FOCUSED FEASIBILITY STUDY/ALTERNATIVES ANALYSIS

Residential Areas (OU1, OU2, and OU5)

Study Area
Corning, NY

NYSDEC Project ID 851046

March 23, 2017

Prepared for:

Corning Incorporated
Corning, New York

Prepared by:

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Certifications

I, Michael H. Corbin, certify that I am currently a New York State registered professional engineer and that this Focused Feasibility Study/Alternatives Analysis for School/Community Use Areas (OU3) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Executed on the 23rd day of March 2017

Weston Solutions, Inc.

Technical Director

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
COPC	constituents of potential concern
cy	cubic yards
DER	Division of Environmental Remediation
DOT	Department of Transportation
DUSR	Data Usability Summary Report
ESA	Endangered Species Act
E&S	Erosion and Sedimentation
FEMA	Federal Emergency Management Agency
FFS/AA	Focused Feasibility Study/Alternatives Analysis
ft amsl	feet above mean sea level
ft bgs	feet below ground surface
GHG	greenhouse gases
HAZWOPER	Hazardous Waste Operations and Emergency Response
in bgs	inches below ground surface
mg/Kg	milligram per kilogram
mg/L	milligram per liter
NPV	Net Present Value
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
OM&M	Operations, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PC	public-conservation zoning
R1	low-density residential zoning
RAO	Remedial Action Objectives

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R1	low-density residential zoning
RAO	Remedial Action Objectives

LIST OF ACRONYMS (Continued)

RCRA	Resource Conservation and Recovery Act
ROW	rights-of-way
SCG	Standards, Criteria and Guidance
SCO	soil cleanup objectives
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
TBC	to be considered
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical Operational Guidance Series
µg/Kg	microgram per kilogram
USGS	U.S. Geological Survey
US EPA	U.S. Environmental Protection Agency
WESTON®	Weston Solutions, Inc.

EXECUTIVE SUMMARY

This Focused Feasibility Study/Alternatives Analysis (FFS/AA) has been prepared by Weston Solutions, Inc. (WESTON®) on behalf of Corning Incorporated to evaluate remedial alternatives for the residential operable units (OU1, OU2 and OU5) contained within the Study Area located in the City of Corning, New York. The FFS/AA has been prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10; May 2010) and the New York Codes, Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs (6 NYCRR 375; effective December 14, 2006).

BACKGROUND

From 2014 through 2016, soil and groundwater characterization activities were performed in OU1, OU2 and OU5. The characterization activities in OU1, OU2 and OU5 have identified discrete areas of soil and discrete layers of fill material containing ash, brick and/or glass with constituents at concentrations greater than the NYSDEC Soil Cleanup Objectives (SCOs). Based on sampling activities performed to date, the constituents of potential concern (COPCs) in the Study Area are arsenic, cadmium, and lead. Analytical results from two groundwater sampling events indicate that the COPCs were not detected in groundwater at concentrations greater than the New York State Division of Water Technical and Operational Guidance Series (TOGS) standards. This indicates that groundwater in the Study Area has not been impacted by the layers of fill material containing ash, brick, and/or glass or the constituents detected in soils above SCOs.

The following materials (collectively referred to as the "Subject Material") are the subject of the remediation:

- Soil with constituents at concentrations greater than the SCOs; and
- Layers of fill material containing ash, brick and/or glass[1] with constituents at concentrations greater than the SCOs.

[1] A "layer of fill material containing ash, brick, and/or glass" is defined as non-native material containing ash, brick, and/or glass with a thickness of greater than 1 inch.

The properties in OU1, OU2 and OU5 are primarily closely-spaced single family and low density multi-family residential properties and the primary exposure pathways to Subject Material are incidental ingestion and dermal contact. Thus, this FFS/AA focuses on remedial technologies of limited soil excavation with a soil cover, an approach which is in accordance with DER-10 and NYCRR Part 375.

REMEDIAL ACTION OBJECTIVES (RAOS)

The RAOs developed for this FFS/AA include the following:

1. Prevent human incidental ingestion and dermal contact with Subject Material.
2. Prevent human inhalation of Subject Material that may be disturbed and suspended in air as particles or dust.
3. Achieve SCOs, as required by NYSDEC Part 375 throughout OU1, OU2 and OU5.

REMEDIAL ALTERNATIVES

A screening of remedial technologies was performed to identify and evaluate possible remedial technologies and to assess their feasibility for addressing the Subject Material in OU1, OU2 and OU5. As a result of this screening, the remedial technologies retained and evaluated in this FFS/AA include variations of limited excavation with a soil cover. The remedial alternatives that were developed for evaluation include:

- **Alternative 1 – No Action**
  The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. In this alternative, no remedial action is conducted to address Subject Material. No institutional or engineering controls are implemented. The properties in OU1, OU2 and OU5 remain unchanged and in their current condition.

- **Alternative 2 – Excavate Up to 2 Feet with a Soil Cover**
  In this alternative, Subject Material would be excavated to a depth of up to 2 feet below ground surface (ft bgs) and disposed off-site at a permitted facility. Where characterization activities and analytical results indicate that there are constituents at concentrations greater than SCOs at depths greater than the 2 ft excavation, a demarcation layer would be installed in the excavation area at the base of the excavation over the existing in-place Subject Material. Imported backfill material would be placed over the demarcation layer to grade. The excavated area would be re-vegetated.

Where characterization activities and analytical results indicate that there are constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs, and no Subject Material is present at depths less than 2 ft bgs (in the existing soil cover), no excavation would be conducted and no demarcation layer will be installed.

No excavation would be conducted in areas covered by building footprints and paved roadways. At the discretion of the NYSDEC, isolated samples with concentrations of constituents greater than SCOs, may be left in place because the disturbance caused by the excavation to remove these materials would likely outweigh the benefit of removal. This alternative includes institutional and engineering controls in the form of City Code notification requirements regarding potential excavations greater than 2 ft bgs and a Site Management Plan (SMP) to prevent potential exposure of residents to constituents at concentrations greater than SCOs at depths greater than 2 ft bgs.

- **Alternative 3 – Excavate Up to 15 Feet and Backfill**
  In this alternative, Subject Material would be excavated to a depth of up to 15 ft bgs and disposed off-site at a permitted facility. A 15 foot excavation could eliminate the need for institutional controls such as an environmental easement or deed restriction in accordance with DER-10 [DER-10 1.12 (b)1.iii] in a residential area. Imported backfill material would be placed in the excavation to grade and the area would be re-vegetated. This alternative includes institutional controls to prevent exposure to inaccessible subsurface Subject Material.

The remedial alternatives were evaluated based on the following criteria:

- Overall Protection of Human Health and the Environment
- Conformance with Standards, Criteria, and Guidance (SCGs) and Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment
- Short-Term Impact and Effectiveness
- Implementability
- Cost Effectiveness
- Land Use
- Green Remediation Practices Criterion
- State and Community Acceptance

The comparison of alternatives is presented in Table 7-1 of this report.

RECOMMENDED ALTERNATIVE

The recommended alternative is Alternative 2: Excavate Up to 2 Feet with a Soil Cover. This alternative meets overall protectiveness for residential use with the least amount of disruption to the community, and the smallest environmental footprint. Prevention of the potential human exposure pathways (i.e., incidental ingestion, dermal contact, inhalation) is achieved by excavation of Subject Material from ground surface up to 2 ft bgs, use of a cover of either 2 feet of soil or asphalt/pavement, and implementation of an SMP.

Deeper excavations are possible, but impracticable, and do not provide any significant additional benefit with respect to overall health or environmental protectiveness. In comparison to excavation limited to 2 feet, deeper excavations result in more potential exposure during implementation, cause more disruption to the community for a longer period of time, impose a larger environmental footprint, require more complex construction when slope stabilization and shoring is needed around structures and subsurface utilities, and still would result in residual constituents at concentrations greater than SCOs. Deep excavations thus are not cost-effective for the little, if any, additional benefit provided. Also, Subject Material is distributed across OU1, OU2 and OU5 and in many cases is adjacent to properties that require no excavation. Requiring deeper excavation at any property within OU1, OU2 and OU5 could result in disruption and impacts to properties that require no, or very limited, excavation.

1. INTRODUCTION

The Study Area is located in the City of Corning, New York as illustrated on Figure 1-1, and, in general, is bounded by the Chemung River to the south; Post Creek and Interstate 86 to the east and north; and the Guthrie Medical Center, the City of Corning Fire Department, and Centerway to the west. The Study Area is separated into five operable units (OUs) based on location and land use, to assist in advancing properties through the remedial process. The five OUs in the Study Area are identified as follows: the Residential Area (OU1), the Residential Area at the Eastern End of Corning Boulevard (OU2), School/Community Use Areas (OU3), Flood Control Areas (OU4) and the Residential Expansion Area (OU5). The Study Area and OUs are depicted on Figure 1-2.

This Focused Feasibility Study/Alternatives Analysis (FFS/AA) has been prepared by Weston Solutions, Inc. (WESTON®) on behalf of Corning Incorporated to evaluate remedial alternatives for the residential OUs (OU1, OU2, and OU5) contained within the Study Area. The FFS/AA has been prepared in accordance with the NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10; May 2010) and the New York Codes, Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs (6 NYCRR 375; effective December 14, 2006).

From 2014 through 2016, WESTON performed characterization activities in OU1 and OU2 under an Order on Consent and Administrative Settlement (Order on Consent) with the New York State Department of Environmental Conservation (NYSDEC) dated June 27, 2014. The characterization activities were performed in OU1 and OU2 under the Study Area Characterization Work Plan dated June 2014, Study Area Work Plan Addendum 1 (Work Plan Addendum 1), Study Area Work Plan Addendum 2 (Work Plan Addendum 2) and Study Area Work Plan Addendum 3 (Work Plan Addendum 3) (WESTON, 2014b; WESTON, 2015a; WESTON, 2015b). Collectively, the June 2014 Study Area Characterization Work Plan and its Addenda, as modified, amended and approved by NYSDEC, are referenced herein as the Study Area Work Plan. Characterization activities also were performed by NYSDEC in OU1 and OU2 in 2014 and 2015 and in OU5 in the summer of 2015.

1.1 PURPOSE OF A FOCUSED FEASIBILITY STUDY/ALTERNATIVES ANALYSIS

This FFS/AA has been prepared to evaluate remedial alternatives for OU1, OU2 and OU5 in the Study Area. Based on the results of characterization activities performed to date, environmental impacts in OU1, OU2 and OU5 are limited to only certain media (discrete areas of soil and identified layers of fill material containing ash, brick and/or glass) and potential remedies are limited by property use. Limited excavation with a soil cover are remedial technologies that are applicable to the media and property use in OU1, OU2 and OU5. Other technologies for remediating metals in soils (such as fixation, chemical extractions, soil washing, in-situ thermal or vitrification, and bioremediation/phytoremediation) are eliminated through screening, and deemed to be not applicable or impractical, either because they fail to reduce metal concentrations, processing would be highly disruptive with uncertain effectiveness for some constituents, potential for safety concerns or damage to proximate structures, or as inapplicable for the potential exposure pathways. Thus this FFS/AA focuses on remedial technologies of limited excavation with a soil cover, an approach which is in accordance with DER-10 and NYCRR Part 375.

Good cause exists, pursuant to 6 NYCRR 375-1.8(f)(2)(i)(b and c), for allowing concentrations of constituents greater than NYSDEC Soil Cleanup Objectives (NYSDEC SCOs; NYCRR Subpart 375-6) to remain at depths that are not readily accessible within OU1, OU2 and OU5. The key considerations for the development and evaluation of the focused remedial technologies of limited excavation with a soil cover for OU1, OU2 and OU5 include the following:

- **Site Conditions** – OU1, OU2 and OU5 consist of 326 residential properties. The residential properties average less than one acre in size and are primarily closely spaced single family homes. Pursuant to 6 NYCRR 375-1.8(f)(9), the NYSDEC has determined that there is reasonable certainty that the current land use (primarily single family and low density multi-family residential) within these three operable units will remain the intended and reasonably anticipated future land use. This determination is buttressed by the long-term residential character of the neighborhood; current use and historical development patterns; applicable zoning laws and maps; the City of Corning Master Plan; the nature of OU1, OU2 and OU5 being bounded by highways, major roadways and the Chemung River; and the City of Corning Planning Code, which provides for institutional controls that are applicable to residential properties within the three operable units.

- **Environmental Media**
    - Soil and layers of fill material containing ash, brick and/or glass[1] are the only environmental media in OU1, OU2 and OU5 containing constituents of potential concern (COPCs) at concentrations greater than the NYSDEC SCOs.
        - Layers of fill material containing ash, brick, and/or glass have been observed in portions of the Study Area and were the subject of the investigation.
        - Samples collected on residential properties are screened against NYSDEC residential SCOs and samples collected in the City of Corning rights-of-way (ROWs) are screened against the restricted-residential SCOs.
        - The following materials (collectively referred to as the "Subject Material") are the subject of the remediation:
            - Soil with constituents at concentrations greater than the SCOs; and
            - Layers of fill material containing ash, brick and/or glass with constituents at concentrations greater than the SCOs.
    - Analytical results from two groundwater sampling events in the Study Area indicate that groundwater has not been impacted by the layers of fill material containing ash, brick, and/or glass. Arsenic, cadmium, and lead were not detected in groundwater at concentrations greater than New York State Division of Water Technical and Operational Guidance Series (TOGS) standards.
- **COPCs** – The COPCs for the Study Area are arsenic, cadmium, and lead. Based on sampling conducted to date, arsenic, cadmium, and lead are the primary constituents detected in Subject Material (discussed further in Section 3) and are the focus for the alternatives evaluation presented in Section 6.
- **Exposure Pathways** – Based on Study Area conditions (e.g., media and COPCs) the primary exposure pathways are incidental ingestion and dermal contact. The remedial technology will prevent potential exposure to the Subject Material.
- **Technical Feasibility –** Pursuant to 6 NYCRR 375-1.8(f)(2)(i)(c), conformity to SCOs at all depths sampled within OU1, OU2 and OU5 is technically impracticable because total excavation of all Subject Material to achieve pre-disposal conditions would result in complete destruction or removal of some residences, unnecessarily disturb the closely-spaced adjacent residences, force removal of mature trees, and alter the character of the residential neighborhood without fully achieving complete contaminant removal due to

[1] A "layer of fill material containing ash, brick, and/or glass" is defined as non-native material containing ash, brick, and/or glass with a thickness of greater than 1 inch.

necessary sloping of sidewalls to avoid risk of subsidence near adjacent roadways and structures.

- **Short-Term Health Risks –** Pursuant to 6 NYCRR 375-1.8(f)(2)(i)(b), remediation/ excavation to achieve conformity to SCOs at all depths within OU1, OU2 and OU5 would result in increased traffic and dust, mobilize a greater amount of airborne constituents and pose a greater risk to public health than residual constituents would pose if allowed to remain at depth and under cover of either soil or asphalt/pavement.

- **Green Remediation –** Pursuant to DER-31, the smallest volume of soil to be excavated and backfilled results in the least amount of disturbance, the fewest hours of equipment use, the least number of vehicles, the smallest volume of landfill capacity required, the smallest amount of mature tree removal, as well as the smallest volume of clean backfill being brought in, thus minimizing greenhouse gas emissions and hydrocarbon use without materially reducing the protection of human health and the environment. Excavation to achieve conformity to SCOs at all depths would significantly increase the carbon footprint as compared to the focused remedial technology of limited removal with a soil cover without a commensurate health or environmental benefit.

Due to the above considerations, the remedial alternatives evaluated herein include variations of the focused remedial technologies of excavation; limited excavation with a soil cover; as well as a no action alternative. As discussed in Section 5 of this FFS/AA, other technologies are not feasible for addressing the Subject Material in OU1, OU2 and OU5.

1.2 ORGANIZATION OF THIS DOCUMENT

This FFS/AA is organized into the following sections:

- **Section 1 – Introduction.** This section contains an introduction to the Study Area, as well as the focus of the FFS/AA.

- **Section 2 – Study Area Description and History.** This section contains a description of the Study Area and the OUs that comprise it, a general history of the Study Area, and a summary of the Study Area environmental setting including land use, topography and drainage, geology, and hydrogeology, and ecological setting.

- **Section 3 – Summary of Remedial Investigations.** This section contains a summary of the remedial investigations that have been performed to date and findings.

- **Section 4 – Remedial Objectives and Goals.** This section contains identification of the COPCs for the Study Area; an evaluation of the Standards, Criteria, and Guidance (SCGs) that apply to the remedial activities that will be conducted; and considering the COPCs and SCGs, presents the remedial action objectives (RAOs) for remediation activities conducted in the Study Area.

- **Section 5 – Screening of Technologies and Development of Remedial Alternatives.** This section contains a brief description of the technologies that were screened out as inapplicable and those that were retained and developed for further evaluation. The remedial alternatives that were developed for implementation in OU1, OU2 and OU5 are limited soil excavation with a soil cover, more extensive soil excavation with a soil cover, and the No Action Alternative.

- **Section 6 – Evaluation of Remedial Alternatives.** This section contains an evaluation of the developed alternatives based the following criteria:

    - Overall protection of human health and the environment;
    - Conformance with SCGs;
    - Long-term effectiveness and permanence;
    - Reduction of toxicity, mobility, and volume of contamination through treatment;
    - Short-term impact and effectiveness;
    - Implementability;
    - Cost effectiveness;
    - Land use; and
    - Green remediation practices.

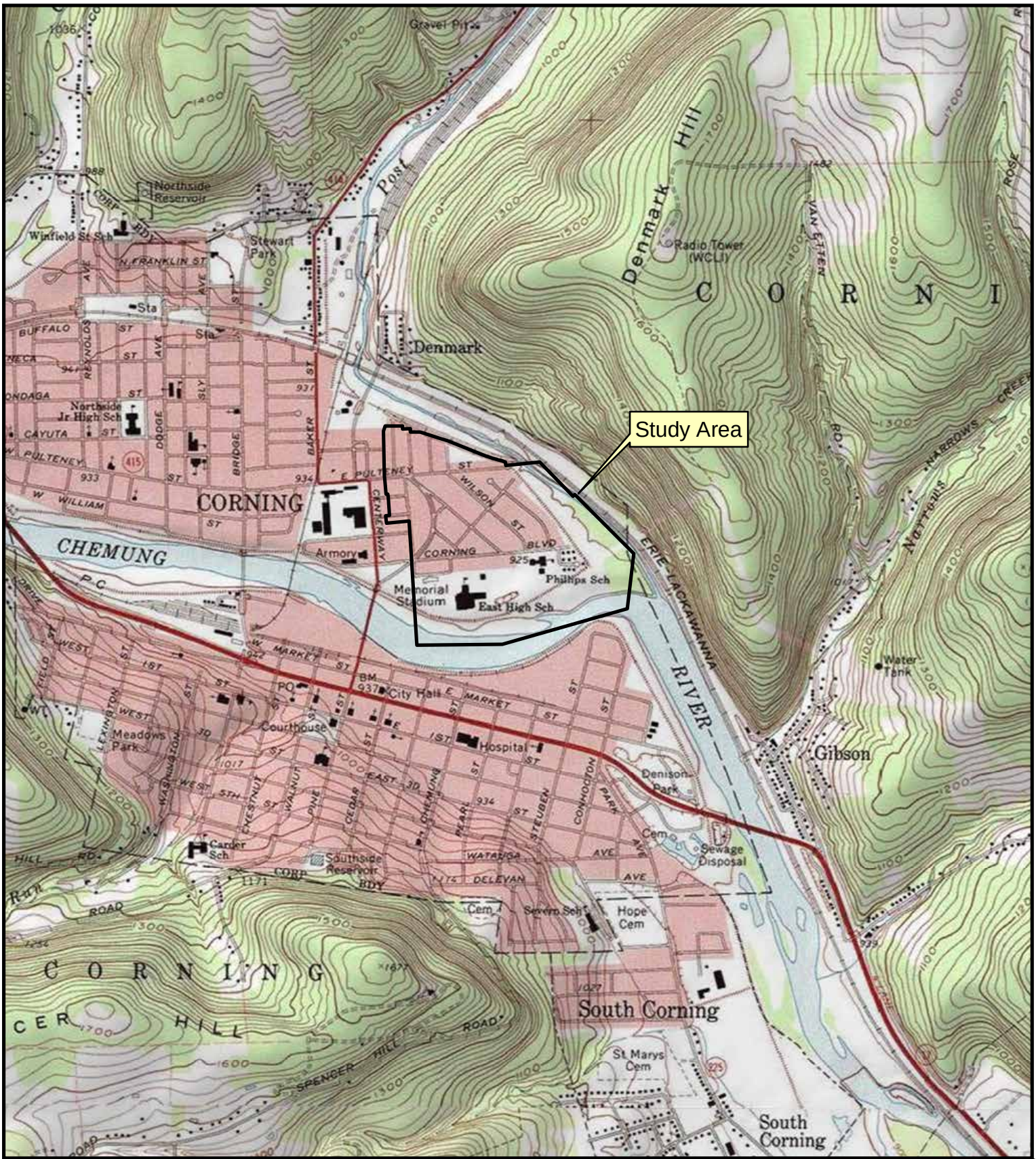
- **Section 7 – Comparison of Alternatives.** This section contains a comparative summary of the retained remedial alternatives with respect to the evaluation criteria.

- **Section 8 – Recommended Alternative.** This section provides the recommended alternative for implementation at OU1, OU2 and OU5 and a summary of the basis for selection.

- **Section 9 – References.**

Tables and figures are provided at the end of each section for ease of review.

SECTION 1 FIGURES

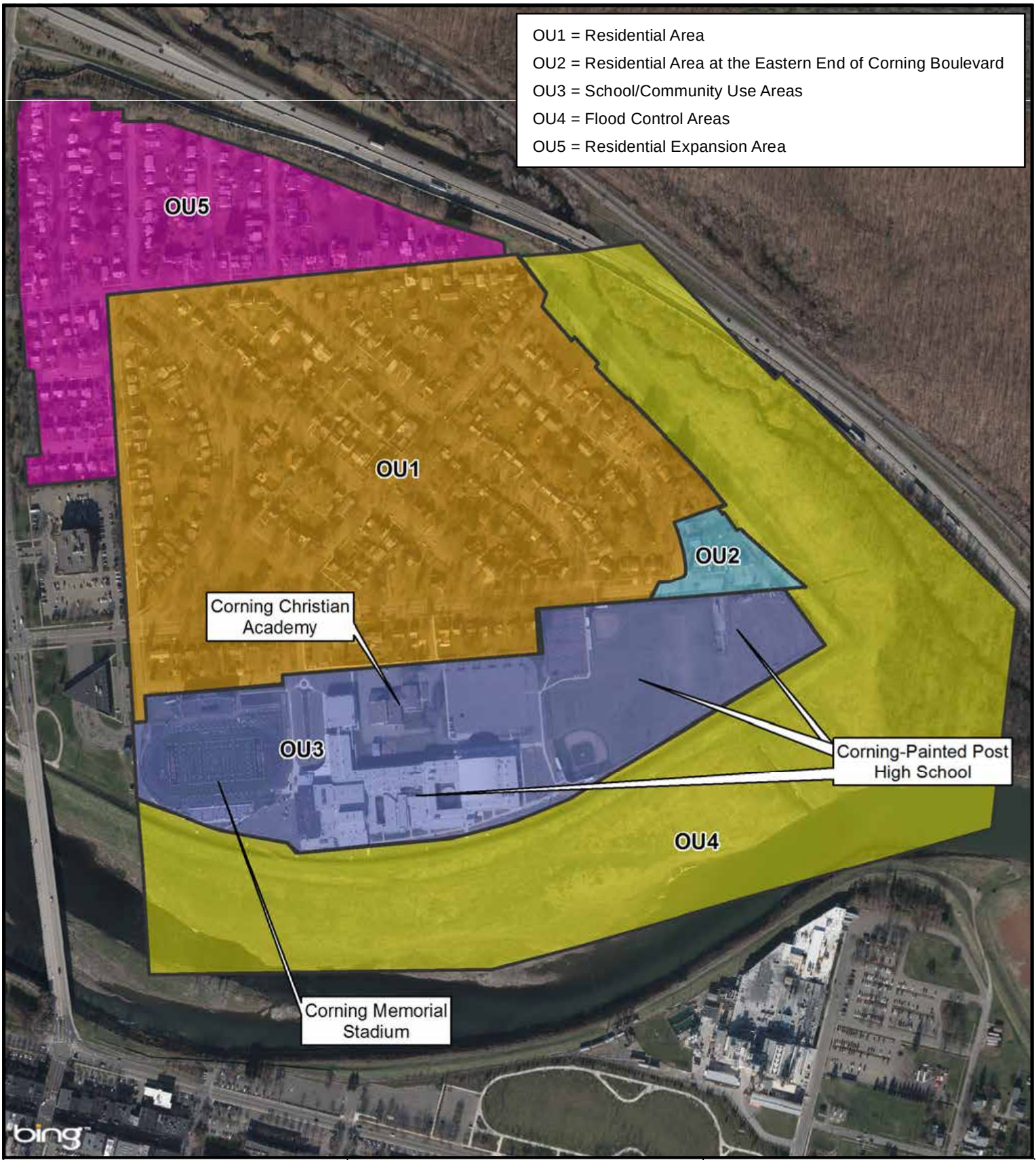


USGS 7.5 Minute Quadrangle Corning NY, 1971

Figure 1-1
Location of Study Area

Corning, NY

Document Name: Site_Location.MXD



Legend

Operable Units

- OU1
- OU2
- OU3
- OU4
- OU5

N
W E
S

0 250 500 Feet

Base Imagery:Robinson Aerial Imagery, Dec 2015
Coordinate System: NAD 1983 State Plane
New York Central Feet
Datum: NAD83. Units: Feet

Figure 1-2
Study Area Operable Units

Corning, NY

Document Name: Study_Area_OU.MXD

2. STUDY AREA DESCRIPTION AND HISTORY

2.1 STUDY AREA LOCATION AND DESCRIPTION

The Study Area is located in the City of Corning, New York as illustrated on Figure 1-1. In general, it is bounded by the Chemung River to the south; Post Creek and Interstate 86 to the east and north; and the Guthrie Medical Center, the City of Corning Fire Department, and Centerway to the west. The Study Area is separated into five OUs, which are depicted in Figure 1-2:

- OU1 – Residential Area (includes 212 residential properties)
- OU2 – Residential Area at the Eastern End of Corning Boulevard (includes five residential properties)
- OU3 – School/Community Use Areas (includes the Corning-Painted Post School District, Corning Christian Academy and City of Corning Memorial Stadium properties)
- OU4 – Flood Control Areas
- OU5 – Residential Expansion Area (includes 109 residential properties).

This FFS/AA report has been prepared for OU1, OU2, and OU5.

2.2 STUDY AREA HISTORY

The City of Corning has a long history of manufacturing, particularly in brick and glassmaking. Historical references indicate that, in the late 1800s and early 1900s, one of the largest brick manufacturers and more than sixty glass manufacturers were located in the City of Corning (Dimitroff, 2001) (Sinclaire & Spillman, 1997) including Corning Incorporated which was formerly known as Corning Glass Works. During that time frame, coal was the primary fuel source in the Corning, New York area, and most of the local industries and municipalities used coal to heat their furnaces. In the early 1900s, when natural gas was introduced to the region, some industries converted their fuel sources to natural gas.

Between 1949 and at least 1968, the City of Corning operated a municipal incinerator that created significant volumes of ash. Historical City Council meeting minutes indicate that the City applied ash and cinders to roadways within the City to control ice during the winter months during, at least, the mid-1950s (City of Corning, 1936; 1941; 1958; 1959). These records also indicate that when land within the Study Area (now comprising OU3) was being considered for redevelopment as a school in the late 1950s, the City of Corning stated that it would require “a considerable amount

of work and expense involved in filling and grading to render the track suitable for recreational and educational purposes." (City of Corning, 1950) Ultimately a school, which opened in 1962, was constructed on this portion of the Study Area.

Several times during the City of Corning's history, the Chemung River overflowed its banks. This resulted in construction and improvement of flood control structures within the Study Area on multiple occasions, including in the mid-1940s and again after Hurricane Agnes in the mid-1970s, according to NYSDEC and U.S. Army Corps of Engineers records (USACE, 1941; USACE, 1973). Such construction efforts would have likely required the import of significant volumes of material of uncertain origin, the removal or relocation of material deemed unsuitable as foundation for earthworks, the creation and filling of borrow areas from which soils suitable for construction were obtained, as well as other potential grading and filling activities. These activities occurred within and surrounding the perimeters of the Study Area, including along the Chemung River, along Post Creek, and along what is now Interstate 86 (USACE, 1941; USACE, 1973).

The land use within OU1, OU2 and OU5 has developed over time from farmland into a residential area. In general, aerial photographs indicate that the development of OU1, OU2 and OU5 north of Corning Boulevard began prior to 1938 along Pyrex Street and Houghton Circle. The residential area subsequently expanded in an easterly direction across farmlands until about 1964, by which time OU1, OU2 and OU5 were mostly developed. During development activities, fill material was commonly used as sub-grade material for construction, to fill in low-lying areas and as an aid to drainage.

Through a title search of property deeds, it was found that part of the Study Area[1] encompasses lands previously owned by Corning Homes, Inc. (a residential developer not affiliated with Corning Incorporated). The deeds for these properties contained a condition that allowed Corning Glass Works (not a party to the transaction) to maintain structures, buildings and "ash dumps as now located" on the properties. Despite reviewing available historical maps, aerial photographs, documents and public records, Corning Incorporated has not, to date, located any maps or records

[1] This portion includes OU1, OU2, OU3 and OU4, but excludes OU5 (the Residential Expansion Area).

that depict the location, if any, of potential "ash dumps" as referenced in the deeds (i.e., that may have existed as of 1920).

In 2012, during a capital improvement project at the Corning-Painted Post High School located in OU3, within the southern portion of the Study Area, fill material that the Corning-Painted Post School District described as containing ash, brick, and glass, was encountered in the subsurface soils. During the capital improvement project, the Corning-Painted Post School District's consultant tested excavated material to determine appropriate disposal methods. A review of a summary of the analytical results for these samples, prepared by the Corning-Painted Post School District's consultant for NYSDEC, indicates over 200 samples were collected and analyzed for various constituents. The majority of the constituents were either not detected or were reported at concentrations less than SCOs. The primary constituents which exceeded the SCOs in the excavated materials were lead, cadmium, and arsenic.

In the context of this FFS/AA, the term "fill" is used in several contexts. First, the term is used to refer to sub-grade construction material such as that found at the high school property and other material containing brick, ash, and/or glass (i.e., "fill material containing ash, brick and/or glass"). The term is also used to describe cover or backfill such as top soil and clay or sand that is brought in to support lawn and garden growth. The term "backfill" and/or "cover" will be used in this FFS/AA to describe materials that may be returned to an excavation or brought in as part of the Work to distinguish such materials from other references to previously existing fill material.

2.3 ENVIRONMENTAL SETTING

2.3.1 Land use

The Study Area consists of approximately 201 acres of land located on the eastern side of the City of Corning, New York along the northern bank of the Chemung River, northwest of the confluence with Post Creek (see Figure 1-1). The Study Area includes the Corning-Painted Post High School property; the Corning Christian Academy property; the City of Corning Memorial Stadium property; a residential area consisting of 326 individual properties; and flood control areas along the Chemung River and Post Creek. The properties within the Study Area are zoned as either public-conservation (PC) or low-density residential (R1) by the City of Corning as illustrated on

Figure 2-1. The land area zoned PC is generally concentrated south of Corning Boulevard and in the flood control areas near the Chemung River and Post Creek. No industrial/commercial facilities are known to be located within the Study Area at present.

The 326 individual properties in OU1, OU2 and OU5 are zoned R1. Of these properties, 305 are classified as single family residences, one is classified as a single family residence with an apartment, seven are classified as multi-family residences, three are classified as apartments, nine are classified as residential-vacant land, and one (Houghton Park) is classified as a playground. A list of the individual properties that comprise OU1, OU2 and OU5, with the zoning, property classifications, and dates of construction is presented in Table 2-1. Zoning and property classifications are also illustrated on Figure 2-1 and Figure 2-2, respectively.

2.3.2 Topography and Drainage

The Study Area is relatively flat with a slight gradient to the south and east. The Corning, New York 1976 U.S. Geological Service (USGS) 7.5-minute topographic quadrangle map indicates that the Study Area is approximately 929 feet above mean sea level (ft amsl). Within a one mile radius of the Study Area, the ground surface elevation ranges from 915 ft amsl to 1,459 ft amsl, with two steep elevation changes, one located to the north and one to the east.

Surface water within the Study Area generally flows south/southeast toward the Chemung River. Storm water is believed to be conveyed to the river through one or more storm drains located in the southeast corner of the Study Area. While the flow of Post Creek and the Chemung River have changed over time and have been altered for flood control, drainage and development purposes, surface flow in these waterways have generally been south/southeast. Surface water from the confluence of Post Creek and the Chemung River flows southward to where it ultimately joins the Susquehanna River. Due to the proximity of the Chemung River and Post Creek, OU4 is located within both the Federal Emergency Management Agency (FEMA) 100-year and 500-year flood zones (FEMA, 2002).

The Chemung River flows along the southern portion of the Study Area and has a drainage area of approximately 2,006 square miles. Measured daily flows range from a minimum of 640 cubic feet per second (cfs) to 20,200 cfs, with median and mean flows of 1,820 and 3,620 cfs, based on

38 years of records. The Chemung River is designated as Class C water in the New York State classification system (USGS, 2014). Class C waters indicate the water is best used for supporting fisheries and suitable for non-contact activities.

The much smaller, second order Post Creek along the eastern edge of the Study Area also has a Class C designation in the vicinity of the Study Area. The riparian zone immediately adjacent to Post Creek is wooded.

2.3.3 Geology

The Study Area is located in the Chemung River valley, and contains predominately sand and gravel deposits of glaciofluvial origin and more recent alluvial deposits. The river valley deposits are on the order of 100 feet thick in the vicinity of the Study Area. These river valley deposits are underlain by low permeability shale/siltstone bedrock (Miller, 1982). In the vicinity of the Study Area, a low permeability, lacustrine silt and clay layer (approximately 10 feet thick) is present about 30 feet below ground surface (ft bgs) (Miller, 1982).

2.3.4 Hydrogeology

The saturated portions of the Chemung River valley deposits are recharged principally by infiltration of precipitation. This valley-filled glacial/alluvial aquifer is generally unconfined (i.e., the water table forms the upper boundary of the aquifer) and saturated approximately to the level of nearby rivers (such as the Chemung River) (Olcot, 1995). In the higher topographic portions of the Study Area, the depth to the water table is expected to be on the order of 20 to 25 ft bgs; however, groundwater levels may be deeper where supply wells actively extract groundwater from the valley aquifer. Groundwater in the valley aquifer generally flows toward and discharges to nearby rivers/creeks; however, groundwater flow directions can be locally altered by supply well withdrawals from the valley aquifer.

2.3.5 Ecological Setting

Much of the Study Area is composed of a terrestrial cultural ecological community created and maintained by human activities. It has been modified by human influence to such a degree that the physical conformation of the substrate and the biological composition of the resident ecological community is substantially different from the character of the substrate or community as it existed

prior to human influence. The ground cover in OU1, OU2 and OU5 is primarily mowed lawn with trees.

SECTION 2 FIGURES

Legend

Study Area

Zoning

Public-Conservation

R1 - Low Density

NOTES:
Base Imagery:Robinson Aerial Imagery, Dec 2015
Coordinate System: NAD 1983 State Plane New York Central Feet
Datum: NAD83. Units: Feet

Study Area
Corning, NY

WESTON SOLUTIONS

Figure 2-1
Property Zoning

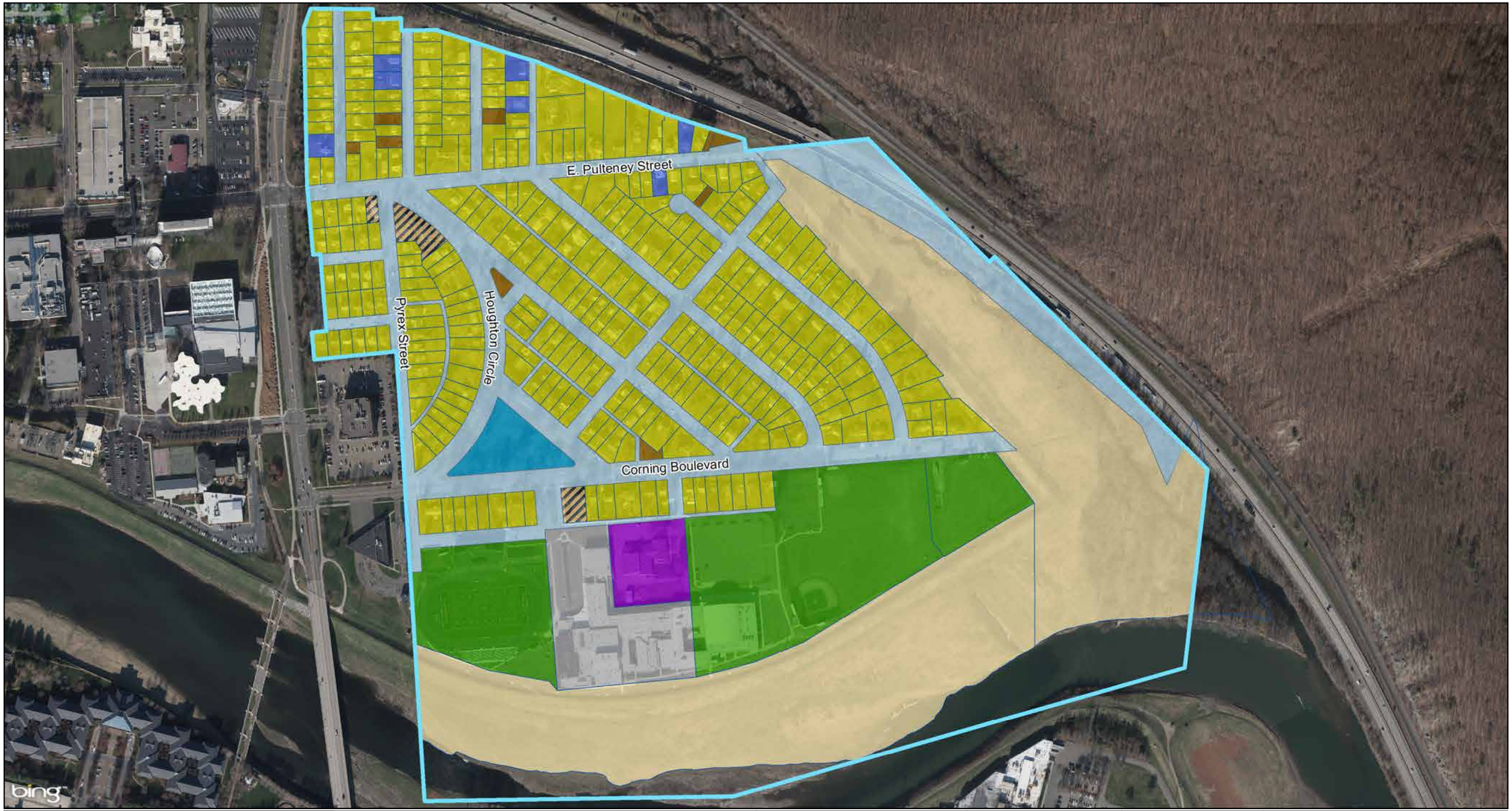
N

0 400 800 Feet

0 80 160 240 Meters

Document Name: Zoning.MXD

03/23/2017



Legend

Study Area

Property Classification

- 210 - Single Family Residence
- 220 - Multi Family Residence
- 311 - Residential - Vacant Land
- 411 - Apartment
- 591 - Playground
- 592 - Athletic Field
- 612 - School
- 615 - Educational Facility
- 622 - Fire/Police
- 821 - Flood Control
- Road/City of Corning Rights -of -Way

NOTES:
Base Imagery:Robinson Aerial Imagery, Dec 2015
Coordinate System: NAD 1983 State Plane New York Central Feet
Datum: NAD83. Units: Feet

Study Area
Corning, NY

N

0 400 800 Feet

0 75 150 225 Meters

Figure 2-2
Property Classification

Document Name: Property_Classification.MXD

03/23/2017

SECTION 2 TABLE

Table 2-1
Property Information for OU1, OU2 and OU5
Study Area, Corning, New York

OU	Parcel ID	Address	Property Classification[1]	Year Built
OU1	318.05-01-001.000	Pershing St (Memorial Stone)	Residential - Vacant Land	---
OU1	318.05-01-002.000	69 Pershing St	Single Family Residence	1942
OU1	318.05-01-003.000	6 Belleau St	Single Family Residence	1928
OU1	318.05-01-004.000	4 Belleau St	Single Family Residence	1960
OU1	318.05-01-005.000	65 Pershing St	Single Family Residence	1926
OU1	318.05-01-006.000	61 Pershing St	Single Family Residence	1956
OU1	318.05-01-007.000	57 Pershing St	Single Family Residence	1928
OU1	318.05-01-008.000	53 Pershing St	Single Family Residence	1972
OU1	318.05-01-009.000	49 Pershing St	Single Family Residence	1926
OU1	318.05-01-010.000	47 Pershing St	Single Family Residence	1950
OU1	318.05-01-011.000	45 Pershing St	Single Family Residence	1973
OU1	318.05-01-012.000	35 Pershing St	Single Family Residence	1946
OU1	318.05-01-013.000	33 Pershing St	Single Family Residence	1927
OU1	318.05-01-014.000	29 Pershing St	Single Family Residence	1955
OU1	318.05-01-015.000	25 Pershing St	Single Family Residence	1926
OU1	318.05-01-016.000	21 Pershing St	Single Family Residence	1930
OU1	318.05-01-017.000	75 Corning Blvd	Single Family Residence	1940
OU1	318.05-01-018.000	29 Pershing St	Residential - Vacant Land	---
OU1	318.05-01-019.000	65 Corning Blvd	Single Family Residence	1939
OU1	318.05-01-020.000	33 Sims Ave	Single Family Residence	1999
OU1	318.05-01-021.000	31 Sims Ave	Single Family Residence	1943
OU1	318.05-01-022.000	27 Sims Ave	Single Family Residence	1930
OU1	318.05-01-023.000	21 Sims Ave	Single Family Residence	1922
OU1	318.05-01-024.000	19 Sims Ave	Single Family Residence	1943
OU1	318.05-01-025.000	17 Sims Ave	Single Family Residence	1940
OU1	318.05-01-026.000	15 Sims Ave	Single Family Residence	1956
OU1	318.05-01-027.000	11 Sims Ave	Single Family Residence	1940
OU1	318.05-01-028.000	42 Houghton Cir	Single Family Residence	1940
OU1	318.05-01-029.000	40 Houghton Cir	Single Family Residence	1910
OU1	318.05-01-031.000	Houghton Park	Playground	---
OU1	318.05-01-032.000	6 Corning Blvd	Single Family Residence	1973
OU1	318.05-01-033.000	10 Corning Blvd	Single Family Residence	1919
OU1	318.05-01-034.000	14 Corning Blvd	Single Family Residence	1920
OU1	318.05-01-035.000	18 Corning Blvd	Single Family Residence	1930
OU1	318.05-01-036.000	20 Corning Blvd	Single Family Residence	1940
OU1	318.05-01-037.000	22 Corning Blvd	Single Family Residence	1950
OU1	318.05-01-039.000	26 Corning Blvd	Single Family Residence	1974
OU1	318.05-01-040.000	40 Corning Blvd	Single Family Residence	1950
OU1	318.05-01-041.000	50 Corning Blvd	Apartment	---
OU1	318.05-01-042.000	54 Corning Blvd	Single Family Residence	1954
OU1	318.05-01-043.000	58 Corning Blvd	Single Family Residence	1940
OU1	318.05-01-044.000	66 Corning Blvd	Single Family Residence	1935
OU1	318.05-01-045.000	74 Corning Blvd	Single Family Residence	1928
OU1	318.05-01-046.000	78 Corning Blvd	Single Family Residence	1942
OU1	318.05-01-047.000	82 Corning Blvd	Single Family Residence	1930
OU1	318.05-01-048.000	84 Corning Blvd	Single Family Residence	1929
OU1	318.05-01-049.000	94 Corning Blvd	Single Family Residence	1952
OU1	318.05-01-050.000	100 Corning Blvd	Single Family Residence	1945
OU1	318.05-01-051.000	102 Corning Blvd	Single Family Residence	1937
OU1	318.05-01-052.000	104 Corning Blvd	Single Family Residence	1938
OU1	318.05-01-053.000	106 Corning Blvd	Single Family Residence	1947
OU1	318.05-02-046.000	67-99 Houghton Cir	Apartment	---
OU1	318.05-02-048.000	63 Houghton Cir	Single Family Residence	1950
OU1	318.05-02-049.000	61 Houghton Cir	Single Family Residence	1955
OU1	318.05-02-050.000	59 Houghton Cir	Single Family Residence	1952
OU1	318.05-02-051.000	55 Houghton Cir	Single Family Residence	1951
OU1	318.05-02-052.000	53 Houghton Cir	Single Family Residence	1920
OU1	318.05-02-053.000	49 Houghton Cir	Single Family Residence	1951
OU1	318.05-02-054.000	47 Houghton Cir	Single Family Residence	1952
OU1	318.05-02-055.000	45 Houghton Cir	Single Family Residence	1951
OU1	318.05-02-056.000	39 Houghton Cir	Single Family Residence	1928
OU1	318.05-02-057.000	33 Houghton Cir	Single Family Residence	1973
OU1	318.05-02-058.000	27 Houghton Cir	Single Family Residence	1930
OU1	318.05-02-059.000	21 Houghton Cir	Single Family Residence	1972
OU1	318.05-02-060.000	19 Houghton Cir	Single Family Residence	1937
OU1	318.05-02-061.000	15 Houghton Cir	Single Family Residence	1930
OU1	318.05-02-062.000	13 Houghton Cir	Single Family Residence	1945

Table 2-1
Property Information for OU1, OU2 and OU5
Study Area, Corning, New York
(continued)

OU	Parcel ID	Address	Property Classification[1]	Year Built
OU1	318.05-02-063.000	11 Houghton Cir	Single Family Residence	1951
OU1	318.05-02-064.000	9 Houghton Cir	Single Family Residence	1935
OU1	318.05-02-066.000	24 Pyrex St	Single Family Residence	1956
OU1	318.05-02-067.000	26 Pyrex St	Single Family Residence	1972
OU1	318.05-02-068.000	28 Pyrex St	Single Family Residence	1953
OU1	318.05-02-069.000	30 Pyrex St	Single Family Residence	1929
OU1	318.05-02-070.000	32 Pyrex St	Single Family Residence	1950
OU1	318.05-02-071.000	34 Pyrex St	Single Family Residence	1950
OU1	318.05-02-072.000	36 Pyrex St	Single Family Residence	1950
OU1	318.05-02-073.000	38 Pyrex St	Single Family Residence	1952
OU1	318.05-02-074.000	40 Pyrex St	Single Family Residence	1920
OU1	318.05-02-075.000	42 Pyrex St	Single Family Residence	1952
OU1	318.05-02-076.000	44 Pyrex St	Single Family Residence	1973
OU1	318.05-02-077.000	46 Pyrex St	Single Family Residence	1952
OU1	318.05-02-078.000	48 Pyrex St	Single Family Residence	1953
OU1	318.05-03-001.000	94 Pershing St	Single Family Residence	1946
OU1	318.05-03-002.000	92 Pershing St	Single Family Residence	1950
OU1	318.05-03-003.000	88 Pershing St	Single Family Residence	1950
OU1	318.05-03-004.000	86 Pershing St	Single Family Residence	1950
OU1	318.05-03-005.000	84 Pershing St	Single Family Residence	1974
OU1	318.05-03-006.000	82 Pershing St	Single Family Residence	1973
OU1	318.05-03-007.000	80 Pershing St	Single Family Residence	1973
OU1	318.05-03-008.000	66 Pershing St	Single Family Residence	1938
OU1	318.05-03-009.000	64 Pershing St	Single Family Residence	1973
OU1	318.05-03-010.000	62 Pershing St	Single Family Residence	1948
OU1	318.05-03-011.000	60 Pershing St	Single Family Residence	1943
OU1	318.05-03-012.000	58 Pershing St	Single Family Residence	1940
OU1	318.05-03-013.000	54 Pershing St	Single Family Residence	1945
OU1	318.05-03-014.000	50 Pershing St	Single Family Residence	1975
OU1	318.05-03-015.000	42 Pershing St	Single Family Residence	1925
OU1	318.05-03-016.000	99 Argonne St	Single Family Residence	1973
OU1	318.05-03-018.000	45 Wilson St	Single Family Residence	1975
OU1	318.05-03-019.000	47 Wilson St	Single Family Residence	1975
OU1	318.05-03-020.000	49 Wilson St	Single Family Residence	1948
OU1	318.05-03-022.000	53 Wilson St	Single Family Residence	1973
OU1	318.05-03-023.000	55 Wilson St	Single Family Residence	1973
OU1	318.05-03-025.000	59 Wilson St	Single Family Residence	1974
OU1	318.05-03-026.000	61 Wilson St	Single Family Residence	1974
OU1	318.05-03-028.000	65 Wilson St	Single Family Residence	1974
OU1	318.05-03-029.000	67 Wilson St	Single Family Residence	1952
OU1	318.05-03-030.000	232 E Pulteney St	Single Family Residence	1950
OU1	318.05-03-031.000	234 E Pulteney St	Single Family Residence	1945
OU1	318.05-03-032.000	236 E Pulteney St	Single Family Residence	1950
OU1	318.05-03-033.000	240 E Pulteney St	Single Family Residence	1973
OU1	318.05-03-034.000	244 E Pulteney St	Single Family Residence	1952
OU1	318.05-03-035.000	56 Wilson St	Single Family Residence	1973
OU1	318.05-03-036.000	54 Wilson St	Single Family Residence	1973
OU1	318.05-03-037.000	52 Wilson St	Single Family Residence	1973
OU1	318.05-03-038.000	50 Wilson St	Single Family Residence	1974
OU1	318.05-03-040.000	46 Wilson St	Single Family Residence	---
OU1	318.05-03-041.000	44 Wilson St	Single Family Residence	1951
OU1	318.05-03-042.000	42 Wilson St	Single Family Residence	1950
OU1	318.05-03-043.000	34 Wilson St	Single Family Residence	1950
OU1	318.05-03-044.000	109 Argonne St	Single Family Residence	1977
OU1	318.05-03-045.000	111 Argonne St	Single Family Residence	1957
OU1	318.05-03-046.000	6 Jackson Cir	Single Family Residence	1940
OU1	318.05-03-047.000	8 Jackson Cir	Single Family Residence	1956
OU1	318.05-03-048.000	10 Jackson Cir	Single Family Residence	1945
OU1	318.05-03-049.000	12 Jackson Cir	Single Family Residence	1948
OU1	318.05-03-050.000	248 E Pulteney St	Single Family Residence	1952
OU1	318.05-03-051.000	250 E Pulteney St	Single Family Residence	1955
OU1	318.05-03-052.000	252 E Pulteney St	Single Family Residence	1973
OU1	318.05-03-053.000	258 E Pulteney St	Multi Family Residence	1927
OU1	318.05-03-054.000	262 E Pulteney St	Single Family Residence	1958
OU1	318.05-03-055.000	260 E Pulteney St	Single Family Residence	1927
OU1	318.05-03-056.000	264 E Pulteney St	Single Family Residence	1960
OU1	318.05-03-057.000	266 E Pulteney St	Single Family Residence	1960

Table 2-1
Property Information for OU1, OU2 and OU5
Study Area, Corning, New York
(continued)

OU	Parcel ID	Address	Property Classification[1]	Year Built
OU1	318.05-03-058.000	268 E Pulteney St	Single Family Residence	1960
OU1	318.05-03-059.000	270 E Pulteney St	Single Family Residence	1959
OU1	318.05-03-060.000	121 Argonne St	Single Family Residence	1973
OU1	318.05-03-062.000	117 Argonne St	Single Family Residence	1974
OU1	318.05-03-063.000	115 Argonne St	Single Family Residence	1956
OU1	318.05-03-064.000	113 Argonne St	Single Family Residence	1960
OU1	318.05-03-065.000	7 Jackson Cir	Single Family Residence	1946
OU1	318.05-03-066.000	17 Jackson Cir	Residential - Vacant Land	---
OU1	318.05-04-001.000	36 Pershing St	Single Family Residence	1937
OU1	318.05-04-002.000	34 Pershing St	Single Family Residence	1940
OU1	318.05-04-003.000	30 Pershing St	Single Family Residence	1925
OU1	318.05-04-004.000	26 Pershing St	Single Family Residence	1925
OU1	318.05-04-005.000	22 Pershing St	Single Family Residence	1927
OU1	318.05-04-006.000	18 Pershing St	Single Family Residence	1928
OU1	318.05-04-007.000	14 Pershing St	Single Family Residence	1937
OU1	318.05-04-008.000	10 Pershing St	Single Family Residence	1925
OU1	318.05-04-009.000	8 Pershing St	Single Family Residence	1969
OU1	318.05-04-010.000	105 Corning Blvd	Single Family Residence	1973
OU1	318.05-04-011.000	107 Corning Blvd	Single Family Residence	1947
OU1	318.05-04-012.000	109 Corning Blvd	Single Family Residence	1946
OU1	318.05-04-013.000	7 Wilson St	Single Family Residence	1948
OU1	318.05-04-014.000	9 Wilson St	Single Family Residence	1947
OU1	318.05-04-015.000	11 Wilson St	Single Family Residence	1948
OU1	318.05-04-016.000	13 Wilson St	Single Family Residence	1947
OU1	318.05-04-017.000	15 Wilson St	Single Family Residence	1947
OU1	318.05-04-018.000	17 Wilson St	Single Family Residence	1973
OU1	318.05-04-019.000	19 Wilson St	Single Family Residence	1947
OU1	318.05-04-020.000	21 Wilson St	Single Family Residence	1947
OU1	318.05-04-021.000	23 Wilson St	Single Family Residence	1949
OU1	318.05-04-022.000	25 Wilson St	Single Family Residence	1947
OU1	318.05-04-023.000	27 Wilson St	Single Family Residence	1947
OU1	318.05-04-024.000	29 Wilson St	Single Family Residence	1948
OU1	318.05-04-025.000	98 Argonne St	Single Family Residence	1973
OU1	318.05-04-026.000	104 Argonne St	Single Family Residence	1978
OU1	318.05-04-028.000	30 Wilson St	Single Family Residence	1947
OU1	318.05-04-029.000	28 Wilson St	Single Family Residence	1947
OU1	318.05-04-030.000	26 Wilson St	Single Family Residence	1948
OU1	318.05-04-031.000	24 Wilson St	Single Family Residence	1948
OU1	318.05-04-032.000	22 Wilson St	Single Family Residence	1951
OU1	318.05-04-033.000	20 Wilson St	Single Family Residence	1947
OU1	318.05-04-034.000	18 Wilson St	Single Family Residence	1947
OU1	318.05-04-035.000	16 Wilson St	Single Family Residence	1947
OU1	318.05-04-036.000	14 Wilson St	Single Family Residence	1946
OU1	318.05-04-037.000	12 Wilson St	Single Family Residence	1947
OU1	318.05-04-038.000	10 Wilson St	Single Family Residence	1942
OU1	318.05-04-039.000	8 Wilson St	Single Family Residence	1977
OU1	318.05-04-040.000	6 Wilson St	Single Family Residence	1947
OU1	318.05-04-041.000	4 Wilson St	Single Family Residence	1976
OU1	318.05-04-042.000	115 Corning Blvd	Single Family Residence	1950
OU1	318.05-04-043.000	117 Corning Blvd	Single Family Residence	1975
OU1	318.05-04-045.000	121 Corning Blvd	Single Family Residence	1975
OU1	318.05-04-046.000	7 Roosevelt St	Single Family Residence	1974
OU1	318.05-04-048.000	11 Roosevelt St	Single Family Residence	1974
OU1	318.05-04-049.000	15 Roosevelt St	Single Family Residence	1976
OU1	318.05-04-050.000	17 Roosevelt St	Single Family Residence	1977
OU1	318.05-04-051.000	19 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-052.000	21 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-054.000	25 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-055.000	27 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-056.000	33 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-057.000	35 Roosevelt St	Single Family Residence	1975
OU1	318.05-04-058.000	37 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-060.000	39 Roosevelt St	Single Family Residence	1975
OU1	318.05-04-061.000	108 Argonne St	Single Family Residence	1977
OU1	318.05-04-062.000	46 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-063.000	44 Roosevelt St	Single Family Residence	1951
OU1	318.05-04-064.000	42 Roosevelt St	Single Family Residence	1976

Table 2-1
Property Information for OU1, OU2 and OU5
Study Area, Corning, New York
(continued)

OU	Parcel ID	Address	Property Classification[1]	Year Built
OU1	318.05-04-066.000	38 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-067.000	36 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-068.000	34 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-069.000	30 Roosevelt St	Single Family Residence	1978
OU1	318.05-04-070.000	28 Roosevelt St	Single Family Residence	1974
OU1	318.05-04-072.000	24 Roosevelt St	Single Family Residence	1976
OU1	318.05-04-073.000	20 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-074.000	18 Roosevelt St	Single Family Residence	1976
OU1	318.05-04-076.000	16 Roosevelt St	Single Family Residence	1975
OU1	318.05-04-078.000	12 Roosevelt St	Single Family Residence	1973
OU1	318.05-04-079.000	10 Roosevelt St	Single Family Residence	1975
OU2	318.05-04-080.000	8 Roosevelt St	Single Family Residence	1973
OU2	318.05-04-081.000	4 Roosevelt St	Single Family Residence	1974
OU2	318.05-04-082.000	123 Corning Blvd	Single Family Residence	1976
OU2	318.05-04-083.000	125 Corning Blvd	Single Family Residence	1975
OU2	318.05-04-084.000	127 Corning Blvd	Single Family Residence	1973
OU5	300.17-01-013.000	179 E Pulteney St	Single Family Residence	1930
OU5	300.17-01-014.000	181 E Pulteney St	Single Family Residence	1930
OU5	300.17-01-015.000	3 High St	Multi Family Residence	1896
OU5	300.17-01-017.000	5 High St	Single Family Residence	1860
OU5	300.17-01-018.000	9 High St	Single Family Residence	1947
OU5	300.17-01-019.000	11 High St	Single Family Residence	1972
OU5	300.17-01-020.000	13 High St	Single Family Residence	1950
OU5	300.17-01-022.000	15 High St	Single Family Residence	1989
OU5	300.17-01-023.000	17 High St	Single Family Residence	1946
OU5	300.17-01-024.000	37 High St	Single Family Residence	1973
OU5	300.17-01-025.000	39 High St	Single Family Residence	1975
OU5	300.17-01-026.000	43 High St	Single Family Residence	1948
OU5	300.17-01-030.000	44 High St	Single Family Residence	1973
OU5	300.17-01-031.000	42 High St	Single Family Residence	1953
OU5	300.17-01-033.000	38 High St	Single Family Residence	1942
OU5	300.17-01-034.000	34 High St	Single Family Residence	1940
OU5	300.17-01-035.000	28 High St	Single Family Residence	1961
OU5	300.17-01-036.000	24 High St	Single Family Residence	1951
OU5	300.17-01-037.000	22 High St	Single Family Residence	1940
OU5	300.17-01-038.000	14 High St	Single Family Residence	1945
OU5	300.17-01-039.000	6 High St	Single Family Residence	1945
OU5	300.17-01-040.000	4 High St	Single Family Residence	1942
OU5	300.17-01-042.000	High St	Residential - Vacant Land	--
OU5	300.17-01-043.000	201 E Pulteney St	Single Family Residence	1915
OU5	300.17-01-044.000	203 E Pulteney St	Single Family Residence	1915
OU5	300.17-01-045.000	205 E Pulteney St	Single Family Residence	1925
OU5	300.17-01-046.000	207 E Pulteney St	Single Family Residence	1945
OU5	300.17-01-047.000	Earl St	Residential - Vacant Land	--
OU5	300.17-01-048.000	15 Earl St	Single Family Residence	1950
OU5	300.17-01-049.100	21 Earl St	Single Family Residence	1920
OU5	300.17-01-049.200	17 Earl St	Residential - Vacant Land	--
OU5	300.17-01-050.000	23 Earl St	Single Family Residence	1950
OU5	300.17-01-051.000	25 Earl St	Multi Family Residence	1960
OU5	300.17-01-052.000	27-29 Earl St	Multi Family Residence	1920
OU5	300.17-01-053.000	31 Earl St	Single Family Residence	1955
OU5	300.17-01-054.000	33 Earl St	Single Family Residence	1950
OU5	300.17-02-003.000	34 Earl St	Single Family Residence	1952
OU5	300.17-02-004.000	32 Earl St	Single Family Residence	1976
OU5	300.17-02-005.000	30 Earl St	Single Family Residence	1974
OU5	300.17-02-006.000	26 Earl St	Single Family Residence	1971
OU5	300.17-02-007.000	22 Earl St	Single Family Residence	1940
OU5	300.17-02-008.000	20 Earl St	Single Family Residence	1960
OU5	300.17-02-009.000	18 Earl St	Single Family Residence	1976
OU5	300.17-02-010.000	16 Earl St	Single Family Residence	1940
OU5	300.17-02-011.000	12 Earl St	Single Family Residence	1939
OU5	300.17-02-012.000	211 E Pulteney St	Single Family Residence	1940
OU5	300.17-02-013.000	215 E Pulteney St	Single Family Residence	1940
OU5	300.17-02-014.000	223 E Pulteney St	Single Family Residence	1940
OU5	300.17-02-015.000	9 Clara St	Single Family Residence	1915
OU5	300.17-02-016.000	11 Clara St	Single Family Residence	1955
OU5	300.17-02-017.000	13 Clara St	Single Family Residence	1955
OU5	300.17-02-018.000	15 Clara St	Single Family Residence	1960
OU5	300.17-02-019.000	17 Clara St	Single Family Residence	1952

Table 2-1
Property Information for OU1, OU2 and OU5
Study Area, Corning, New York
(continued)

OU	Parcel ID	Address	Property Classification[1]	Year Built
OU5	300.17-02-020.000	19 Clara St	Single Family Residence	1978
OU5	300.17-02-025.000	18 Clara St	Single Family Residence	1973
OU5	300.17-02-026.000	16 Clara St	Single Family Residence	1951
OU5	300.17-02-027.000	14 Clara St	Single Family Residence	1951
OU5	300.17-02-028.000	12 Clara St	Single Family Residence	1975
OU5	300.17-02-029.000	Clara St	Residential - Vacant Land	--
OU5	300.17-02-030.000	233 E Pulteney St	Single Family Residence	1946
OU5	300.17-02-031.000	235 E Pulteney St	Single Family Residence	1949
OU5	300.17-02-032.000	237 E Pulteney St	Single Family Residence	1952
OU5	300.17-02-033.000	239 E Pulteney St	Single Family Residence	1925
OU5	300.17-02-034.000	1 James St	Single Family Residence	1937
OU5	300.17-02-035.000	3 James St	Single Family Residence	1973
OU5	300.17-02-036.000	5 James St	Multi Family Residence	1979
OU5	300.17-02-037.000	7 James St	Single Family Residence	1974
OU5	300.17-02-038.000	9-11 James St	Multi Family Residence	1978
OU5	300.17-02-040.100	4 James St	Single Family Residence	1999
OU5	300.17-02-040.200	8 James St	Single Family Residence w/Apartment	2000
OU5	300.17-02-041.000	241 E Pulteney St	Single Family Residence	1900
OU5	300.17-02-042.000	243 E Pulteney St	Single Family Residence	1900
OU5	300.17-02-043.000	245 E Pulteney St	Single Family Residence	1900
OU5	300.17-02-044.000	247 E Pulteney St	Single Family Residence	1900
OU5	300.17-02-047.100	249 E Pulteney St	Single Family Residence	1895
OU5	300.17-02-049.000	253 E Pulteney St	Single Family Residence	1953
OU5	300.17-02-050.000	255 E Pulteney St	Single Family Residence	1830
OU5	300.17-02-051.000	257 E Pulteney St	Single Family Residence	1974
OU5	300.17-02-053.000	259 E Pulteney St	Single Family Residence	1935
OU5	300.17-02-054.000	261-263 E Pulteney St	Multi Family Residence	1988
OU5	300.17-02-055.000	267 E Pulteney St	Single Family Residence	1951
OU5	300.17-02-056.000	E Pulteney St (ROW to dyke)	Residential - Vacant Land	--
OU5	300.17-02-057.000	271 E Pulteney St	Residential - Vacant Land	--
OU5	318.05-02-011.000	170 South Pl	Single Family Residence	1949
OU5	318.05-02-012.000	174 South Pl	Single Family Residence	1949
OU5	318.05-02-013.000	178 South Pl	Single Family Residence	1946
OU5	318.05-02-014.000	182 South Pl	Single Family Residence	1946
OU5	318.05-02-015.000	186 South Pl	Single Family Residence	1950
OU5	318.05-02-016.000	33 Pyrex St	Single Family Residence	1950
OU5	318.05-02-017.000	37 Pyrex St	Single Family Residence	1947
OU5	318.05-02-018.000	185 South Pl	Single Family Residence	1948
OU5	318.05-02-019.000	183 South Pl	Single Family Residence	1948
OU5	318.05-02-020.000	179 South Pl	Single Family Residence	1947
OU5	318.05-02-021.000	175 South Pl	Single Family Residence	1940
OU5	318.05-02-027.000	174 North Pl	Single Family Residence	1950
OU5	318.05-02-028.000	178 North Pl	Single Family Residence	1948
OU5	318.05-02-029.000	182 North Pl	Single Family Residence	1950
OU5	318.05-02-030.000	186 North Pl	Single Family Residence	1950
OU5	318.05-02-031.000	41 Pyrex St	Single Family Residence	1945
OU5	318.05-02-032.000	45 Pyrex St	Single Family Residence	1947
OU5	318.05-02-033.000	187 North Pl	Single Family Residence	1945
OU5	318.05-02-034.000	183 North Pl	Single Family Residence	1946
OU5	318.05-02-035.000	179 North Pl	Single Family Residence	1946
OU5	318.05-02-036.000	175 North Pl	Single Family Residence	1946
OU5	318.05-02-041.000	174 E Pulteney St	Single Family Residence	1950
OU5	318.05-02-042.000	178 E Pulteney St	Single Family Residence	1946
OU5	318.05-02-043.000	182 E Pulteney St	Single Family Residence	1948
OU5	318.05-02-044.000	186 E Pulteney St	Single Family Residence	1947
OU5	318.05-02-045.000	47-57 Pyrex St	Apartment	--

[1] All properties within tOU1, OU2, and OU5 are zoned R1 (low density residential)

Notes:
--- = Not available
OU1 - Operable Unit 1 (Residential Area)
OU2 - Operable Unit 2 (Eastern End of Corning Boulevard)
OU5 - Operable Unit 5 (Residential Expansion Area)

3. SUMMARY OF REMEDIAL INVESTIGATION

Commencing in June 2014, WESTON performed characterization activities within the Study Area, including OU1 and OU2, pursuant to a NYSDEC-approved Study Area Work Plan. In 2014 and 2015, NYSDEC conducted characterization activities in OU1, OU2 and OU5. The objectives of the Study Area characterization activities were to assess the nature and extent of layers of fill material containing ash, brick and/or glass that were encountered within the Study Area, and to collect data necessary for understanding the current conditions and associated potential exposure pathways.

Characterization activities in OU1, OU2 and OU5 are substantially complete. Validated analytical data for samples collected in OU1 and OU2 has been submitted to NYSDEC by WESTON in Data Usability Summary Reports (DUSRs) throughout the characterization program. NYSDEC has provided data to WESTON for its characterization samples in OU1, OU2 and OU5. Additional sampling may be conducted by WESTON prior to remedial activities to refine areas requiring remedial actions. A summary of findings of the investigations to date in OU1, OU2 and OU5 is described below:

- A total of 295 of the 326 properties have been sampled to date. This includes 186 of the 212 properties within OU1, the 5 properties within OU2 and 104 of 109 properties in OU5. Access to the remaining 31 properties has not been granted by property owners; therefore these properties have not been sampled.
- Laboratory analytical data for 109 of the 295 properties sampled indicated that soil concentrations were less than or equal to the SCOs.
- A total of 102 soil borings have been advanced in the City of Corning ROWs within OU1, OU2 and OU5.

To date, more than 4,000 soil samples, including surface soil and soil boring samples, have been collected in OU1, OU2 and OU5, the majority of which are less than the SCOs. This includes surface soil and soil boring samples collected on individual residential properties and soil boring samples collected in the City of Corning ROWs. Laboratory analytical results for constituents at concentrations greater than the SCOs are summarized in Table 3-1, Table 3-2 and Table 3-3 for OU1, OU2 and OU5, respectively. The majority of samples had no analytical results greater than

SCOs. For samples with analytical results greater than SCOs, arsenic, cadmium, and lead were the constituents detected most frequently and are the COPCs. Other constituents as shown in Table 3-1 through Table 3-3 have been detected in a limited number of samples at concentrations greater than SCOs.

Surface soil samples were collected from 0 to 2 inches below ground surface (in bgs). A total of 1,466 surface soil samples have been collected in OU1, OU2 and OU5: 1,054 in OU1; 1 in OU2; and 411 in OU5.

- Laboratory analytical data for 1,287 of the 1,466 surface soil samples were less than or equal to SCOs.
- Laboratory analytical data for 179 of the surface soil samples were greater than SCOs (129 surface soil samples in OU1 and 50 surface soil samples in OU5).

To date, a total of 994 soil borings have been advanced in OU1, OU2 and OU5 to investigate sub-surface soil conditions. All soil borings were logged, and the presence of a layer of fill material containing ash, brick and/or glass was documented where encountered. The total number of soil borings advanced in OU1, OU2 and OU5 consists of:

- In OU1, 534 soil borings were advanced on residential properties and 71 soil borings were advanced in ROW areas (three of the soil borings advanced on residential properties, six of the soil boings advanced in the ROW areas and two of the soil borings advanced in a public park were associated with test pit activities as discussed below).
- In OU2, 13 soil borings were advanced in residential properties and two soil borings were advanced in ROW areas.
- In OU5, 339 soil borings were advanced in residential properties and 35 soil borings were advanced in ROW areas.

The findings of the soil boring investigations in OU1, OU2 and OU5 related to the presence or absence of a layer of fill material containing ash, brick and/or glass are summarized in Table 3-4, Table 3-5, and Table 3-6, respectively. These tables categorize the soil borings by presence of a layer of fill material containing ash, brick and/or glass, as well as the depth at which analytical results were greater than SCOs.

A total of 661 of the 994 soil borings advanced in OU1, OU2 and OU5 to date contained no layer of fill material containing ash, brick and/or glass. Of the remaining 333 soil borings, a layer of fill material containing ash, brick and/or glass was encountered at the following depth intervals:

- From 0 to 2 ft bgs in 61 soil borings;
- From 0 to 2 ft bgs and greater than 2 ft bgs in 130 soil borings; and
- Greater than 2 ft bgs in 142 soil borings.

A total of 17 test pits were excavated in the Study Area: five in OU1 ROWs, two in a public park located in OU1, three on residential properties within OU1, and seven in OU5 ROWs. A layer of fill material containing ash, brick and/or glass was encountered in one test pit excavated in a ROW in OU1 and in four of the test pits excavated in ROWs in OU5.

Garden soil samples, comprised of composite soil samples[1], were collected from 0 to 12 in bgs within vegetable gardens on residential properties in OU1 and OU5, or in non-vegetable gardens when requested by NYSDEC. No garden soil samples were collected in OU2. A total of 88 garden soil samples were collected, 73 of which did not contain constituents at concentrations greater than the SCOs. Of the 15 garden soil samples that had concentrations of one or more constituent greater than a SCO, five samples were collected in OU1 and 10 samples were collected in OU5.

Two rounds of groundwater samples were collected from seven groundwater monitoring wells installed in the Study Area and one irrigation groundwater well. Arsenic, cadmium, and lead, the constituents most frequently detected in the Subject Material at concentrations greater than the SCOs in the Study Area, were not detected in groundwater at concentrations greater than New York State Division of Water TOGS standards. This indicates that groundwater in the Study Area has not been impacted by layers of fill material containing ash, brick, and/or glass.

[1] Each composite garden soil sample consisted of five to seven subsamples mixed together as one.

SECTION 3 TABLES

Table 3-1
Summary of Detected Analytical Results - OU1[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Residential Properties								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Barium, TCLP	100	0.16 J	105	415	5	410	1[3]	1
Cadmium, TCLP	1	0.00050 U	3.7	415	96	319	2[3]	2
Lead, TCLP	5	0.0030 U	277	415	126	289	31[3]	17
Total Metals, mg/Kg								
Arsenic, Total	16	1.5 J	1280	2910	1	2909	251	56
Barium, Total	350	29.7	35600	2176	0	2176	34	21
Cadmium, Total	2.5	0.032 U	21000	2910	294	2616	127	40
Chromium, Total	36	3.0	556	2176	0	2176	21	12
Copper, Total	270	6.3	12900	2176	0	2176	4	4
Lead, Total	400	7.1	28200	2910	0	2910	112	40
Manganese, Total	2000	44.9	2720	2176	0	2176	3	3
Mercury, Total	0.81	0.0080 U	70.0 J	2132	68	2064	49	20
Nickel, Total	140	4.0 J	221	2176	0	2176	3	3
Selenium, Total	36	0.39 U	11200	2176	1339	837	4	4
Zinc, Total	2200	34.7	6260	2176	0	2176	3	3
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
2-Methylnaphthalene	410	2.3 U	2100 U	451	433	18	3	3
Benz(a)anthracene	1000	3.4 U	21000	451	268	183	48	24
Benzo(a)pyrene	1000	5.4 U	25000 J	451	272	179	50	26
Benzo(b)fluoranthene	1000	4.3 U	44000	451	263	188	58	28
Benzo(k)fluoranthene	1000	2.1 U	18000	451	319	132	31	18
Chrysene	1000	2.0 U	30000	451	311	140	49	25
Dibenz(a,h)anthracene	330	2.2 U	2500 J	451	416	35	5	5
Indeno(1,2,3-cd)pyrene	500	9.6 J	10000	451	265	186	77	29
Rights of Way Areas								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Lead, TCLP	5	0.0030 U	90.0	96	40	56	6[3]	2
Total Metals, mg/Kg								
Arsenic, Total	16	0.50 U	429	177	1	176	34	2
Barium, Total	400	34.5	498	125	0	125	2	1

Table 3-1 (continued)
Summary of Detected Analytical Results - OU1[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Rights of Way Areas (continued)								
Total Metals, mg/Kg (continued)								
Cadmium, Total	4.3	0.031 U	48.0	177	13	164	14	2
Lead, Total	400	0.30 U	9480	177	1	176	16	2
Mercury, Total	0.81	0.0088 U	2.9	112	1	111	1	1
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
Benz(a)anthracene	1000	3.1 U	41000	101	45	52	9	2
Benzo(a)pyrene	1000	4.5 U	38000	101	38	59	10	2
Benzo(b)fluoranthene	1000	3.6 U	65000	101	34	63	12	2
Benzo(k)fluoranthene	3900	2.1 U	30000	101	45	52	2	1
Chrysene	3900	1.9 U	38000	101	43	54	2	1
Dibenz(a,h)anthracene	330	2.1 U	1800 U	101	65	32	3	1
Indeno(1,2,3-cd)pyrene	500	5.2 U	33000	101	40	57	9	2

Notes:

[1] Table includes constituents detected at concentrations greater than applicable screening levels in one or more sample.

[2] TCLP samples are screened against the TCLP Regulatory Screening Levels contained in the Federal Code of Regulations, Section 2.6.1-Toxicity Characteristic. Non-TCLP Samples from Residential Areas are screened against NYSDEC Subpart 375-6 Remedial Program Residential SCOs. Non-TCLP Samples from Rights-of-Way Areas are screened against NYSDEC Subpart 375-6 Remedial Program Restricted-Residential SCOs.

[3] USEPA TCLP method is used to determine the appropriate disposal method under current NYSDEC and USEPA regulations.

[4] Total Number of Samples above the Screening Level includes only detected concentrations above the screening level.

NYSDEC = New York State Department of Environmental Control

USEPA = United States Environmental Protection Agency

SCO = soil cleanup objective

TCLP = Toxicity Characteristic Leaching Procedure

OU = Operable Unit

mg/L = milligram per liter

µg/Kg = microgram per kilogram

mg/Kg = milligram per kilogram

U = The analyte was analyzed for, but was not detected above the level of the detection quantitation limit shown.

J = The positive result reported is estimated either because the result is less than the limit of quantitation (LOQ) or because certain quality control criteria were not met.

Table 3-2
Summary of Detected Analytical Results - OU2[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Residential Properties								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Cadmium, TCLP	1	0.00050 U	1.2	30	3	27	1[3]	1
Lead, TCLP	5	0.0030 U	35	30	5	25	5[3]	4
Total Metals, mg/Kg								
Arsenic, Total	16	4.9	200	49	0	49	17	5
Barium, Total	350	71	660	30	0	30	1	1
Cadmium, Total	2.5	0.061 J	44	49	0	49	17	5
Chromium, Total	36	6.2	43	30	0	30	1	1
Lead, Total	400	9.3	4200	49	0	49	12	5
Nickel, Total	140	9.6	170	30	0	30	1	1
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
Benz(a)anthracene	1000	3.4 U	10000	37	11	19	5	4
Benzo(a)pyrene	1000	4.9 UJ	8700	37	7	23	5	4
Benzo(b)fluoranthene	1000	4.0 UJ	14000	37	6	24	5	4
Benzo(k)fluoranthene	1000	2.0 U	3800 J	37	14	16	3	2
Chrysene	1000	2.0 U	10000	37	8	22	5	4
Dibenz(a,h)anthracene	330	2.3 U	2500 J	37	12	18	4	3
Indeno(1,2,3-cd)pyrene	500	5.4 U	9900	37	10	20	5	4
Rights of Way Areas								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Lead, TCLP	5	0.010 U	8.7	4	2	2	1[3]	1
Total Metals, mg/Kg								
Arsenic, Total	16	7.0	170	8	0	8	3	1
Cadmium, Total	4.3	0.16 J	53	8	0	8	3	1
Lead, Total	400	19	7600	8	0	8	3	1

Table 3-2 (continued)
Summary of Detected Analytical Results - OU2[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Rights of Way Areas (continued)								
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
Benz(a)anthracene	1000	3.5 U	3600	4	1	3	2	1
Benzo(a)pyrene	1000	4.9 U	7000	4	1	3	2	1
Benzo(b)fluoranthene	1000	6.5 J	8300	4	0	4	2	1
Chrysene	3900	2.1 U	4300	4	1	3	1	1
Dibenz(a,h)anthracene	330	2.4 U	2100	4	1	3	2	1
Indeno(1,2,3-cd)pyrene	500	5.7 U	8300	4	1	3	2	1

Notes:

[1] Table includes constituents detected at concentrations greater than applicable screening levels in one or more sample.

[2] TCLP samples are screened against the TCLP Regulatory Screening Levels contained in the Federal Code of Regulations, Section 2.6.1-Toxicity Characteristic. Context: Title 40 - Protection of Environment. CHAPTER I - ENVIRONMENTAL PROTECTION AGENCY. SUBCHAPTER I - SOLID WASTES. PART 261 - IDENTIFICATION AND LISTING OF HAZARDOUS WASTE. Subpart C - Characteristics of Hazardous Waste (2012-07-01). Non-TCLP Samples from Residential Areas are screened against NYSDEC Subpart 375-6 Remedial Program Residential SCOs. Non-TCLP Samples from Rights-of-Way Areas are screened against NYSDEC Subpart 375-6 Remedial Program Restricted-Residential SCOs.

[3] USEPA TCLP method is used to determine the appropriate disposal method under current NYSDEC and USEPA regulations.

[4] Total Number of Samples above the Screening Level includes only detected concentrations above the screening level.

NYSDEC = New York State Department of Environmental Control
USEPA = United States Environmental Protection Agency
SCO = soil cleanup objective
TCLP = Toxicity Characteristic Leaching Procedure
OU = Operable Unit
mg/L = milligram per liter
µg/Kg = microgram per kilogram
mg/Kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the level of the detection quantitation limit shown.
J = The positive result reported is estimated either because the result is less than the limit of quantitation (LOQ) or because certain quality control criteria were not met.
UJ = The analyte was analyzed for, but not detected. The quantitation limit is approximate and may be inaccurate or imprecise.

Table 3-3
Summary of Detected Analytical Results - OU5[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Residential Properties								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Barium, TCLP	100	0.11 J	104	282	0	282	1[3]	1
Cadmium, TCLP	1	0.012 U	17.2	282	215	67	4[3]	4
Lead, TCLP	5	0.021 U	283	282	59	223	15[3]	10
Total Metals, mg/Kg								
Arsenic, Total	16	0.89	669	1329	0	1329	138	53
Barium, Total	350	8.8 J	4790	1329	0	1329	35	19
Cadmium, Total	2.5	0.098 U	374	1329	1038	291	47	23
Chromium, Total	36	1.4 J	436	1329	1	1328	22	17
Copper, Total	270	2.4 J	738	1329	0	1329	5	4
Lead, Total	400	0.97	28600	1329	0	1329	71	31
Manganese, Total	2000	30.8	8260	1329	0	1329	10	10
Mercury, Total	0.81	0.011 U	18	1329	67	1262	31	21
Nickel, Total	140	1.5 J	442	1329	1	1328	2	2
Selenium, Total	36	0.35 U	65.8	1329	976	353	1	1
Zinc, Total	2200	10.1	14200	1329	0	1329	5	5
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
2-Methylnaphthalene	410	8.3 J	1900 U	282	127	155	7	6
Benz(a)anthracene	1000	32 J	5000	282	124	158	18	12
Benzo(a)pyrene	1000	12 J	5400	282	100	182	19	11
Benzo(b)fluoranthene	1000	15 J	11000 J	282	94	188	25	15
Benzo(k)fluoranthene	1000	17 J	3000	282	124	158	10	9
Chrysene	1000	11 J	8400 U	282	92	190	21	14
Dibenz(a,h)anthracene	330	21 J	1600	282	175	107	17	12
Indeno(1,2,3-cd)pyrene	500	24 J	7000	282	123	159	35	20
Isophorone	100000	8.4 J	150000	282	251	31	1	1
Rights of Way Areas								
Toxicity Characteristic Leaching Procedure (TCLP) Metals, mg/L								
Lead, TCLP	5	0.021 U	149	54	13	41	1[3]	1
Total Metals, mg/Kg								
Arsenic, Total	16	3.3 J	265	112	1	111	12	4
Cadmium, Total	4.3	0.33 U	54.1	112	99	13	2	2
Copper, Total	270	6.5	1520	112	1	111	1	1

Table 3-3 (continued)
Summary of Detected Analytical Results - OU5[1]
Study Area, Corning, New York

	Screening Levels[2]	Minimum Analytical Result	Maximum Analytical Result	Total # Samples	Total # Non-Detects	Total # Samples with Detected Concentrations	Total # Samples above the Screening Level[4]	Total # Properties with Samples above the Screening Level
Rights of Way Areas (continued)								
Total Metals, mg/Kg (continued)								
Lead, Total	400	3.4	4030	112	0	112	5	2
Manganese, Total	2000	7.3	3390	112	0	112	3	2
Mercury, Total	0.81	0.012 U	1.3	112	9	103	1	1
Semi-Volatile Organic Compounds (SVOCs), ug/Kg								
Benz(a)anthracene	1000	35 U	55000	54	24	30	4	2
Benzo(a)pyrene	1000	13 J	50000	54	21	33	4	2
Benzo(b)fluoranthene	1000	16 NJ	83000	54	19	35	7	4
Benzo(k)fluoranthene	3900	18 J	35000	54	24	30	1	1
Chrysene	3900	13 J	53000	54	16	38	2	2
Dibenz(a,h)anthracene	330	25 J	11000	54	27	27	3	2
Indeno(1,2,3-cd)pyrene	500	27 J	53000	54	24	30	11	4

Notes:

[1] Table includes constituents detected at concentrations greater than applicable screening levels in one or more sample.

[2] TCLP samples are screened against the TCLP Regulatory Screening Levels contained in the Federal Code of Regulations, Section 2.6.1-Toxicity Characteristic. Context: Title 40 - Protection of Environment. CHAPTER I - ENVIRONMENTAL PROTECTION AGENCY. SUBCHAPTER I - SOLID WASTES. PART 261 - IDENTIFICATION AND LISTING OF HAZARDOUS WASTE. Subpart C - Characteristics of Hazardous Waste (2012-07-01). Non-TCLP Samples from Residential Areas are screened against NYSDEC Subpart 375-6 Remedial Program Residential SCOs. Non-TCLP Samples from Rights-of-Way Areas are screened against NYSDEC Subpart 375-6 Remedial Program Restricted-Residential SCOs.

[3] USEPA TCLP method is used to determine the appropriate disposal method under current NYSDEC and USEPA regulations.

[4] Total Number of Samples above the Screening Level includes only detected concentrations above the screening level.

NYSDEC = New York State Department of Environmental Control

USEPA = United States Environmental Protection Agency

SCO = soil cleanup objective

TCLP = Toxicity Characteristic Leaching Procedure

OU = Operable Unit

mg/L = milligram per liter

µg/Kg = microgram per kilogram

mg/Kg = milligram per kilogram

U = The analyte was analyzed for, but was not detected above the level of the detection quantitation limit shown.

J = The positive result reported is estimated either because the result is less than the limit of quantitation (LOQ) or because certain quality control criteria were not met.

NJ = The detection is tentative in identification and estimated value. Although there is presumptive evidence of the analyte, the result should be used with caution as a potential false positive and/or elevated quantitative value.

Table 3-4
Soil Boring Summary - OU1[1]
Study Area, Corning, NY

Sample Results	Observations			
	No Layer of fill material containing ash, brick and/or glass observed	Layer of fill material containing ash, brick and/or glass observed		
		0-2 ft bgs Only	0-2 ft bgs and > 2 ft bgs	> 2 ft bgs Only
Number of Soil Borings with All Soil Samples < SCOs[2]	361	10	6	18
Number of Soil Borings with One or More Soil Samples >SCOs in 0-2 ft bgs Only[2]	36	18	2	7
Number of Soil Borings with One or More Soil Sample >SCOs in 0-2 ft bgs and > 2 ft bgs[2]	5	2	27	34
Number of Soil Borings with One or More Soil Sample >SCOs in >2 ft bgs Only[2]	5	2	10	53
Number of Soil Borings with no Samples Collected[3]	9	0	0	0
Totals	**416**	**32**	**45**	**112**
		189		

Notes:

[1] Includes 534 soil borings on residential properties, 71 soil borings in the City of Corning ROW areas

[2] Samples collected in residential soil borings compared to residential SCOs and samples collected in ROW area soil borings compared to restricted residential SCOs.

[3] Soil borings were associated with test pit activities and because no layer of ash, brick and/or glass was observed in these soil borings, no samples were collected.

ft bgs = feet below ground surface

SCOs = New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives

ROW = Rights-of-Way

Table 3-5
Soil Boring Summary - OU2[1]
Study Area, Corning, NY

Sample Results	Observations			
	No Layer of fill material containing ash, brick and/or glass observed	Layer of fill material containing ash, brick and/or glass observed		
		0-2 ft bgs Only	0-2 ft bgs and > 2 ft bgs	> 2 ft bgs Only
Number of Soil Borings with All Soil Samples < SCOs[2]	4	0	0	1
Number of Soil Borings with One or More Soil Samples >SCOs in 0-2 ft bgs Only[2]	0	0	0	0
Number of Soil Borings with One or More Soil Sample >SCOs in 0-2 ft bgs and > 2 ft bgs[2]	0	0	0	4
Number of Soil Borings with One or More Soil Sample >SCOs in >2 ft bgs Only[2]	0	0	0	6
Totals	**4**	**0**	**0**	**11**
		11		

Notes:

[1] Includes 13 soil borings on residential properties and 2 soil borings in the City of Corning ROW

[2] Samples collected in residential soil borings compared to residential SCOs and samples collected in ROW area soil borings compared to restricted residential SCOs.

ft bgs = feet below ground surface

SCOs = New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives

ROW = Rights-of-Way

Table 3-6
Soil Boring Summary - OU5[1]
Study Area, Corning, NY

Sample Results	Observations			
	No Layer of fill material containing ash, brick and/or glass observed	Layer of fill material containing ash, brick and/or glass observed		
		0-2 ft bgs Only	0-2 ft bgs and > 2 ft bgs	> 2 ft bgs Only
Number of Soil Borings with All Soil Samples < SCOs[2]	212	17	14	5
Number of Soil Borings with One or More Soil Samples >SCOs in 0-2 ft bgs Only[2]	10	12	7	1
Number of Soil Borings with One or More Soil Sample >SCOs in 0-2 ft bgs and > 2 ft bgs[2]	17	0	30	11
Number of Soil Borings with One or More Soil Sample >SCOs in >2 ft bgs Only[2]	2	0	34	2
Totals	**241**	**29**	**85**	**19**
		133		

Notes:

[1] Includes 339 soil borings on residential properties and 35 soil borings in the City of Corning ROW

[2] Samples collected in residential soil borings compared to residential SCOs and samples collected in ROW area soil borings compared to restricted residential SCOs.

ft bgs = feet below ground surface

SCOs = New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives

ROW = Rights-of-Way

4. REMEDIAL OBJECTIVES AND GOALS

Remedial action objectives (RAOs) are established for remedial alternatives in the FFS/AA to ensure that remedial activities meet the threshold criteria of providing overall protection of human health and the environment. Effective RAOs address the potential exposure and migration pathways for Subject Material in the Study Area. Additionally, in accordance with the United States Environmental Protection Agency (US EPA) and New York State guidance, development of RAOs for the Study Area includes consideration of Standards, Criteria and Guidance (SCGs).

4.1 CONSTITUENTS OF POTENTIAL CONCERN (COPCS)

The COPCs for OU1, OU2 and OU5 are arsenic, cadmium, and lead.

4.2 STANDARDS, CRITERIA, AND GUIDANCE (SCGS) AND APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Remedial actions in OU1, OU2 and OU5 should meet New York State SCGs as well as Federal Applicable or Relevant and Appropriate Requirements (ARARs). In accordance with 6 NYCRR Part 375-1.8(f) remedial actions will 1) "*conform to standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable, or that are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with*" and 2) "*consider applicable Department guidance*." NYSDEC's DER-10 Technical Guidance for Site Investigation and Remedial defines SGSs as "*Mean standards and criteria that are generally applicable, consistently applied and officially promulgated, that are either directly applicable, or that are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with, and with consideration being given to guidance determined, after the exercise of scientific and engineering judgement, to be applicable. This term incorporates both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) concept of "applicable or relevant and appropriate requirements" (ARARs) and the EPA's "to be considered" (TBC) category of non-enforceable criteria or guidance"* [DER-10 Section 1.3(b)71].

According to the US EPA (1988), ARARS are defined as follows:

- ***"Applicable requirements*** *are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a site.*"

- ***"Relevant and appropriate requirements*** *are those cleanup standards, standards of control or other substantive environmental protection requirements, criteria or limitation promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site.*"

ARARs are divided into the following categories:

- **Chemical-specific requirements** are health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. These limits may take the form of cleanup levels or discharge levels.

- **Location-specific requirements** are restrictions on activities that are based on the characteristics of a site or its immediate environment. An example would be the restrictions on wetlands development.

- **Action-specific requirements** are controls or restrictions on particular types of activities in related areas such as hazardous waste management or wastewater treatment.

Identification of primary chemical-specific, location specific, and action-specific ARARs for the Study Area is summarized in Table 4-1.

4.3 REMEDIAL ACTION OBJECTIVES

Considering the COPCs, the evaluation of SCGs, and input provided by NYSDEC, the RAOs developed for this FFS/AA include the following:

1. Prevent human incidental ingestion and dermal contact with Subject Material.

2. Prevent human inhalation of Subject Material that may be disturbed and suspended in air as particles or dust.

3. Achieve SCOs, as required by NYSDEC Part 375 throughout OU1, OU2 and OU5.

Of the above-listed RAOs, the data indicate the following:

- With respect to RAO1 and RAO2:
    - The primary potential exposure pathways to constituents at concentrations greater than the SCOs are incidental ingestion and dermal contact. A majority of the surface area in OU1, OU2 and OU5 is maintained lawns with sod or impervious surface (including but not limited to asphalt roadways, concrete walkways, houses, sheds, patios, etc.)
- With respect to RAO3
    - At 109 of 295 properties sampled, all sample results collected at each individual property are less than or equal to the SCOs, and therefore currently achieve RAO3. The remaining properties have some analytical results that are less than or equal to the SCOs and some that are greater than the SCOs.

Of the RAOs, achieving SCOs throughout the lateral and vertical extent of OU1, OU2 and OU5 (i.e., RAO3) would necessitate removal of Subject Material to depths that are technically impracticable due to the existing physical features of OU1, OU2 and OU5 (i.e., an inhabited residential area with 326 individual properties) and would not achieve materially greater protection with respect to RAO1 and RAO2.

SECTION 4 TABLE

Table 4-1
Summary of SCGs and ARARs
OU1, OU2 and OU5
Study Area, Corning, New York

Potential ARAR	Description	Study Area-specific information	Applicable or Relevant and Appropriate?
Chemical-Specific ARARs			
Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) [40 CFR Part 261]	Federal regulations for disposal of hazardous waste.	If the Subject Material from the Study Area is excavated, a waste is generated. TCLP extracts from some samples collected in the Study Area indicate that some constituents have been detected in the extracts at concentrations greater than TCLP criteria. Excavated material from the Study Area will be profiled to determine the disposal requirements.	TCLP criteria is applicable to the Study Area Subject Material when excavated and a waste is generated. Classification of the excavated material as a hazardous or nonhazardous waste is based on TCLP results of the waste profile for representative samples collected from the excavated material The material in place would not become a waste until it is excavated.
New York State Soil Cleanup Objectives (SCOs) [6 NYCRR Part 375-6.8(b)	New York State guidance soil cleanup objectives. Samples collected on residential properties are screened against NYSDEC residential SCOs and samples collected in the City of Corning rights-of-way are screened against NYSDEC restricted-residential SCOs	SCOs are applicable based on the residential use of properties within OU1, OU2 and OU5 in the Study Area. Analytical sampling to date indicates the presence of some constituents at concentrations greater than SCOs.	SCOs are applicable to OU1, OU2, and OU5 based on the current and anticipated future use of the properties. If future use of properties change, the appropriate SCOs would apply.
New York State Commissioner Policy on Soil Cleanup Guidance (CP-Soil)	Commissioner policy is to be used in conjunction with applicable New York State guidance for restricted use soil cleanup objectives	Residential CP-51 standards may apply based on the residential use of properties within OU1, OU2 and OU5 in the Study Area.	Per communication with NYSDEC, certain CP-51 criteria do not apply to the Study Area. The constituents included in CP-51 are not COPCs within the Study Area.
Location-Specific ARARs			
Protection of Wetlands Executive Order No. 1190 in furtherance of the National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq.)	Activities performed in a wetlands area are required to take actions to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of the wetlands.	No wetlands are known to exist within OU1, OU2 and OU5 of the Study Area.	Not applicable, relevant or appropriate. This requirement is only applicable if it is determined that Study Area activities impact a wetland.
Floodplain Management Executive Order No. 11988 in furtherance of the National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq.)	Action to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains.	The subject portions of the Study Area (OU1, OU2 and OU5) are not located within a 100-year floodplain.	Not applicable or relevant. The proposed activities in OU1, OU2 and OU5 are conducted in areas outside of and protected by the USACOE engineered berm and flood control area.
Archeological and Historic Preservation Act (54 USC 312501-312508)	Provides for the preservation of historical and archeological data which might otherwise be destroyed or irreparably lost due to a Federal action.	The subject portions of the Study Area (OU1, OU2 and OU5) could possibly contain archeological artifacts in the subsurface. No historic properties, landmarks, or monuments are known to be within this area.	Not applicable since the removal will not be a federal action. May be relevant and appropriate if significant historic archeological artifacts are encountered during excavation activities in the OU1, OU2 and OU5 areas.
Action-Specific ARARs			
Endangered Species Act (ESA) 50 CFR 402.04 and 50 CFR 402.01	Actions must not threaten the continued existence of a listed species. Actions must not destroy a critical habitat.	No known listed species have been identified in the subject portions of the Study Area or immediate area. Actions proposed in this FFS/AA in the remedial action alternatives are not expected to disturb or affect a critical habitat or listed species.	Not applicable or relevant.
New York State Fish, Wildlife and Marine Standards: 6 NYCRR Part 182 (Endangered & Threatened Species of Fish & Wildlife), 6 NYCRR Part 608 (Use and Protection of Waters); 6 NYCRR Pert 663 (Freshwater Permit Requirements), 6 NYCRR 664 (Freshwater Wetland Maps and Classifications)	Actions must not threaten the continued existence of a listed species. Actions must not destroy a critical habitat.	No known listed species have been identified in the subject portions of the Study Area or immediate area. Actions proposed in this FFS/AA in the remedial action alternatives are not expected to disturb or affect a critical habitat or listed species.	Not applicable or relevant.

Table 4-1 (continued)
Summary of SCGs and ARARs
OU1, OU2 and OU5
Study Area, Corning, New York

Potential ARAR	Description	Study Area-specific information	Applicable or Relevant and Appropriate?
Action-Specific ARARs (continued)			
U.S. EPA Hazardous Waste Management Regulations (40 CFR 260-264)	These regulations contain requirements for treatment, storage, and disposal of hazardous waste at Resource Conservation and Recovery Act (RCRA) facilities. Includes regulations for generators and transporters of hazardous waste.	A small portion of the excavated material may be classified as hazardous waste based on TCLP results.	Applicable during storage, handling and staging activities if hazardous waste is generated during implementation of remedial actions. Storage of RCRA material should not exceed 90 days.
Occupational Health and Safety Administration (OSHA) construction (29 CFR 1926) and general industry standards (29 CFR 1910)	These regulations contain requirements for workers involved in construction and general operations.	Remedial activities in the Study Area involve construction equipment and potentially, some hazardous waste.	Applicable. If hazardous waste is generated during implementation of a remedial activities, workers must have Hazardous Waste Operation and Emergency Response (HAZWOPER) training. Also applicable to construction activities such as excavation.
U.S. Department of Transportation rules contained in 49 CFR and for general transportation requirements and 49 CFR Parts 172 - 179 for the transport of hazardous materials, 6 NYCRR Part 364 (Waste Transporters), 370 (Hazardous Waste Management System: General), 371 (Identification and Listing of Hazardous Waste), 372 (Hazardous Waste Manifest System and Related Standards for Generators, Transported and Facilities)	These regulations contain general transportation requirements and requirements for transporting hazardous waste, including but no limited to packaging, labeling and manifesting.	Remediation activities involve the transportation of excavated material over roadways by haul trucks to disposal facilities. Some of the excavated material may be classified as hazardous waste.	Applicable.
Environmental Remediation Programs (6 NYCRR Part 375)	These regulations contain requirements for environmental remediation programs.	Work performed in the Study Area to date and anticipated in the future is considered environmental remediation.	Applicable. Work performed in the Study Area to date and anticipated in the future is under the oversight of the NYSDEC and is being performed under the applicable regulations.
Land Disposal Restrictions (6 NYCRR Part 376)	These regulations contain requirements and restrictions for land disposal in New York State.	Materials subject to land disposal requirements could be generated during the implementation of the remedial alternatives.	These regulations are applicable if hazardous waste is generated during remediation activities.
NYSDEC State Pollutant Discharge Elimination System (SPDES) Permit Program	General Permit for Stormwater Discharges from Construction Activity	Construction activities within the Study Area may require a NYSDEC SPDES permit for construction activities.	Applicable. These regulations are applicable depending upon the planned activities and disturbance area.
New York State 6 NYCRR Part 200 (General Provisions), 6 NYCRR Part 201 (Permits and Registrations), 6 NYCRR Part 211 (General Prohibitions) 6 NYCRR Part 257 (Air Quality Standards)	These regulations contain requirements for air emissions.	The COPCs are not volatile compounds. However, Subject Material may be disturbed during remediation activities that could be inhaled if airborne dust or soil particles are generated.	Not relevant or applicable. Dust suppression and air monitoring are implemented during construction activities in accordance with OSHA requirements, the Health & Safety Plan and the Community Air Monitoring Plan (CAMP).

Notes:
SCGs - Standards, Criteria, and Guidance
ARARs - Applicable or Relevant and Appropriate Requirements
OU1 - Operable Unit 1 (Residential Area)
OU2 - Operable Unit 2 (Residential Area at the Eastern End of Corning Boulevard)
OU5 - Operable Unit 5 (Residential Expansion Area)

5. SCREENING OF TECHNOLOGIES AND DEVELOPMENT OF ALTERNATIVES

5.1 SCREENING OF REMEDIAL TECHNOLOGIES

WESTON performed a remedial technology screening to identify and evaluate possible remedial technologies to assess their effectiveness and feasibility for application to OU1, OU2 and OU5, and to identify whether any such technologies had limitations which prevented or restricted their possible application in the OU1, OU2 and OU5. In addition to excavation and removal alternatives retained for further discussion below, this screening process evaluated capping/covering, fixation, soil washing, chemical extraction, in-situ thermal treatment/vitrification and bioremediation/ phytoremediation. The following is a brief description of each evaluated remedial technology and reasons why it was not retained for purposes of this FFS/AA.

1. Capping/Covering: This technology involves placement of clean soil over a permeable geotextile or installation of another physical barrier or covering (such as a flexible membrane liner) over the Subject Material. Due to absence of impacts to groundwater a membrane liner is not needed. A soil cover can feasibly be placed over all areas to be remediated, but doing so does not remove affected materials and would require either clearing or scraping of vegetation to remove brush and other surface materials and their eventual replacement. This approach was retained, as discussed below, for combination with excavation or as a means to provide a soil barrier over deeper affected Subject Material, and remains a possibility for larger open areas or fields, but was not retained as a standalone technology for tight or localized residential areas due to the impracticability of having increased elevation near houses or structures.

2. Fixation/Stabilization: This technology involves the addition of a reactive material (such as cement or fly ash) to restrict the solubility or mobility of constituents in the matrix by encapsulating or trapping the mobile constituents. Fixation or stabilization can be done in-situ or ex-situ, but does not remove the constituents or reduce their concentrations. Typically this technology is used for inorganic materials, but based on groundwater sample results, the potential migration of COPCs is not a concern, so this technology was not retained for further evaluation. Also, the increase in volume and placement of a soil layer would result in higher ground surface elevations near homes and other structures, and pose processing logistics that are not appropriate for OU1, OU2 and OU5.

3. Soil Washing: Soil washing is an ex-situ process involving removal of the Subject Material, removal of oversized material, washing the remaining soil (with water and

sometimes surfactants), draining, dewatering and returning the washed soil back into the excavation area. Typically this is best applied to coarse soils with small amounts of fines, and is not suitable to materials containing significant amounts of fine sand, silt or clay, such as found at OU1, OU2 and OU5. Processing would be difficult in a residential area, with staging of multiple large pieces of equipment, washing agents, and wastewater streams including water, sediment and sludge. This technology affords no benefits over the retained technologies.

4. Chemical Extraction: This is similar to soil washing but does the washing in a tank or separator with an organic solvent or acid to extract inorganics and metals (and the solvent or acid is regenerated and reused). This technology concentrates on separation of fine particles (clay and silt) in the soil matrix where constituents tend to bind (and is best applied to coarse soils with small amounts of fines, unlike the soils within OU1, OU2 and OU5). This approach involves excavation, extraction and treatment in the tank, and returning the treated soils to the excavation area. This technology has all the disadvantages of soil washing and has uncertain effectiveness, so it was not retained as a technology for further consideration.

5. Thermal Treatment/Vitrification: This technology involves the in-place heating of soils to volatilize and remove organic constituents, or, in the case of vitrification, heating the soils to the point that it fuses and vitrifies (turns to molten glass creating a solid mass that immobilizes the constituents). There are various methods of generating the heat needed for either approach. The thermal treatment technology is not typically implemented for metals and inorganics, since they do not have the ability to volatilize in significant amounts, are not thermally destroyed and would be virtually impossible to implement in a residential setting due to space constraints, moreover it will not reduce the metals, just encapsulate them in a vitrified matrix. Therefore, this technology was deemed not applicable or appropriate for implementation within OU1, OU2 and OU5.

6. Bioremediation/Phytoremediation: This technology uses plants to remove contaminants from soils through uptake of nutrients and accumulation of inorganics and metals into the plant's biomass, and then harvesting the plants and disposing them off-site at a permitted facility. Property owners would have to maintain specific types of vegetation which may not be compatible with their current or preferred landscaping. The limited uptake of the COPCs, the short growing season, and large number of plants required and the requirement for harvesting and replanting are drawbacks for use of this technology within OU1, OU2 and OU5.

As a result of this screening process, the retained remedial technologies are limited excavation with a soil cover, as discussed in greater detail below.

5.2 DEVELOPMENT OF ALTERNATIVES

With the exception of Alternative 1: No Action, the development of alternatives is focused on the remedial technologies of limited excavation with a soil cover, and includes variations of excavation and cover as the primary means to address the Subject Material. As indicated in Section 1.1 and discussed further above, considering the conditions of OU1, OU2 and OU5 (e.g., residential properties are relatively small lots and primarily single family homes that are closely spaced, soil and layers of fill material containing ash, brick and/or glass are the only environmental media that needs to be addressed, and the primary exposure pathways are incidental ingestion and dermal contact), other methods or technologies are not feasible for addressing the Subject Material.

5.2.1 Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves OU1, OU2 and OU5 in their present condition and does not provide any additional protection of human health or the environment. Additional detail for this alternative is provided in Section 6.1.

5.2.2 Alternative 2: Excavate up to 2 Feet With a Soil Cover

In this alternative, subject to property owner consent to access, Subject Material is excavated to a depth of up to 2 ft bgs and disposed off-site at a permitted facility. Where characterization activities and analytical results indicate that there are constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs, a demarcation layer is installed in the excavation area at the base of the excavation over the existing in-place Subject Material. Imported soil backfill material would be placed over the demarcation layer to grade. The disturbed area would be re-vegetated.

No excavation would be conducted and no demarcation layer will be installed in areas where characterization activities and analytical results indicate that there are constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs, and no Subject Material is present at depths less than 2 ft bgs (in the existing soil cover).

No excavation would be conducted in areas covered by building footprints and paved public roadways. At the discretion of the NYSDEC, isolated samples with concentrations greater than SCOs may be left in place, because the disturbance caused by the excavation to remove these

materials would likely outweigh the benefit of removal. This alternative includes institutional and engineering controls in the form of City of Corning Building Code notification requirements regarding potential excavations greater than 2 ft bgs and a Site Management Plan (SMP) to prevent potential exposure of residents to constituents at concentrations greater than the SCOs, at depths greater than 2 ft bgs. Additional detail for this alternative is provided in Section 6.2.

5.2.3 Alternative 3: Excavate up to 15 Feet and Backfill

In this alternative, subject to property owner consent to access, Subject Material would be excavated to a depth of up to 15 ft bgs and disposed off-site at a permitted facility. A 15 foot excavation could eliminate the need for institutional controls such as City of Corning Building Code notification requirements and an SMP, or an environmental easement or deed restriction in accordance with DER-10 [DER-10 1.12 (b)1.iii] in a residential area. Imported soil backfill material would be placed in the excavation to grade and the area would be re-vegetated. This alternative includes institutional controls to prevent exposure to inaccessible subsurface Subject Material. Additional detail for this alternative is provided in Section 6.3.

6. ALTERNATIVES ANALYSIS

This section presents an analysis of the alternatives identified in Section 5 to address the Subject Material in OU1, OU2 and OU5. Each alternative is evaluated on the following criteria set forth in the 6 NYCRR 375-1.8(f) and DER-10.

Threshold Criteria

Overall protection of human health and the environment and conformance to SCGs are threshold requirements that each alternative must meet in order to be eligible for selection.

- **Overall Protection of Human Health and the Environment** – This criterion involves an assessment of whether a remedy provides adequate protection of human health and the environment. The remedy contains a description of how risks posed through each exposure pathway are eliminated, reduced, or controlled. The selected remedy must meet this criterion.

- **Conformance with SCGs and ARARs** – This criterion involves an assessment of whether a remedy conforms to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The remedy also must take into consideration guidance as appropriate. The selected remedy must meet this criterion unless good cause exists if any of the following are present:

    - The proposed action is only a part of a complete program or project that will, as a whole, conform to such standard or criterion upon completion;

    - Conformity to such a standard or criterion will result in greater risk to the public health and the environment than alternatives;

    - Conformity to such a standard or criterion is technically impracticable from an engineering or scientific perspective; or

    - The program or project will attain a level of performance that is equivalent to that required by the standard or criterion through use of another method or approach.

Primary Balancing Criteria

- **Long-term Effectiveness and Permanence** – This criterion involves an assessment of the long-term effectiveness and permanence of an alternative or remedy after implementation.

- **Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment** – This criterion involves an assessment of the ability of an alternative or remedy to reduce toxicity, mobility and volume of constituents at concentrations greater than the SCOs. Preference is given to remedies that permanently or significantly reduce the toxicity, mobility and volume of constituents at concentrations greater than the SCOs at the site.

- **Short-Term Impact and Effectiveness** – This criterion involves an assessment of the potential short-term adverse environmental impacts and human exposures during construction and/or implementation of an alternative or remedy.

- **Implementability** – This criterion involves an assessment of the technical and administrative feasibility of implementing an alternative or remedy.

- **Cost Effectiveness** – This criterion involves an assessment of the overall cost effectiveness of an alternative or remedy. A remedy is cost effective if its costs are proportional to its overall effectiveness.

- **Land Use** – This criterion involves an assessment of the current, intended and reasonably anticipated future use of the site and its surroundings, as it relates to the alternative or remedy, when unrestricted levels are not achieved.

Green Remediation Practices Criterion

The green remediation practices criterion requires each alternative to be evaluated for consistency with USEPA's and NYSDEC's Green Remediation (DER-31) concepts and strategies which consider the environmental consequences of remedial actions including energy requirements, air emissions, material consumption, resource consumption, and waste generation. The criterion provides a goal of using the best management practices (e.g., clean diesel technology, waste minimization, resource conservation, reduction of greenhouse gases (GHGs) and other air emissions, ecological and soil preservation) to reduce demands on the environment ("footprint"). However, it is important to note that green remediation concepts are not used to preclude appropriate and necessary cleanup of environmental contamination. These policies are intended to pro-actively apply sustainable methods to remediate efficiently, cost-effectively, and with reduced environmental impacts while still protecting public health and the environment and striving to achieve established cleanup goals.

NYSDEC's Program Policy, DER-31 (Green Remediation) states that alternatives with the following characteristics will likely be the greenest:

- Fewer short-term and long-term ancillary impacts to the environment;
- Fewer GHG emissions;

- Smaller environmental footprint;
- Achieves the remedial action objectives more sustainably;
- Allows for the greenest reuse;
- Achieves a complete and permanent cleanup; and
- Permanently and significantly reduces the toxicity, mobility or volume of contamination.

Modifying Criteria

- **State and Community Acceptance** – This criterion will be considered during remedy selection by NYSDEC after public comment has been received for the alternatives.

6.1 ALTERNATIVE 1: NO ACTION

6.1.1 Description

In this alternative, no remedial action is conducted to address Subject Material in OU1, OU2 and OU5. No institutional or engineering controls are implemented. The properties in OU1, OU2 and OU5 remain unchanged and in their current condition.

6.1.2 Overall Protectiveness of Human Health and the Environment

The no action alternative does not mitigate potential environmental or human exposure to Subject Material in OU1, OU2 and OU5. However, the potential for incidental ingestion of residual soil with constituents at concentrations greater than SCOs on the surface of home-grown vegetables can be mitigated. Washing vegetables removes this residual soil and interrupts the exposure pathway.

6.1.3 Conformance with SCGs and ARARs

The no action alternative does not conform with the SCGs. Specifically, Subject Material is not addressed in OU1, OU2 and OU5 and thus remains unaltered.

6.1.4 Long-Term Effectiveness and Permanence

The no action alternative would not address Subject Material. Potential exposure pathways remain and no engineering or institutional control would be implemented to prevent or reduce potential exposures over the long-term.

6.1.5 Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment

Implementation of the no action alternative would not result in a reduction of toxicity, mobility, or volume of the Subject Material in OU1, OU2 and OU5.

6.1.6 Short-Term Impact and Effectiveness

Since there is no construction, maintenance, or monitoring activity conducted in this alternative, there is no significant impact to the environment and human exposure in the short-term. However, this alternative is not effective short-term or long-term.

6.1.7 Implementability

While technically, this alternative is readily implemented, it is not feasible administratively, as approval from NYSDEC and community acceptance are not expected.

6.1.8 Cost Effectiveness

There is no cost associated with this alternative.

6.1.9 Land Use

The individual properties within OU1, OU2 and OU5 are zoned residential (see Figure 2-1), and the current and reasonably anticipated future use of these properties is residential. The no action alternative is not consistent with residential land use due to the presence of Subject Material in surficial soil in OU1, OU2 and OU5.

6.1.10 Green Remediation Practices

Since no remedial activities are conducted in Alternative 1, the green remediation practices evaluation criterion is not applicable. DER-31 specifies that the policy is not intended to encourage, and does not justify, implementation of a “no action” or lesser remedy when a more comprehensive remedy is called for, appropriate and feasible. However, there are some “green” benefits associated with a no action alternative including: no fuel consumption, preservation of existing vegetative soil cover, no tree removal, minimizing generation of greenhouse gases, and no run-off or erosion, no waste generation, minimizing truck traffic, dust and noise, and conserving landfill resources.

6.2 ALTERNATIVE 2: EXCAVATE UP TO 2 FEET WITH A SOIL COVER

6.2.1 Description

Where property owners consent to access, Subject Material in the top two feet in OU1, OU2 and OU5 would be excavated and disposed at an off-site permitted facility. No excavation would be conducted in areas covered by building footprints and paved public roadways. At the discretion of NYSDEC, isolated samples with constituents at concentrations greater than SCOs may be left in place because the disturbance caused by the excavation to remove these materials would likely outweigh the benefit of removal. In some cases, the NYSDEC may consider no removal around mature trees or other property features at the request of the property owner.

A detailed property-specific plan would be prepared to define the limits and extent of excavation for each property. The excavation plan would identify trees/vegetation, impervious covers and/or other property features to be protected and preserved at the request of the property owner, as well as those to be removed. Soil removal would typically be accomplished through the use of conventional earth moving equipment such as an excavator, backhoe, front-end loader, skid steer loader and/or other construction equipment. Smaller equipment (e.g., small to mid-size excavator and or a skid steer loader) may be used in this alternative depending on the excavation depth and location of the excavation relative to existing property structures and roadways. The depth of excavation would be controlled via GPS elevation through survey and/or field measurements.

Excavation activities would be performed in a controlled manner to minimize the exposed earthen areas and soil erosion. Shovels, rakes and other hand tools would be used as needed for precise removal of material around existing property structures, foundations and utilities.

Staging of excavated material would be conducted in a controlled manner such as (1) on a prepared pad lined with plastic sheeting (i.e., visqueen), bermed and tarped to provide containment and protection from precipitation, or (2) in roll-off containers. Wherever possible, excavated material would be directly loaded into trucks or into roll off containers for hauling to an appropriate facility or staging area.

Excavation activities would be performed in a matter such that erosion is adequately controlled and soil and sediments are not allowed to move into or onto any watercourse, adjacent properties,

roadways, parking areas, walkways or storm and sanitary sewers. In most of the areas, excavation would be conducted in a below grade manner which would minimize uncontrolled run-off. Staging/stockpiling areas would be bermed and covered/tarped. Water that collects in an excavation area would be allowed to infiltrate to the maximum extent practical. Excavation would proceed in a manner to minimize water management; however, excess water may have to be removed by pumping prior to backfill. Erosion and sedimentation (E&S) control measures would be implemented as needed, and inspected weekly and after each major storm event during the excavation activities. Maintenance and repair of the E&S control measures will be performed on an as needed basis.

Actions, such as water mist or other suitable methods, would be undertaken during excavation and transport activities to manage dust generation. Best construction practices would be used to minimize the tracking of soil onto neighborhood streets and/or highways.

Based on characterization results to date, the excavated material is expected to be classified as nonhazardous waste and disposed at a permitted solid waste facility. However, it is possible that, based on disposal profiling sample results, a small portion of the excavated material may be profiled as a hazardous waste. Such material would be transported in accordance with the federal regulations contained in 40 CFR 260 to 264 by Resource Conservation and Recovery Act (RCRA)-licensed haulers and disposed at a RCRA-permitted Subtitle C hazardous waste facility.

When characterization activities and analytical results indicate that there are constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs, a demarcation layer, typically a geotextile membrane, would be placed at the base of excavation between the subsurface in-place Subject Material and the imported backfill material. The excavated areas would be backfilled with structural fill and graded to the natural surrounding topographic contours or pre-determined elevations. Disturbed areas would be covered with a minimum of 6 inches of vegetative support soil (e.g., top soil, amended soil). Following placement of the vegetative support soil, sod or a natural seed blanket would be installed at the ground surface. Property-specific features that are necessary to be removed during excavation, such as fences, sheds, trees, above-ground pools, and limited areas of pavement would be restored to the extent practicable, in accordance with the detailed property-specific plan to be provided for each property at which excavation will occur.

In areas with constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs and where soil in the 0 to 2 ft bgs interval does not contain Subject Material, no excavation will occur and no demarcation layer will be placed. These areas will be identified in the detailed property-specific plan for each property.

This alternative includes reliance upon City of Corning Building Code notification requirements by owners in advance of any planned excavation at depths greater than 2 ft bgs and implementation of a SMP for the Study Area administered by Corning Incorporated. The SMP would provide procedures for the management of remaining residual constituents at depths greater than 2 ft bgs or otherwise inaccessible for excavation at the time of remediation.

6.2.2 Overall Protectiveness of Human Health and the Environment

This alternative is protective of human health and the environment for residential use. It prevents human exposure to Subject Material through removal, soil cover, and institutional control. If accessible, any such material would be removed from the ground surface to 2 ft bgs and replaced with clean compactable backfill, vegetative support soil, and sod or a natural seed blanket. Removal of Subject Material from the top two feet of soil would reduce potential health risks in all residential yards, especially considering that exposure frequency to soils at depth would be much lower than for surface soils. Removal of Subject Material beyond two feet would not achieve a meaningful additional reduction in health risks.

Over the long-term, the City of Corning Building Code notification requirement coupled with an area-wide SMP is the institutional control to address residual constituents at concentrations greater than SCOs. No environmental easement will be recorded. The SMP would provide procedures for the management of residual constituents at concentrations greater than SCOs, should excavation occur at a property in the future. Under the remediation program, each property owner in OU1, OU2 and OU5 where residuals remain will be required to adhere to the SMP. A map will be provided to each owner indicating the locations where residual constituents at concentrations greater than SCOs remain on their property. In addition, in many cases, these areas will be covered with the demarcation layer which will act as a visual indicator to the homeowner that the material below the demarcation layer, is subject to the requirements of the SMP. The map notes will refer

to the SMP for requirements and procedures for excavation that will apply to areas where residual constituents at concentrations greater than SCOs remain.

6.2.3 Standards, Criteria, and Guidance (SCGs) and ARARs

The 2 foot thick soil cover would meet the SCOs (6 NYCRR Part 375-6.8(b)) and the DER-10 Technical Guidance for soil cover (DER-10 4.1(f)2) for residential or restricted residential use.

Exposure to deeper residual constituents at concentrations greater than SCOs would be prevented by the clean soil cover or asphalt/pavement. Adherence to the City of Corning Building Code notification requirement and SMP would be the institutional control for management of the remaining residual constituents at concentrations greater than SCOs, at depths greater than 2 ft bgs.

Per 6 NYCRR 375-1.8(f)(2)(i) and DER-10 4.2(c)(1), a good cause exists for deviation from the requirements of DER-10 1.12(b)1 to allow the use of an SMP for residential land use because:

> 1) total excavation of Subject Material presents a greater potential impact to the neighborhood and residents through increased earthmoving activities, soil particle/dust generation, truck traffic, and deep excavations in residential areas and thus will result in greater risk to public health and the environment; and
>
> 2) total excavation is technically impracticable because some material may be inaccessible due to slope stability concerns, potential damage to integrity of adjacent structures, presence of underground utilities, and/or presence of structures (e.g., house, garage, etc.) over the Subject Material. The problems are all compounded by the residential setting and close proximity of the residential structures.

Excavation activities would be conducted in compliance with Occupational Safety and Health Administration (OSHA) regulations for excavations (29 CFR 1926 Subpart P (Excavations)) and other applicable Federal and local codes.

Transportation of excavated materials to the disposal facility would be conducted in accordance with U.S. Department of Transportation (DOT) (49 CFR) and New York State Department of Transportation (NYSDOT) regulations.

6.2.4 Long-Term Effectiveness and Permanence

Subject Material from the ground surface up to 2 ft bgs would be permanently removed from the property. The two foot soil cover or asphalt/pavement would provide a permanent barrier to prevent potential exposure to any residual subsurface constituents at concentrations greater than SCOs, and the integrity of the cover would be maintained through the implementation of the SMP. The SMP would provide direction for future potential construction activities that involve excavations below the cover or into the Subject Material, and information notification requirements as well as planned inspections and necessary repair activities to maintain the integrity of the soil cover.

6.2.5 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Implementation of this alternative would reduce permanently the volume of Subject Material from the ground surface to 2 ft bgs. The approximate total volume of Subject Material excavated in this alternative for OU1, OU2 and OU5 is 33,100 cubic yards (cy).

The COPCs, i.e., arsenic, cadmium, and lead, which were detected in Subject Material at concentrations greater than SCOs, were not detected in groundwater at concentrations greater than New York State Division of Water TOGS standards. Thus, these COPCs are not mobile at the Study Area in the dissolved phase. Mobility via dust or erosion is limited by maintenance of a cover.

The soil cover or asphalt/pavement provides physical protection of underlying residual constituents at concentrations greater than SCOs by covering and restricting disturbance of these materials. During excavation and backfill activities, dust will be controlled through dust suppression techniques and erosion will be controlled by best practices.

6.2.6 Short-term Impact and Effectiveness

Short-term exposure during excavation and backfill activities would be monitored and controlled in accordance with a Community Air Monitoring Plan (CAMP). Excavation activities would be conducted in a controlled manner to minimize the exposed earthen areas and the effect on possible soil erosion. The excavated material would be loaded out directly or staged in a controlled manner

such as (1) on a prepared pad lined with plastic sheeting (i.e., visqueen), bermed and tarped to provide containment and protection from precipitation or (2) in roll-off containers. Wherever, possible, excavated material would be directly loaded into trucks or roll-off containers for hauling to an appropriate landfill or staging area. This method for handling excavated material will be effective in the short-term by eliminating surficial exposure pathways (e.g., incidental ingestion, dermal contact).

Backfilling would occur after excavation activities are completed to minimize the time that excavations remain open. As such, excavation and disturbance may be suspended in the winter months when properties could not be successfully restored with sod/grass and stabilized. Limiting the time an excavation remains open will also assist in minimizing water management. Water that collects in an excavation will be allowed to infiltrate to the maximum extent practical; however, excess water may have to be removed by pumping prior to backfill.

Temporary construction of E&S control measures (e.g., silt fences, erosion eels) would be installed as needed, adjusted during the course of the work, and removed when the area is stabilized after completion of the work. Existing lawns are well established with little potential for disturbance or erosion. Excavation activities would be conducted in a manner such that erosion is adequately controlled and soil and sediments are not allowed to move into any watercourse, adjacent properties, roadways, parking areas, walkways or storm and sanitary sewers.

Construction health and safety perimeters would be established around the project work areas (i.e., exclusion zone) to prevent unauthorized entry. The perimeters are established through use of temporary barriers, fencing and/or signage to prevent access to the area during excavation and backfilling activities. The perimeter would remain in place until backfilling of the excavation is completed. During construction activities it may be necessary for short-term access restriction to driveways, roads and/or sidewalks.

While they will be minimized to the greatest extent possible, nuisance conditions of traffic and noise associated with haul trucks and work crews might temporarily occur. There may also be some temporary utility cut-offs to facilitate excavation and load out. Where possible, care would be taken to allow traffic to pass around the staging and excavation areas. The City of Corning

would be notified of planned excavation activities and locations within OU1, OU2 and OU5 in advance of the start of activities.

6.2.7 Implementability

This alternative can be implemented readily with conventional and smaller excavation and earth moving equipment and tools such as shovels. The equipment, such as a small to mid-size excavator and a skid steer loader, can fit into the smaller spaces between residences for excavation. Final grading and preparation near structures or property lines can be conducted using hand tools or landscaping equipment.

Removal of some sidewalks, driveways, walkways, fences, or other structures as well as trees and shrubbery to access the Subject Material will be minimized to the greatest extent possible. These features will be restored where reasonably practicable at the completion of excavation, backfilling, and placement of sod or seed blanket or equivalent.

In some instances, certain selected mature trees may not be removed (e.g., at the property owner's or other entity's request) resulting in a setback from the dripline of the trees for excavation to 2 ft bgs. The required setback for tree viability is determined by a qualified horticulturalist or arborist, who also can assist in determining the appropriate cover under the tree canopy extending from the dripline to the tree trunk.

A disturbance, excavation, removal and restoration schematic will be prepared for each property showing the limits of work and vegetation removal.

The construction time for implementation of Alternative 2 in OU1, OU2 and OU5 is estimated 3 to 5 years.

6.2.8 Cost Effectiveness

The cost estimate tables for Alternative 2 are provided in Appendix A. For cost estimating purposes, the following information regarding Alternative 2 is noted:

Capital Items

- It is assumed that 33,100 cy of Subject Material from the ground surface up to 2 ft bgs would be excavated for off-site disposal.

- For cost estimating purposes, it is assumed that 90% of the excavated material is disposed as nonhazardous waste and 10% is disposed as hazardous waste.

Annual Operations, Maintenance &Monitoring (OM&M) Items

- Annual OM&M costs include costs for inspection, reporting and management of residual constituents at concentrations greater than SCOs.

- For cost estimating purposes, it is assumed that annual OM&M would be conducted for 30 years.

- An Annual Performance Report would be prepared and submitted to NYSDEC for 30 years.

Estimated Cost

- Capital cost: $ 23,300,000

- Annual OM&M cost: Years 1-30, $ 36,000

- Total Net Present Value (NPV) (assuming a 30-year life and a 5% discount rate): $ 23,900,000

Alternative 2 is considered cost effective because the remedy:

1. Provides long-term effectiveness and permanence with respect to prevention of potential human exposure to Subject Material.

2. Reduces the volume of Subject Material from the ground surface to 2 ft bgs.

3. The short-term impact to the community and the environment would be minimized during excavation activities through use of engineering controls. While impacts due to traffic and equipment operation would be mitigated to the extent possible, some impact will still occur.

6.2.9 Land Use

The historic and current land use and zoning for the individual properties in OU1, OU2 and OU5 is residential. It is anticipated that this use will remain the same in the future and is consistent with current zoning.

6.2.10 Green Remediation Practices

As stated by NYSDEC, "Green Remediation" (or greener cleanups) can be defined as "*the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions"* (DER-31, Green Remediation). This criterion is evaluated to ensure that best remediation practices are employed with respect to: use of clean diesel technology, waste minimization, resource conservation, reduction of air emissions, ecological and soil preservation.

Alternative 2 would provide an efficient means to address potential human exposure to Subject Material while minimizing any potential short-term impact during remediation. The 2 ft bgs removal of Subject Material and soil cover in Alternative 2 would provide the required protection from human exposure with less disruption of the environment, use of resources, and potential for exposure during implementation over a shorter period of time than Alternative 3. This is discussed in more detail in Section 6.3.10 for Alternative 3. Thus, Alternative 2 would provide a "greener" remediation approach for virtually the same elimination of human exposure benefit offered by Alternative 3, since it would require less excavation, hence, less truck transportation, less fuel consumption, less generation of greenhouse gases, less run-off and erosion and less surface water exposure compared to Alternative 3. As described in Section 6.1.10 Alternative 1 is "greener" than both Alternative 2 and Alternative 3.

Additionally, it is likely that a significant portion of the excavated materials (i.e. soil) could potentially be beneficially reused for daily cover at the off-site disposal facility.

6.3 ALTERNATIVE 3: EXCAVATE UP TO 15 FEET AND BACKFILL

6.3.1 Description

Where property owners consent to access, Subject Material in OU1, OU2 and OU5 would be excavated to a depth of up to 15 ft bgs and disposed at an off-site permitted facility. Fifteen feet bgs is the depth at which there would be no requirement for institutional controls in accordance with DER-10 [DER-10 1.12 (b)1.iii]. No excavation would be conducted in areas covered by building footprints and paved roadways. At the discretion of NYSDEC, isolated samples with constituents at concentrations greater than SCOs may be left in place because the disturbance caused by the excavation to remove these materials would likely outweigh the benefit of removal. In some cases, the NYSDEC may consider no removal around mature trees or other property features at the request of the property owner.

A detailed property-specific plan would be prepared to define the limits and extent of excavation for each property. The excavation plan would identify trees/vegetation, impervious covers and/or other property features to be protected and preserved as well as those to be removed. Removal would be accomplished through the use of conventional earth moving equipment such as an excavator, backhoe, front-end loader, skid steer loader and/or other construction equipment. The deeper excavation depth requires larger equipment, however smaller equipment (*e.g.*, small to mid-size excavator and a skid steer loader) may be used as needed, depending on the location of the excavation relative to existing property structures and roadways. Sloping and shoring may be needed in areas of deeper excavation to protect roadways and structures/buildings. This could result in residual constituents being left in place to protect roadways and structures/buildings. The depth of excavation would be controlled via GPS elevation through survey and/or field measurements.

Excavation activities would be performed in a controlled manner to minimize the exposed earthen areas and the effect on soil erosion and collection of precipitation in the excavation. Shovels, rakes and other hand tools would be used as needed to maximize removal of material around existing property structures, foundations and utilities.

Staging of excavated material would be conducted in a controlled manner such as (1) on a prepared pad lined with plastic sheeting (i.e., visqueen), bermed and tarped to provide containment and protection from precipitation, or (2) in roll-off containers. Wherever possible, excavated material would be directly loaded into trucks or roll off containers for hauling to an appropriate facility or staging area.

Excavation activities would be performed in a matter such that erosion is adequately controlled and soil and sediments are not allowed to move into or onto any watercourse, adjacent properties, roadways, parking areas, walkways or storm and sanitary sewers. In most of the areas, excavation would be conducted in a below grade manner which would minimize uncontrolled run-off. Staging/stockpiling areas would be bermed and covered/tarped. Water that collects in an excavation area would be allowed to infiltrate to the maximum extent practical. Excavation would proceed in a manner to minimize water management; however, excess water may have to be removed by pumping prior to backfill. E&S control measures would be implemented as needed, and inspected weekly and after each major storm event during the excavation activities. Maintenance and repair of the E&S control measures will be performed on an as needed basis.

Actions, such as water mist or other suitable method, would be undertaken during excavation and hauling activities to manage dust generation. Best construction practices would be used to minimize the tracking of soil onto neighborhood streets and/or highways.

Based on analytical results to date, the excavated material is expected to be profiled as nonhazardous waste and disposed at a permitted solid waste facility. However, it is possible that, based on analytical results, a small portion of the excavated material may be profiled as a hazardous waste. Such material would be transported in accordance with the hazardous waste regulations contained in 40 CFR 260 to 264 by RCRA-licensed haulers and disposed at a RCRA-permitted Subtitle C hazardous waste facility.

The excavated areas would be backfilled with structural fill and graded to the natural surrounding topographic contours or pre-determined elevations. Disturbed areas would be covered with a minimum of 6 inches of vegetative support soil (e.g., top soil, amended soil). Following placement of the vegetative support soil, sod or a natural seed blanket would be installed at the ground surface.

Property-specific features that are necessary to be removed during excavation, such as fences, sheds, trees, aboveground pools, and limited areas of pavement would be restored to the extent practicable in accordance with the detailed property-specific plans to be provided for each property at which excavation will occur.

For any residual constituents at concentrations greater than SCOs, this alternative includes reliance upon City of Corning Building Code notification requirements by owners in advance of any planned excavation of depths greater than 2 ft bgs and implementation of a SMP administered by the Corning Incorporated. The SMP would provide procedures for the management of residual constituents at concentrations greater than SCOs that are inaccessible for excavation at the time of remediation. This could include soils under structures such as buildings or around trees or vegetation that is not removed.

6.3.2 Overall Protectiveness of Human Health and the Environment

This alternative meets overall protectiveness of human health and the environment for residential use. It eliminates existing or potential human exposure to Subject Material through removal, soil cover, and institutional control. If accessible, any such material would be removed to 15 ft bgs. The removed material is replaced with clean structural fill, vegetative support soil, and sod or a natural seed blanket. Therefore, potential human exposure to Subject Material would be eliminated.

Over the long-term, the City of Corning Building Code notification requirement coupled with an area-wide SMP is the institutional control to address residual constituents at concentrations greater than SCOs. The SMP would provide procedures for the management of residual constituents at concentrations greater than SCOs that were inaccessible for excavation at the time of remediation, should excavation occur at a property in the future. Under the remediation program, each property owner in OU1, OU2 and OU5 will be required to adhere to the SMP. A map will be provided to each owner indicating the locations where residual constituents at concentrations greater than SCOs remain on their property. The map notes will refer to the SMP for requirements and procedures for excavation that will extend into the areas where residual constituents remain.

6.3.3 Standards, Criteria, and Guidance (SCGs) and ARARs

Removal of Subject Material from the surface to 15 ft bgs would meet the Part 375 requirements (6 NYCRR Part 375-6.8(b)). Since the depth of excavation is up to 15 ft bgs, there is no need for a demarcation layer to identify underlying residuals, if any. Thus, with respect to soil cover thickness, this alternative exceeds the requirements under DER-10 Technical Guidance for soil cover (DER-10 4.1(f)2) for residential or restricted residential use.

Under this alternative, there may be areas where Subject Material is inaccessible at depth due to slope stability concerns, limited room for larger equipment to excavate to the deeper depths, property owner requirements, existing underground utilities or other subsurface obstruction, etc. Adherence to the City of Corning Building Code notification requirements and SMP would be the institutional control to address the residual constituents at concentrations greater than SCOs that remain to depths of 15 ft bgs.

Per 6 NYCRR 375 1.8(f)(2)(i) and DER-10 4.2(c)(1), a good cause exists for deviation from the requirements of DER-10 1.12(b)1 to allow the use of an SMP for residential land use because:

> 1) total excavation of Subject Material is technically impracticable because some material may be inaccessible due to slope stability concerns, potential damage to integrity of adjacent structures, presence of underground utilities, and/or presence of structures over the Subject Material, and
>
> 2) total excavation presents a greater risk of injury because excavation into the inaccessible areas would be unsafe due to deeper excavations and slope stability.

Excavation activities would be conducted in compliance with OSHA regulations for excavations (29 CFR 1926 Subpart P (Excavations)) and applicable Federal and local codes.

Transportation of excavated materials to the disposal facility would be conducted in accordance with U.S. DOT (49 CFR) and NYSDOT regulations.

6.3.4 Long-term Effectiveness and Permanence

Subject Material from the ground surface to 15 ft bgs would be permanently removed where practicable. The SMP would provide direction for future potential construction activities that might disturb residual constituents at concentrations greater than SCOs which could not be removed. If

all the Subject Material is accessible to 15 ft bgs and can be removed, then an SMP would not be necessary.

The effectiveness of this Alternative is comparable to Alternative 2 since the potential exposure pathway is blocked.

6.3.5 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Implementation of this alternative would reduce permanently the volume of Subject Material from the ground surface to 15 ft bgs. The approximate total volume of Subject Material excavated in this alternative for OU1, OU2 and OU5 is 104,700 cy.

The COPCs, i.e., arsenic, cadmium, and lead, which were detected in Subject Material at concentrations greater than SCOs, were not detected in groundwater at concentrations greater than New York State Division of Water TOGS standards. Thus, these COPCs are not mobile at the Study Area in the dissolved phase. Mobility via dust or erosion is eliminated.

There may be some residual constituents at concentrations greater than SCOs remaining after implementation of this alternative, but such soil and fill material would be either not accessible, or located at depth, and would be covered with 2 feet or more of clean backfill. Thus the potential for disturbance is limited.

6.3.6 Short-term Impact and Effectiveness

Due to the more extensive nature of excavation and volume of material moved, the following is noted for Alternative 3 in comparison to Alternative 2:

- It is more likely in Alternative 3 that residents would need to be temporarily relocated during excavation and backfilling activities.
- There is an increased potential for impact to an adjacent property due to deeper excavation in Alternative 3.
- The longer excavation schedule in Alternative 3 means more potential for dust generation and exposure.

- The larger volume of excavated material in Alternative 3 means more truck traffic, exhaust fumes, and noise.

As in Alternative 2, short-term exposure during excavation and backfill activities would be monitored and controlled in accordance with a CAMP. Excavation activities would be conducted in a controlled manner to minimize the exposed earthen areas and the effect on soil erosion. The excavated material would be staged in a controlled manner such as (1) on a prepared pad lined with plastic sheeting (i.e., visqueen), bermed and tarped to provide containment and protection from precipitation or (2) direct load out in roll-off containers. Wherever, possible, excavated material would be directly loaded onto trucks or into roll-off containers for hauling to an appropriate disposal facility or staging area.

Temporary construction of E&S control measures (e.g., silt fences, erosion eels) would be installed as needed, adjusted during the course of the work, and removed when the area is stabilized after completion of the work. Excavation activities would be conducted in a manner such that erosion is controlled via temporary measures and soil and sediments are not allowed to move into any watercourse, adjacent properties, roadways, parking areas, walkways or storm and sanitary sewers. In most of the areas, excavation will be conducted in a below grade manner which will minimize uncontrolled run-off. Staging/stockpiling areas will be bermed and covered/tarped. Water that collects in an excavation will be allowed to infiltrate to the maximum extent practical. Excavation will proceed in a manner to minimize water management; however, excess water may have to be removed by pumping prior to backfill. The temporary measures to control runoff will remain in place until backfill is completed and the surface is restored.

Backfilling would occur soon after excavation activities are completed to minimize the time that excavations remain open. As such, excavation and disturbance may be suspended in the winter months since properties could not be successfully restored with sod/grass and stabilized.

Construction health and safety perimeters would be established around the project work areas (i.e., exclusion zone) to prevent unauthorized entry. The perimeter would be established through use of temporary barriers, fencing and/or signage to prevent access to the area during excavation and backfilling activities. The perimeter would remain in place until backfilling of the excavation is completed.

Traffic and noise associated with haul trucks and work crews would occur during this alternative. Traffic routing, sidewalks, school bus stops may be temporally re-routed or relocated. Where possible, care would be taken to allow some residential traffic to pass around the staging and excavation areas. The City of Corning would be notified of planned excavation activities and location within the Study Area in advance of the start of activities.

6.3.7 Implementability

This alternative can be implemented with conventional excavation equipment such as an excavator, backhoe, front-end loader, skid steer loader and/or other construction equipment.

There would be much more difficulty in implementing this alternative in a residential area between closely spaced houses and other structures to a depth of up to 15 ft bgs than to a depth of up to 2 ft bgs in Alternative 2. Due to a potential excavation depth of 15 ft bgs, shoring or benching would be required around some structures so that the excavation stays open and so that undermining the structures does not occur.

Implementation of Alternative 3 also requires the removal of more sidewalks, driveways, walkways, fences, or other structures as well as trees and shrubbery than Alternative 2 to access the Subject Material from the ground surface to 15 ft bgs. These features would be restored to the extent practicable at the completion of excavation, backfilling, and placement of sod or seed blanket or equivalent.

In some instances, certain selected mature trees may not be removed (e.g., at the property owner's or other entity's request) and there is a setback from the dripline of the trees for excavation. The required setback for tree viability is determined by a qualified horticulturalist or arborist, who also can assist in determining the appropriate cover under the tree canopy extending from the dripline to the tree trunk.

The estimated construction time for implementation of Alternative 3 at OU1, OU2 and OU5 will be much longer than for Alternative 2, and is estimated to take 5 to 7 years.

6.3.8 Cost Effectiveness

The cost estimate tables for Alternative 3 are provided in Appendix A. For cost estimating purposes, the following information regarding Alternative 3 is noted:

Capital Items

- It is assumed that 104,700 cy of Subject Material from the ground surface up to 15 ft bgs would be excavated for off-site disposal.
- For cost estimating purposes, it is assumed that 90% of the excavated material would be disposed as nonhazardous waste and 10% is disposed as hazardous waste.

Annual OM&M Items

- Annual OM&M costs include costs for inspection, reporting and management of residual constituents at concentrations greater than SCOs.
- For cost estimating purposes, it is assumed that annual OM&M will be conducted for 30 years.
- An Annual Performance Report would be prepared and submitted to NYSDEC for 30 years.

Estimated Cost

- Capital cost: $ 70,400,000
- Annual OM&M cost: Years 1 – 30, $ 36,000
- Total NPV (assuming a 30-year life and a 5% discount rate): $ 71,000,000

Alternative 3 is not considered cost effective because:

1. Compared to Alternative 2, Alternative 3 provides no additional long-term effectiveness and permanence that is commensurate with the additional cost.
2. While Alternative 3 reduces the volume of Subject Material from the ground surface to 15 ft bgs, the additional volume is located at a depth of greater than 2 ft bgs, which typically would be accessed only during an extensive construction project or subsurface utility work. Under Alternative 2, such Subject Material, when encountered, are appropriately addressed by the City of Corning Building Code notification requirements and SMP.

3. Due to the 3-fold increase in volume removed and additional 13 feet depth of excavation, the short-term impact to the community and the environment would be potentially significant. The larger removal volume means a longer amount of time for remedial activities, truck traffic, potential temporary relocation of residents, and potential disruption of normal residential activities. The deeper excavation depth requires larger equipment, more complex design to include shoring or sloping, and potentially, more water management than Alternative 2.

In summary, no additional increase in long-term effectiveness would be provided by Alternative 3, and implementation of Alternative 3 would result in more potential short-term impacts over a longer period of time than Alternative 2. Thus the significant increase in cost of Alternative 3 over Alternative 2 is not warranted.

6.3.9 Land Use

The historic and current land use and zoning for the individual properties in OU1, OU2 and OU5 in the Study Area is residential. It is anticipated that this use will remain the same in the future and is consistent with current zoning.

6.3.10 Green Remediation Practices

Implementation of Alternative 3 would result in the removal of a larger volume of Subject Material than in Alternative 2. The vehicle operations associated with this alternative would consume more fuel and would produce more engine exhaust and greenhouse gases. There would be increased volumes of excavated materials requiring disposal at licensed facilities and consuming more landfill space. Analytical results indicate that the COPCs are not migrating from the Subject Material downward to the groundwater. Therefore, removal of most or all of the Subject Material is not necessary for protection of human health and the environment and doing so may unnecessarily consume resources.

The 2 ft bgs removal and soil cover in Alternative 2 provides the required protection from human exposure via the surficial pathways with less disruption of the environment, use of resources, and potential for exposure during a shorter implementation period than Alternative 3. When compared to Alternative 2, implementation of Alternative 3 imposes a significantly larger environmental footprint as indicated below:

- Alternative 3 involves generation of approximately 104,700 cy of waste and Alternative 2 involves generation of approximately 33,100 cy of waste for disposal at an off-site facility.
- The increase in removal volume and depth of excavation would mean more time to implement and more potential for human exposure.
- The increase in removal volume would result in more trucks consuming fuel, generating emissions, and wear/tear of infrastructure and local roads. In terms of 20-ton haul trucks, that means an additional 5,400 truck trips.
- The increase in removal volume would result in more disposal facility space consumed.
- The increase in removal volume would result in more mature trees and vegetation being removed.

7. COMPARISON OF ALTERNATIVES

This section presents a comparative analysis of the alternatives, in Table 7-1, to identify key tradeoffs with respect to advantages and disadvantages under each of the analysis criteria for the retained remedial technologies discussed in this FFS/AA. The alternatives are ranked (1, 2, or 3) by criteria. The higher numbers are assigned to alternatives that better meet the criteria (i.e., a ranking of "1" is assigned to the alternative that least achieves the criteria). Therefore, the alternative with the highest total score is the favored alternative.

SECTION 7 TABLE

Table 7-1
Comparison of Alternatives
OU1, OU2 and OU5
Study Area, Corning, NY

	Alternative 1: No Action	Score	Alternative 2: Excavate up to 2 Feet With a Soil Cover	Score	Alternative 3: Excavate up to 15 Feet and Backfill	Score
Overall Protectiveness of Human Health and the Environment Potential Human Exposure Pathways: - Incidental ingestion - Inhalation - Dermal contact	- Would not mitigate potential environmental or human exposure pathways.	1	- Is protective of human health and the environment for residential use. - City of Corning Building code notification procedures and SMP are the institutional controls that provides procedures for the management of residual constituents at concentrations greater than SCOs. - Prevents human exposure to Subject Material.	2	- Meets overall protectiveness for residential use. - Potential human exposure to Subject Material would be eliminated if material is accessible during remediation. - City of Corning Building code notification procedures and SMP are the institutional controls that would provide procedures for the management of residual constituents at concentrations greater than SCOs that were inaccessible.	2
Standards, Criteria, and Guidance (SCGs)	- Would not conform with SCGs	1	- Soil in the top 2 feet (0-2 ft bgs) meet NYSDEC SCOs [6 NYCRR Part 375-6.8(b)] for residential use. - Would meet DER-10 guidance (DER-10 4.1(f)2) for soil cover and demarcation layer. - Per 6 NYCRR 375-1.8(f)(2)(i) and DER-10 4.2(c)(1), a good cause exists for deviation from the requirements of DER-10 1.12(b)1 to allow the use of an SMP for residential land use because: 1) total excavation of Subject Material presents a greater potential impact to the neighborhood and residents through increased earthmoving activities, soil particle/dust generation, truck traffic, and deep excavations in residential areas and thus will result in greater risk to public health and the environment and 2) total excavation is technically impracticable because some material may be inaccessible due to slope stability concerns, potential damage to integrity of adjacent structures, presence of underground utilities, and/or presence of structures over the Subject Material. The problems are all compounded by the residential setting and close proximity of the residential structures. - Would comply with solid waste (nonhazardous) and hazardous waste regulations. - Excavation activities up to 2 ft bgs would be conducted in compliance with OSHA regulations. - Transportation of excavated materials would be conducted in compliance with U.S. DOT and NYSDOT regulations.	2	- Removal of Subject Material in the top 15 feet (0-15 ft bgs) would meet NYSDEC SCOs [6 NYCRR Part 375-6.8(b)] for residential use. - Would exceed DER-10 guidance (DER-10 4.1(f)2) for soil cover, no demarcation layer needed since greater than 2 ft of clean soil cover. - Per 6 NYCRR 375-1.8(f)(2)(i) and DER-10 4.2(c)(1), a good cause exists for deviation from the requirements of DER-10 1.112(b)1 to allow the use of an SMP for residential use because: 1) total excavation of Subject Material is technically impracticable because some material may be inaccessible due to slope stability concerns, potential damage to integrity of adjacent structures, presence of underground utilities, and/or presence of structures over the Subject Material, and 2) total excavation presents a greater risk of injury because excavation into the inaccessible areas would be unsafe due to deeper excavations and slope stability. - Would comply with solid waste (nonhazardous) and hazardous waste regulations. - Deep excavation activities would require shoring/sloping to be conducted in compliance with OSHA regulations. - Transportation of excavated materials would be conducted in compliance with U.S. DOT and NYSDOT regulations.	2
Long-term Effectiveness and Permanence	- Would not address Subject Material. - Potential exposure pathways remain	1	- Subject Material from the ground surface up to 2 ft bgs are permanently removed from the property. - The 2 ft clean backfill/soil cover would provide a permanent barrier to prevent potential exposure to any residual subsurface constituents at concentrations greater than SCOs. - The City of Corning Building Code notification procedures and SMP would provide direction for future potential construction activities that would involve excavations below the demarcation barrier or into the Subject Material.	2	- Subject Material from the ground surface to 15 ft bgs would be permanently removed from the property, where practicable. - Clean backfill provides a permanent barrier to prevent exposure to any inaccessible subsurface constituents at concentrations greater than SCOs that remain at depth. - The City of Corning Building Code notification procedures and SMP would provide direction for future potential construction activities that disturb residual constituents at concentrations greater than SCOs which remain at depth to 15 ft bgs so that these controls remain permanent and effective.	2

Table 7-1
Comparison of Alternatives
OU1, OU2 and OU5
Study Area, Corning, NY

	Alternative 1: No Action	Score	Alternative 2: Excavate up to 2 Feet With a Soil Cover	Score	Alternative 3: Excavate up to 15 Feet and Backfill	Score
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	- Would not result in a reduction of toxicity, mobility, or volume of Subject Material.	1	- Would reduce permanently the volume of Subject Material from the ground surface up to 2 ft bgs. - The approximate total volume of Subject Material excavated in this alternative is 33,100 cy. - The COPCs detected in the Subject Material at concentrations greater than SCOs were not detected in groundwater at concentrations greater than TOGS standards and thus, are not mobile in the dissolved phase at the Study Area. - The 2 ft backfill/soil cover provides physical protection of the underlying residual constituents at concentrations greater than SCOs from possible direct contact and will restrict disturbance of these materials.	2	- Would reduce permanently the volume of Subject Material from the ground surface up to 15 ft bgs. - The approximate volume of Subject Material excavated in this alternative is 104,700 cy. - The COPCs detected in the Subject Material at concentrations greater than their respective SCO, were not detected in groundwater at concentrations greater than TOGS standards and thus, are not mobile in the dissolved phase at the Study Area. - There may be some residual constituents at concentrations greater than SCOs remaining after implementation of this alternative, but material would be either not accessible, or located at depth, and would be covered with 2 feet or more of clean backfill. - The potential for disturbance is limited.	3
Short-term Impact and Effectiveness	- Since there is no construction, maintenance, or monitoring activity conducted in this alternative, there is no significant impact to the environment and human exposure in the short-term. - However this alternative is not effective short-term or long-term.	2	- Short-term exposure during excavation and backfill activities is monitored and controlled in accordance with a CAMP. - Excavation activities would be conducted in a controlled manner to minimize the exposed earthen areas and the effect on possible soil erosion, dust generation and collection of precipitation as excavation water. - Temporary E&S control measures (e.g., silt fences, erosion eels) would be installed as needed, adjusted during the course of the work, and removed when the area is stabilized after completion of the work - Construction health and safety perimeters would be established around the project work areas (i.e., exclusion zone) to prevent unauthorized entry. - Minimal nuisance conditions of traffic and noise associated with haul trucks and work crews might occur temporarily. - Residents may need to be temporarily relocated during excavation and backfilling activities.	3	- It is more likely that residents would need to be temporarily relocated during excavation and backfilling activities. - Increased potential for impact to an adjacent property due to deeper excavation. - The longer excavation schedule means more potential for dust generation and exposure. - The deeper excavation may impact subsurface utilities or require temporary terminations. - The larger volume of excavated material means more truck traffic, exhaust fumes, and noise. As with Alternative 2: - Short-term exposure during excavation and backfill activities is monitored and controlled in accordance with a CAMP. - Excavation activities would be conducted in a controlled manner to minimize the exposed earthen areas and the effect on soil erosion. - Temporary E&S control measures (e.g., silt fences, erosion eels) would be installed as needed, adjusted during the course of the work, and removed when the area is stabilized after completion of the work. - Construction health and safety perimeters are established around the project work areas (i.e., exclusion zone) to prevent unauthorized entry. - Traffic and noise associated with haul trucks and work crews would be more likely to occur during this alternative.	1

Table 7-1
Comparison of Alternatives
OU1, OU2 and OU5
Study Area, Corning, NY

	Alternative 1: No Action	Score	Alternative 2: Excavate up to 2 Feet With a Soil Cover	Score	Alternative 3: Excavate up to 15 Feet and Backfill	Score
Implementability	- While technically, this alternative can be readily implemented, it is not feasible administratively, as approval from NYSDEC and community acceptance are not expected.	2	- Can be implemented readily with conventional smaller excavation equipment (small to mid-size excavator and a skid steer loader), landscaping equipment and hand tools. - The equipment can fit into the smaller spaces between residences and close to structures to facilitate excavation. - Detail work and tight spaces can be finished using hand tools. - Removal of sidewalks, driveways, walkways, fences, or other structures as well as trees and shrubbery to access the Subject Material will be minimized to the greatest extent possible. - These features will be restored where reasonably practicable and in accordance with the excavation/restoration plan at the completion of excavation, backfilling, and placement of sod or seed blanket or equivalent. - Certain selected mature trees may not be removed (e.g., at the property owner's or other entity's request) resulting in a setback from the dripline of the trees for excavation. - The required setback for tree viability is determined by a qualified horticulturalist or arborist, who also can assist in determining the appropriate cover under the tree canopy extending from the dripline to the tree trunk. - The estimated construction time for implementation of Alternative 2 in OU1, OU2 and OU5 is 3 to 5 years. - May involve digging around and under subsurface utilities such as gas, sewer, water, cable, power, and telecommunication, each of which needs to be addressed or temporarily terminated during site activities for safety.	3	- Can be implemented with conventional excavation equipment (excavator, backhoe, front-end loader, skid steer loader) and other construction equipment. - Would be much more difficult to implement this alternative in a residential area between closely spaced houses and other structures to a depth of up to 15 ft bgs than to a depth of up to 2 ft bgs in Alternative 2. - Due to a potential excavation depth of 15 ft bgs, shoring, sloping or benching would be required around some structures so that the excavation stays open and so that undermining the structures does not occur, resulting in residual constituents at concentrations greater than SCOs. - Involves digging around and under subsurface utilities such as gas, sewer, water, cable, power, and telecommunication, each of which needs to be addressed or temporarily terminated during site activities for safety. - Requires the removal of more sidewalks, driveways, walkways, fences, or other structures as well as trees and shrubbery than Alternative 2 to access the Subject Material from the ground surface up to 15 ft bgs. - These features would be restored to the extent practicable at the completion of excavation, backfilling, and placement of sod or seed blanket or equivalent and in accordance with the excavation/restoration plan. - Certain selected mature trees may not be removed (e.g., at the property owner's or other entity's request) and there is a setback from the dripline of the trees for excavation. - The required setback for tree viability is determined by a qualified horticulturalist or arborist, who also can assist in determining the appropriate cover under the tree canopy extending from the dripline to the tree trunk. - The estimated construction time for implementation of Alternative 3 in OU1, OU2 and OU5 will be much longer than Alternative 2 and is estimated to take 5 to 7 years.	1
Cost effectiveness (NPV)	- There is no cost associated with this alternative	3	$23,900,000	3	$71,000,000	2

Table 7-1
Comparison of Alternatives
OU1, OU2 and OU5
Study Area, Corning, NY

	Alternative 1: No Action	Score	Alternative 2: Excavate up to 2 Feet With a Soil Cover	Score	Alternative 3: Excavate up to 15 Feet and Backfill	Score
Land Use	- The individual properties within OU1, OU2 and OU5 of the Study area are zoned residential. - Is not consistent with residential land use due to the presence of Subject Material in OU1, OU2 and OU5.	1	- The historic and current land use for OU1, OU2 and OU5 in the Study Area is residential. - It is anticipated that this use will remain the same in the future and is consistent with current zoning.	3	- The historic and current land use for OU1, OU2 and OU5 in the Study Area is residential. - It is anticipated that this use will remain the same in the future and is consistent with current zoning.	3
Subtotal		**12**		**20**		**16**
Green Remediation (DER-31)	- Since no remedial activities are conducted in Alternative 1, the green remediation practices evaluation criterion is not applicable.	3	- Would provide an efficient means to address potential human exposure to Subject Material while minimizing any short-term impact during remediation. - The up to 2 ft bgs removal and soil cover would provide the required protection from direct contact human exposure with less disruption of the environment, use of resources, and potential for exposure during implementation over a shorter period of time than Alternative 3. - Would provide a "greener" remediation approach for virtually the same elimination of human exposure benefit offered by Alternative 3 (less excavation and therefore less truck transportation, less fuel consumption, and minimized greenhouse gases, etc.). - Alternative 2 involves excavation of approximately 33,100 cy of Subject Material that would be excavated for disposal at an off-site landfill.	2	- Would result in the removal of a larger volume of Subject Material than in Alternative 2. - However, analytical results indicate that the site COPCs are not migrating to any significant extent from the Subject Material downward to the groundwater. Therefore, removal of most or all of the Subject Material is not necessary for protection of human health and the environment and doing so may unnecessarily consume resources. - When compared to Alternative 2, implementation of Alternative 3 imposes a significantly larger environmental footprint as indicated below: • Alternative 3 would involve removal of approximately 104,700 cy of Subject Material for disposal at an off-site facility. • The increase in removal volume and depth of excavation would result in an extended construction schedule more potential for short-term impacts related to mud, dust, run-off, construction water, etc. • The increase in removal volume would result in more trucks consuming fuel, generating emissions, and wear/tear of infrastructure and local roads. In terms of 20-ton haul trucks, that means an additional 5,400 truck trips. • The increase in removal volume would result in more disposal facility capacity consumed. • The increase in removal volume would result in more mature trees and vegetation being removed as a result of setbacks and increased surface area disturbances.	1
Total		**15**		**22**		**17**

8. RECOMMENDED ALTERNATIVE

The recommended alternative is Alternative 2: Excavate up to 2 Feet with a Soil Cover. This alternative meets overall protectiveness for residential use with the least amount of disruption to the community, and the smallest environmental footprint. Prevention of the potential human exposure pathways (i.e., incidental ingestion, dermal contact, inhalation) is achieved by excavation of Subject Material from ground surface up to 2 ft bgs, use of a cover of either 2 feet of soil or asphalt/pavement, and implementation of an SMP.

Deeper excavations are possible, but impracticable, and do not provide any significant additional benefit with respect to overall health or environmental protectiveness. In comparison to excavations limed to 2 feet, deeper excavations result in more potential exposure during implementation, cause more disruption to the community for a longer period of time, impose a larger environmental footprint, require more complex construction when slope stabilization and shoring is needed around structures and subsurface utilities, and still would result in residual constituents at concentrations greater than SCOs. Deeper excavations thus are not cost-effective for the little, if any, additional benefit provided. Also, Subject Material is distributed across OU1, OU2 and OU5 and in many cases is adjacent to properties that require no excavation. Requiring deeper excavation at any property within OU1, OU2 and OU5 would result in disruption and impacts to adjacent properties that require no, or very limited, excavation.

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APPENDIX A

PLANNING LEVEL COST ESTIMATES

Planning Level Cost Estimate
Alternative 2: Excavate up to 2 feet and Install Soil Cover
Study Area, Corning, New York

					Inplace Volume	
OU1 - Surface soil removal only		13	properties		770	cyd
OU1 - Top 2 ft removal only		9	properties		2,260	cyd
OU1 - 2 ft removal with demarc. layer		43	properties		14,470	cyd
OU2 - 2 ft removal with demarc. layer		5	properties		3,590	cyd
OU5 - Surface soil removal only		5	properties		100	cyd
OU5 - Top 2 ft removal only		18	properties		1,690	cyd
OU5 - 2 ft removal with demarc. layer		34	properties		10,200	cyd
		127	properties	(rounded)	33,100	cyd
	Weight	1.5	tons/cyd	(rounded)	49,700	tons

1. Capital Costs

Sample and Analysis	$	15,000	/property	127	properties		$	1,905,000
Demolition of Structures in OU2	$	35,000	each	5	structures		$	175,000
Excavate Soils	$	150.00	/cyd	33,100	cyds		$	4,965,000
Transport and Disposal (Nonhaz)	$	100.00	/ton	44,730	tons	90%	$	4,473,000
Transport and Disposal (Haz)	$	275.00	/ton	4,970	tons	10%	$	1,366,750
Demarc Layer allowance	$	5.00	/cyd	28,260	cyds		$	141,300
Backfill	$	45.00	/cyd	33,100	cyds		$	1,489,500
Restoration Allowance							$	1,725,000
						Subtotal	$	*16,240,550*
Construction Management, Project Management, and Reporting							$	3,164,083
						Subtotal	$	*19,404,633*
Contingency						20%	$	3,880,927
						CAPITAL COSTS ROUNDED	**$**	**23,300,000**

2. Annual Costs for Inspection, Operations, Maintenance & Monitoring of the Soil Cover

Annual Inspections	$	15,000	/yr				$	15,000
Annual Report	$	15,000	/yr				$	15,000
						Subtotal	$	*30,000*
Contingency						20%	$	6,000
						ANNUAL MONITORING COSTS ROUNDED	**$**	**36,000**

Total Net Present Worth	30	years	5% discount rate	**$ 23,900,000**

Notes:
1. Estimate is based on soil borings and analytical data collected to date.
2. Estimate does not include any control measures associated with groundwater or surface water intrusion or remediation.
3. Estimate does not include costs for overexcavation, if required.
4. Estimate does not include costs to remove or shore underground or above ground utilities or structures.
5. Estimate does not include costs for NYSDEC oversight.
6. Estimate does not include cost associated with legal support or a value protection plan.
7. Estimate does not include cost to record easements on any properties.

Planning Level Cost Estimate
Alternative 3: Excavate up to 15 feet and Install Backfill
Study Area, Corning, New York

					Inplace Volume	
OU1 - Surface soil removal only		13	properties		770	cyd
OU1 - Top 2 ft removal only		9	properties		2,260	cyd
OU1 - Greater than 2 ft removal		43	properties		53,110	cyd
OU2 - Greater than 2 ft removal		5	properties		19,350	cyd
OU5 - Surface soil removal only		5	properties		100	cyd
OU5 - Top 2 ft removal only		18	properties		1,690	cyd
OU5 - Greater than 2 ft removal		34	properties		27,380	cyd
		127	properties	(rounded)	104,700	cyd
	Weight	1.5	tons/cyd	(rounded)	157,100	tons

1. Capital Costs

Sample and Analysis	$	15,000	/property	127	properties		$	1,905,000
Demolition of Structures in OU2	$	35,000	each	5	structures		$	175,000
Excavate Soils (includes shoring)	$	200.00	/cyd	104,700	cyds		$	20,940,000
Transport and Disposal (Nonhaz)	$	100.00	/ton	141,390	tons	90%	$	14,139,000
Transport and Disposal (Haz)	$	275.00	/ton	15,710	tons	10%	$	4,320,250
Backfill	$	65.00	/cyd	104,700	cyds		$	6,805,500
Restoration Allowance							$	1,725,000
						Subtotal	$	*50,009,750*
Construction Management, Project Management, and Reporting							$	8,593,463
						Subtotal	$	*58,603,213*
Contingency						20%	$	11,720,643
						CAPITAL COSTS ROUNDED	**$**	**70,400,000**

2. Annual Costs for Inspection, Operations, Maintenance & Monitoring of the Soil Cover

Annual Inspections	$	15,000	/yr				$	15,000
Annual Report	$	15,000	/yr				$	15,000
						Subtotal	$	*30,000*
Contingency						20%	$	6,000
						ANNUAL MONITORING COSTS ROUNDED	**$**	**36,000**

Total Net Present Worth	30	years	5% discount rate	**$ 71,000,000**

Notes:
1. Estimate is based on soil borings and analytical data collected to date.
2. Estimate does not include any control measures associated with groundwater or surface water intrusion or remediation.
3. Estimate does not include costs for overexcavation, if required.
4. Estimate does not include costs to remove or shore underground or above ground utilities or structures.
5. Estimate does not include costs for NYSDEC oversight.
6. Estimate does not include cost associated with legal support or a value protection plan.