting concentrations above Unrestricted Use SCOs and full building demolition (including the building slab). The conceptual extent of excavation is depicted on **Figure 4-2**. Administrative controls and reviews are not required under this alternative.

Soil Removal with Off-site Disposal

Soils exceeding the Unrestricted SCO would be removed and disposed off-site at an appropriate facility. Soils would also be removed from the drainage ditch in the manner described in Alternative 2. The entirety of the existing building would require demolition (approximately 3,300 square feet) to access soils under the building footprint.

Soil excavation areas would be backfilled with clean material in accordance with DER-10 Section 5.4(e)4. The excavated drainage ditch areas would be restored with light rip rap.

5. DETAILED ANALYSIS OF ALTERNATIVES

This section documents the detailed analysis of three remedial alternatives developed during the assembly of remedial alternatives. The detailed analysis of the remedial alternatives was conducted consistent with *DER-10* and the *Guidance for Developing Remedial Investigation and Feasibility Studies under CERCLA* (USEPA 1988). This section describes the individual and comparative analysis of the remedial alternatives with respect to ten evaluation criteria that embody the specific statutory requirements that must be evaluated to satisfy the CERCLA remedy selection process.

5.1 Individual Analysis of Alternatives

DER-10 Section 4.2 indicates that, during remedy selection, ten evaluation criteria should be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to balance the differences between the alternatives. The modifying criteria are formally considered by NYSDEC after public comment is received on the Proposed Plan. The criteria are described below:

Table 5-1. Remedial Alternative Evaluation Criteria

Criterion	Considerations
Threshold Criteria	
Overall protectiveness of human health and the environment	• Achievement and maintenance of adequate protection • Elimination, reduction, or control of site risks through treatment, engineering, or institutional controls • Assessment relative to the current, intended, and reasonably anticipated future use of the Site and its surroundings.
Compliance with SCGs	• Attainment of chemical-, location-, and action-specific SCGs
Primary Balancing Criteria	
Long-term effectiveness and permanence	• Magnitude of potential residual risk from materials remaining at the conclusion of the remedial activities. • Adequacy and reliability of controls necessary to manage materials left on Site
Reduction of toxicity, mobility, or volume through treatment	• Treatment or recycling processes employed and materials treated • Amount of hazardous substances, pollutants, or contaminants treated or recycled • Degree of expected reduction of mobility, toxicity, or volume of the waste due to treatment or recycling • Degree to which treatment would be irreversible • Type and quantity of residuals that would remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate • Degree to which treatment would reduce the inherent hazards posed by the Site.

Criterion	Considerations
Short-term effectiveness	• Short-term potential risks to the community during implementation • Potential impacts to workers and effectiveness/reliability of protective measures • Potential environmental impacts and the effectiveness/reliability of mitigative measures • Time until protection would be achieved.
Implementability	• Technical difficulties and unknowns • Reliability of the technology • Ease of undertaking additional remedial actions • Ability to monitor the effectiveness of the remedy • Activities needed to coordinate with other offices and agencies • Ability and time required to obtain any necessary agency approvals and permits • Availability of adequate off-Site treatment, storage, and disposal capacity/services • Availability of necessary equipment and specialists • Provisions to obtain necessary additional resources • Availability of prospective technologies.
Costs	• Capital costs • Annual O&M costs • Periodic O&M costs • Present worth cost.
Land Use[1]	• Consistency with land use
Modifying Criteria	
State acceptance	• Indicates whether, based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the preferred response measure.
Community acceptance	• Summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

The objective of the detailed analysis of alternatives was to analyze and present sufficient information to allow the alternatives to be compared and a remedy selected. The analysis consisted of an individual assessment of each alternative with respect to the evaluation criteria that encompass statutory requirements and overall feasibility and acceptability. The summary of this analysis is presented in **Table 5-2.**

[1] Land use is not a criterion under the NCP; however, it is primary balancing criterion under DER-10 and is included as such in a detailed analysis of alternatives at this Site.

5.2 Comparative Analysis of Alternatives

The detailed analysis of alternatives also included a comparative evaluation designed to consider the relative performance of the alternatives and identify major trade-offs among them. The comparative evaluation of alternatives is presented in the following subsections. In the comparative analysis of alternatives, the performance of each alternative relative to the others was evaluated for each criterion.

As discussed in the following subsections, with the exception of Alternative 1, each alternative would satisfy the threshold criteria by providing protection to human health and the environment, and by addressing the identified SCGs as it relates to soil. The relative comparison based on the primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) concludes that Alternative 2 would best satisfy the primary balancing criteria. As noted in **Section 5.1**, the detailed evaluation with respect to the FS criteria for each of the alternatives is presented in **Table 5-2**.

5.2.1 Overall Protection of Human Health and the Environment

Alternative 1, the no further action alternative, does not include any additional engineering or institutional controls and therefore is not expected to provide protection of human health due to potential exposure to soil and would not offer additional protection of the environment. Alternatives 2 and 3 would be protective of human health and the environment following implementation. Alternative 2 provides protectiveness through soil removal, institutional controls and monitoring. Alternative 3 provides protectiveness through full soil removal. Consistent with 6 NYCRR-1.8(f) and *DER-10* 4.2(i), the current, intended, and reasonably anticipated future use of the Site was considered when selecting SCOs. Excavation of soil in Alternatives 2 and 3 was selected to address soil exceeding Residential Use SCOs and Unrestricted Use SCOs, respectively. Alternative 1 would not be consistent with current, intended, and reasonably anticipated future use of the Site as it would not be protective of human health and the environment, under residential property use.

Alternative 2 would be protective of human health under residential property use and the environment and would meet RAOs through removal of soil, monitoring of groundwater, the use of institutional controls, a SMP, and periodic review to provide a means to evaluate continued protectiveness. Alternative 3 would be protective of the environment through removal of soil and would meet RAOs while allowing for unrestricted use of the Site by addressing soil exceeding Unrestricted Use SCOs.

In summary, Alternatives 2 and 3 would satisfy the threshold criteria by providing protection of human health and the environment and by addressing RAOs. Alternatives 2 and 3 are consistent with current, intended, and reasonably anticipated future use of the Site. While Alternatives 2 and 3 would provide protectiveness of human health and the environment and are consistent with current, intended and reasonably anticipated future use of the Site, the added soil excavation in Alternative 3 would allow for unrestricted use of the Site.

5.2.2 Compliance with SCGs

Chemical-, location-, and action-specific SCGs identified for consideration in the FS are summarized in **Table 5-2**. Alternative 1 does not actively address chemical-specific SCGs.

Alternative 2 addresses chemical-specific SCGs through targeted soil excavation, a SMP, and institutional controls. Alternative 3 addresses chemical-specific SCGs through removal of soil.

No action- or location-specific SCGs were identified for Alternative 1, the no further action alternative. Construction methods and safety procedures, compliance with Occupational Safety and Health Administration (OSHA) requirements, and transportation and disposal requirements would be implemented to adhere to the location- and action-specific SCGs identified for Alternatives 2 and 3. Specifically, institutional controls would be implemented in Alternative 2 in general conformance with NYSDEC's guidance DER-33 (NYSDEC 2010b). Procedures would be implemented to adhere to the location-specific SCGs related to federal and state requirements for cultural, archeological, and historical resources. With respect to action-specific SCGs, proposed excavation activities would be conducted consistent with applicable standards; earth moving/excavation activities would be conducted consistent with air quality standards; transportation and disposal activities would be conducted in accordance with applicable State and Federal requirements, by licensed and permitted haulers; and Site construction activities would be conducted in accordance with OSHA safety requirements.

5.2.3 Long-term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence in a reasonable time frame, whereas long-term effectiveness and permanence for Alternatives 2 and 3 would be provided upon completion of construction. No controls are included in Alternatives 1, while limited controls are included in Alternative 2, including institutional controls, SMP, and periodic reviews. Therefore, with respect to the magnitude of residual risk, potentially unacceptable human health risks associated with human exposure to soil (in areas not currently covered) would remain in Alternative 1, but would be addressed via targeted soil excavation, institutional controls, SMP, and periodic reviews in Alternative 2. Additional soil excavation in Alternative 3 results in added effectiveness relative to addressing potential human health risks and potential for erosion of soil.

Institutional controls, SMP, and periodic Site reviews included in Alternatives 2 would be adequate and reliable controls of potential risks associated with exposure to constituents in soil. Excavation and off-Site management of soil in Alternative 2 would be adequate and reliable controls of potential risks associated with erosion of and exposure to constituents in soil at the Site.

Alternatives 2 and 3 will meet RAOs at completion of their respective remedies, estimated at one construction season.

Each alternative offers long-term sustainability, though implementation of Alternative 3, specifically due to additional soil excavation, would result in nominally greater impacts to greenhouse gas emissions during construction than Alternatives 1 or 2. Long-term O&M requirements in Alternative 2 would result in minimal impact to the environment.

In summary, Alternatives 2 and 3 would provide long-term effectiveness and permanence, while Alternative 1 would not. Residual risks associated with Alternative 2 would be adequately and reliably addressed through institutional controls. Alternative 2 results in minimal long-term fuel/energy consumption, greenhouse gas emissions, and impacts to water, ecology, workers or

the community associated with long-term maintenance of the remedies, while there is no long-term maintenance associated with Alternative 3.

5.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

There would be no reduction in toxicity, mobility, or volume in soil through treatment under Alternative 1, the no further action alternative. Alternative2 would result in some reduction in toxicity, mobility (i.e., erosion) and volume of Site-related contaminants in soil through targeted excavation and off-Site disposal. Additional soil removal in Alternative 3 would result in a greater reduction in toxicity, mobility and volume of Site-related contaminants in soil as compared to Alternative 2.

5.2.5 Short-term Effectiveness

Alternative 1, does not include physical measures in areas of contamination. Alternatives 2 and 3 would be constructed using proper protective equipment to manage potential risks to on-Site workers, and proper precautions and monitoring to be protective of the general public and the environment. Both alternatives 2 and 3 will meet RAOs upon completion of soil excavation activities within one construction season.

Impacts to the community resulting from implementation of the excavation and off-Site disposal included in of Alternative 2 would be minimal. The implementation of the excavation and off-Site disposal included in Alternative 3 would result in greater impacts to the community, including increased traffic, as well as increased noise for the duration of construction.

As it relates to traffic, transportation of excavated materials and backfill in Alternative 3 is anticipated to result in approximately 215 truck trips, respectively, to and from the Site as compared to 25 truck trips necessary for transportation of excavated materials included in Alternative 2.

With respect to sustainability, there is an environmental footprint inherent in implementation of each alternative as it relates to construction and operation as well as impacts to the community (as described above). The implementation of the excavation and off-Site disposal included in Alternatives 2 and 3 would result in direct emissions and fuel consumption. It is estimated that greenhouse gas emissions associated with construction and transportation needs for Alternatives 2 and 3 would be approximately 12 and 74 metric tons of carbon dioxide equivalent (MtCO2e), respectively.

Green remediation techniques, as detailed in NYSDEC's *Green Remediation Program Policy - DER-31* (NYSDEC 2011) and the EPA Region 2's *Clean and Green Policy* (USEPA 2010), would be considered for each alternative to reduce short-term environmental impacts. Green remediation best practices such as the following may be considered:

- Use of renewable energy (*e.g.* biofuels) and/or purchase of renewable energy credits to power energy needs during construction and/or O&M of the remedy
- Reduction in vehicle idling, including both on and off road vehicles and construction equipment during construction and/or O&M of the remedy
- Beneficial reuse of material that would otherwise be considered a waste
- Use of Ultra Low Sulfur Diesel.

In summary, Alternatives 2 and 3 would provide short-term effectiveness. Worker and community risks during remedy implementation are similar for Alternatives 2 and 3.

5.2.6 Implementability

Alternatives 1 through 3 are implementable. Alternatives 2 and 3 can be readily constructed and operated; the materials necessary for the construction of these alternatives are reasonably available. Excavation and disposal in Alternatives 2 and 3 are readily constructible and reliable options requiring only conventional excavation and over-the-road hauling equipment; no proprietary equipment or specialists are needed to implement. Institutional controls and the SMP are readily implementable to achieve effectiveness for Alternative 2. Both Alternatives 2 and 3 would require coordination with other agencies, including NYSDEC, New York State Department of Transportation (NYSDOT), New York State Department of Health (NYSDOH), the Town and Village of Lima, and Livingston County, as well as property owners.

Transportation considerations related to the implementation of Alternative 3 include increased traffic, fuel usage, and adverse effects on both air quality and community safety (based on the full demolition of the existing building, export of excavated material, import of clean fill and other materials) as compared to Alternative 2.

5.2.7 Cost

Detailed cost estimates have been developed for the purpose of comparison of alternatives and are included as **Tables 5-3 through 5-5**. The costs associated with Alternatives 1 through 3 are summarized as follows:

Table 5-6. Summary of Remedial Alternative Cost Estimates

Alternative	Total estimated capital present worth cost	Total estimated present worth of O&M (30 years)	Total estimated net present worth cost
1 – No Further Action	$0	$0	$0
2 – Targeted Soil Removal	$ 194,000	$ 104,000	$ 298,000
3 – Restoration to Pre-Disposal/Pre-Release Conditions	$ 823,000	$ 0	$ 823,000

6. CONCLUSIONS

To provide long-lasting protection to human health and environment, three remedial alternatives were developed and evaluated for the Site in this FS Report. Specifically, this FS Report documents the development of RAOs for the protection of human health and the environment to address contaminants identified in soil for the Site. Consistent with *DER-10* and the NCP, the three remedial alternatives developed to address these RAOs were subjected to a detailed evaluation based on required evaluation criteria and in sufficient detail such that risk management decision makers may select a remedy for the Site.

As discussed in **Section 5**, Alternative 1 would not satisfy the threshold criteria, while Alternatives 2 and 3 would satisfy the threshold criteria by providing protection to human health and the environment, and by addressing the identified alternative specific SCGs. Therefore, with the exception of Alternative 1, each alternative would be eligible for selection as the final remedy. The relative comparison based on the primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; land use; and cost) concludes that Alternative 2 would be protective of human health and the environment through targeted soil removal and implementation of institutional controls. Direct exposure to soil is addressed through implementation of targeted soil removal. Monitoring and institutional controls in Alternatives 2 would provide a means for monitoring effectiveness of the soil remedy, while restricting property usage.

Alternative 3 would provide added protectiveness compared to Alternative 2 given the additional building demolition and soil excavation to meet more stringent SCOs and allow unrestricted future site use. However, Alternative 2 is less costly than Alternative 3. Alternative 2 would be protective of human health under residential property use and the environment and would meet RAOs through removal of soil, monitoring of groundwater, the use of institutional controls, a SMP, and periodic review to provide a means to evaluate continued protectiveness.

As part of the remedial decision-making process and following review of the evaluations documented in this *FS Report*, NYSDEC will identify an alternative to propose as the preferred remedy to be documented in a Proposed Plan for the Site. Following receipt of public comments on the Proposed Plan, the selected remedial alternative will be documented in a *Record of Decision (ROD)* for the Site.

REFERENCES

Rickard, L.V. and Fisher, D.W. 1970. Geologic Map of New York State: Finger Lakes Sheet. 1:250,000. Map and Chart Series No. 15. The University of the State of New York, Albany, New York.

Muller, E.H., and Cadwell, D.H. 1986. Surficial Geologic Map of New York: Finger Lakes Sheet. 1:250,000. New York State Museum Map and Chart Series 40, The University of the State of New York, Albany, New York.

NYSDEC. Finlayson, D. Albany NY. Letter, *RE: WA Issuance/Notice to Proceed*. Babcock, D. Parsons Engineering of NY, Syracuse, NY. April 7, 2015.

NYSDEC. 2011. New York State Department of Environmental Conservation, Division of Environmental Remediation, *Green Remediation (DER-31)*. NYSDEC Program Policy. August 11, 2010. Revised January 20, 2011.

NYSDEC. 2010a. New York State Department of Environmental Conservation, Division of Environmental Remediation, *Technical Guidance for Site Investigation and Remediation (DER-10)*. NYSDEC Program Policy. May 3, 2010.

NYSDEC. 2010b. *NYSDEC Program Policy – Institutional Controls: A Guide to Drafting and Recording Institutional Controls (DER-33)*. December 3, 2010.

NYSDEC. 1994. New York State Department of Environmental Conservation, Division of Fish and Wildlife, *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites.* October 1994.

OBG 2018. *Remedial Investigation Report.* February 2018.

OBG. 2015. *Interim Remedial Measure Work Plan (IRMWP).* November 2015.

Shaw. 2012. *Final Site Characterization Report (SCR). Former K&K Stripping Facility. Lima, NY.* February 2012.

USEPA. 1988. *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA*. Publication EPA/540/G-89/004. Office of Emergency and Remedial Response. Washington, D.C. October 1988.

USEPA. 1990. Federal Register. *The preamble to the NCP*.

USEPA. 2010. *Superfund Green Remediation Strategy.* http://www.epa.gov/superfund/greenremediation/sf-gr-strategy.pdf. September 2010.

TABLES

TABLE 4-1. POTENTIAL STANDARDS, CRITERIA, AND GUIDANCE

Medium Location/Action	Citation	Requirements	Comments	Potential SCG
Potential Chemical-Specific SCGs				
Soil	6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives (SCOs)	Promulgated state regulation that provides guidance for SCOs for various restricted property uses (industrial, commercial, restricted residential, and residential), for the protection of groundwater and ecological resources, and for unrestricted property use. A site designated for unrestricted use is a site subject to no imposed institutional or engineering controls, such as an environmental easement or deed restriction. [DER-10 (NYSDEC 2010)].	SCOs for residential use are potentially applicable to Site soil given the current and reasonably anticipated future land use as residential property. SCOs for the protection of groundwater may not be applicable.	Yes
Potential Location-Specific SCGs				
Water Bodies	33 CFR 320 - 330 - Navigation and Navigable Waters	Regulatory policies and permit requirements for work affecting waters of the United States and navigable waterways.	Not applicable.	No
	16 USC 661 - Fish and Wildlife Coordination Act	Requires protection of fish and wildlife in a stream or other water body when performing activities that modify a stream or river.		
Wetlands	6 NYCRR 663 - Freshwater wetland permit requirements	Actions occurring in a designated freshwater wetland (within 100 feet) must be approved by NYSDEC or its designee. Activities occurring adjacent to freshwater wetlands must: be compatible with preservation, protection, and conservation of wetlands and benefits; result in no more than insubstantial degradation to or loss of any part of the wetland; and be compatible with public health and welfare.	Not applicable since the Site is not within 100 feet of a designated freshwater wetland.	No
	Clean Water Act Section 404 33 CFR Parts 320 - 330	Regulatory policies and permit requirements for work affecting waters of the United States, including wetlands.		
	Clean Water Act Section 404 40 CFR Parts 230-231	Provides for restoration and maintenance of integrity of waters of the United States, including wetlands, through the control of dredged or fill material discharge.	Not applicable. There are no delineated wetlands on-Site.	No
	Executive Order 11990 - Protection of Wetlands	Executive order requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or loss of wetlands if a practical alternative exists.		
Wetlands & Floodplains	Policy on Floodplains and Wetland Assessments for CERCLA Actions (OSWER Directive 9280.0-2; 1985)	Policy and guidance requiring Superfund actions to meet substantive requirements of Executive Orders 11988 and 11990. Describes requirements for floodplain assessment during remedial action planning.	Not applicable, there are no delineated wetlands on-Site and the Site is not within a 100-year floodplain.	No
	40 CFR Part 6, Appendix A - Statement of Procedures on Floodplains Management and Wetlands Protection (January 5, 1979, https://www.epa.gov/nepa/floodplain-management-and-wetland-guidance-national-environmental-policy-act-reviews)	Policy and guidance for implementing Executive Orders 11988 and 11990. Requires federal agencies to evaluate the potential effects of action proposed in wetlands and floodplains to avoid, to the extent possible, adverse effects. Federal agencies are required to evaluate alternatives to actions in wetlands or floodplains and to avoid or minimize adverse impacts if not practical alternatives exist.		

RAMBOLL

TABLE 4-1. POTENTIAL STANDARDS, CRITERIA, AND GUIDANCE

Medium Location/Action	Citation	Requirements	Comments	Potential SCG
Floodplains	6 NYCRR 373-2.2 - Location standards for hazardous waste treatment, storage, and disposal facilities -100-yr floodplain	Hazardous waste treatment, storage, or disposal facilities located in a 100-yr floodplain must be designed, constructed, operated and maintained to prevent washout of hazardous waste during a 100-year flood.	Not applicable, the Site is not within the 100-year floodplain.	No
	40 CFR Part 264.18(b) - Location Standards - Floodplains	Hazardous waste treatment, storage, or disposal facilities located in a 100-yr floodplain must be designed, constructed, operated and maintained to prevent washout of hazardous waste during a 100-year flood.		
	Executive Order 11988 - Floodplain Management	USEPA is required to conduct activities to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupation or modification of floodplains. The procedures also require USEPA to avoid direct or indirect support of floodplain development wherever there are practicable alternatives and minimize potential harm to floodplains when there are no practicable alternatives.		
	Executive Order 13690 - Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input	Executive order establishes a Federal Flood Risk Management Standard (FFRMS), a Process for Further Soliciting and Considering Stakeholder Input, and amends Executive Order 11988. The FFRMS establishes a construction standard and framework for Federally funded projects constructed in, and affecting, floodplains, to reduce the risks and cost of floods. Under the FFRMS, federal agency management is expanded from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk to increase resiliency of projects funded with federal funds. The Executive Order also sets forth a process for solicitation and consideration of public input, prior to implementation of the FFRMS.		
	6 NYCRR 500 - Floodplain Management Regulations Development Permits	Promulgated state regulations providing permit requirements for development in areas of special flood hazard (floodplain within a community subject to a one percent or greater chance of flooding in any given year).		
Within 61 meters (200 feet) of a fault displaced in Holocene time	40 CFR Part 264.18(a) - Location Standards - Seismic considerations	New treatment, storage, or disposal of hazardous waste is not allowed.	Not applicable. Site is not located within 200 feet of a fault displaced in Holocene time, as listed in 40 CFR 264 Appendix VI. None listed in New York State.	No
Within salt dome or bed formation, underground mine, or cave	40 CFR Part 264.18 (c) - Location standards; salt dome formations, salt bed formations, underground mines and caves.	Placement of non-containerized or bulk liquid hazardous waste is not allowed.	Not applicable. No salt dome formations, salt bed formations, underground mines, or caves present at Site.	No
Habitat of an endangered or threatened species	6 NYCRR 182	Promulgated state regulation that provides requirements to minimize damage to habitat of an endangered species.	Not applicable. No endangered or threatened wildlife species, rare plants, or significant habitats were identified at the Site.	No
	Endangered Species Act	Provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction.		
	50 CFR Part 17 - Endangered and Threatened Wildlife and Plants and 50 CFR Part 402 - Interagency Cooperation	Promulgated federal regulation that requires that federal agencies ensure authorized, funded, or executed actions will not destroy or have adverse modification of critical habitat.		
Historical property or district	National Historic Preservation Act 36 CFR 800- Preservation of Historic Properties Owned by a Federal Agency	Remedial actions are required to account for the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places.	Not applicable. Site not owned by a Federal Agency.	No

RAMBOLL

TABLE 4-1. POTENTIAL STANDARDS, CRITERIA, AND GUIDANCE

Medium Location/Action	Citation	Requirements	Comments	Potential SCG
	National Historic Preservation Act 36 CFR Part 65 - National Historic Landmarks Program	Promulgated federal regulation requiring that actions must be taken to preserve and recover historical/archeological artifacts found.	Potentially applicable. Historic, architectural, archeological and/or cultural resources present at or near the Site would be evaluated, as necessary, during the design phase.	Yes
	New York State Historic Preservation Act of 1980 9 NYCRR Parts 426 - 428	State law and regulations requiring the protection of historic, architectural, archeological, and cultural property.		
Wilderness area	Wilderness Act 50 CFR Part 35 - Wilderness Preservation and Management	Provides for protection of federally-owned designated wilderness areas.	Not applicable. Site not located in wilderness area.	No
Wild, scenic, or recreational river	Wild and Scenic Rivers Act	Provides for protection of areas specified as wild, scenic, or recreational.	Not applicable. Site not located near wild, scenic, or recreational river.	No
Coastal zone	Coastal Zone Management Act	Requires activities be conducted consistent with approved State management programs.	Not applicable. Site not located in coastal zone.	No
Coastal barrier	Coastal Barrier Resources Act	Prohibits any new Federal expenditure within the Coastal Barrier Resource System.	Not applicable. Site not located in coastal barrier system or coastal zone.	No
Potential Action-Specific SCGs				
Institutional controls	NYSDEC DER-33 Institutional Controls: A Guide to Drafting and Recording Institutional Controls, December 2010	Technical guidance document that provides guidelines for proper development and recording of institutional controls as part of a site remedial program.	Potentially applicable when institutional controls are implemented as a component of the selected remedy.	Yes
Generation and management of solid waste	6 NYCRR 360 - Solid Waste Management Facilities	Promulgated state regulation that provides requirements for management of solid wastes, including disposal and closure of disposal facilities.	Potentially applicable to alternatives including disposal of residuals generated by treatment processes.	No
Land disposal	6 NYCRR 376 - Land Disposal Restrictions	Promulgated federal and state regulations that provide treatment standards to be met prior to land disposal of hazardous wastes.	Not applicable.	No
	40 CFR Part 268 - Land Disposal Restrictions			
	62 CFR 25997 - Phase IV Supplemental Proposal on Land Disposal of Mineral Processing Wastes			
Green remediation	NYSDEC DER-31 Green Remediation Program Policy, January 2011	State and federal technical guidance documents that provide guidelines for the development of site remediation strategies in a manner that minimizes environmental impacts and applies green remediation concepts (e.*g.,* reduction in greenhouse gas emissions, energy consumption and resource use, promotion of recycling of materials and conservations of water, land and habitat).	Potentially applicable.	Yes
	Superfund Green Remediation Strategy, September 2010			
General excavation	6 NYCRR 200-203, 211-212 - Prevention and Control of Air Contamination and Air Pollution	Provides requirements for air emission sources.	Not applicable.	No
	6 NYCRR 257 - Air Quality Standards	Promulgated state regulation that provides specific limits on generation of SO_2, particulates, CO_2, photochemical oxidants, hydrocarbons (non-methane), NO_2, fluorides, beryllium and H_2S from point sources.	Not applicable. Dust emissions would not be generated from a point source.	No

RAMBOLL

TABLE 4-1. POTENTIAL STANDARDS, CRITERIA, AND GUIDANCE

Medium Location/Action	Citation	Requirements	Comments	Potential SCG
	40 CFR Part 50.1 - 50.12 - National Ambient Air Quality Standards	Promulgated federal regulation that provides air quality standards for pollutants considered harmful to public health and the environment. The six principle pollutants are carbon monoxide, lead, nitrogen dioxide, particulates, ozone, and sulfur oxides.	Potentially applicable to alternatives during which dust generation may result, such as during earth moving, grading, and excavation.	Yes
	NYS TAGM 4031 - Dust Suppressing and Particle Monitoring at Inactive Hazardous Waste Disposal Sites	State guidance document that provides limitations on dust emissions.		
Construction	29 CFR Part 1910.120 - Occupational Safety and Health Standards - Hazardous Waste Operations and Emergency Response	Promulgated federal regulation requiring that remedial activities must be in accordance with applicable OSHA requirements.	Potentially applicable for construction activities.	Yes
	29 CFR Part 1926 - Safety and Health Regulations for Construction	Promulgated federal regulation requiring that remedial construction activities must be in accordance with applicable OSHA requirements.	Potentially applicable for construction activities.	Yes
Transportation	6 NYCRR 364 - Waste Transporter Permits	Promulgated state regulation requiring that hazardous waste transport must be conducted by a hauler permitted under 6 NYCRR 364.	Not applicable	No
	49 CFR 107, 171-174 and 177-179 - Department of Transportation Regulations	Promulgated federal regulation requiring that hazardous waste transport to off-site disposal facilities must be conducted in accordance with applicable Department of Transportation requirements	Not applicable	No

Notes:

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CFR – Code of Federal Regulations
DER – Division of Environmental Remediation
FFRMS – Federal Flood Risk Management Standard
NYCRR – New York Code of Rules and Regulations
NYS – New York State
NYSDEC – New York State Department of Environmental Conservation
OSWER – Office of Solid Waste and Emergency Response
SCOs – Soil Cleanup Objectives
SCGs – Standards, Criteria, and Guidance
TAGM – Technical and Administrative Guidance Memorandum (NYSDEC)
TOGS – Technical and Operational Guidance Series
USC – United States Code
USEPA or EPA – United States Environmental Protection Agency
VI – Vapor Intrusion
Shaded cells - not identified as Potential SCGs

TABLE 4-2. SCREENING AND EVALUATION OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL

General Response Action	Remedial Technology	Process Option	Description	Implementability	Effectiveness	Relative Cost	Screening and Evaluation Comments	Retained for Further Consideration
No further action	No further action	No further action*	No further action.	Readily implementable	Not effective in mitigating potential for erosion of, or contact with, exposed contaminated soil in areas not previously addressed by the IRM.	No capital No O&M	Required for consideration by the NCP (40 CFR Part 300.430) and NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation.	Yes
Institutional controls/Limited actions	Access/use restrictions/ administrative control(s)	Institutional controls (ICs)*	Implementation and documentation of access and land use restrictions that would require activities that would potentially disturb or expose contaminated soil (and require health and safety precautions) be conducted in accordance with the site management plan (SMP). The environmental easement ICs would also provide provisions to evaluate and address potential soil vapor intrusion, as necessary, if a new building(s) is constructed at the Site.	Readily implementable	Effective means of controlling Site access and documenting use restrictions.	Low capital No O&M	Potentially applicable	Yes
	Site controls	SMP*	Documentation of Site restrictions and provisions for continued operation and maintenance of the remedy. Presents Site engineering controls (ECs) and ICs and physical components of the selected remedy requiring operation, maintenance, and monitoring to provide continued effectiveness. The SMP would also present provisions for periodic Site reviews.	Readily implementable	Effective means of controlling Site use restrictions, remedy components, and communicating soil management/handling procedures. Effective means of documenting remedy components, including operation, maintenance, and monitoring requirements.	Low capital No O&M cost	Potentially applicable	Yes
	Periodic reviews	Periodic site reviews*	Periodic reviews are required by 6 NYCRR Part 375 and DER-10 where ECs and ICs, monitoring plans, and/or operations and maintenance activities are implemented on a site. The purpose of the reviews is to evaluate the areas in regards to the continuing protection of human health and the environment and to provide documentation of remedy effectiveness. In accordance with 6 NYCRR Part 375-1.8(h)(3), the frequency of periodic reviews should be annual, unless a different frequency is approved by the NYSDEC. Periodic reviews would include the performance of Five Year Reviews in accordance with 40 CFR 300.430(f)(4)ii.	Readily implementable.	Effective means of evaluating continued protection to human health and the environment.	No capital Low O&M	Potentially applicable	Yes
Containment	Cover system	Engineered cover	Use of vegetated, soil/granular material, gravel, asphalt, and/or building surface cover to promote surface water runoff, reduce erosion and prevent direct contact with soil. Final restoration cover would be selected based upon intended site use and restoration requirements within the covered area. Grading and cover installation would be performed such that drainage is promoted, erosion is minimized, and cover integrity is protected.	Limited implementability due to site grades in relation to the existing building/slabs and site slopes or the need to remove the existing building.	Effective means of minimizing direct contact with exposed soil. Effective means of minimizing erosion of soil that could result in surface water contamination. Effectiveness relies on maintaining integrity of cover system.	Medium capital Low O&M	Not retained for further consideration because of limited implementability.	No

TABLE 4-2. SCREENING AND EVALUATION OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL

General Response Action	Remedial Technology	Process Option	Description	Implementability	Effectiveness	Relative Cost	Screening and Evaluation Comments	Retained for Further Consideration
Containment	Cover system	Low permeability cover	Use of low permeability cover to minimize surface water infiltration, encourage runoff and control erosion, and isolate and contain impacted soil. Low permeability cover components may consist of low permeability clay and/or a geomembrane system. Vegetation, asphalt, or gravel may be utilized as the top layer based upon intended Site use and restoration requirements within the covered area.	Limited implementability due to Site grades in relation to the existing building/slabs and Site slopes.	Effective means of minimizing erosion of, and contact with exposed soil. Effective means of minimizing erosion of soil that could result in surface water contamination. Results in reduction in infiltration that could reduce leaching of contaminants in soil to groundwater, and reduce mobilization of Site-related contaminants.	High capital Low O&M	Not retained for further consideration because of limited implementability.	No
In situ treatment	Physical	Solidification/ stabilization (ISS)	Contaminants are physically bound or enclosed within a stabilized mass (solidification) and/or chemical reactions are induced between stabilizing agent and contaminants to reduce their mobility (stabilization), toxicity, and leachability.	Limited implementability adjacent to existing structures. A pilot test would be necessary to evaluate implementability of amendment distribution methods.	Long-term effectiveness of ISS for subsurface treatment has been demonstrated at many sites. Surficial soils are subjected to stress that may impact long term effectiveness (*e.g.*, freeze-thaw cycles, surface water run-off, etc.). Does not prevent direct contact with stabilized material from human and ecological receptors. Treatability studies necessary to evaluate stabilization of material.	Low to Medium capital No O&M	Not retained for further consideration because of implementability concerns.	No
In situ treatment	Chemical	Soil flushing	Injection of solvent or surfactant mixture to extract contaminants bound to soils to liquid fraction that is subsequently recovered, collected/treated.	Limited implementability due to shallow target zones which make recovery of solvent difficult. Risk of transferring bound inorganic constituents to groundwater media. Limited space available for injection and waste stream handling equipment.	Treatability tests required to evaluate potential effectiveness	Medium capital Medium O&M	Not retained for further consideration due to implementability concerns.	No
In situ treatment	Biological	Phytoremediation	Use of plants to remove, transfer, stabilize, or destroy contaminants in shallow soil.	Limited implementability. Larger, deeper rooting species would be necessary to access sub-surface soils. Utilization of larger species across the site would interfere with anticipate site use.	Effectiveness of phytoextraction is limited by the ability of plants to absorb, concentrate, and precipitate metals from contaminated soil into the above ground biomass (shoots, leaves, etc.). A treatability study would be necessary to evaluate effectiveness.	Medium capital Low O&M	Not retained for further consideration because of limited implementability and effectiveness.	No
Removal	Excavation	Mechanical excavation*	Use of construction equipment to remove soil. Excavated areas would be backfilled, graded, and restored based on restoration requirements. Soil would be transported and disposed off-Site.	Readily implementable.	Effective means of reducing toxicity, mobility, and volume of impacted soil (where accessible).	Medium capital No O&M	Potentially applicable	Yes
Ex situ treatment	Chemical	Extraction/ washing	Soil and extractant are mixed in an extractor, thereby dissolving the contaminants. The extracted solution is then placed in a separator, where the contaminants and extractant are separated for treatment and further use.	On-site implementability limited by lack of available space for equipment and process streams. Limited off-site processing facilities exist.	Effective technology for removing inorganic constituents contained in soils. Would require a treatability study to evaluate process needs and effectiveness.	Medium capital Low O&M	Not retained for further consideration because the option is not readily implementable.	No

TABLE 4-2. SCREENING AND EVALUATION OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL

General Response Action	Remedial Technology	Process Option	Description	Implementability	Effectiveness	Relative Cost	Screening and Evaluation Comments	Retained for Further Consideration
Ex situ treatment	Physical	Solidification/ stabilization (ISS)	Contaminants are physically bound or enclosed within a stabilized mass (solidification), and/or chemical reactions are induced between stabilizing agent and contaminants to reduce their mobility (stabilization), toxicity, and leachability.	On-site implementability limited by lack of available space for equipment and process streams. Limited off-site processing facilities exist.	Potentially effective for treatment of inorganic constituents. A treatability study would be necessary to evaluate reagent mixes and effectiveness.	Medium capital Low O&M	Not practicable for site-wide treatment of non-discrete source areas of inorganic constituents.	No
Disposal	Off-Site disposal	Disposal at a commercial facility*	Excavated soil would be transported to a permitted commercial landfill.	Readily Implementable	Effective technology for management of materials for disposal.	Medium capital No O&M	Potentially applicable	Yes

Notes:

1) Where a Representative Process Option has been selected for a remedial technology, the Process Option is noted with an asterisk "*".
2) Process Options which are not effective for Site-related contaminants were considered but not presented above. For clarity, these include:
   - *In situ*: Chemical Oxidation, Soil Vapor Extraction, Soil Heating, Hot Air/Steam Injection, Bioremediation/Enhanced Bioremediation
   - *Ex Situ*: Chemical Oxidation, Low Temperature Thermal Desorption, Biopiles, and Landfarming.

Shaded cells – Process option not retained for further consideration.

Abbreviations/Acronyms:

CFR – Code of Federal Regulations
DER – Division of Environmental Remediation
ECs – Engineering Controls
ICs – Institutional Controls
IRM – Interim Remedial Measure
ISS – *In situ* solidification/ stabilization
NCP – National Contingency Plan
NYSDEC – New York State Department of Environmental Conservation
NYCRR – New York Code of Rules and Regulations
O&M – Operation and Maintenance
RCRA – Resource Conservation and Recovery Act
SCO – Soil Cleanup Objective
SMP – Site Management Plan

TABLE 5-2. DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

Criterion	Alternative 1 No Further Action	Alternative 2 Targeted Soil Removal	Alternative 3 Restoration to Pre-Disposal/Pre-Release
	• No Further Action	• ICs/limited actions, SMP and periodic Site reviews • Limited building demolition • Targeted excavation • Off-Site disposal • Groundwater monitoring • Site restoration	• Full building demolition • Excavation • Off-Site disposal • Site restoration
Overall Protection of Human Health and the Environment			
Overall protection of human health	Not protective of human health. Alternative would not provide for mitigation of potentially unacceptable risks to human health associated with exposure to contaminated soil.	Protection of human health would be provided. Targeted removal of soil would address potentially unacceptable risks to human health associated with inhalation of dust and direct exposure to soil for the anticipated Site use. Access/excavation restrictions, SMP, periodic Site reviews would limit Site use and minimize potentially unacceptable risks to human health associated with soils remaining on-Site.	Protection of human health would be provided. Full building demolition and excavation of soil would address potentially unacceptable risks to human health associated with inhalation of dust and direct exposure to soil.
Overall protection of the environment	Not protective of the environment relative to potential erosion and/or migration of contaminants in soil.	Protection of the environment would be provided. Removal of soil, replacement with clean backfill and maintenance of restoration (vegetation on-Site, rip-rap off-Site) would address potentially unacceptable risks to the environment associated with dust and erosion of soil.	Protection of the environment would be provided. Full building demolition and removal of soil would address potentially unacceptable risks to the environment associated with dust and erosion of soil.
Attainment of Remedial Action Objectives (RAOs)	Alternative 1 would not address RAOs for the protection of environmental and human health.	Alternative 2 would address RAOs for the protection of human health and the environment through removal of targeted areas of soil on-Site, and through ICs and a SMP.	Alternative 3 would address RAOs for the protection of human health and protection of the environment through removal of Site soil.
Compliance with Site-Specific SCGs			
Compliance with chemical-specific SCGs	Alternative 1 does not actively address chemical-specific SCGs.	Removal of targeted areas of soil that exhibit exceedances of Residential Use SCOs, ICs, SMP, and periodic Site reviews would address soil SCGs by minimizing the potential for erosion of soil and the potential for direct contact with Site soil.	Removal of soil that exhibit exceedances of SCOs, including the demolition of the existing building, would address soil SCGs.
Compliance with location-specific SCGs	No location-specific SCGs triggered for this alternative.	Proposed actions would be conducted in a manner consistent federal and state requirement for cultural, archeological, and historical resources.	Proposed actions would be conducted in a manner consistent federal and state requirement for cultural, archeological, and historical resources.
Compliance with action-specific SCGs	No action-specific SCGs triggered for this alternative.	Excavated soil would be managed in accordance with applicable Federal and State regulations. Earth moving activities would be conducted consistent with air quality standards. Transportation activities would be completed in accordance with applicable State and Federal requirements, by licensed and permitted haulers. Site construction activities would be conducted in accordance with OSHA safety requirements. ICs would be implemented in general conformance with NYSDEC DER-33 and USEPA guidance and policy.	Excavated soil, would be managed in accordance with applicable Federal and State regulations. Earth moving activities would be conducted consistent with air quality standards. Transportation activities would be completed in accordance with applicable State and Federal requirements, by licensed and permitted haulers. Site construction activities would be conducted in accordance with OSHA safety requirements.
Long-Term Effectiveness and Permanence			
Magnitude of residual risk	Risks associated with soil exceeding chemical-specific SCGs would remain unchanged.	Minimal residual risk. Residual risks associated with soil would be mitigated through ICs, SMP, and periodic Site reviews.	Minimal residual risk.
Adequacy and reliability of controls	No adequate and reliable controls under this alternative.	Excavation and off-Site management is an adequate and reliable means for controlling exposures to soil. ICs are an adequate and reliable means of controlling residual risk.	Excavation and off-Site management is an adequate and reliable means for controlling exposures to soil.
Long-term sustainability	No long-term activities are proposed under this alternative.	Minimal fuel/energy use and greenhouse gas emissions associated with long-term maintenance.	No long-term maintenance activities are proposed under this alternative.
Reduction of Toxicity, Mobility, or Volume Through Treatment			
Treatment process used and materials treated	No active treatment components.	No active treatment components.	No active treatment components.
Amount of hazardous material destroyed or treated	None.	Approximately 110 cy of soil would be removed from the site.	Approximately 1,200 cy of soil would be removed from the site.
Degree of expected reduction in toxicity, mobility, or volume	No reduction in toxicity, mobility, or volume anticipated.	Toxicity, mobility, and volume of soil would be reduced through removal.	Toxicity, mobility, and volume of soil would be reduced through removal.
Degree to which treatment is irreversible	No treatment being performed.	Excavation and off-Site disposal are considered irreversible.	Excavation and off-Site disposal are considered irreversible.
Type and quantity of residuals remaining after treatment	None.	None.	None.

TABLE 5-2. DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

Criterion	Alternative 1 No Further Action	Alternative 2 Targeted Soil Removal	Alternative 3 Restoration to Pre-Disposal/Pre-Release
Short-Term Effectiveness			
Protection of community during remedial actions	No active components beyond the completed IRMs are related to this alternative.	Dust and volatile emissions, if any, would be controlled during construction activities. Building demolition, excavation of soil, and off-Site disposal would result in impacts to the community relative to truck traffic and noise during the construction.	Dust and volatile emissions, if any, would be controlled during construction activities. Building demolition, excavation of soil, and off-Site disposal would result in significant impacts to the community relative to truck traffic and noise during the construction.
Protection of workers during remedial actions	No active components are related to this alternative.	Proper health and safety measures would be established and implemented during remedial activities and would be effective in protecting workers from exposure to contaminants.	Proper health and safety measures would be established and implemented during remedial activities and would be effective in protecting workers from exposure to contaminants.
Environmental impacts	No active components are related to this alternative.	Dust, volatile emissions, and surface runoff controls would be instituted to minimize impacts to the environment during implementation of this alternative. Minimal clearing would be required prior to excavation.	Dust, volatile emissions, and surface runoff controls would be instituted to minimize impacts to the environment during implementation of this alternative. Minimal clearing would be required prior to excavation.
Time until remedial action objectives are achieved	RAOs related to public health protection and migration of contaminants in soil would not be met with this alternative.	RAOs would be achieved upon completion of the remedy. The remedy would be completed in approximately one construction season.	RAOs would be achieved upon completion of the remedy. The remedy would be completed in approximately one construction season.
Short-term sustainability	No active components. No fuel/energy consumption, greenhouse gas or pollutant emissions, no water or resource use, and no impacts to water or ecology from construction-related activities.	Greenhouse gas emissions associated with fuel/energy use by construction equipment and transportation of materials on- and off-Site during targeted soil removal is estimated at approximately 12 $MTCO_2e$.	Greenhouse gas emissions associated with fuel/energy use by construction equipment and transportation of materials on- and off-Site during targeted soil removal is estimated at approximately 74 $MTCO_2e$.
Implementability			
Ability to construct and operate the technology	There are no technologies to be constructed in this alternative.	Excavation and off-Site disposal of 110 cy of material is readily implementable.	Excavation and off-Site disposal of 1,200 cy of material is readily implementable.
Reliability of technology	There are no technologies to be constructed in this alternative.	Excavation and disposal are reliable technologies.	Excavation and disposal are reliable technologies.
Ease of undertaking additional remedial actions, if necessary	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be implementable.	Additional remedial actions, if necessary, would be implementable.
Ability to monitor effectiveness of remedy	No monitoring is included under this Alternative	Verification of removal would be conducted as part of construction. Effectiveness of remedy could be monitored through groundwater monitoring.	Verification of removal would be conducted as part of construction.
Coordination with other agencies and property owners	None required.	Coordination with other agencies including NYSDOH, NYSDOT, Town and Village of Lima, and Livingston County would be necessary. Coordination with property owner would be necessary.	Coordination with other agencies including NYSDOH, NYSDOT, Town and Village of Lima, and Livingston County would be necessary. Coordination with property owner would be necessary.
Availability of off-Site treatment storage and disposal services and capacities	None included in this Alternative.	Capacity for off-Site disposal of 110 cy of material is readily available.	Capacity for off-Site disposal of 1,200 cy of material is readily available.
Availability of necessary equipment, specialists, and materials	None required.	Equipment, specialists, and materials are available.	Equipment, specialists, and materials are available.
Costs			
Total estimated capital cost	$0	$194,000	$823,000
Present worth of operation and maintenance cost (30 years, 7% discount factor)	$0 M	$104,000	$0
Total estimated net present worth cost	$0 M	$298,000	$823,000
Land Use			
Consistency with proposed future use	Not protective for current, intended, and reasonably anticipated future uses of the Site.	Excavation/removal may cause disruption to current land use. Following restoration and implementation of ICs, conditions would be consistent with current, intended, and reasonably anticipated future uses of the Site.	Excavation/removal may cause disruption to current land use. Following restoration, conditions would be consistent with current, intended, and reasonably anticipated future uses of the Site.
Notes:	cy – Cubic Yard DER – Division of Environmental Remediation ICs – Institutional Controls IRM – Interim Remedial Measure NYSDEC – New York State Department of Environmental Conservation NYSDOH – New York State Department of Health NYSDOT – New York State Department of Transportation O&M – Operation and Maintenance OSHA – Occupational Safety and Health Administration		RAOs – Remedial Action Objectives SCG – Standards, Criteria, and Guidance SCOs – Soil Cleanup Objectives SMP – Site Management Plan USEPA – United States Environmental Protection Agency

COST ESTIMATE SUMMARY

TABLE 5-3. ALTERNATIVE 1 COST ESTIMATE

Site: Former K&K Stripping Site
Location: Lima, NY
Phase: Feasibility Phase (+50%/-25%)
Base Year: 2018
Conceptual Basis: No Action

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
DIRECT CAPITAL CONSTRUCTION COSTS					
TOTAL DIRECT CAPITAL COST				**$0**	
Engineering/Design/Legal			27%	0	10%, 15%, 2% respectively
Construction Management			15%	0	
Contingency			20%	0	Scope contingency
TOTAL ALTERNATIVE CAPITAL COST (rounded)				**$0**	
OPERATION AND MAINTENANCE COSTS					
TOTAL OPERATION AND MAINTENANCE COST				**$0**	

PRESENT WORTH ANALYSIS (YEARS 1-30) Cost Type	Total Cost	Effective Discount Factor (7%)	Cost Per Yr	Present Value
Capital Cost - Year 0	$0	1.000	$0	$0
Annual O&M - Years 1-30		0.4136	$0	$0
Periodic Costs - Years 5, 10, 15, 20, 25, 30		0.3596	$0	$0
TOTAL PROJECT PRESENT WORTH (rounded)				**$0**

Notes

1. This cost estimate has been prepared based on information and assumptions available at the time of alternative development and is meant for comparison relative to other remedial alternatives. It is not intended to be representative of actual project costs or for use in establishing project budgets.

COST ESTIMATE SUMMARY

TABLE 5-4 - ALTERNATIVE 2 COST ESTIMATE

Site: Former K&K Stripping Site
Location: Lima, NY
Phase: Feasibility Phase (+50% / -30% accuracy)
Base Year 2018

Conceptual Basis: Excavation and disposal to meet Residential SCO
Backfill and restoration
Institutional Controls and groundwater monitoring

	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
DIRECT CAPITAL CONSTRUCTION COSTS					
General Conditions	mo	1	$15,000	$15,000	Trailer, electrical, and maintenance
Erosion and Sediment Control	lf	700	$2.50	$1,750	reinforced silt fence; site perimeter, and ditch excavation perimeter
Surveys	ea	2	$2,500	$5,000	pre- and post- construction surveys
Select Building Demolition					
Building Demolition	cf	15,000	$0.75	$11,300	Portion of Bldg footprint 750 SF, assumed height 20 feet
Concrete Slab Removal	sf	750	$1.50	$1,100	Slab footprint for demo portion of building , assume 1 foot thick
Footing Removal	lf	130	$14	$1,800	Footing removal for demo portion of building, assume 1 ft thick, 2 ft wide
Transportation and Disposal - C&D	ton	200	$135	$27,000	within 60-miles; 2 T/cy concrete, 1.2 T/cy building materials
Repair Building Exterior	ls	1	$3,000	$3,000	enclosure/weather-proof main building at demo location
Soil Excavation					
Clearing	ls	1	$3,600	$3,600	20-ft width along dith; assume 2 persons for two 8-hour days and chipping
Excavation - On-site	cy	60	$10	$600	Material exceeding Residential SCO; up to 2-ft below grade surface
Excavation - Off-site	cy	50	$10	$500	1-ft thickness from ditch area
Transportation and Disposal - Non-Haz	ton	165	$110	$18,200	within 60-miles; assume 1.5 T/cy
Confirmation Sampling	ea	10	$300	$3,000	USEPA Method 6010; on site excavation only
Backfill and Restoration					
Geotextile Demarcation Layer	sy	140	$2.00	$280	on-site excavation areas where soils above Unrestricted SCOs remain
Topsoil and Seeding	sy	140	$7.00	$980	6-inches topsoil to match surrounding grade
Sub-grade Soil Backfill	cy	35	$35	$1,225	to within 6-inches of final grade
Riprap - Light	sy	150	$30	$4,500	Ditch Restoration; assume 12-inch total thickness
Irrigation	wk	4	$1,500	$6,000	Irrigation of seeding
Institutional Controls					
Develop Site Management Plan	ls	1	$15,000	$15,000	
TOTAL DIRECT CAPITAL COST				**$119,835**	
Engineering/Design/Legal			27%	$32,355	10%, 15%, 2% respectively
Construction Management			15%	$17,975	
Contingency			20%	$23,967	Scope contingency
TOTAL ALTERNATIVE CAPITAL COST (rounded)				**$194,000**	(rounded)

COST ESTIMATE SUMMARY

TABLE 5-4 - ALTERNATIVE 2 COST ESTIMATE

Site: Former K&K Stripping Site
Location: Lima, NY
Phase: Feasibility Phase (+50% / -30% accuracy)
Base Year 2018

Conceptual Basis: Excavation and disposal to meet Residential SCO
Backfill and restoration
Institutional Controls and groundwater monitoring

	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
OPERATION AND MAINTENANCE COSTS					
Annual Costs (Years 1-30)					
Institutional Controls					
Site Inspection and Reporting	ls	1	$5,000	$5,000	Annual
Groundwater monitoring	LS	1	$2,500	$2,500	3 samples for inorganics, VOCs and SVOCs; one event annually
TOTAL ANNUAL O&M COST Years 1-30 (rounded)				**$7,500**	
Periodic Costs (Years 5, 10, 15, 20, 25, 30)					
5-yr reviews		1	$5,000	$5,000	

PRESENT WORTH ANALYSIS (YEARS 1-30)

Cost Type	Total Cost	Effective Discount Factor (7%)	Cost Per Yr	Present Value
Capital Cost - Year 0	**$194,000**	1.000	$194,000	$194,000
Annual O&M - Years 1-30		0.4136	$7,500	$93,000
Periodic Costs - Years 5, 10, 15, 20, 25, 30		0.3596	$5,000	$11,000
TOTAL PROJECT PRESENT WORTH (rounded)				**$298,000**

Notes

1. This cost estimate has been prepared based on information and assumptions available at the time of alternative development and is meant for comparison relative to other remedial alternatives. It is not intended to be representative of actual project costs or for use in establishing project budgets.

COST ESTIMATE SUMMARY

TABLE 5-5. ALTERNATIVE 3 COST ESTIMATE

Site: Former K&K Stripping Site
Location: Lima, NY
Phase: Feasibility Phase (+50% / -30% accuracy)
Base Year

Conceptual Basis: Excavation and disposal to meet Unrestricted SCO
Backfill and restoration

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
DIRECT CAPITAL CONSTRUCTION COSTS					
General Conditions	mo	1	$15,000	$15,000	Trailer, electrical, and maintenance
Erosion and Sediment Control	lf	700	$2.50	$1,750	reinforced silt fence; site perimeter, and ditch excavation perimeter
Surveys	ea	2	$2,500	$5,000	pre- and post- construction surveys
Building Demolition					
Building Demolition	cf	81,000	$0.75	$60,800	Portion of Bldg footprint 4,100 SF, assumed height 20 feet
Utility disconnnection/termination	ls	1	$10,000	$10,000	allowance for power, water and sewer.
Concrete Slab Removal	sf	4,700	$1.50	$7,100	Slab footprint for demo portion of building, assume 1 foot thick
Footing Removal	lf	375	$14	$5,300	Footing removal for demo portion of building, assume 1 ft thick, 2 ft wide
Transportation and Disposal - C&D	ton	1,180	$135	$159,350	within 60-miles; 2 T/cy concrete, 1.2 T/cy building materials
Soil Excavation					
Clearing	ls	1	$3,600	$3,600	20-ft width along dith; assume 2 persons for two 8-hour days and chipping
Excavation - On-site	cy	921	$10	$9,200	Material exceeding Residential SCO; up to 2-ft below grade surface
Excavation - Off-site	cy	50	$10	$500	1-ft thickness from ditch area
Remove Stone Pad	cy	35	$10	$350	
Transportation and Disposal - Non-Haz	ton	1,509	$110	$166,000	within 60-miles; assume 1.5T/cy
Confirmation Sampling	ea	45	$300	$13,500	USEPA Method 6010; on site only
Backfill and Restoration					
Topsoil and Seeding	sy	1,680	$7.00	$11,760	6-inches topsoil to match surrounding grade
Sub-grade Soil Backfill	cy	810	$35	$28,350	to within 6-inches of final grade
Riprap - Light	sy	150	$30	$4,500	Ditch Restoration; assume 12-inch total thickness
Irrigation	wk	4	$1,500	$6,000	Irrigation of seeding
TOTAL DIRECT CAPITAL COST				**$508,060**	
Engineering/Design/Legal			27%	$137,176	10%, 15%, 2% respectively
Construction Management			15%	$76,209	
Contingency			20%	$101,612	Scope contingency
TOTAL ALTERNATIVE CAPITAL COST (rounded)				**$823,000**	(rounded)

COST ESTIMATE SUMMARY

TABLE 5-5. ALTERNATIVE 3 COST ESTIMATE

Site: Former K&K Stripping Site
Location: Lima, NY
Phase: Feasibility Phase (+50% / -30% accuracy)
Base Year

Conceptual Basis: Excavation and disposal to meet Unrestricted SCO
Backfill and restoration

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
OPERATION AND MAINTENANCE COSTS					
Annual Costs (Years 1-30)					
TOTAL ANNUAL O&M COST Years 1-30 (rounded)				**$0**	
Periodic Costs (Years 5, 10, 15, 20, 25, 30)					
				$0	

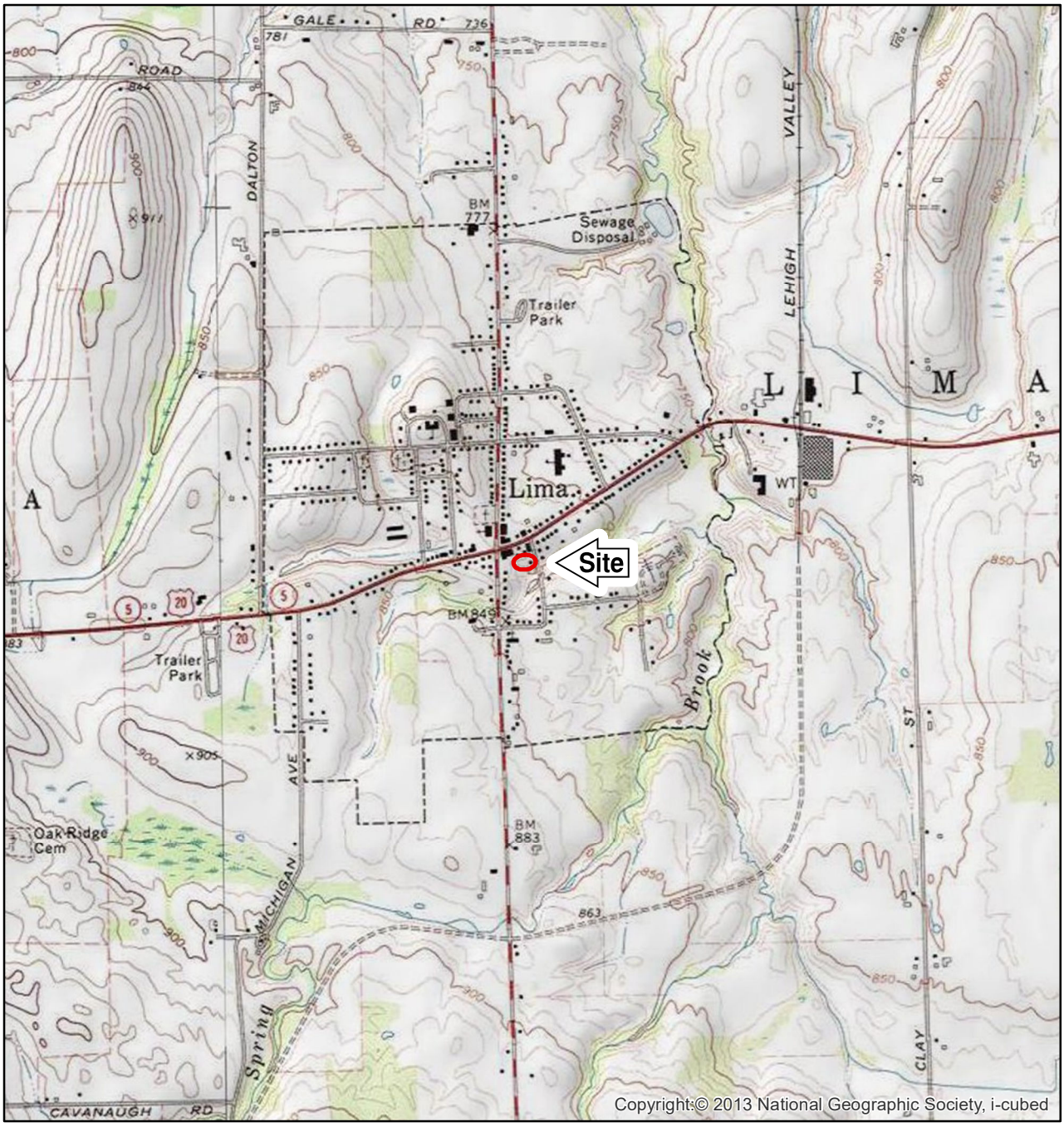
PRESENT WORTH ANALYSIS (YEARS 1-30)		**Effective Discount**		
Cost Type	**Total Cost**	**Factor (7%)**	**Cost Per Yr**	**Present Value**
Capital Cost - Year 0	**$823,000**	1.000	$823,000	$823,000
Annual O&M - Years 1-30		0.4136	$0	$0
Periodic Costs - Years 5, 10, 15, 20, 25, 30		0.3596	$0	$0
TOTAL PROJECT PRESENT WORTH (rounded)				**$823,000**

Notes

1. This cost estimate has been prepared based on information and assumptions available at the time of alternative development and is meant for comparison relative to other remedial alternatives. It is not intended to be representative of actual project costs or for use in establishing project budgets.

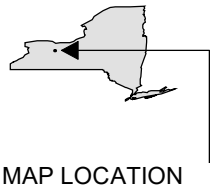
FIGURES

FIGURE 1-1



ADAPTED FROM: HONEOYE FALLS AND RUSH, NEW YORK USGS QUADRANGLES

NYSDEC
FEASIBILITY STUDY
K&K STRIPPING SITE
LIMA, NEW YORK
SITE NO. 826021



MAP LOCATION

SITE LOCATION

N

0 1,000 2,000 4,000
Feet

8653.61247
FEBRUARY 2018

1:24,000

O'BRIEN & GERE ENGINEERS, INC.

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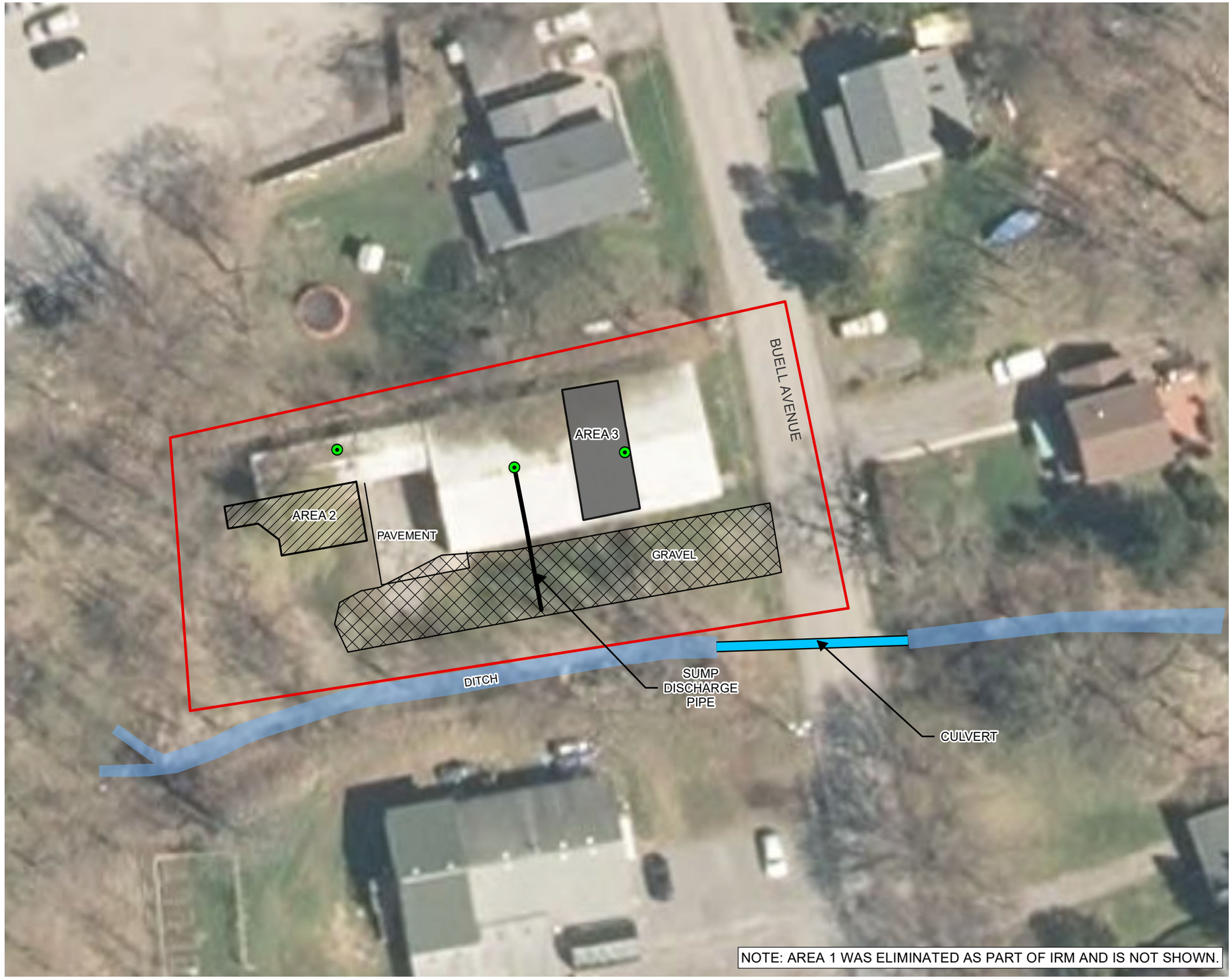

AERIAL IMAGERY PROVIDED BY NYS GIS CLEARINGHOUSE, IMAGERY YEAR 2015

N

LEGEND

- APPROXIMATE SUMP LOCATION
- UNDERGROUND SUMP PIPE
- STREAM
- PROPERTY LINE

INTERIM REMEDIAL MEASURE (IRM)

- LEAD-IMPACTED SOIL REMOVAL AREA (AREA 2)
- FORMER TANK/PLATFORM REMOVAL AREA (AREA 3)
- EXTENT OF IMPORTED GRAVEL ABOVE GRADE

NYSDEC
FEASIBILITY STUDY
K&K STRIPPING SITE
LIMA, NEW YORK
SITE NO. 826021

SITE PLAN

0 15 30 60
Feet

FILE NO. 8653.62147
FEBRUARY 2018

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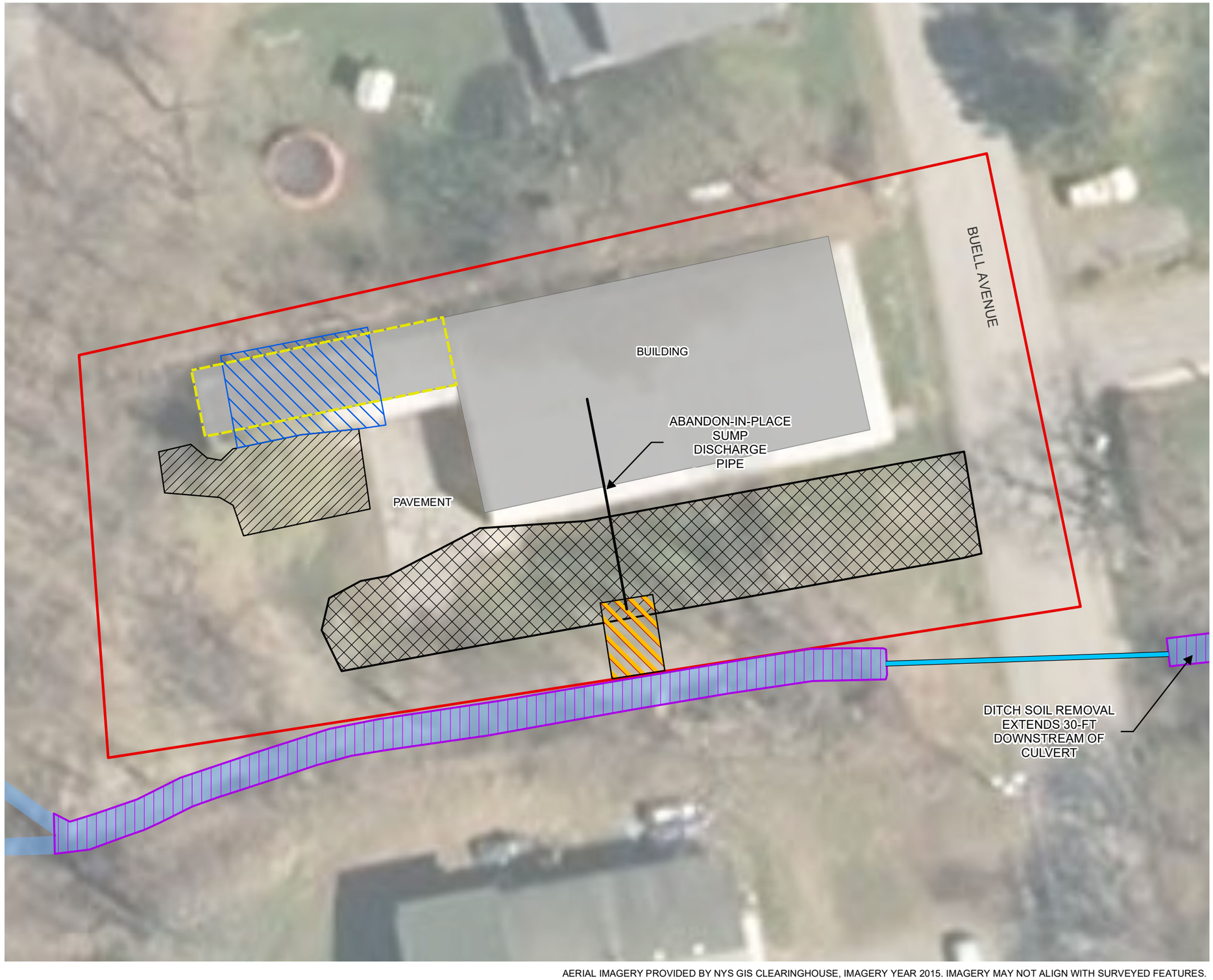

AERIAL IMAGERY PROVIDED BY NYS GIS CLEARINGHOUSE, IMAGERY YEAR 2015. IMAGERY MAY NOT ALIGN WITH SURVEYED FEATURES.

N

LEGEND

- UNDERGROUND SUMP PIPE
- BUILDING AND SLAB
- SOIL REMOVAL (1-FT)
- SOIL REMOVAL (3-FT)
- DITCH SOIL REMOVAL
- DITCH
- BUILDING
- PROPERTY BOUNDARY
- 1-FT GRAVEL COVER

INTERIM REMEDIAL MEASURE (IRM)

- LEAD-IMPACTED SOIL REMOVAL AREA (AREA

NYSDEC
FEASIBILITY STUDY
K&K STRIPPING SITE
LIMA, NEW YORK
SITE NO. 826021

ALTERNATIVE 2

0 10 20 40
Feet

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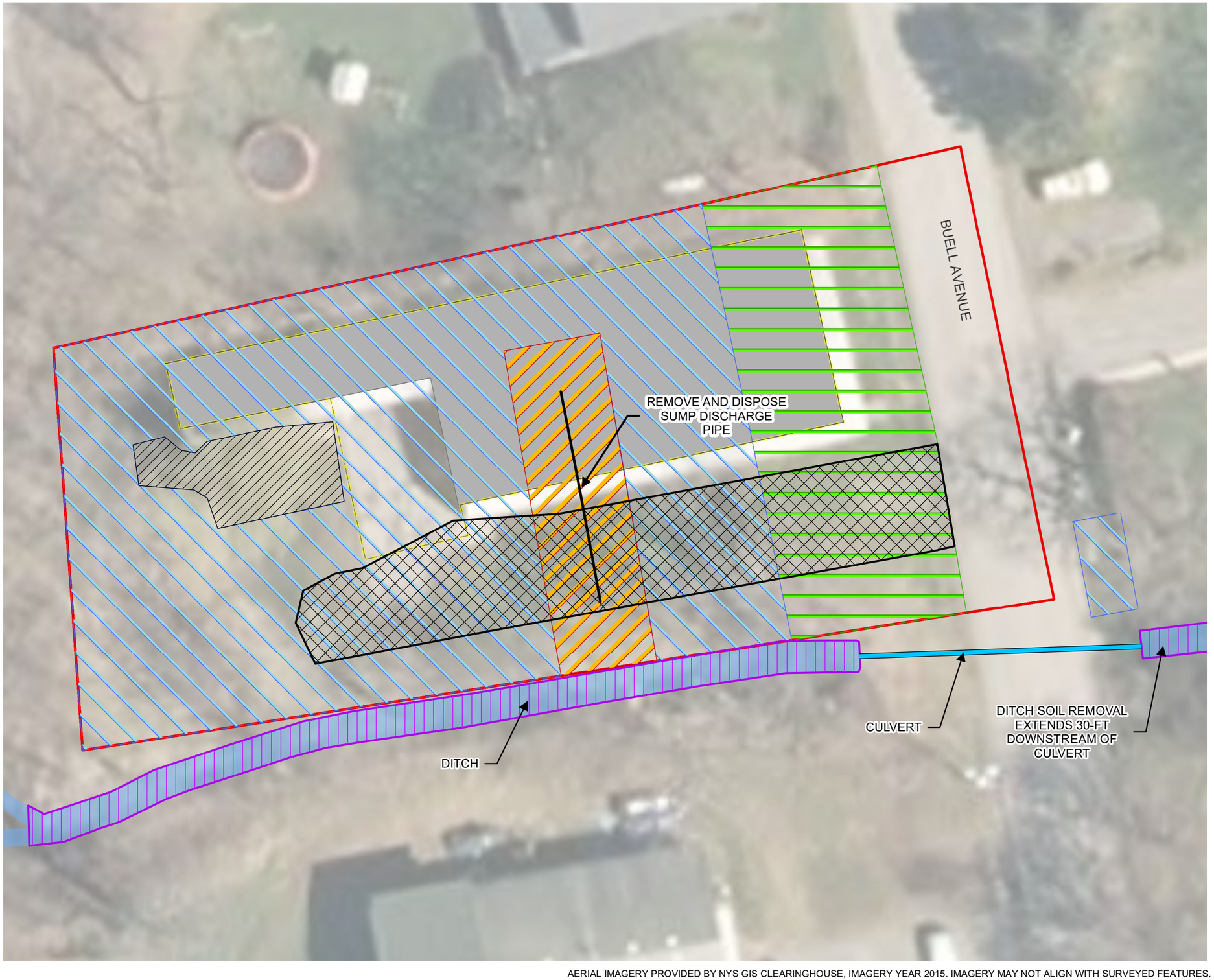

AERIAL IMAGERY PROVIDED BY NYS GIS CLEARINGHOUSE, IMAGERY YEAR 2015. IMAGERY MAY NOT ALIGN WITH SURVEYED FEATURES.

N

LEGEND

- UNDERGROUND SUMP PIPE
- BUILDING AND SLAB DEMOLITION
- SOIL REMOVAL (1-FT)
- SOIL REMOVAL (2-FT)
- SOIL REMOVAL (4-FT)
- DITCH SOIL REMOVAL AREA
- GRAVEL REMOVAL
- DITCH
- BUILDING
- PROPERTY BOUNDARY

INTERIM REMEDIAL MEASURE (IRM)

- LEAD-IMPACTED SOIL REMOVAL AREA (AREA 2)

NYSDEC
FEASIBILITY STUDY
K&K STRIPPING SITE
LIMA, NEW YORK
SITE NO. 826021

ALTERNATIVE 3

0 10 20 40
Feet

FILE NO. 8653.62147
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