AMENDED DECISION DOCUMENT

NM - Clinton Street - Schenectady MGP
Operable Unit Number 01: Clinton St. MGP
Schenectady, Schenectady County
Site No. 447053
Formerly Site No. V00474
March 2019

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT – AMENDED DECISION DOCUMENT

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Statement of Purpose and Basis

This Amended Decision Document presents the remedy for Operable Unit Number: 01: NM – Clinton Street Schenectady MGP site. The remedy for the site was amended to address new safety concerns received from the City of Schenectady. The remedial program the was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number: 01: NM – Clinton Street Schenectady MGP site and the public's input to the proposed amended decision document presented by the Department.

Description of Selected Remedy

The elements of the remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and

- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. In-situ solidification (ISS) will be implemented in the area south of Clinton Street previously identified for removal under the 2013 Decision Document. This area of ISS will extend west towards Broadway as shown on Figure 2. The treatment zone will extend vertically from the limits of the removal conducted under remedial element 3 (approximately four feet below grade) to approximately 20 feet below grade with four localized areas extending to 45 feet below grade. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass will then be covered with a cover system as described in element 6 to prevent direct exposure to the solidified mass. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

3. Excavation of soil in two areas:

3a. Existing pavement and soil will be removed in the area identified for ISS to a minimum depth of four feet. Soil that satisfies the soil cover requirements of remedial element 6 may be stockpiled and used as cover material. Approximately 3,000 cubic yards of contaminated soil will be removed from the site.

3b. Soil north of Clinton Street, in the area of former Gas Holder B, that meets the following criteria will be removed to a depth of 15 feet below grade and transported off-site for disposal:

- soil exceeding restricted-residential SCOs to a depth of 15 feet, as defined by 6 NYCRR Part 375-6.8;
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Approximately 1,000 cubic yards of contaminated soil will be removed from the site.

On-site soil which does not exceed the above excavation criteria may be used below the cover system described in remedy element 6 to backfill the excavation to the extent that a sufficient volume of on-site soil is available and establish the designed grades at the site.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for restricted residential use will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

4. Recovery wells will be installed and operated to collect mobile NAPL from deeper contaminant source zones in non-accessible areas. The number, depth, type and spacing of recovery wells will be determined during the design phase of the remedy.

5. Upon determining that NAPL recovery is no longer productive, in-situ groundwater treatment

will be implemented to address remaining groundwater impacts. The specific technology will depend on information collected during the NAPL recovery period, but it is currently anticipated that in-situ enhanced biodegradation will be employed to treat contaminated groundwater. The biological breakdown of contaminants through aerobic respiration will be enhanced by the placement of an oxygen release compound (ORC), or similar material into the subsurface. The method and depth of injection will be determined during the remedial design.

6. A site cover will be required to allow for restricted-residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetation layer. The soil cover over the ISS treatment area will consist of a minimum of four feet of soil meeting the SCOs for restricted-residential use. Any fill material brought to the site placed below the soil cover will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

7. Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
- allows the use and development of the controlled property for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and,
- requires compliance with the Department-approved Site Management Plan.

8. A Site Management Plan is required, which includes the following:

a) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

i. Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.

ii. Engineering Controls: The site cover discussed in paragraph 6 above and the recovery wells discussed in paragraph 4 above. This plan includes, but is not limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination. The Excavation Plan shall include a Community Air Monitoring Plan for excavations below the demarcation layer;
- descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for the Schenectady

Municipal Housing Authority building and any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion or if there are any changes to the existing building;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

b) a Monitoring Plan to access the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
- monitoring of groundwater and NAPL recovery to access the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency for submittals to the Department;
- monitoring for vapor intrusion for the Schenectady Municipal Housing Authority building and any buildings developed on the site, as may be required by the institutional and Engineering Control Plan discussed above.

c) an Operations and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
- compliance monitoring of the recovery wells identified in paragraph 3 to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site.

Declaration

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

3/27/2019

Date

Janet Brown, Director
Remedial Bureau C

AMENDED DECISION DOCUMENT

NM – Clinton Street – Schenectady MGP
Schenectady, Schenectady County
Site No. 447053
Formerly Site No. V00474
March 2016

SECTION 1: INTRODUCTION

On July 29, 2013 the New York State Department of Environmental Conservation issued a Decision Document which selected a remedy to clean up Operable Unit 1 of the NM – Clinton Street – Schenectady Manufactured Gas Plant Site. Since that time, discussions with the City of Schenectady and other local officials have added to the understanding of potential safety concerns and additional short-term adverse impacts at the time of remedy implementation. Upon evaluation of this recent information, the Department is proposing the use of in-situ stabilization as the primary component of the remedy in place of excavation and off-site disposal of source material.

In February 2019, the Department released for public review a proposal to amend the Decision Document. A 30-day public comment period was provided, during which the public was encouraged to submit comments on the proposed amendment. No comments were received.

SECTION 2: SITE DESCRIPTION AND HISTORY

2.1 Site Description

Location: The site is located at the corner of Broadway and Clinton Streets in the downtown area of the City of Schenectady. The two-acre site is located in an urban area.

On-Site and Off-Site Features: The on-site area is the location of the former manufactured gas plant (MGP). This area consists of property currently owned by the Schenectady Municipal Housing Authority (SMHA), and property owned by the Schenectady Urban Renewal Authority. On-site features include a seven-story public housing building and an adjacent parking lot. The Schonowee Village Apartments are adjacent to the site on the east side. The site is bounded by Broadway to the west. Across Broadway is the off-site area, which is characterized by several paved parking lots and four commercial buildings. A railroad embankment with an active railroad is present at the western boundary of the off-site area.

Current Zoning and Land Use: The current zoning for the site is multi-family residential, a restricted-residential use, and the site is used for public housing serving the elderly and disabled. There are no anticipated future changes to the current zoning. The current zoning for the off-site area is commercial.

Past Use of the Site: The site manufactured gas from coal from approximately 1851 to 1906. Prior to the construction of the on-site building in the 1960s, the site was used for the storage and distribution of agricultural products. The foundations of two gas holders remain in the subsurface.

Operable Units: Two operable units have been identified. An operable unit represents a portion of a remedial program for a site that for technical or administration reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release, or exposure pathway resulting from the site contamination.

Operable Unit 1 is the on-site area which was the location of the former manufactured gas plant (MGP). This area consists of property owned by the Schenectady Municipal Housing Authority and property owned by the Schenectady Urban Renewal Authority described above. Operable Unit 2 is the off-site area impacted by contamination emanating from the former MGP. A portion of Operable Unit 2 includes the 312 Broadway Environmental Restoration Project Site (ite number E447035). The off-site impacted area is characterized by a large paved parking lot and commercial buildings in an urban setting.

Water is publicly supplied to both Operable Unit 1 and Operable Unit 2.

Site Geology and Hydrogeology: Fill material containing sand with silt, cobbles, brick fragments, broken concrete and ash is present from the ground surface to an approximate depth of 10 feet. Below the fill is an alluvial unit consisting of sand and silty sand with occasional gravel. The alluvium is about 70 feet thick. Beneath the alluvium is a glacial till unit comprised of dense clayey silt mixed with gravel. The groundwater table is approximately 10 feet below ground. Groundwater flows from east to west.

Operable Unit (OU) Number 01 is the subject of this document.

A Decision Document was issued previously for OU2.

A site location map and aerial view are attached as Figures 1a and 1b.

2.2 Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors. The assessment of OU2, the off-site area, is not affected by this amendment and therefore is not included here. The environmental assessment for OU2 is described in the August 2015 Decision Document for OU2.

OU1: On-Site Area

OU1 Soils: The primary contaminants of concern for OU1 include benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), and coal tar. No coal tar was observed within the subsurface remains of the gas holder foundations, however coal tar was found to the exterior of the foundations. Where coal tar is present in an area of about 1.7 acres, the soil cleanup objectives for these contaminants were generally exceeded for BTEX and PAHs.

Coal tar was found in localized areas of the subsurface at OU1 from depths of approximately 15 to 55 feet below ground surface, generally within the footprint of the former process area, which is currently the area of the Schenectady Municipal Housing Authority parking lot.

OU1 Groundwater: Groundwater at OU1 has been impacted by MGP contaminants over approximately 1.8 acres. Benzene was detected as high as 39,000 parts per billion (ppb), exceeding the Class GA standard of 1 ppb.

OU1 Soil Vapor: Analysis of sub-slab soil vapor samples collected from beneath the Schenectady Municipal Housing Authority Building foundation slab showed elevated levels of xylenes associated with MGP waste, however, no associated indoor air impacts were identified.

2.3 Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

People will not come into contact with contaminated soil unless they dig or disturb the soil. People are not drinking the contaminated groundwater since the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater may move into soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Environmental sampling identified site related contamination in soil vapor beneath the on-site building, but no impacts were identified in indoor air quality. Soil vapor sampling conducted at off-site locations indicates that soil vapor intrusion is not a concern for existing off-site structures; however, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future off-site development.

2.4 Original Remedy

The elements of the original July 29, 2013 Decision Document are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design,

implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation and off-site disposal of contaminant source areas, including:

- soil exceeding restricted-residential SCOs to a depth of 15 feet, as defined by 6 NYCRR Part 375-6.8;
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);

Soil observed to be containing tar or non-aqueous phase liquid (NAPL) will be excavated to a depth of 15 feet and transported off-site for disposal. In addition, soil containing tar or NAPL along the northern perimeter of former "Gas Holder C" will be excavated to a depth of approximately 27 feet and soil containing tar or NAPL in the area of soil boring SB-45 will be excavated to a depth of approximately 20 feet. These soils will also be disposed off-site. During all ground intrusive activities, a Community Air Monitoring Plan will be implemented to protect the public and residents of the Schenectady Municipal Housing Authority Building from fugitive emissions.

Approximately 11,100 cubic yards of soil will be removed from the site for disposal. On-site soil which does not exceed SCOs may be used to backfill the excavation to the extent that a sufficient volume of on-site soil is available. Clean fill meeting the requirements of DER-10, Appendix 5 will be brought in to complete the backfilling of the excavation and establish the designed grades at the site. The site will be re-graded to accommodate installation of a cover system as described in remedy element 6. Soil derived from the re-grading may be used to backfill the excavation.

3. Recovery wells will be installed and operated to collect mobile NAPL from deeper contaminant source zones in non-accessible areas. The number, depth, type and spacing of recovery wells will be determined during the design phase of the remedy.

4. Upon determining that NAPL recovery is no longer productive, in-situ groundwater treatment will be implemented to address remaining groundwater impacts. The specific technology will depend on information collected during the NAPL recovery period, but it is currently anticipated that in-situ enhanced biodegradation will be employed to treat contaminated groundwater. The biological breakdown of contaminants through aerobic respiration will be enhanced by the placement of an oxygen release compound (ORC), or similar material into the subsurface. The

method and depth of injection will be determined during the remedial design.

5. A site cover will be required to allow for restricted-residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site placed below the soil cover will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

6. Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
- allows the use and development of the controlled property for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and,
- requires compliance with the Department-approved Site Management Plan.

7. A Site Management Plan is required, which includes the following:

a) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

i. Institutional Controls: The Environmental Easement discussed in Paragraph 5 above:

ii. Engineering Controls: This plan includes, but is not limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination. The Excavation Plan shall include a Community Air Monitoring Plan for excavations below the demarcation layer;
- descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for the Schenectady Municipal Housing Authority building and any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion or if there are any changes to the existing building;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b) a Monitoring Plan to access the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to access the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency for submittals to the Department;
- monitoring for vapor intrusion for the Schenectady Municipal Housing Authority building and any buildings developed on the site, as may be required by the institutional and Engineering Control Plan discussed above.

c) an Operations and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- compliance monitoring of the recovery wells identified in paragraph 3 to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

SECTION 3: DESCRIPTION OF CHANGES

3.1 New Information

The investigation of the site and development of the remedial design have been accompanied by an active citizen participation program. Fact sheets have been distributed at appropriate milestones, meetings have been held with stakeholders and the Decision Document was open to public comment prior to being finalized. Subsequent to the Decision Document, involvement with certain stakeholders continued, including National Grid's discussions with the City of Schenectady, the Schenectady Metroplex Development Authority and the Schenectady Municipal Housing Authority (collectively "city officials"). As the details of the remedial design developed, city officials expressed new and substantial safety concerns where the public could be affected by the remedial construction.

Remedial construction is routinely conducted within a secure area which is typically gated, and according to a plan designed by an individual with proficient construction knowledge. The original Decision Document was issued with controls and provisions in-place to minimize risks to the public during the cleanup. However, subsequent to the Decision Document, city officials expressed concern with the following aspects of implementation of the original selected remedy:

1) The use of sheet piling in general and the use of long (60 feet) sheet piling in particular. The original Decision Document calls for a substantial excavation, approximately 15 feet deep to 27 feet deep, over approximately one-half acre. The sheet piling is necessary to maintain the stability of the open excavation. City officials are concerned that the longer sheet piling creates an increased risk to the public, since, in the event of failure during installation or handling, the sheet could fall beyond the secure area, likely into the sidewalk or roadway and thus creating a substantial increased safety risk to the public. Also, sheet piling is typically installed using vibratory hammers.

City officials expressed the concern that mechanical driving of the sheet piling may have an adverse impact on adjacent structures. In a project unrelated to the Department's remedial program, the Nicholas Building, a historic building within the city of Schenectady, became unstable likely due to the demolition of an adjacent building in 2016. City officials expressed concern, after the issuance of the Decision Document, of the likely extensive use of vibratory equipment and noisy constructive methods near structures and living areas such as the Schonowee Village Apartments and Schenectady Municipal Housing Building.

2) The need for a temporary sidewalk and road closure. The removal of approximately 11,000 cubic yards of contaminated soil and subsequent importation of backfill requires the transport of approximately 1,200 truckloads of materials. While truck volume was considered in the remedy selection analysis, the need to close Clinton Street to effectuate the cleanup was not fully realized. The closure of Clinton Street would reduce police, medical and fire response times and exacerbate congestion in the high volume traffic area entering and exiting downtown.

In addition to the road closure, the Broadway sidewalk would require temporary relocation with a canopy. The sidewalk would be relocated to within Broadway and protected by concrete barriers, causing a reduction in vehicle lane width. The sidewalk would also be covered to protect pedestrians, however, the canopy support structures would reduce sight distance. Overall, relocating the sidewalk during remedial construction would increase the risk to pedestrians and drivers.

3.2 Remedy Changes

The substantive change to the 2013 Decision Document is the use of in-situ solidification (ISS, described in Section 5) of source areas in place of excavation and removal, although some excavation would still be required as identified in Section 5. The change is based on the following:

- The methods that would be necessary to remove soil from the required depths, and the removal of soil from below the water table to implement the Decision Document would pose a greater risk than originally anticipated to pedestrians and drivers. The use of ISS in lieu of excavation in the SMHA parking lot will not require closure of Clinton Street nor re-location of the Broadway sidewalk. The use of ISS will significantly reduce truck traffic to and from the site.

- Since shoring and dewatering are not required for ISS, The ISS will be used to treat deeper, isolated hot-spot contaminated soil that would otherwise remain in place under the original removal remedy. The ISS will also be applied to contaminated soil areas closer to Broadway as compared to the removal remedy. The ISS is not anticipated to adversely affect the groundwater flow.

- Excavation utilizing a sheet pile or secant pile shoring system would require more on-site or off-site space than ISS in order to accommodate a dewatering system, a waste staging area and increased truck traffic.

- The implementation time for ISS would be significantly less than that of excavation due to less extensive on-site activities. Further, ISS would not require as large a waste staging area as compared to excavation. ISS would not require the conditioning of materials as may be necessary for off-site disposal.

SECTION 4: EVALUATION OF CHANGES

4.1 Remedial Goals

The remedial action objectives for the cleanup of the site were established in the Decision Document and remain unchanged.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

4.2 Evaluation Criteria

In comparing the amended remedy and the original remedy with the nine factors identified in 375-1.8(f), both remedies are similar for the majority of the factors, including protection of human health and the environment and long-term effectiveness. However, the amended remedy will further reduce short-term impacts as compared to the original remedy by eliminating or reducing potential safety risks inherent in the site-specific conditions and through a shorter construction schedule. In addition, the amended remedy will have a greater reduction of toxicity, mobility, and volume of the contamination since ISS will actively address deeper contamination below the

groundwater table as compared to excavation. Also, by avoiding the complications of shoring, dewatering, water treatment, and truck staging/loading, the amended remedy will be easier to implement as compared to the 2013 selected remedy. The estimated present worth cost of the amended remedy is $10.4 million ($8.1 million capital cost) while the estimated present worth cost of the original remedy, revised from the 2011 Alternatives Analysis, is $11.4 million ($8.2 million capital cost). Since the original remedy will not provide a substantial benefit over the amended remedy, the amended remedy provides better cost effectiveness without sacrificing protectiveness of human health and the environment.

SECTION 5: SUMMARY OF THE SELECTED CHANGES

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation.

The amended remedy is referred to as the Excavation and In-Situ Solidification of Source Material remedy.

The elements of the amended remedy, as shown in Figure 2, are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

2. In-situ solidification (ISS) will be implemented in the area south of Clinton Street previously identified for removal under the 2013 Decision Document. This area of ISS will extend west towards Broadway as shown on Figure 2. The treatment zone will extend vertically from the limits of the removal conducted under remedial element 3 (approximately four feet below grade) to approximately 20 feet below grade with four localized areas extending to 45 feet below grade. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland

cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass will then be covered with a cover system as described in element 6 to prevent direct exposure to the solidified mass. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

3. Excavation of soil in two areas:
3a. Existing pavement and soil will be removed in the area identified for ISS to a minimum depth of four feet. Soil that satisfies the soil cover requirements of remedial element 6 may be stockpiled and used as cover material. Approximately 3,000 cubic yards of contaminated soil will be removed from the site.
3b. Soil north of Clinton Street, in the area of former Gas Holder B, that meets the following criteria will be removed to a depth of 15 feet below grade and transported off-site for disposal:

- soil exceeding restricted-residential SCOs to a depth of 15 feet, as defined by 6 NYCRR Part 375-6.8;
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Approximately 1,000 cubic yards of contaminated soil will be removed from the site.

On-site soil which does not exceed the above excavation criteria may be used below the cover system described in remedy element 6 to backfill the excavation to the extent that a sufficient volume of on-site soil is available and establish the designed grades at the site.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for restricted residential use will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

4. Recovery wells will be installed and operated to collect mobile NAPL from deeper contaminant source zones in non-accessible areas. The number, depth, type and spacing of recovery wells will be determined during the design phase of the remedy.

5. Upon determining that NAPL recovery is no longer productive, in-situ groundwater treatment will be implemented to address remaining groundwater impacts. The specific technology will depend on information collected during the NAPL recovery period, but it is currently anticipated that in-situ enhanced biodegradation will be employed to treat contaminated groundwater. The biological breakdown of contaminants through aerobic respiration will be enhanced by the placement of an oxygen release compound (ORC), or similar material into the subsurface. The method and depth of injection will be determined during the remedial design.

6. A site cover will be required to allow for restricted-residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a

minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetation layer. The soil cover over the ISS treatment area will consist of a minimum of four feet of soil meeting the SCOs for restricted-residential use. Any fill material brought to the site placed below the soil cover will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

7. Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
- allows the use and development of the controlled property for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and,
- requires compliance with the Department-approved Site Management Plan.

8. A Site Management Plan is required, which includes the following:

a) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
i. Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.
ii. Engineering Controls: The site cover discussed in paragraph 6 above and the recovery wells discussed in paragraph 4 above. This plan includes, but is not limited to:

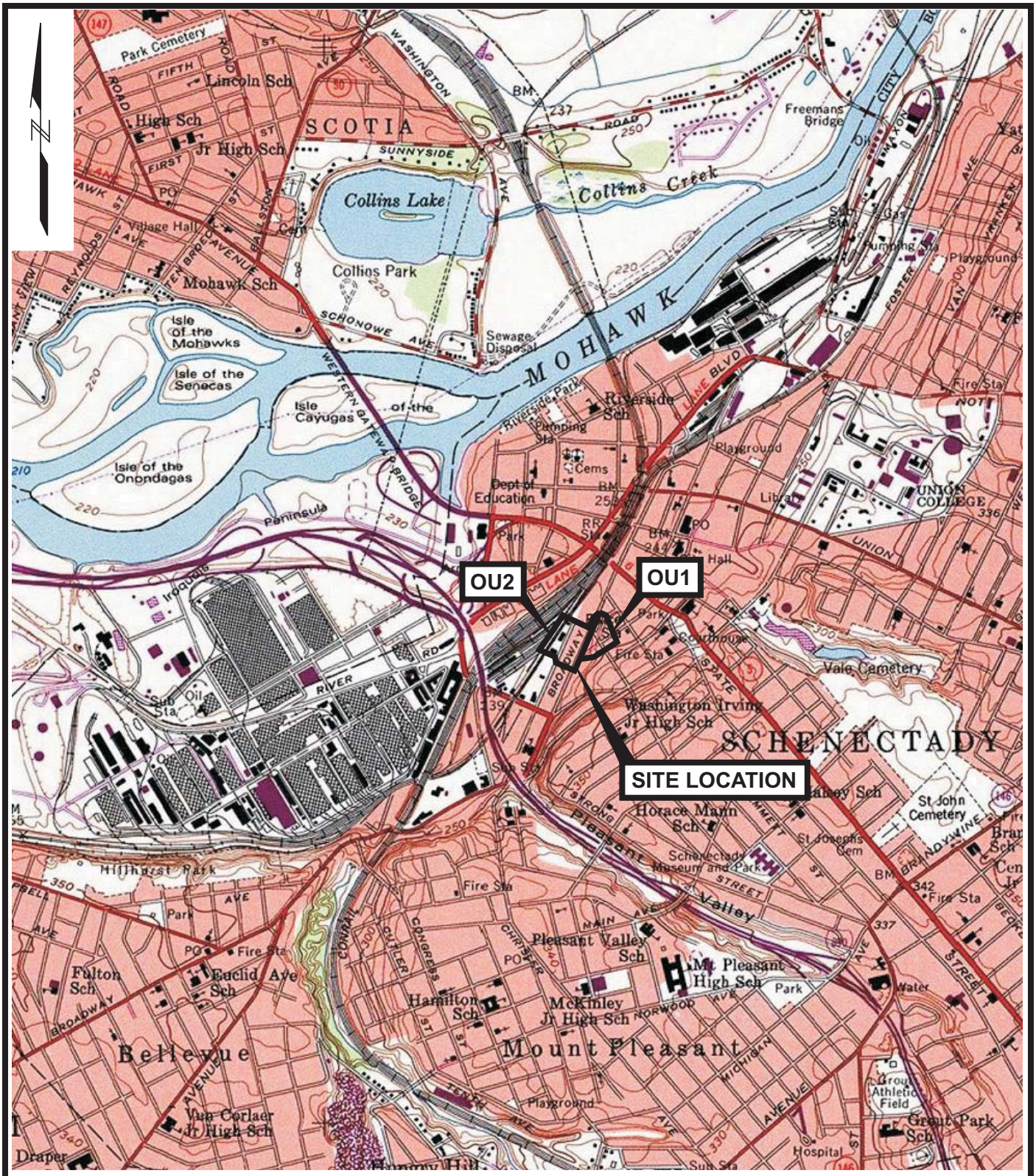
- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination. The Excavation Plan shall include a Community Air Monitoring Plan for excavations below the demarcation layer;
- descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for the Schenectady Municipal Housing Authority building and any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion or if there are any changes to the existing building;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

b) a Monitoring Plan to access the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater and NAPL recovery to access the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency for submittals to the Department;
- monitoring for vapor intrusion for the Schenectady Municipal Housing Authority building and any buildings developed on the site, as may be required by the institutional and Engineering Control Plan discussed above.

c) an Operations and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- compliance monitoring of the recovery wells identified in paragraph 3 to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site.



SOURCE: Map created with TOPO! ® ©2001 National Geographic (www.nationalgeographic.com/topo)"

ALTERNATIVES ANALYSIS - OU1
CLINTON STREET FORMER MGP SITE
SCHENECTADY, NEW YORK

nationalgrid

GEI Consultants

SITE LOCATION MAP

Project 091990-2-1202

February 2011

Figure 1a

National Grid\Schenectady\CADD drawings\02-04-2010\MISC\Schenectady-SITE LOC.CDR

NOT FOR CONSTRUCTION

SOURCES:

1. AERIAL PHOTOGRAPH OBTAINED FROM NEW YORK INTERACTIVE MAPPING GATEWAY (www1.nysgis.state.ny.us), PHOTO TAKEN APRIL 2007, RESOLUTION: 1 FOOT, ACCESSED ON 03/16/11.
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ALTERNATIVES ANALYSIS OU1
CLINTON STREET FORMER MGP SITE
SCHENECTADY, NEW YORK

nationalgrid

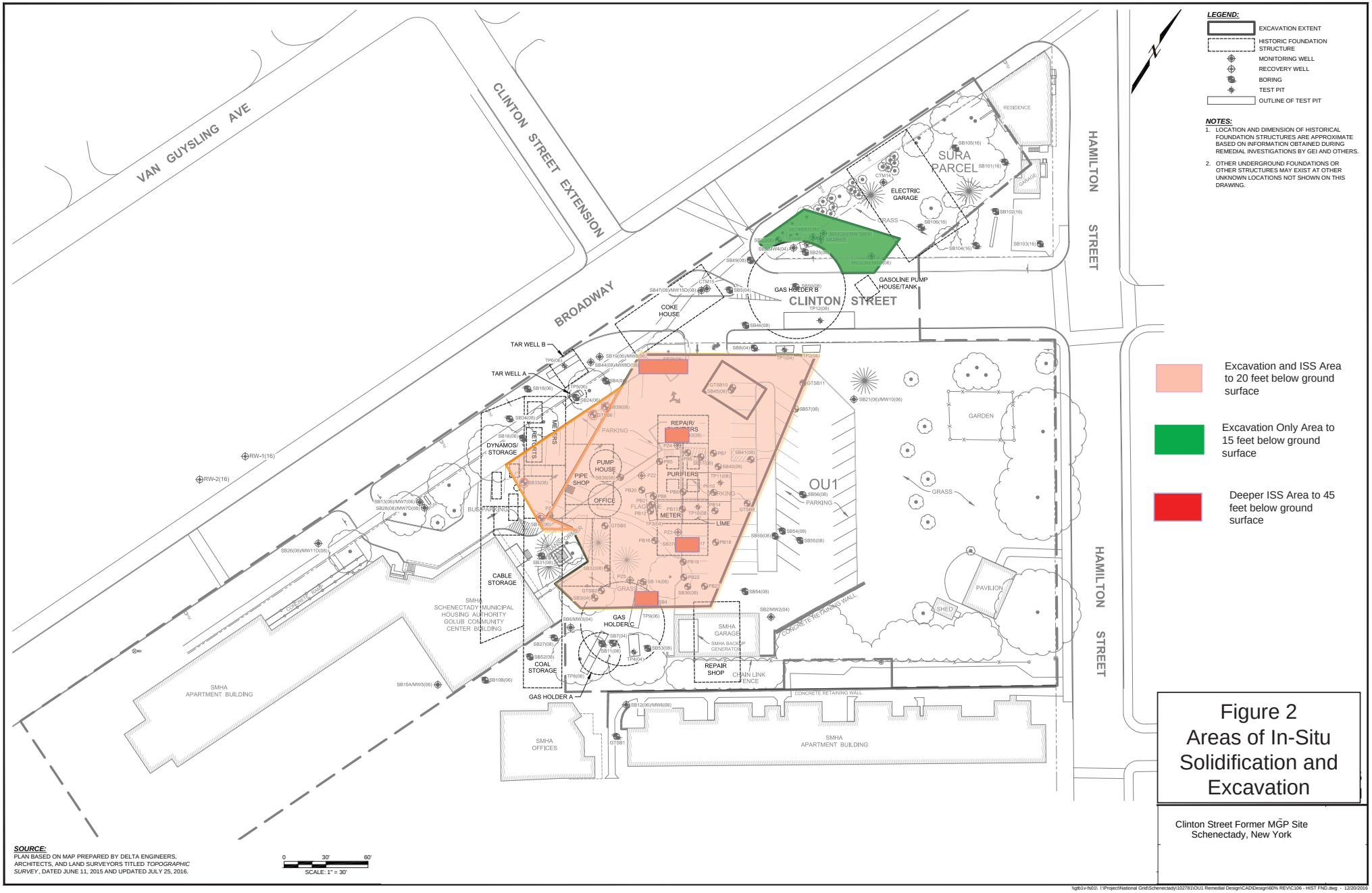
GEI Consultants

Project 091990-2-1202

AERIAL PHOTOGRAPH OF OU1

Figure 1b

I:\Project\National Grid\Schenectady\091990\Alternative Analysis-OU1\DRAWINGS\Schenectady-Aerial Photo of OU1 F3.dwg



LEGEND:

- EXCAVATION EXTENT
- HISTORIC FOUNDATION STRUCTURE
- MONITORING WELL
- RECOVERY WELL
- BORING
- TEST PIT
- OUTLINE OF TEST PIT

NOTES:

1. LOCATION AND DIMENSION OF HISTORICAL FOUNDATION STRUCTURES ARE APPROXIMATE BASED ON INFORMATION OBTAINED DURING REMEDIAL INVESTIGATIONS BY GEI AND OTHERS.
2. OTHER UNDERGROUND FOUNDATIONS OR OTHER STRUCTURES MAY EXIST AT OTHER UNKNOWN LOCATIONS NOT SHOWN ON THIS DRAWING.

Excavation and ISS Area to 20 feet below ground surface

Excavation Only Area to 15 feet below ground surface

Deeper ISS Area to 45 feet below ground surface

Figure 2
Areas of In-Situ Solidification and Excavation

Clinton Street Former MGP Site
Schenectady, New York

SOURCE:
PLAN BASED ON MAP PREPARED BY DELTA ENGINEERS, ARCHITECTS, AND LAND SURVEYORS TITLED *TOPOGRAPHIC SURVEY*, DATED JUNE 11, 2015 AND UPDATED JULY 25, 2016.

0 30' 60'
SCALE: 1" = 30'

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