FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SITE NO. 8-50-010
SENECA FALLS, NEW YORK

by

Haley & Aldrich of New York
Rochester, New York

for

New York State Department of Environmental Conservation
Albany, New York

File No. 34507-021
26 November 2013
Revised 30 January 2015

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New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway
Albany, New York 12233-7014

Attention: Douglas MacNeal, P.E.

Subject: Revised Feasibility Study
Seneca Falls Former MGP Site, Site No. 8-50-010
Seneca Falls, New York

Dear Mr. MacNeal:

On behalf of New York State Electric & Gas Corporation (NYSEG), Haley & Aldrich of New York (Haley & Aldrich) is pleased to present this revised Feasibility Study (FS) for the Seneca Falls Former Manufactured Gas Plant (MGP) Site located in Seneca Falls, New York (Site).

The FS dated 2 December 2013 was prepared following New York State Department of Environmental Conservation (NYSDEC) approval of the Remedial Investigation Report, dated 9 April 2013. The revised FS was prepared based on comments by NYSDEC in a letter dated 26 June 2014, and responses to NYSDEC's comments in a 19 September 2014 letter by Haley & Aldrich on behalf of NYSEG. The FS provides a brief Site history, summarizes the findings of the remedial investigation, identifies the remedial goals and remedial action objectives, identifies and evaluates remedial technologies, and provides recommendations for a remedial alternative.

If you have any questions, please contact Tracy Blazicek (NYSEG) at 607.762.8839.
Sincerely yours,

HALEY & ALDRICH OF NEW YORK

Douglas C. Allen, P.G.
Project Manager

Colin R. Sweeney
Vice President

Enclosures

c: New York State Department of Health; Attn: Steven Karpinski
NYSEG; Attn: Tracy Blazicek

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EXECUTIVE SUMMARY

Haley & Aldrich of New York (Haley & Aldrich) has prepared this revised Feasibility Study (FS) Report on behalf of New York State Electric and Gas Corporation (NYSEG) for the Seneca Falls Former MGP Site (Site) located at 187 Fall Street in Seneca Falls, New York.

The Site is bordered to the east by residential properties (181-185 Fall Street), to the south by the Seneca River and Canal (a Class C surface water), to the west by a gasoline filling station (Sunoco Property at 193 Fall Street), and to the north by Fall Street. The northern portion of the Site (the Upland Area) which includes a paved vehicle parking area and building slab is separated from the southern portion of the Site (the Lowland Area) by a steep slope. The Site is located in a mixed residential and commercial portion of Seneca Falls Village and is currently vacant. The Site and adjacent properties are zoned 'Highway Commercial", which includes various commercial uses. Residential use within this zoning designation is allowed for properties where residential use pre-dated the current zoning ordinance.

The FS was performed based on Haley & Aldrich's 2013 Remedial Investigation Report (RIR), earlier phases of investigation and a qualitative health risk assessment presented in the RIR. The RIR was approved by the New York State Department of Environmental Conservation (NYSDEC) on 17 January 2013 pending requested report modifications. The final RIR was submitted to NYSDEC on 9 April 2013.

Explorations conducted during the 2013 RI and earlier investigations indicate that the Site is underlain by fill material ranging in thickness from 4 to 20 feet (ft), which is underlain by glacial till with thickness ranging from not present to 24 ft. Bedrock is encountered beneath the glacial till at a depth of approximately 30 ft below ground surface (bgs) in the upland portion of the Site and less than 10 ft bgs in the lowland portion of the Site. In the upland portion of the Site, overburden groundwater is present in a sandy interval of the glacial till approximately 20 to 25 ft bgs. In the lowland portion of the Site, groundwater is present at the base of the overburden material above bedrock. Groundwater elevation data indicate that the groundwater flow direction beneath the Site is to the south towards the Seneca River and Canal.

The results of various phases of investigation at the Site indicate the following regarding the Former MGP Site:

- MGP-related compounds (metals and semi-volatile organic compounds (SVOCs)) in surface and subsurface soil exceeding the New York Codes, Rules, and Regulations Part 375 Restricted Commercial Soil Cleanup Objectives (SCOs) are almost exclusively limited to the fill material, with localized impacts observed in the glacial till in the Upland Area immediately adjacent to the former gas holder;

- The extent of MGP-related compounds (volatile organic compounds [VOCs] and SVOCs) exceeding Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Water Quality Standards are limited to the Upland Area of the Site adjacent to the former MGP plant area and do not impact the Seneca River and Canal. The vertical extent of groundwater beneath the Upland Area is limited to the sandy layer with fine-grained glacial till above and below; and,

- Results of a soil vapor intrusion SVI investigation completed within the former commercial building in the Upland Area determined that the vapor intrusion pathway was not complete.

Investigations conducted at residential properties (181-183 and 185 Fall Street) located east of the Site indicated that portions of the surface soil and subsurface soil at the residential property abutting the Site (185 Fall Street) contain impacts by SVOCs and metals that are similar to impacts associated with MGP operations. The 185 Fall Street property is currently owned by NYSEG. Backyard fill material at 181–183 Fall Street included materials that are not typically observed in Former MGP Site fill material and impacts by metals and low concentration SVOCs that represent ambient urban fill conditions in Seneca Falls Village that are unrelated to former MGP operations.

Investigations conducted for the Sunoco Property (193 Fall Street) lowland area located west of the Site indicated that impacts to soil by SVOCs and arsenic that exceed Part 375 Restricted Commercial SCOs were at concentrations similar to Former MGP Site results and occurred in the upper portion of fill. However, historical documentation indicated that the southeastern portion of the lowland area was used for coal storage and canal activity during the period the MGP plant was operational, and, concentrations of SVOCs in the southwestern portion of the Sunoco Property lowland are comparable with off-site Seneca Falls Village urban soil sample results and are likely unrelated to former MGP operations. Although impacts in the 193 Fall Street southeastern lowland area may not be related to former MGP operations, the FS includes response actions to address impacts by arsenic and polycylic aromatic hydrocarbons (PAHs) at concentrations greater than typically found in urban fill.

The results of a 2009 sediment investigation completed in the Seneca River and Canal indicated that MGP-related impacts are observable adjacent to the Former MGP Site property boundary, and the limits have been defined. Concentrations of SVOCs in sediment samples collected upstream, adjacent to, and downstream of the Site indicate that concentrations are variable, widely distributed, and indicative of multiple sources.

The results of the qualitative health risk assessment indicated the following regarding potential exposure to MGP-related materials:

- On-site (Upland and Lowland Areas): Complete exposure pathways to surface soil were identified for current and future scenarios: an on-site utility worker, trespasser, or NYSEG employee occasionally visiting the Site. A complete exposure pathway to surface soil was identified for a future construction worker under the scenario that a new building is constructed at the Site. Complete exposure pathways to subsurface soil were identified for current and future utility workers, and for a future construction worker under the scenario that a new building is constructed at the Site.

- Off-site Residence at 185 Fall Street: Complete exposure pathways to surface soil and subsurface soil were identified for a current and future resident or construction worker.

- For the Seneca River and Canal: Complete exposure pathways to sediment were identified for current and future trespassers and boaters.

The FS was conducted in accordance with NYSDEC guidance to identify and evaluate potential remedial actions to mitigate risks of exposure to MGP-impacted media by potential receptors identified by the qualitative risk assessment. The following remedial alternatives were identified and evaluated.

- **Alternative 1 – No Action with Engineering Controls, Institutional Controls, Groundwater Monitoring**: This alternative generally consists of establishment of land use restrictions to prohibit uses and activities that may result in exposure to impacted surface and subsurface soils in the Upland and Lowland Areas of the Former MGP Site, a portion of the lowland area of 193 Fall Street, and at the residential property at 185 Fall Street. Engineering controls would include fencing to restrict access to the Lowland Area of the Former MGP Site and 193 Fall Street and exposed surface soil at the residential property at 185 Fall Street. Engineering controls would also include posting of the Seneca River and Canal to prohibit wading/swimming and mooring/temporary anchoring of watercraft in the area of impacted sediments. Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

- **Alternative 2 – Capping, Engineering Controls, Institutional Controls, Groundwater Monitoring**. This alternative generally consists of capping of surface soils in the Upland and Lowland Areas of the Former MGP Site, the MGP- impacted portion of the 193 Fall Street lowlands, and MGP-impacted surface soil at the 185 Fall Street residential property, as well as capping of impacted sediments in the Seneca River and Canal. Engineering controls would include posting of the Seneca River and Canal to prohibit mooring/temporary anchoring of watercraft that may affect the sediment cap. Institutional controls would be implemented to restrict uses and activities that could result in future exposure to impacted soil underlying caps in in the Upland Area, Lowland Areas and 185 Fall Street property. Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

- **Alternative 3 – Excavation and Off-Site Treatment/Disposal of Surface Soils, Dredging of Impacted Sediments, Institutional Controls, Groundwater Monitoring**: Alternative 3 generally consists of excavation and off-site treatment/disposal of all affected surface soil with restoration in kind or consistent with planned future uses, dredging of impacted sediments, and groundwater quality monitoring in the Upland Area of the Former MGP Site. Sediments impacted by tar-like material (TLM) or oil-like material (OLM) would be dredged, dewatered and transported off-site for thermal treatment. Dredged areas would be backfilled using clean granular soil to restore the benthic habitat. Institutional controls would be established to restrict land uses that may result in exposure to subsurface soils. Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

- **Alternative 4 –In Situ Solidification/Stabilization (ISS) of Impacted Soil, Dredging of Impacted Sediments, Institutional Controls, Monitored Natural Attenuation (MNA) of Impacted Groundwater:** Alternative 4 generally consists of excavation and off-site treatment/disposal of surface soil in the Upland and Lowland Areas of the Former MGP Site, and on the residential property to accommodate ISS. Impacted surface soil the lowland portion of 193 Fall Street would be excavated in conjunction with excavation in other areas to mitigate risk of exposure to surface soil in that area. Subsurface soil in the Upland and Lowland Areas of the Former MGP Site and residential property would be treated in place by ISS methods. Dredging and restoration of the benthic habitat would be performed similar to Alternative 3 as described above. Institutional controls would likely be implemented to identify the presence and locations of solidified soil. Groundwater treatment would be by MNA following completion of ISS.

- **Alternative 5 - Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soils, Dredging of Impacted Sediments, Enhanced Bioremediation and MNA of Impacted Groundwater:** Alternative 5 generally consists of excavation and off-site treatment/disposal of all MGP-impacted surface soil and subsurface soil throughout the Former MGP Site, the lowland portion of 193 Fall Street and western portion of the 185 Fall Street residential property. Restoration would be in kind or consistent with planned future uses. Future uses would be unrestricted following restoration. Dredging and restoration of the benthic habitat would be performed similar to Alternatives 3 and 4 described above with the addition of sediments with visual/olfactory indications of MGP-related impacts and total PAH concentrations exceeding background conditions. Groundwater treatment would consist of application of Oxygen Release Compound™ (ORC) or other suitable agent upon completion of the Upland Area excavation to enhance aerobic degradation of residual contaminants followed by MNA.

- **Alternative 6 – ISS of Impacted Soil in the Upland Area, Capping of Impacted Soils in the Lowland Area, Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soil at the Residential Property, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater.** Alternative 6 involves excavation and off-site treatment/disposal of surface soil in the upland area in order to accommodate the volume expansion that would result from ISS of subsurface soil in this area. Soil caps would be constructed in the Lowland Areas of the former MGP site and 193 Fall Street to mitigate risk of potential exposure by direct contact with impacted soil. Surface and subsurface soil would be excavated and removed from the 185 Fall Street, which would allow for unrestricted use of the residential property. Dredging and restoration of the benthic habitat would be performed similar to Alternatives 3, 4 and 5 described above. Institutional controls would include recording the presence of solidified soil in the Upland Area and prohibition of excavations and development of the Lowland Area that would compromise the soil cap. Groundwater remediation would be by MNA following ISS in the Upland Area.

Alternative 6 was determined to be the recommended remedy based on comparative analysis of the six alternatives using the nine evaluation criteria presented in this FS. The development and evaluation of the remedial alternatives are described in detail in this FS Report. Limited pre-design explorations and bench scale testing are recommended.

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

Page

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

This Feasibility Study represents the latest phase of work related to the Seneca Falls Former Manufactured Gas Plant (MGP) Site at 187 Fall Street in Seneca Falls, New York. New York State Electric & Gas Corporation (NYSEG) initially retained Haley & Aldrich of New York (Haley & Aldrich) in 2007 to prepare a Preliminary Site Assessment (PSA) for the Former MGP Site. On behalf of NYSEG, Haley & Aldrich completed soil, sediment, groundwater, and soil vapor investigations over several phases of work between September 2007 and August 2009. Work was completed in accordance with the September 2007 Preliminary Site Assessment Work Plan (PSA Work Plan), the February 2008 Soil Vapor Intrusion and Additional Subsurface Investigation Work Plan (SVI Work Plan), and the June 2009 Remedial Investigation Work Plan (RI Work Plan).

The Former MGP was operated by the Seneca Falls & Waterloo Gas Light Company, which was a predecessor company to NYSEG. The former MGP Site is currently referred to as the Seneca Falls Former MGP Site (the Site). The 187 Fall Street parcel is currently owned by NYSEG. The parcel has had various property owners and uses since the MGP ceased operation in the early 1900's.

The investigation was performed in accordance with the requirements of a Multi-Site Consent Order (Index # D0-0002-9309, 1994 March 30) between NYSEG and the New York State Department of Environmental Conservation (NYSDEC), the NYSDEC-approved PSA Work Plan dated 10 July 2007 and revised 11 September 2007, prepared by Haley & Aldrich (PSA Work Plan). The 2008 supplemental investigation activities, including the soil vapor intrusion (SVI) investigation, were completed in accordance with the NYSDEC- and New York State Department of Health (NYSDOH)-approved Soil Vapor Intrusion and Additional Subsurface Investigation Work Plan dated 11 February 2008, prepared by Haley & Aldrich (SVI Work Plan). The 2009 remedial investigation activities, including the sediment investigation, were completed in accordance with the NYSDEC-approved Remedial Investigation Work Plan dated 24 November 2008 and revised 18 June 2009.

The Remedial Investigation Report (RIR) was approved by NYSDEC in a letter dated 17 January 2013. A final version of the RIR, with modifications requested by NYSDEC in their January 2013 letter, was submitted to NYSDEC on 9 April 2013.

1.1 Purpose

The purpose of the FS is to identify, evaluate, and select a remedy to address MGP-related impacts to soil, groundwater, and sediment identified in the RIR.

1.2 Site Description

The footprint of the Seneca Falls former MGP Site is located at 187 Fall Street, Seneca Falls, Seneca County, New York. As shown on Figure 1, the Site is located adjacent to the Seneca River and Canal, which flows east towards Cayuga Lake. The Seneca River and Canal is classified as Class C surface water in the vicinity of the Site. The Site consists of an approximately 1.2 acre parcel currently owned by NYSEG and located in a mixed residential/commercial area. The Site is bordered by Fall Street to the north, residential properties (181-183 and 185 Fall Street) to the east, a Sunoco gasoline filling station (193 Fall Street) to the west, and the Seneca River and Canal to the south. NYSEG currently owns 185 Fall Street, which abuts the Site to the east. A zoning map obtained from the Village of Seneca Falls dated May 1995 indicates the Site and adjacent properties are zoned as C-2, described as a

"Highway Commercial" permitted use zone. The zoning map indicates the Seneca River and Canal waterway shoreline is zoned as L-C, described as "Land Conservation".

The layout of the Site and surrounding properties is shown in Figure 2. The parcel located at 187 Fall Street is physically defined by Upland and Lowland Areas separated by a steep slope running east-west, located in the approximate center of the parcel. The upland area of the parcel consists of a building floor slab and a paved vehicle parking lot located immediately west of the floor slab. A commercial building located at the Site was demolished during the summer of 2009 and was previously occupied by Pick-a-Flick Video (a movie rental and cosmetic tanning business). The Upland Area is generally flat with an elevation of approximately 456 ft above mean sea level, bordered to the south by the steep slope and the Lowland Area of the Site. The steep slope and lowland portions of the parcel are heavily vegetated. The Lowland Area of the Site gently slopes south to the Seneca River and Canal, with elevations from approximately 430 ft to 433 ft above sea level. Surface drainage (at a macro scale) appears to be to the south toward the Seneca River and Canal. There is a catch basin present on the upland portion of the Site that drains northerly to a storm sewer line beneath Fall Street.

A flood insurance rate map (FIRM) obtained from the Federal Emergency Management Agency (FEMA) for the Site vicinity indicates that the 100 year flood zone (Zone A4) is limited to the present riverbanks of the Seneca River and Canal, likely due to the ability to control water levels within the canal system. The FIRM indicates that the Upland and Lowland Areas of the Site and abutting properties are within Zone C, described as areas of limited flooding.

1.3 Site History

The Seneca Falls MGP is believed to have begun operations in 1856, producing manufactured gas using coal carbonization processes until plant closure circa 1903. A narrative history of Seneca County indicates in 1871 the gas plant included twenty (20) retorts, four (4) purifiers and a large condenser (Atlantic Environmental Services, 1991). The gas holder at the Site had a capacity of 25,000 cubic feet (cf). Annual gas production was 8,000,000 cf in 1889 and 7,000,000 cf in 1899 (Atlantic Environmental Services, 1991). A 1904 Sanborn Map indicates that the plant is no longer in operation, suggesting that the Seneca Falls MGP ceased operations between 1899 and 1904. Based on review of the Sanborn fire insurance maps, demolition of the retorts and gas fitter occurred between 1911 and 1916. The remainder of the gas plant was demolished between 1925 and 1944. The former MGP operational features include: one gas holder, two coal sheds, retorts, purifier house and lime house, engine room, meter room, and gas fitter, as shown on the 1899 and 1904 Sanborn maps reviewed in connection with previous investigations.

The residential dwellings (181-183 and 185 Fall Street) located east of the Site were constructed between 1892 and 1897. A 1897 Sanborn Map shows the residential dwelling configuration were similar to the present configuration. Prior to construction of the residential dwellings, the 1886 Sanborn Map indicates a "planked drive" provided access to a small structure southwest of the MGP. A 1892 Sanborn Map does not show the planked drive and small structure, likely replaced with a coal shed east of the gas holder where the eastern portion of the on-site building stands today. A carpenter's shop was located in the approximate future location of the 185 Fall Street dwelling, although the change in geographic placement and dimensions suggests the carpenter's shop was demolished between 1892 and 1897 prior to construction of 185 Fall Street.

The Lowland Area between the MGP and Seneca River and Canal was historically used for lumber and coal storage and distribution. Delivery of lumber and coal were likely via the Seneca River and Canal,

constructed in 1818 and widened in 1915. The 1886 through 1897 Sanborn Maps indicate the southern portions of the Site and adjacent properties to the east and west were used for storage of "scattered lumber", lumber sheds, and coal sheds. Lumber and coal storage continued on the F. Maier Coal & Lumber Yard west of the Site through 1925.

A United States Geological Survey (USGS) 7.5 minute quadrangle dated 1905 was reviewed as part of the historic research. The map indicates a "Lehigh Valley Railroad" line terminated at a switchyard operated adjacent Site on the southern side of the Seneca River and Canal. Interpretation of the 1905 topographic contour lines indicate the Seneca River and Canal elevation relative to mean sea level was approximately 420 ft, which is several feet below the current surface water elevations measured during the remedial investigation. This change in elevation is likely the result of lock modifications and canal widening in 1915. Lock modifications and canal widening in 1915 created Van Cleef Lake east of the Site, reportedly displacing 116 industrial buildings and 60 residential dwellings.

The 1886 Sanborn Map indicates "Coal and Shavings" were the primary heating fuels for F. Maier's Lumber and Coal Yard and National Yeast Company west of the Site. Coal and wood shavings were likely used as heating fuels elsewhere in Seneca Falls businesses and residences due to close proximity to the Canal and railways.

1.4 Summary of Investigations

The interpreted extent of MGP-impacted soil and sediments interpreted based on data presented in the RIR are shown on Figure 2. Selected figures from the 2011 RIR are provided in Appendix A. The Site was initially screened in 1991 by Atlantic Environmental Services, Inc. (AES). The 1991 "Site Screening Report" consisted of a Site reconnaissance, collection of three surface soil samples from the Lowland Area of the Site, three sediment samples from the Seneca River and Canal adjacent to the Site, and three surface water samples from the Seneca River and Canal adjacent to the Site. Samples were analyzed for VOCs, SVOCs, metals, and cyanide. The intent of the screening was to determine if there was any imminent threat to human health or the environment at the Site.

Surface soil samples were collected from intervals of 0 ft to 0.5 ft below ground surface (bgs). VOCs were not detected in any of the surface soil samples. SVOCs were detected in all three samples, with SVOC totals ranging from 186 parts per million (ppm) to 274.4 ppm. Arsenic, calcium, mercury, nickel, and selenium were detected at generally low levels, some exceeding NYSDEC Recommended Soil Cleanup Objectives (SCOs) (NYSDEC, 1994). Cyanide was detected at sample locations SS-2 and SS-3 at concentrations 3.80 ppm and 6.60 ppm, respectively.

Sediment samples were collected from the Seneca River and Canal at three locations: approximately 250 ft upstream of the Site, adjacent to the west portion of the Site, and adjacent to the east portion of the Site. VOCs were not detected in sediment samples collected by AES. Total SVOCs with a concentration of 34.18 ppm were detected at the upgradient sampling location. Total SVOCs concentrations at the west location adjacent to the Site were 63.33 ppm, and 260.2 ppm at the east location adjacent to the Site. Antimony, arsenic, calcium, copper, lead, manganese, mercury, and nickel were detected at similar levels at the sediment sampling locations.

Three surface water samples were collected from the Seneca River and Canal at locations corresponding to sediment sample locations. VOCs and SVOCs were not detected in surface water samples. Cyanide was detected at 0.27 ppm in a surface water sample collected adjacent to the Site (New York State Ambient Water Quality Standard for cyanide in Class C surface waters is 0.0052

ppm). Calcium, magnesium, and sodium were detected in surface water samples below water quality standards.

On 26 November 2002, NYSEG conducted limited surface soil analytical sampling on the residential property, 185 Fall Street, adjacent to the Site. Samples were analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), Target Analyte List (TAL) Metals, total cyanide and cyanide amenable to chlorination, and total recoverable phenolics. BTEX constituents were not detected at any location. PAH compounds were detected at all three locations with total PAH concentrations ranging from 0.389 ppm to 145.88 ppm. Metals were also detected, with arsenic, beryllium, chromium, copper, and iron exceeding NYSDEC Recommended SCOs at all three sample locations. As a contingency matter, NYSEG completed an Interim Remedial Measure (IRM) consisting of the application of clean backfill across the backyard portion of the 185 Fall Street property.

Three phases of field investigations were completed following NYSDEC-approved work plans. The three phases of work and their respective work plans included:

- In 2007: A Preliminary Site Assessment (PSA) following a PSA Work Plan dated September 2007 which included test pit excavations, soil borings, surface soil sampling, and monitoring well installations to evaluate soil and groundwater conditions on-site, and soil borings and surface soil sampling in the backyard portions of two residential properties east of the Site to evaluate off-site residential soil conditions;

- In 2008: A soil vapor intrusion (SVI) investigation inside the former on-site building (demolished in 2009) and additional soil borings and monitoring wells to investigate the former gas holder, located partially beneath the former building floor slab. The work was completed in accordance with a SVI and Additional Subsurface Investigation Work Plan dated February 2008; and,

- In 2009: Remedial Investigation (RI) activities following a RI Work Plan dated June 2009 to investigate the extent of MGP-related impacts in off-site surface and subsurface soils west of the Site, a sediment mapping and sampling program to evaluate the nature and extent of MGP-related impacts to sediment in the Seneca River and Canal, and soil sampling to quantify the ambient concentrations of metals and semi-volatile organic compounds (SVOCs) in urban fill collected in Seneca Falls Village.

The outcome of the PSA, SVI investigation, and RI are described in the NYSDEC-approved RIR submitted in April 2013. The main elements of the RIR are described in the following section.

2. SUMMARY OF REMEDIAL INVESTIGATION

2.1 Geology and Hydrogeology

Based on the review of existing literature (see References) and observations during field work, a description of the geologic and hydrogeologic setting at the Site is provided below.

2.1.1 Geology

The overburden at the Site consists of two geologic layers, fill and glacial till. The underlying bedrock observed in test pits completed in the lowland area is shale, likely a member of the Late Silurian Salina Group. Four subsurface profiles (cross-sections) have been developed to facilitate discussion of subsurface geology. The locations of the cross-sections are presented on RIR Figure 3 and cross-sections A-A', B-B', C-C', and D-D' are presented in RIR Figures 5A through 5D, respectively (Appendix A).

Haley & Aldrich field staff observed fill at on-site and off-site borings. In the upland portion of the Site, fill thickness ranges from 6.5 ft in the northern portion of the vehicle parking area to 20 ft beneath the on-site building. Fill materials in the upland portion of the Site are variable in nature, but generally consist of silt and fine sand with varying proportions of gravel, ash-like material, cinders, coal fragments, bricks and brick fragments, wood, and stone building blocks.

Fill materials encountered in the lowland portion of the Site were similar to the Upland Area, with lesser amounts of building debris such as bricks and stone building blocks. Fill material generally consisted of silt and fine sand with varying proportions of gravel, cinders, coal fragments, and wood. Discarded debris was observed at ground surface in several areas of the Lowland Area and along the slope separating the Upland and Lowland Areas of the Site. Fill material thickness varied across the lowland area, ranging from 4 to 11 ft.

Fill material in the backyards of the residential properties to the east (181-183 Fall Street and 185 Fall Street) generally consisted of silt and fine sand with varying quantities of gravel, coal fragments, cinders, brick fragments, and ceramic fragments. The fill thickness ranged from 2 to 5 ft. The inclusion of ceramic fragments in the fill material, not widely observed in on-site fill materials, suggests residential property fill materials may be from a source unrelated to MGP operations. A layer of topsoil was observed at eight of the twelve residential property soil boring locations.

Fill material at the hand auger urban fill sample locations, collected on publically- and privately-owned parcels within the Seneca Falls Village typically consisted of silty sand with varying amounts of brick fragments, coal-like material, glass fragments, or metal fragments. Coal-like fragments were observed at five of the six hand auger locations.

Glacial till was encountered in the upland portion of the Site, including both the on-site exploration locations and off-site exploration locations at 181-183 and 185 Fall Street. Glacial till generally consisted of silt with varying amounts of sand and gravel (typically in small proportions). Upland soil boring locations indicated a saturated zone of fine sand was present near the base of the glacial till, approximately 10 ft above the underlying bedrock. The sandy water-saturated zone within the glacial till is the water-bearing interval beneath the Site.

Upland glacial till thickness ranges from 12 to 24 ft. Glacial till was present across most of the Lowland Area, except for the southeast portion of the Site where fill was encountered to bedrock. Lowland glacial till thickness ranged from not present to 8 ft thick. Refusal on bedrock was encountered at both upland and lowland conditions, where the shale bedrock surface was found to be flat and relatively smooth.

2.1.2 Hydrogeology

Groundwater level monitoring was conducted in all Site monitoring wells on 11 December 2007, 31 March 2008, 14 May 2008, and 21 August 2009 during groundwater sampling events, and on 1 July 2008 during monitoring well hydraulic conductivity testing. The Seneca River and Canal surface water elevation was gauged at three locations (SG-1 through SG-3) during each of the four monitoring events.

Groundwater potentiometric surface maps were created for each of the groundwater monitoring events and are provided as RIR Figures 6, 7, and 8 (Appendix A). These figures indicate a general groundwater flow direction of north to south beneath Site, towards the Seneca River and Canal. Surface water elevations in the Seneca River and Canal are generally equivalent to lowland monitoring well elevations, indicating hydraulic communication between surface water and groundwater in the vicinity of the Site. During the May 2008 monitoring event the surface water elevation in the Seneca River and Canal was slightly higher than the groundwater elevation in MW-07-06, suggesting that periodic and localized reversal of the groundwater flow direction is possible in the immediate vicinity of the waterway.

Water elevations monitoring wells MW-08-01 and MW-08-02s have occasionally been measured at levels higher than surrounding Site monitoring wells, indicating localized perched conditions likely related to the former gas holder and fill materials beneath the on-site building. Water levels measured in MW-08-01 and MW-08-02 since these wells were first sampled in March 2008 have declined or remained the same, indicating seasonal changes in perched conditions.

The average horizontal hydraulic gradient across the Site is estimated to be approximately 0.07 ft/foot.

During 2007, 2008, and 2009 groundwater level monitoring events, none of the Site wells contained a measurable thickness of non-aqueous phase liquid (NAPL).

2.2 Nature and Extent of Contamination

This section summarizes the physical and chemical observations from the on-site and off-site investigations. Refer to Figure 2 for the interpreted extent of MGP-related impacts to soils and sediments.

2.2.1 On-Site

2.2.1.1 Soil

The Site is physically defined by Upland and Lowland Areas separated by a steep slope running approximately east to west. The Upland Area previously included an approximately 9,750 square-foot slab-on-grade commercial building, which was demolished in 2009. The concrete floor slab was left in place. To the west of the floor slab is an asphalt-covered vehicle parking area. The Lowland Area includes heavily vegetated undeveloped land bordered to the south by the Seneca River and Canal. The Site is bordered by Fall Street to the north, residential properties to the east, and a Sunoco gasoline filling station to the west. The residential property abutting the Site to the east is owned by NYSEG. The area surrounding the Site is mixed residential and commercial.

Subsurface explorations completed in the Upland Area of the Site indicate the vehicle parking area and building floor slab are underlain by varying thicknesses of fill material and historic MGP structures. In general, the fill included ash-like material, clinker-like material, and minor amounts of viscous or hardened tar-like material (TLM). The contents of the former gas holder, located beneath the floor slab, appear to be limited to fill materials that primarily include building demolition debris (unrelated to commercial building demolition in 2009). The bottom of the former gas holder appears to be intact, and was encountered approximately 20 ft bgs.

TLM was not encountered at the two boring locations (SB-08-01 and SB-08-02) and one test pit (TP-07-01) completed inside the former gas holder footprint. A MGP-type odor was noted at each of the three exploration locations. One soil boring (SB-08-03) was completed immediately adjacent to and downgradient from the former gas holder. Stringers of TLM were observed in glacial till at the approximate bottom elevation of the former gas holder. Visual observations, head space analysis results, and laboratory analytical results for a soil sample collected below the TLM stringers in SB-08-03 (observed intermittently between 27 to 29 ft bgs) indicate the downward vertical extent of the TLM is limited by the fine-grained glacial till and impacts do not extend into underlying bedrock. Soil borings to the west, south, and east of the on-site building (SB-07-02, SB-07-10, SB-07-03, and SB-07-04) indicate that the TLM stringers are not laterally extensive.

The Lowland Area of the Site is underlain by fill material ranging in thickness from 4 to 11 ft. The bottom elevation of the fill material in the southern portion of the Lowland Area is several feet below the measured water elevation of the Seneca River and Canal, suggesting the fill material may have been placed during the construction of the waterway in 1818 (prior to MGP operations beginning circa 1856) or during canal modifications in 1915 (after MGP operations ceased in 1905). In the southern portion of the Lowland Area, the bottom elevation of fill material ranges from approximately 423 ft at SB-07-09 to 427 ft at SB-07-06. The surface water elevation of the Seneca River and Canal at the time of field investigations was approximately 428 ft in the vicinity of the Site during surface water elevation monitoring.

Based on the current and predicted future use of the Site as a commercial property, laboratory analytical results for soil samples collected during field investigations were compared to Part 375 Restricted Commercial SCOs. With the exception of soil boring SB-08-03 located adjacent to the former gas holder, compounds exceeding the applicable SCOs were limited to arsenic and SVOCs in samples collected from fill material. Benzene, toluene, ethylbenzene, and xylene (BTEX), VOCs which are often present in soil at former MGP sites, were detected at concentrations well below the applicable SCOs in on-site soil samples. Analytical results, visual observations, and PID screening results for soil samples collected from glacial till in upland and lowland portions of the Site indicated that MGP-related impacts are not typically present in the underlying glacial till and are limited to the overlying fill.

The horizontal distribution of fill material sample locations with compounds exceeding Restricted Commercial SCOs appears random across both the Upland and Lowland Areas of the Site. The wide distribution correlates with historic documentation (Sanborn Maps) that indicate the Upland and Lowland Areas of the Site were both active during MGP operations.

2.2.1.2 Groundwater

Groundwater analytical results for VOCs and SVOCs indicate that concentrations exceeding applicable NYSDEC Technical and Operational Guidance Series (TOGS) Class GA standards are limited to monitoring wells in the Upland Area of the Site. With the exception of monitoring wells MW-08-01, MW-08-02, and MW-08-03 which were installed within or immediately adjacent to the former gas holder, benzene is the only VOC which exceeds groundwater quality standards. Benzene is consistently detected at low concentrations (less than 6.6 μg/L) in samples collected from monitoring well MW-07-04, and has been detected in one of three samples collected from MW-07-03.

Excluding the three wells installed in the immediate vicinity of the former gas holder, naphthalene is the only SVOC which exceeds groundwater quality standards, detected in one of three samples collected from MW-07-02. Naphthalene was not detected in the sample most recently (August 2009) collected from MW-07-02.

The applicable Class GA groundwater quality standards for several metals were exceeded at all groundwater monitoring well locations.

2.2.1.3 Soil Vapor

The SVI investigation results determined that MGP constituents of concern at the Site are not present in the soil gas or indoor air at concentrations in excess of the 75th percentile of the NYSDOH 2003 guidelines and the vapor intrusion pathway was determined to not be complete at the Site. Further, the on-site building was demolished in 2009.

2.2.2 Off-Site Soil

2.2.2.1 Urban Fill Material

The fill material collected in Seneca Falls Village typically includes anthropogenic materials (brick, glass, metal) and coal-like material. This observation is consistent with the commercial and manufacturing history (including barge canal and railroad transportation) of Seneca Falls.

Analytical results of soil samples collected from the Village fill locations detected metals (lead, mercury, and zinc) and PAHs ((benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene chrysene, and indeno(1,2,3-cd)pyrene) at concentrations exceeding Part 375 Unrestricted Use SCOs.

The distribution of soil sample locations with concentrations of metals and PAHs exceeding Part 375 Unrestricted Use SCOs is variable and typical of urban fill. Urban fill samples with concentrations exceeding the Unrestricted Use SCO were collected from properties several hundred feet from the Former MGP Site and not associated with former MGP operations.

Concentrations of PAHs in urban fill were highest at location HA-09-02, located approximately 200 ft east of the former MGP eastern property boundary (350 ft from the upland MGP plant area). This location is adjacent to the community center parking area and in the vicinity of residential backyards, a setting similar to the Former MGP Site lowland area. Since the HA-09-02 sample location area has been residential since the time of MGP operations, the PAHs present in fill are unrelated to the former MGP. The concentrations likely reflect typical urban fill and historical residential heating fuel (wood, coal) ash disposal.

2.2.2.2 Eastern Properties (181-185 Fall Street)

The backyards of residential properties east of the Site (181-183 and 185 Fall Street) are located topographically lower than the Site upland area, and Fall Street. The ground surface in the backyards is generally uneven and slopes to the south. A steep slope and retaining wall separates the former on-site building location and the backyard of the adjacent former residence at 185 Fall Street. As previously indicated, 185 Fall Street is now owned by NYSEG.

During investigation field work, the residence at 181-183 Fall Street was a multi-family dwelling, and the residence at 185 Fall Street appeared to be a single-family dwelling. The backyard areas of both dwellings were accessible via basement-level doorways. The backyard surfaces were grassy and appeared to be well maintained during the June 2007 Site walkover and November 2007 field investigations. Vegetable gardens were not observed in either backyard during the June 2007 Site walkover.

Direct-push explorations in the residential backyards encountered topsoil, fill material, and glacial till. Fill materials included silt and fine sand with varying amounts of brick fragments, clinker-like material, ash-like material, and ceramic fragments throughout the samples collected. Analytical results for soil samples collected from the fill

material indicate several metals and SVOCs exceed the Part 375 Unrestricted Use SCOs. BTEX were not detected in the eastern property soil samples.

Analytical results for one soil sample collected from the glacial till indicate metals and SVOCs exceeding Unrestricted Use SCOs are limited to the fill material. No MGP-related residual material or structures were observed in the glacial till beneath the residential properties.

The origin of the fill material in the residential backyards is unknown. The presence of ceramic materials throughout the fill, not commonly observed in on-site fill material, suggests the backyard fill may be unrelated to MGP operations. Possible sources may include material from nearby historic industrial operations placed during residential structure construction, fill material that was placed during the construction of the canal in 1818 or subsequent modifications in 1915, or discarded coal-fired furnace waste from residential heating systems. The Village sample results described above indicate that metals and SVOCs are present in urban fill at concentrations exceeding Unrestricted Use SCOs in other portions of Seneca Falls Village.

2.2.2.3 Western Property (193 Fall Street)

According to historical Sanborn maps, portions of the Sunoco Property lowland area were used by the MGP for coal storage. A historical wharf structure suggests that material handling and loading to canal vessels likely occurred in the southeast portion of the Sunoco Property lowland area. The primary historical use of the Sunoco Property lowland area appears to have been for lumber and coal storage.

The lowland portion of the Sunoco Property is underlain by fill material and glacial till. The fill material generally consists of silty sand with varying amounts of building demolition debris (brick fragments, stone blocks); ash-, clinker-, and cinder-like material, and coal-like fragments. No visual or olfactory indications of MGP materials were observed.

Analytical results from shallow (less than 5 ft bgs) subsurface and surface soil samples collected from the Sunoco Property lowland area fill material indicate the presence of PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) and arsenic (one surface soil sample) above Part 375 Restricted Commercial SCOs. Analytical results for samples collected at the bottom of the test pits, including a glacial till sample, did not detect potential MGP constituents at concentrations exceeding Part 375 Restricted Commercial SCOs. Visual observations and head space screening during test pit explorations did not indicate that MGP-related materials are present in glacial till beneath the Sunoco Property. BTEX were not detected in the western property soil samples.

2.2.3 Sediment

Sediment along the northern shoreline of the Seneca River and Canal typically consists of silt and clay with varying quantities of organic material (wood, leaves, and other organic detritus). The total organic carbon content ranges from 12,200 ppm to 159,000 ppm.

Sediment is not present in areas west (upstream) of the Former MGP Site western property boundary and along the navigational channel approximately 80 ft south of and parallel to the northern shoreline.

Apparent MGP-related materials were observed in sediment in a defined area near the western Site property boundary. Observations included TLM, oil-like material (OLM), staining, and MGP-like odor. The distribution of the apparent MGP-related impacts may be associated with the historical handling and loading of MGP residual products to barge vessels at the historical wharf structure depicted on Sanborn maps.

Sediment sampling analytical results indicates the widespread presence of PAHs. The concentration of total PAHs ranged from non-detectable at station SE-09-38 collected along the southern shoreline (south of the navigational channel) to 12,844 ppm at station SE-09-08 (1.5 to 2.0 ft) located in the visually impacted area near the Former MGP Site western property boundary.

Based on the physical observations during sampling, and analytical results, the distribution of MGP-related impacts appear to be well defined by physical and olfactory observations. Varying concentrations of PAHs in Seneca River and Canal sediments indicate ongoing non-point PAH sources (i.e., storm water runoff and atmospheric deposition of combustion-derived PAHs) are present along the waterway. Collectively, these nonpoint sources contribute to the local ambient PAH concentration in the sediments beyond the areas of MGP impacts. The spatially localized nature of MGP impacts appears to have resulted from a combination of 1) small-volume spills/releases occurring during handling/loading of MGP materials at the former wharf and 2) little to no contaminated sediment resuspension and transport owing to low-energy flow conditions in the near-shore area where apparent MGP-related materials are present.

2.3 Qualitative Exposure Assessment

A qualitative exposure assessment was completed for the Site, off-site properties, and the Seneca River and Canal during the RI. The exposure assessment concluded the following:

- On-site: Complete exposure pathways to surface soil were identified for current and future scenarios: an on-site utility worker, trespasser, or NYSEG employee occasionally visiting the Site. A complete exposure pathway to surface soil was identified for a future construction worker under the scenario that a new building is constructed at the Site. Complete exposure pathways to subsurface soil were identified for current and future utility workers, and for a future construction worker under the scenario that a new building is constructed at the Site.

- Off-site Residences at 181-183 and 185 Fall Street: This exposure assessment is provided for general understanding and completeness. However, most of the constituents considered for these properties are typical urban background and un-related to the Former MGP Site. Complete exposure pathways to surface soil and subsurface soil were identified for a current and future resident or construction worker.

- For the off-site assessment of 193 Fall Street (Sunoco Property), complete exposure pathways to surface soil were identified for a current and future Sunoco employee or trespasser. The

exposure assessment assumes no construction is planned for the lowland portion of the property.

- For the Seneca River and Canal, complete exposure pathways to sediment were identified for current and future trespassers and boaters.

3. REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVES

3.1 Goal of the Remedial Program

The goal of the remedial program is to eliminate the current and future exposure pathways to human receptors and to eliminate the current and future environmental threats identified in the RIR through the elimination or reduction of MGP-related compounds of concern (COCs) or MGP-related material (e.g., coal tar, OLM and TLM) in on-site and off-site surface and subsurface soil, groundwater, and MGP-related material in off-site sediment.

3.2 Standards, Criteria and Guidance

Standards, Criteria and Guidance (SCG) refer 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, to be applicable to site remediation. SCGs for evaluating the Site remedial alternatives are briefly described below:

- DER-10 Technical Guidance for Site Investigation and Remediation provides guidance on remedy evaluation and selection.

- 6 NYCRR Part 375 – Environmental Remediation Programs includes chemical-specific Soil Cleanup Objectives (SCOs) documented in Subpart 375-6 Remedial Program Soil Cleanup Objectives.

- DER-4 Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment.

- Technical & Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

3.3 Media and Locations Requiring Response Actions

The following media and locations were identified to require remedial actions based on the conclusions presented in the RIR and the presence of MGP-related impacts:

- Surface Soil: Completed pathways for potential current and future exposure to MGP-related impacts to surface soil in the following locations were identified during the RI:

  - MGP Site Upland Area;
  - MGP Site Lowland Area;
  - A portion of the residential property at 185 Fall Street; and
  - A portion of the lowland section of 193 Fall Street.

- Subsurface Soil: Completed pathways for potential current and future exposure to MGP-related impacts to subsurface soil in the following locations were identified during the RI:

  - MGP Site Upland Area;
  - MGP Site Lowland Area; and
  - A portion of the residential property at 185 Fall Street.

- Groundwater: MGP-related impacts to groundwater were limited to benzene and naphthalene detected at concentrations slightly greater than TOGS Class GA groundwater quality standards relatively deep in the Former MGP Site Upland Area. Although groundwater was excluded from the exposure assessment because groundwater is not used for potable sources in the Site area, remedial actions for groundwater will be evaluated consistent with the NYSDEC guidance to prevent potential future exposure or migration of impacted groundwater.

- Sediments: Completed pathways for potential current and future exposure to MGP-impacted Seneca River and Canal sediments in an area adjacent to the Site were identified in the RI.

The following media and/or locations were identified to either have incomplete exposure pathways or to be affected by non-MGP related impacts and, therefore, are excluded from evaluation in the FS.

- Off-site surface and subsurface soil: Surface and subsurface soil at residential property at 181-183 Fall Street and eastern portion of 185 Fall Street, and the Sunoco Station at 193 Fall Street were determined to be impacted by non-MGP constituents.

- Soil vapor. No completed exposure soil vapor intrusion pathway was identified.

3.4 Remedial Action Objectives

The following Remedial Action Objectives (RAOs) have been selected based on the observations and analytical results completed during the Remedial Investigation, the outcome of the qualitative exposure assessment presented in the RIR, and in accordance with Chapter 4 of the DER-10 Technical Guidance for Site Investigation and Remediation. RAOs have been selected for the Former MGP Site including portions of the abutting residential property owned by NYSEG (185 Fall Street), and off-site Seneca River and Canal Sediments. Table I contains a summary of the evaluation of potential exposure pathways to MGP-impacted media conducted during the qualitative health risk assessment.

The RAOs for the Former MGP Site include the following:

Media	Compounds or Material of Concern	Remedial Action Objectives
Soil	COCs: PAHs, Arsenic MOC: Coal Tar, OLM, TLM	• Prevent ingestion/direct contact with contaminated subsurface soil. • Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil. • Prevent migration of contaminants that would result in groundwater or surface water contamination.
Groundwater	COCs: VOCs, PAHs, Arsenic, Total Cyanide	• Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards. • Prevent contact with, or inhalation of volatiles, from contaminated groundwater. • Restore groundwater quality to within NYSDEC standards. • Remove the source of groundwater contamination.

Soil Vapor	COCs: VOCs	• Prevent inhalation of contaminants volatilizing from soil. • Prevent inhalation of contaminants volatilizing from groundwater.

The RAOs for Seneca River and Canal sediments include the following:

Media	Compounds or Material of Concern	Remedial Action Objectives
Sediment	COCs: None MOC: Coal Tar, OLM, TLM	• Prevent ingestion/direct contact with contaminated sediment.

4. IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

This section identifies potentially applicable remedial technologies to address MGP-related impacts to surface soil, subsurface soil, and sediment.

4.1 General Response Actions

Based on the RAOs identified in Section 3, the following General Response Actions (GRAs) were developed to address impacted media at the Site:

- No Action
- Institutional Controls
- Engineering Controls
- In-Situ Containment
- In-Situ Treatment
- Removal
- Off-site treatment

4.2 Identification and Screening of Applicable Remedial Technologies and Actions

Remedial technology types applicable to addressing impacted media at the Site (surface soil, subsurface soil, groundwater, and sediment) were identified based on discussions with NYSEG, experience working on similar sites, and review of the following guidance documents:

- DER-15 Presumptive/Proven Remedial Technologies
- DER – 31 Green Remediation
- CP-51 Soil Cleanup Guidance

Table II contains a summary of the screening of potentially applicable technologies for impacted soil, sediments and groundwater. Technologies that were retained following the screening presented in Table II are described below for areas containing media with MGP-related impacts

4.2.1 Surface Soil

- **Former MGP Site Upland Area**: The following potential actions were retained for further evaluation for implementation in the Former MGP Site Upland Area.

  - No Action: No action was retained for use as a baseline or also for possible implementation in combination with non-intrusive actions such as institutional controls.
  - Engineering Controls (fencing): Fencing would be an effective measure for access controls and would effectively reduce potential exposure to surface soils, particularly under current site conditions with the property unoccupied and largely covered by pavement and the concrete slab from the demolished commercial building. Fencing may not be effective or desirable in the long term because of operation and maintenance requirements and limitations that the presence of a fence may place on future use and redevelopment of the Upland Area.

- Institutional Controls/Land Use Restrictions: Restrictions on land use could be effective in preventing activities (e.g., construction, excavation or utility work) that could result in exposure to surface soils. The long-term effectiveness of institutional controls may be limited, and the presence of institutional controls may limit future use or redevelopment of the Upland Area.
- Capping/Containment. Containment by capping could be effective if implemented in conjunction with institutional controls to restrict on-site activities, such as utility work or construction work that could result in exposure to impacted surface soils. Caps may consist of a clean soil cap, layered cap with flexible membrane liner, or an asphalt/concrete cap.
- Excavation with Off-Site Treatment/Disposal: Excavation would effectively remove soil impacted by MGP-related constituents and mitigate potential current and future risk of exposure to the impacted soil. Impacted soil from the Upland Area could be disposed at a RCRA Subtitle D landfill or treated at a thermal desorption facility.

- **Former MGP Site Lowland Area:** The following potential actions were retained for further evaluation for implementation in the Former MGP Site Lowland Area

  - No Action: No action was retained for use as a baseline or also for possible implementation in combination with non-intrusive actions such as institutional controls. These approaches may be effective because of the Lowland Area is relatively inaccessible, with heavily vegetated conditions and locations between steep slopes of the upland area to the north and the presence of the Seneca River and Canal to the south.
  - Engineering Controls (fencing): Access controls, such as perimeter fencing, would effectively limit potential exposure to impacted surface soil in the Lowland Area. The long-term effectiveness of a perimeter fence may be limited by long term maintenance requirements.
  - Institutional Controls/Land Use Restrictions: Institutional controls could be effectively implemented in conjunction with access controls or capping to contain and preclude potential exposure to impacted soils. Based on its relative inaccessibility, it is unlikely that construction or utility work leading to potential exposure to surface soil would be conducted in the Lowland Area in the future.
  - Capping/Containment: Construction of a clean soil cap over the lowland area would effectively preclude potential risk of exposure to surface soils. A cap would require clearing of heavy vegetation in advance of construction. Institutional controls would need to be implemented in conjunction with a cap to record the lateral limits of the cap, establish operation and maintenance (O&M) requirements for the cap, and to restrict land uses that may compromise the integrity of the cap.
  - Excavation with Off-Site Treatment/Disposal: Excavation and off-site treatment/disposal would mitigate potential risk of exposure to near surface soil in the Lowland Area. Soil impacted by PAHs and metals could be disposed at either a RCRA Subtitle D Landfill or thermal treatment facility, depending on which facility is more cost effective.

- **185 Fall Street Residential Property:** The following potential actions were retained for further evaluation for the affected western portion of the residential property at 185 Fall Street.

  - No Action: No action was retained for use as a baseline and also for possible implementation in combination with non-intrusive actions such as institutional and/or access controls.
  - Engineering Controls (fencing): Access controls such as installation of a fence would be an effective or acceptable measure on a portion of a residential property and could be used in combination with other remedial actions.
  - Institutional Controls/ Land Use Restrictions: Institutional controls such as land use restrictions were retained for further evaluation, likely in combination with other remedial actions.
  - Capping/Containment: A vegetated soil cap could be implemented to mitigate the risk of direct exposure or ingestion of surface soil in the area of MGP-related impacts.
  - Institutional Controls/ Land Use Restrictions: Institutional controls such as land use restrictions are unlikely to prevent potential exposure to surface soil at a residential property. Institutional controls may be effective with either engineering controls or a cap; however, these remedies were also determined to be difficult to effectively implement.
  - Excavation with Off-Site Treatment/Disposal: Excavation and off-site treatment/disposal will mitigate potential risk of exposure to near surface soil at the residential property. Impacted soil could be disposed at a RCRA Subtitle D landfill or, if more cost effective, a thermal desorption facility.

- **193 Fall Street (Sunoco Property) Lowland Area:** The following potential actions were retained for further evaluation for implementation in the 193 Fall Street (Sunoco Property) Lowland Area

  - No Action: No action was retained for use as a baseline or also for possible implementation in combination with non-intrusive actions such as institutional controls. These approaches may be effective because of the Lowland Area is relatively inaccessible, with heavily vegetated conditions and locations between steep slopes of the upland area to the north and the presence of the Seneca River and Canal to the south.
  - Engineering Controls (fencing): Access controls, such as perimeter fencing, would effectively limit potential exposure to impacted surface soil in the Sunoco Property Lowland Area. The long-term effectiveness of a perimeter fence may be limited by long term maintenance requirements.
  - Institutional Controls/Land Use Restrictions: Institutional controls could be effectively implemented in conjunction with access controls or capping to contain and preclude potential exposure to impacted soils. Based on its relative inaccessibility, it is unlikely that construction or utility work leading to potential exposure to surface soil would be conducted in the Sunoco Lowland Area in the future.
  - Capping/Containment: Construction of a clean soil cap over the Sunoco Property Lowland Area would effectively preclude potential risk of exposure to surface soils. A cap would require clearing of heavy vegetation in advance of

construction. Institutional controls would need to be implemented in conjunction with a cap to record the lateral limits of the cap, establish operation and maintenance (O&M) requirements for the cap, and to restrict land uses that may compromise the integrity of the cap.

- Excavation with Off-Site Treatment/Disposal: Excavation and off-site treatment/disposal would mitigate potential risk of exposure to near surface soil in the Sunoco Property Lowland Area. Soil impacted by PAHs and metals could be disposed at either a RCRA Subtitle D Landfill or thermal treatment facility, depending on which facility is more cost effective.

4.2.2 Subsurface Soil

- **Former MGP Site Upland Area:** The following potential actions were retained for further evaluation for implementation for subsurface soil in the Former MGP Site Upland Area.

  - No Action: No action was retained for use as a baseline and also for possible implementation in combination with non-intrusive actions such as institutional controls.
  - Institutional Controls: Land use restrictions that would reduce the potential for future exposure to subsurface soil by utility or construction workers could be readily implemented. However, a remedy based solely on the use of institutional controls would not address the source of impacts to ground water.
  - In Situ Solidification/Stabilization (ISS): ISS is a proven, effective remedy for soil impacted by MGP residuals, including OLM and TLM. Implementation of ISS may be somewhat difficult due to buried structures including the gas holder and large debris (building and foundation debris) observed in the fill in the Upland Area, which would require use of bucket mixing using an excavator rather than mixing with augers, which tends to be more effective for relatively deep mixing. ISS would be conducted in conjunction with excavation and off-site disposal of varying depths of surface soil to allow for expansion of the solidified soil. Logistical challenges would exist in operating and positioning both plant equipment for the cement/amendment mixing and an excavator for in situ mixing. ISS would likely be cost effective because no off-site treatment/disposal costs would be incurred. Bench scale tests would be completed to determine the appropriate type of soil additives (typically Portland cement and ground granulated blast-furnace slag (GGBS)) and soil mix design. MGP residuals in the impacted soil, which are the current source of impacts to groundwater quality in the Upland Area, would be immobilized within the solidified soil mixture. Institutional controls (e.g., deed recordation) may be required due to the presence of solidified soil on site. However, the Upland Area would likely be suitable for unrestricted future use following remediation by ISS.
  - Excavation with Off-Site Treatment/Disposal: Excavation to remove subsurface soil could be readily implemented and effective in mitigating potential future risks related to subsurface soil and in removing the source of impacts to groundwater in the Upland Area. The former gas holder would be removed or remediated (e.g., contents removed) in conjunction with the excavation. Excavation to depths of up to 23 ft. bgs would require lateral earth

support and dewatering. Soil containing TLM or OLM would likely be treated off-site by thermal desorption. Soil impacted by PAHs and arsenic could be disposed at the more cost effective of a landfill or thermal desorption facility. The Upland Area would likely be suitable for unrestricted commercial use following the complete removal of impacted soil.

- **Former MGP Site Lowland Area:** The following potential actions were retained for further evaluation for implementation for subsurface soil in the Former MGP Site Lowland Area.

  - No Action: No action was retained as a baseline for alternative evaluations and for potential use in combination with institutional controls.
  - Institutional Controls: Institutional controls, consisting of land use restrictions used in combination with an effective remedial action for near surface soil, would be an effective remedial approach to preclude potential future exposure to subsurface soil in the Lowland Area. The Lowland Area is relatively isolated, does not contain utilities and is unlikely to be developed in the future. Impacted soil is not a source of groundwater contamination. Consequently, institutional controls may be a very effective means to prevent future exposure to the subsurface soil.
  - In Situ Solidification/Stabilization: ISS could be effectively implemented in the Lowland Area due to the relatively shallow 6 to 9 ft. bgs of impacted subsurface soil. Institutional controls (deed recordation) may be required due to the presence of solidified soil.
  - Excavation with Off-Site Treatment/Disposal: Excavation to remove subsurface soil could be readily implemented based on the relatively shallow depths of impacted soil and would be effective in mitigating potential future risks related to subsurface soil. Excavation near the riverbank would require control of potential inflow of surface water from the Seneca River and Canal. With removal of both surface and subsurface impacted soil, the Lowland Area would likely be suitable for unrestricted use.

- **185 Fall Street Residential Property:** The following potential actions were retained for further evaluation for subsurface soil in the affected portion of the residential property at 185 Fall Street abutting the Former MGP Site eastern property boundary.

  - No Action: No action was retained as a baseline for alternative evaluation.
  - Institutional Controls: Institutional controls consisting of land use restrictions may be effective in precluding potential future exposure to subsurface soil if effective measures to remediate surface soil on the residential property are implemented. Use restrictions could likely include deed restrictions preventing the cultivation of food crops on the property if the property remains in residential use,
  - In Situ Solidification/Stabilization: ISS could be effectively implemented in subsurface soil on the residential property. Because of the relatively small volume of soil to be treated, implementation of ISS on this property would likely be cost effective only if conducted in conjunction with ISS on the Former MGP Site.

- Excavation with Off-Site Treatment/Disposal: Excavation to remove subsurface soil could be readily implemented based on the relatively shallow depths of impacted soil and would be effective in mitigating potential future risks related to subsurface soil. With removal of both surface and subsurface impacted soil, the residential property would likely be suitable for unrestricted use.

- **193 Fall Street (Sunoco Property) Lowland Area:** The following potential actions were retained for further evaluation for implementation for subsurface soil in the 193 Fall Street (Sunoco Property Lowland Area).

  - No Action: No action was retained as a baseline for alternative evaluations and for potential use in combination with institutional controls.
  - Institutional Controls: Institutional controls, consisting of land use restrictions used in combination with an effective remedial action for near surface soil, would be an effective remedial approach to preclude potential future exposure to subsurface soil in the Sunoco Property Lowland Area. The Lowland Area is relatively isolated, does not contain utilities and is unlikely to be developed in the future. Impacted soil is not a source of groundwater contamination. Consequently, institutional controls may be a very effective means to prevent future exposure to the subsurface soil.
  - In Situ Solidification/Stabilization: ISS would not likely be effectively implemented in the Sunoco Property Lowland Area due to the relatively shallow nature of the impacted soil.
  - Excavation with Off-Site Treatment/Disposal: Excavation to remove subsurface soil could be readily implemented based on the relatively shallow depths of impacted soil and would be effective in mitigating potential future risks related to subsurface soil. Excavation near the riverbank would require control of potential inflow of surface water from the Seneca River and Canal. With removal of both surface and subsurface impacted soil, the Sunoco Property Lowland Area would likely be suitable for unrestricted use.

4.2.3 Groundwater

Remedial approaches were developed for groundwater in the Upland Area that is impacted by relatively low concentrations of benzene and naphthalene. The following potential actions were retained for further evaluation to address groundwater impacts in the Former MGP Site Upland Area.

- No Action: No action was retained as a baseline for alternative evaluation for the residential property
- Monitored Natural Attenuation: Monitored natural attenuation (MNA) would be a suitable remedy for use in conjunction with an effective remedy for impacted subsurface soil in the Upland Area. MNA is a proven and cost-effective remedial action for benzene, naphthalene and other VOCs/SVOCs when conducted in the absence of a contaminant source.
- In Situ Treatment/Enhanced Bioremediation: In situ treatment, such as by enhanced bioremediation would be effective if used in conjunction with remedial actions to treat

or remove OLM and TLM in the former gas holder and deeper soil in the Former MGP Site Upland Area.

Groundwater extraction and long-term groundwater monitoring were evaluated on a preliminary basis; however, these actions are not considered cost effective for remediation of the low concentrations and limited extent of benzene and naphthalene detected in groundwater.

4.2.4 Sediment

Remedial approaches for Seneca River and Canal sediment impacted by PAHs, OLM and TLM retained for further evaluation include the following.

- No Action: No action was retained as a baseline for alternative evaluation of sediment remedies
- Capping: Subaqueous capping using geocomposite clay liners are proven and effective measures for isolating MGP-impacted sediments and other contaminated sediments from potential exposure to humans using water ways and for restoration of the benthic habitat. Permits and approvals for a subaqueous cap may be difficult to obtain or require substantial time, which could affect implementation of a sediment capping remedy. The long term effectiveness of a subaqueous cap may be limited by the use of the waterway by pleasure water craft, which may damage the cap by using anchors in the affected area.
- Dredging: Dredging would effectively remove visibly impacted sediments and sediments containing OLM or TLM. Dredged sediments would be managed on the Former MGP Site by dewatering and shipped off-site for treatment by thermal desorption. The benthic habitat would be restored by replacing the dredged sediments with clean granular soil.

5. EVALUATION OF REMEDIAL ALTERNATIVES

This section provides a detailed analysis of the remedial technologies and alternatives identified in Section 4.

5.1 Evaluation Criteria

In accordance with the DER-10 Technical Guidance for Site Investigation and Remediation, the following evaluation criteria have been established for evaluating remedial alternatives:

- **Overall protectiveness of human health and the environment**: The ability of a remedial alternative to protect public health and the environment through removal, treatment, containment, engineering controls or institutional controls.

- **Compliance with Standards, Criteria and Guidance (SCGs)**: The ability of a remedial alternative to conform to officially promulgated standards and criteria that are directly applicable or that are relevant and appropriate.

- **Long-term effectiveness and permanence**: The ability of a remedy to maintain long-term effectiveness after implementation.

- **Reduction of toxicity, mobility or volume**: The ability of a remedy to reduce the toxicity, mobility, or volume of a contaminant, with a preference given to remedies that provide a permanent and significant reduction.

- **Short-term impact and effectiveness**: The potential for a remedy to create short-term adverse environmental impacts or human health exposure during remedy implementation, and the length of time that will be required to implement the remedy and achieve remedial objectives.

- **Implementability**: The technical, logistical, and administrative feasibility of implementing a remedy.

- **Cost**: The overall cost of a remedy, including the capital cost of implementation (construction) and long-term operation and maintenance, with considerations towards the overall effectiveness of the remedy.

- **Land Use**: Evaluation of the current, intended, and reasonably anticipated future use of the Site and surroundings as related to a remedy that does not achieve unrestricted levels.

- **Community Acceptance**: The expected level of acceptability of the remedial alternative is evaluated based on the above criteria, with particular consideration regarding overall protectiveness of human health and the environment and short-term impacts on the community that is likely to be affected by the remedial action. This criterion is further evaluated after the public review of the Feasibility Study as part of the remedy selection and approval process.

5.2 Assembly of Alternatives

Combinations of remedial technologies/approaches retained during the screening described in Section 4.2 were assembled in the remedial alternatives to address each of the media and locations affected by MGP residuals. Remedial Alternatives developed for the Former MGP Site and abutting residential property (185 Fall Street) and commercial property (193 Fall Street) are summarized below.

5.2.1 Alternative 1 – No Action with Engineering Controls, Institutional Controls, Groundwater Monitoring

Alternative 1 consists of establishment of land use restrictions to prohibit uses and activities that may result in exposure to impacted surface and subsurface soils in the Upland and Lowland Areas of the Former MGP Site, at the residential property at 185 Fall Street, and at the lowlands of the commercial property at 193 Fall Street. Engineering controls would include fencing to restrict access to the Lowland Area of the Former MGP Site, and exposed surface soil at the residential property at 185 Fall Street and the lowland portion of 193 Fall Street, some of which contains MGP-related impacts. Fencing to restrict access to the Upland Area of the Former MGP Site is not anticipated to be necessary because the presence of existing pavement and the remnant building slab from the former commercial building will sufficiently prevent exposure to impacted soil. Engineering controls would also include posting of the Seneca River and Canal to prohibit wading/swimming and mooring/temporary anchoring of watercraft in the area of impacted sediments. Alternative 1 is shown conceptually in Figure 3.

Tax maps for the Seneca Falls indicate that the Former MGP Site, 185 Fall Street and 193 Fall Street are zoned "Highway Commercial", which allows for various commercial uses. Properties with residential use that pre-dated the commercial zoning designation were allowed to remain in residential use; therefore, continued residential use of properties is allowed but not required. Consequently, institutional controls that prohibit residential use of the property at 185 Fall Street could be implemented, if desired.

Institutional controls/land use restrictions would restrict excavations for construction and utility work in each of the three areas to work by appropriately trained workers conducting the work in accordance with a health and safety plan consistent with Occupational Safety and Health Administration (OSHA) requirements for Hazardous Waste Operations and Emergency Response (HAZWOPER).

An existing ordinance prohibits the use of groundwater in the Site area for potable water; however, a groundwater use prohibition will be included as an institutional control. Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

Institutional controls, such as a local ordinance to prohibit wading/swimming and anchoring/mooring watercraft in affected areas, could be included in Alternative 1 if such measures are available in Seneca Falls and acceptable to the New York State Canal Corporation.

5.2.2 Alternative 2 – Capping, Engineering Controls, Institutional Controls, Groundwater Monitoring

Alternative 2 consists of capping of surface soils in the Upland and Lowland Areas of the Former MGP Site and MGP-impacted surface soil at the 185 Fall Street residential property and the lowlands of 193 Fall Street, as well as capping of impacted sediments in the Seneca River and Canal. A cap in the Upland Area could consist of an asphalt/concrete cap, a vegetated cap including 1-ft thick cover of clean soil or modification of the existing asphalt area and remnant concrete slab would be consistent with continued commercial use of this portion of the Site. A 2-ft thick soil cap would be installed in the Lowland Area of the site and 193 Fall Street, and 185 Fall Street to preclude potential exposure to surface soil. A subaqueous cap consisting of a geocomposite clay liner or equivalent with clean soil cover would be placed over impacted sediments in the Seneca River and Canal. Alternative 2 is shown conceptually in Figure 4.

Engineering controls would consist of posting of the Seneca River and Canal to prohibit mooring/temporary anchoring of watercraft that may affect the cap.

Institutional controls would be implemented to restrict uses and activities that could result in future damage to the cap or exposure to subsurface soil in the Upland Area, Lowland Area, the lowland portion of 193 Fall Street and 185 Fall Street property, such as by future construction workers, and also including prohibition of the cultivation of food crops on the affected portion of the residential property. As noted above for Alternative 1, restriction of the 185 Fall Street property to commercial uses could be implemented; however, for the purpose of this Feasibility Study, continued residential use of the property is assumed. A groundwater use prohibition will be included as an institutional control.

Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

5.2.3 Alternative 3 – Excavation and Off-Site Treatment/Disposal of Surface Soils, Dredging of Impacted Sediments, Institutional Controls, Groundwater Monitoring

Alternative 3 consists of excavation and off-site treatment/disposal of all affected surface soil with restoration in kind or consistent with planned future uses, dredging of impacted sediments and groundwater quality monitoring in the Upland Area of the Former MGP Site. Two feet of surface soil would be excavated for off-site treatment by thermal desorption or landfill disposal. Excavation may be limited to 1 ft of impacted soil in the Upland Area, which would be consistent with future commercial use of that portion of the Former MGP Site. Surface elevations would be restored with a clean vegetated soil cover or by pavement in the Upland Area. Sediments impacted by TLM or OLM would be dredged, dewatered and transported off-site for thermal treatment. Dredged areas would be backfilled using clean granular soil to restore the benthic habitat. Alternative 3 is shown conceptually in Figure 5.

Institutional controls would be established to restrict land uses that may result in exposure to subsurface soils. A groundwater use prohibition will be included as an institutional control. Groundwater monitoring would be conducted in the Upland Area to monitor impacts by VOCs and SVOCs at concentrations in excess of regulatory standards.

5.2.4 Alternative 4 – In Situ Solidification/Stabilization of Impacted Soil, Dredging of Impacted Sediments, Institutional Controls, Monitored Natural Attenuation (MNA) of Impacted Groundwater

Alternative 4 consists of treatment of impacted soil in the Upland and Lowland Areas of the Former MGP Site and residential property by In Situ Solidification/Stabilization (ISS) methods. Excavation and off-site treatment/disposal of near-surface soil in the lowland portion of 193 Fall Street and to varying depths in other areas would be required in each area to accommodate expansion of soil resulting from mixing with ISS agents and restoration using clean backfill with either a vegetated soil cover or pavement. Dredging and restoration of the benthic habitat would be performed similar to as described above for Alternative 3. Alternative 4 is shown conceptually in Figure 6.

Institutional controls would likely be necessary to record the presence of solidified soil and measures for management and disposal if solidified soil is excavated in the future. A groundwater use prohibition will be included as an institutional control.

Groundwater remediation would be by MNA following completion of ISS.

5.2.5 Alternative 5 - Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soils, Dredging of Impacted Sediments, Enhanced Bioremediation and MNA of Impacted Groundwater

Alternative 5 consists of excavation and off-site treatment/disposal of all MGP-impacted surface soil and subsurface soil throughout the Former MGP Site, the 185 Fall Street residential property and the lowland portion of the 193 Fall Street property. Restoration would be in kind or consistent with planned future uses. Future uses would be unrestricted following restoration. Dredging and restoration of the benthic habitat would be performed similar to Alternatives 3 and 4 described above with the addition of sediments with visual/olfactory indications of MGP-related impacts and total PAH concentrations exceeding background conditions. Alternative 5 is shown conceptually in Figure 7.

Groundwater treatment would consist of application of Oxygen Release Compound™ (ORC) or other suitable agent upon completion of the Upland Area excavation to enhance aerobic degradation of residual contaminants followed by MNA. A groundwater use prohibition will be included as an institutional control.

5.2.6 Alternative 6 – ISS in the Upland Area, Capping of Impacted Soil in the Lowland Area, Excavation and Off-Site Treatment Disposal of Surface and Subsurface Soil at the Residential Property, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater

Alternative 6 includes excavation of surface soil in the upland area in order to accommodate the volume expansion that would result from ISS of subsurface soil in this area. Clean soil and pavement would be placed above solidified soil. Soil caps would be constructed in the Lowland Area and the lowland portion of 193 Fall Street to mitigate risk of potential exposure by direct contact. Surface and subsurface soil would be excavated and removed from 185 Fall Street and replaced with clean soil backfill with loaming and seeding, which would allow for unrestricted

use of the residential property. Dredging and restoration of the benthic habitat would be performed similar to Alternatives 3, 4 and 5. Alternative 6 is shown conceptually in Figure 8.

Institutional controls would include recording the presence of and management requirements for solidified soil in the Upland Area and prohibition of excavations and development of the Lowland Area that would compromise the soil caps. A groundwater use prohibition will be included as an institutional control.

Groundwater treatment would be by MNA following ISS in the Upland Area.

5.3 Analysis of Remedial Alternatives

A summary of analysis of Remedial Alternatives 1 through 6 using the criteria identified in Section 5.1 is presented in Table III.

5.3.1 Alternative 1 – No Action with Engineering Controls, Institutional Controls, Groundwater Monitoring

The no action alternative provides a baseline for comparison with the other alternatives and is included in the evaluation for consistency with NYSDEC guidance (NYSDEC, January 2002). No active remediation would be conducted under this alternative. Institutional controls for each affected land area and groundwater monitoring in the former MGP Upland Area are included in this alternative. Engineering controls would consist of perimeter fencing to prevent access to the Lowland Area of the Former MGP Site and a portion of the 193 Fall Street lowland and 185 Fall Street residential property with MGP-impacted soil, as well as posting of the portion of the Seneca River and Canal containing MGP-impacted sediments to prohibit swimming, wading and anchoring/mooring of watercraft. Fences and signage would require periodic inspection and repair/replacement. Potential exposure to impacted surface and subsurface soils in the Upland Area would be inhibited by the existing pavement and concrete slab remaining from the former commercial building; therefore, access restrictions are not necessary in the Upland Area.

The no action alternative would not affect overall current or expected future land use, except for restricted access in fenced areas and restrictions on use of the affected portion of the Seneca River and Canal adjacent to the Site. Exposures to soil would be mitigated through land use restrictions, worker health and safety training, and soil management planning in conjunction with potential future utility work or construction. Installation of perimeter fencing would limit access to this area by trespassers. Potential exposure to impacted soil on the residential property would be inhibited by installation of a fence surrounding the area of MGP impacts, which would somewhat limit use of the residential property.

Groundwater in the area of the Site is not used as a source of potable water. With the availability of municipal drinking water in the Site area, and an existing municipal ordinance prohibiting the use of groundwater for drinking water, future water use is unlikely. However, a groundwater use prohibition will be included as an institutional control. Although exposure to relatively low concentrations of benzene and naphthalene in groundwater in the Upland Area is not a completed exposure pathway, groundwater quality monitoring using existing monitoring wells is included in the no action alternative in order to monitor the potential for or progress of natural attenuation of MGP residuals detected in groundwater.

5.3.1.1 Overall Protectiveness of Human Health and the Environment

The current cover on the Upland Area and limited accessibility of the Lowland Area and lowland portion of 193 Fall Street provide some protection to potential exposure to surface soil in these areas. Perimeter fencing will provide further protection from potential exposure to MGP-impacted soil in the Lowland Area. Potential future exposures to impacted soil in the Upland and Lowland Areas could be readily mitigated by institutional controls requiring soil management in the event of future excavations for utilities or construction for future Site development; however, utilities do not exist in the Lowland Area and it appears unlikely that this area would be developed in the future. Requirements for maintenance of fences will need to be included in institutional controls.

The no action alternative would be somewhat protective for future residential use of 185 Fall Street provided that appropriate monitoring and maintenance of the fence are performed; however, this alternative would be more protective if institutional controls prohibiting future residential use and other uses (e.g., a child day care facility) that may result in exposure to impacted surface soil are implemented based on the current commercial zoning of the 185 Fall Street property. Institutional controls to preclude potential exposure to subsurface soil (e.g., prohibitions on cultivating food crops, required measures for worker health & safety and soil management plans for utility work and construction) would be protective of human health.

Institutional controls prohibiting groundwater use would protect future users of the Upland Area from potential exposures to groundwater. However, the continued presence of TLM and OLM in the subsurface soil and possibly in contents of the gas holder would be a continuing source of impacts to groundwater quality and may be considered a long term risk to the environment.

Engineering controls to prohibit uses that could result in direct contact with impacted sediments may be generally protective of human health because the Seneca River and Canal in the vicinity of the Site is not an attractive area for wading or swimming due to shallow, stagnant water and algae growth. Access to this portion of the waterway is generally limited from the shore due to difficult access to the Lowland Area, and installation of a perimeter fence in the Lowland Area would further limit the ability to access the area of affected sediments from the shore. Although engineering and institutional controls appear somewhat protective of human health, impacts to sediments by TLM and OLM would likely be considered potential long-term risk to the environment.

5.3.1.2 Compliance with SCGs

Institutional controls included in Alternative 1, including land use and groundwater use restrictions, would not comply with SCGs related to direct contact and ingestion of impacted soil and groundwater on the Upland Area of the Former MGP Site. Compliance with SCGs related to exposure to surface soil in the Upland Area could be achieved with maintenance of the asphalt pavement and concrete slab. Compliance with SCGs to attain TOGS Class GA standards would not be achieved because the TLM and OLM in subsurface soil in the Upland Area would remain as a continuing source of

impacts to groundwater quality. Groundwater monitoring would involve compliance with requirements for management of investigation-derived wastes from the monitoring program.

Engineering and institutional controls would not result in compliance with SCGs related to impacted surface and subsurface soils in the Lowland Area, lowland portion of 193 Fall Street and residential property at 185 Fall Street, but would prevent exposure to these media.

5.3.1.3 Long-Term Effectiveness and Permanence

Long term maintenance and monitoring of the existing asphalt/concrete cover on the ground surface in conjunction with institutional controls would be necessary for Alternative 1 to be effective in the long term relative to impacted soil in the Upland Area. Groundwater use restrictions and monitoring would likely be effective in providing long-term prevention of exposure to impacted groundwater.

Access restrictions and institutional controls requiring long-term maintenance of a fence and implementation of land use restrictions for subsurface disturbance would be necessary for Alternative 1 to be effective over the long term relative to potential exposure to soil in the Lowland Area, lowland portion of 193 Fall Street and 185 Fall Street property.

Engineering controls consisting of signage to establish use restrictions related to potential exposure to Seneca River and Canal sediments would not be effective over the long term and would not be considered a permanent solution.

5.3.1.4 Reduction of Toxicity, Mobility or Volume

No reduction in the toxicity, mobility or volume of impacted media would result from implementation of Alternative 1. TLM and OLM present in subsurface soils and materials potentially released from the former gas holder in the Upland Area would continue to be a source of impacts to groundwater quality; however, the impacts to groundwater are limited to the Upland Area and occur at relatively low concentrations, indicating limited mobility and toxicity under current and future conditions if Alternative 1 is implemented.

5.3.1.5 Short-Term Impact and Effectiveness

Other than restricting access to the Lowland Area and a portion of the residential property, Alternative 1 would have no short term effects on users of the Former MGP Site, lowland portion of 193 Fall Street and the 185 Fall Street residential property. Recreational uses in a portion of the Seneca River and Canal would be restricted; however, this portion of the waterway does not appear to be attractive for activities that could result in contact with impacted sediments. Use restrictions would be effective in the short term for the Former MGP Site. Use restrictions for the Seneca River and Canal and residential property would be more effective over the short-term than long-term. Groundwater monitoring would have no short-term effects and would require

implementation of a groundwater sampling program over the long-term (estimated 30-year period).

5.3.1.6 Implementability

Alternative 1 would be readily implementable and generally consistent with current land uses.

5.3.1.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 1 is approximately $591,000 (Table IV). The cost estimation spreadsheet is provided in Appendix B.

5.3.1.8 Land Use:

The Upland and Lowland Areas of the Former MGP Site would remain in commercial use with restrictions on uses that may result in exposure to impacted surface and subsurface soil. Access to the Lowland Area and the lowland portion of 193 Fall Street would be restricted by fencing with warning signs to exclude trespassers, limiting future use of the property. However, the Lowland Area is currently vacant with difficult access due to both steep topography and overgrown vegetation. Fencing and institutional controls over a portion of 185 Fall Street would reduce the area of the property that is usable by residents. Future use of the current residential property at 185 Fall Street could be restricted to commercial use with restrictions to preclude activities that may result in exposure to surface and subsurface soil.

Certain recreational uses of portion of the Seneca River and Canal with impacted sediments would be restricted by signage.

5.3.1.9 Community Acceptance:

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

5.3.2 Alternative 2 – Capping, Engineering Controls, Institutional Controls, Groundwater Monitoring

Alternative 2 includes the following components:

- Capping of impacted surface soils at the Former MGP Site, the lowland portion of 193 Fall Street and residential property at 185 Fall Street to preclude exposure to near-surface soil
- Capping of MGP-impacted sediments in the Seneca River and Canal.
- Engineering controls to protect the subaqueous cap from potential contact and damage by users of the waterway.
- Institutional controls to record the presence of capped areas, establish operation, monitoring and maintenance (OM&M) requirements for caps and to protect from potential future exposure to subsurface soils.
- Long-term groundwater monitoring using existing monitoring wells.

The Upland Area may be capped using pavement or concrete, possibly involving modification of the existing pavement and concrete in an area covering approximately 19,000 sf. Soil caps in the Lowland Area, the lowland portion of 193 Fall Street and a portion of 185 Fall Street would consist of 2-ft-thick clean vegetated soil covers over approximately 15,000 sf, 6,700 sq ft and 4,000 sf, respectively. However, a 1-ft thick soil cover may suffice for future commercial use of the Lowland Area. Approximately 13,500 sf of sediments impacted by TLM or OLM would be capped using a composite geosynthetic clay liner (GCL) or equivalent with clean granular backfill for restoration of the benthic habitat.

Engineering controls would consist of posting of signs to prohibit anchoring or mooring of watercraft in the capped sediment area to preclude potential damage to the cap.

Institutional controls would record the locations of caps and establish long-term OM&M programs for the caps. OM&M programs would consist of annual visual inspections with mowing of vegetated caps and repairs to any damage identified during the annual inspection. Institutional controls would also consist of restrictions on uses and activities (e.g., subsurface utility or construction work) to prevent exposure to subsurface soil in the Upland Area, Lowland Area and residential property. Cultivation of food crops or residential use of 185 Fall Street may also be restricted. Visual monitoring of the subaqueous cap, with maintenance/repair as required, would be necessary until the benthic habitat is fully re-established. Signage along the waterway would require periodic inspection and repair/replacement.

Long-term groundwater monitoring would be conducted in the Upland Area.

5.3.2.1 Overall Protectiveness of Human Health and the Environment:

Alternative 2 remedial actions would effectively protect users of the Former MGP Site, the lowland of 193 Fall Street and residential property from exposure to impacted surface soil and users of the Seneca River and Canal from contact with impacted sediments. Institutional controls would be effective in protecting from potential exposure to subsurface soils.

Alternative 2 does not include measures for removal of the subsurface soil and the former gas holder in the Upland Area, which are continuing sources of impacts to groundwater quality. The long-term presence of OLM and TLM in subsurface soil may be considered a long-term risk to the environment.

Capping of affected sediments would be effective in preventing direct contact exposure with impacted sediment. Restoration of the benthic habitat will reduce or eliminate adverse impacts to the environment currently posed by contaminated sediments.

Long-term groundwater monitoring does not involve any measures for protection of human health; however, institutional controls to prohibit use of groundwater for potable water in the Site area, including the existing ordinance preventing use of groundwater in the Site area, will protect from potential exposure to groundwater.

5.3.2.2 Compliance with SCGs:

Capping of all impacted areas will not directly comply with SCGs related to contact with impacted surface soil and sediments in the affected areas. .

Compliance with SCGs to attain TOGS Class GA standards would not be achieved because the TLM and OLM in subsurface soil in the Upland Area would remain as a continuing source of impacts to groundwater quality. Groundwater monitoring would involve compliance with requirements for management of investigation-derived wastes from the monitoring program.

Institutional controls included in Alternative 2, including land use restrictions combined with the existing groundwater use restrictions are necessary to mitigate risk of direct contact and ingestion of impacted soil and groundwater.

5.3.2.3 Long-Term Effectiveness and Permanence:

Construction of caps over impacted soil and sediments in combination with engineering and institutional controls have been proven, effective measures to prevent direct contact with or ingestion of impacted soil and sediments over the long term. However, significant OM&M are required to maintain the protectiveness of the caps over the long term.

Access and use restrictions have generally been demonstrated as effective long-term measures for protection from potential exposures at contaminated sites. However, institutional controls consisting of land use restrictions, particularly with respect to potential exposure to surface soil, may not be effective for the residential property because the restrictions may be difficult to enforce over the long term.

The existing groundwater use restriction and monitoring would likely be effective in providing long-term prevention of exposure to impacted groundwater, particularly considering the existing ordinance that prohibits use of groundwater as a source of potable water in the presence of a municipal water supply system is likely to remain in effect over the long term.

5.3.2.4 Reduction of Toxicity, Mobility or Volume

Implementation of Alternative 2 would not reduce the toxicity or volume of wastes existing at the Site. Capping would reduce the mobility of impacted soil by eliminating the potential for erosion. Capping of sediments containing TLM or OLM would eliminate mobility by eliminating the potential for transport of impacted sediments to other locations within the waterway.

TLM and OLM present in subsurface soils and materials potentially released from the former gas holder in the Upland Area would continue to be a source of impacts to groundwater quality; however, the impacts to groundwater are limited to the Upland Area and occur at relatively low concentrations, indicating limited mobility and toxicity under existing and future conditions if Alternative 2 is implemented.

5.3.2.5 Short-Term Impact and Effectiveness

Implementation of Alternative 2 would not have significant adverse short-term impacts to users of the property, on-site workers or the community. Dust, noise and traffic would be generated during construction. Construction of the caps can be completed within a reasonable timeframe, which is likely to be within a period of several months following receipt of regulatory approvals and any necessary permits.

5.3.2.6 Implementability

Construction of caps in land areas is a common practice that would be readily implementable. Design and construction of the caps would need to accommodate the relatively steep slope between the Upland and Lowland Areas of the Former MGP Site, which could be accommodated through grading, surface stabilization or slope reinforcement. Permits would likely be required for construction of caps in the land areas; however, the permits would likely be readily attainable. Capping of lowland areas would likely be implementable because these areas are not included in the 100-year flood plain, which extends to the banks of the River and Canal; therefore, it is assumed that establishing flood storage volume to compensate for the volume of lowland caps will not be required.

Capping of impacted sediments would be difficult to implement due to permitting requirements, and obtaining the required permits may not be feasible. The US Army Corps of Engineers, New York State Canal Corporation, and NYSDEC may not be willing to issue permits to construct a cap that would decrease the depth of water in the waterway or restrict watercraft access. Dredging to remove a portion of the sediments in order to accommodate the thickness of the cap would be an impractical approach versus dredging of all visibly impacted sediments, as described for other remedial alternatives.

Institutional and engineering controls included in Alternative 2 are common measures that would be readily implementable.

5.3.2.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 2 is approximately $2.4M (Table IV), based on the following:

- Construction of 19,000 sf of asphalt cap 25,700 sf of soil caps and a 13,500 sf GCL sediment cap
- Engineering controls consisting of posting of signage at the Seneca River are estimated at $47,000;
- Institutional controls estimated at $112,000 and OM&M totaling approximately $540,000; and
- Groundwater monitoring consisting of sampling and VOC and SVOC analysis at four monitoring wells on a semi-annual basis for a period of 30 years, which was estimated at $211,000 (NPV).

The cost estimation spreadsheet is provided in Appendix B.

5.3.2.8 Land Use:

The Upland and Lowland Areas of the Former MGP Site and lowland of 193 Fall Street would remain in commercial use and the residential property would remain in residential use. Each area would have restrictions on uses or activities that may affect the caps or result in exposure to impacted surface and subsurface soil. Under current zoning, use of the current residential property at 185 Fall Street could be restricted to commercial uses with restrictions to preclude activities that may result in exposure to surface and subsurface soil.

Certain recreational uses of a portion of the Seneca River and Canal with impacted sediments would be restricted by signage that would be installed to prevent activities and uses that may damage or disturb the subaqueous cap.

5.3.2.9 Community Acceptance:

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

5.3.3 Alternative 3 – Excavation and Off-Site Treatment/Disposal of Surface Soils, Dredging of Impacted Sediments, Institutional Controls, Groundwater Monitoring

Alternative 3 includes the following components:

- Excavation and off-site treatment/disposal of impacted surface soils at the Former MGP Site, the lowland portion of 193 Fall Street and residential property at 185 Fall Street to preclude exposure to near-surface soil.
- Dredging and off-site treatment/disposal of MGP-impacted sediments in the Seneca River and Canal.
- Institutional controls to protect from potential future exposure to subsurface soils.
- Long-term groundwater monitoring using existing monitoring wells.

Excavation would remove the upper 1 to 2 ft of soil in the Upland and Lowland Areas of the Former MGP Site as well as the lowland portion of 193 Fall Street with surface restoration with a clean vegetated soil cover and/or pavement in the Upland Area depending on potential future use of the property. Excavation could be limited to 1 ft below ground surface which would be consistent with potential future commercial use of the property.

In addition to removal of the upper 2 ft of MGP impacted soil at 185 Fall Street, the upper 2 ft of accessible soil will also be removed from the remainder of the property to eliminate the presence of background levels of PAHs that are prevalent and indicative of urban soils throughout the Seneca Falls Village. The property would be restored with a clean cover of vegetated soil.

This alternative would involve the removal of a total of approximately 3,300 cy of impacted soil for off-site thermal treatment or landfill disposal.

Approximately 2,200 cy of sediments would be dredged from the Seneca River and Canal, dewatered on-site and shipped off-site for treatment by thermal desorption. Dredged sediments would be replaced by granular backfill that would promote restoration of the benthic habitat.

Institutional controls would be implemented to restrict activities that may result in exposure to subsurface soil, such as requirements for appropriate OSHA worker training and planning for soil management during future utility work or construction. Cultivation of food crops would be prohibited on the residential property.

Groundwater monitoring would be conducted over the long term to monitor residual subsurface soil impacts by OLM and TLM that would remain in the Upland Area.

5.3.3.1 Overall Protectiveness of Human Health and the Environment

Implementation of Alternative 3 would effectively remove the potential for direct exposure to impacted soil. Institutional controls would be implemented to reduce the potential for exposure to subsurface soils.

Dredging of sediments would remove the potential for direct contact exposure to MGP-impacted sediments and would eliminate the long-term risk to the environment posed by the presence of OLM and TLM in sediments.

Implementation of Alternative 3 would not result in restoration of groundwater quality; however, the current ordinance prohibiting use of groundwater as a potable water source is an effective existing institutional control relative to potential exposure via consumption of groundwater. Alternative 3 would not mitigate potential long-term risk to the environment resulting from the presence of TLM and OLM in subsurface soil.

5.3.3.2 Compliance with SCGs

Actions to remove impacted surface soil and surface restoration would comply with SCGs related to mitigation of potential direct exposure to surface soils. Removal of sediments would attain SCGs related to potential direct contact exposures and long-term protection of the environment.

Compliance with SCGs would involve proper management of excavated and dredged materials and other remediation wastes, such as effluent from dewatering of dredged sediments and groundwater generated during long-term groundwater quality monitoring. Compliance with these SCGs should be readily attainable.

Alternative 3 does not address SCGs for subsurface soil. Institutional controls are required to mitigate risk to subsurface soil.

Alternative 3 will not attain TOGS Class GA standards for groundwater quality; however, potable use of groundwater in the area is prohibited by existing ordinance.

5.3.3.3 Long-Term Effectiveness and Permanence

Excavation of surface soil with surface restoration and dredging of impacted sediments are effective and permanent measures to prevent potential human exposure to the impacted media. Removal of sediments containing OLM and TLM and restoration of the benthic habitat provide a permanent solution to mitigate potential long-term risk to the environment.

Institutional controls to protect from future exposure to subsurface soils have also been demonstrated to be effective as long-term protective measures for potential exposure to impacted subsurface soils for properties under commercial use. Use restrictions may be difficult to maintain and enforce on residential property.

The presence of OLM and TLM in the subsurface in the Upland Area of the Former MGP Site would remain a source of impacts to groundwater quality; however, impacts to groundwater quality are limited in magnitude and extent and potable use of groundwater is effectively prohibited by existing ordinance. The continued presence of OLM and TLM in Upland Area soil may be considered a long-term risk to the environment.

5.3.3.4 Reduction of Toxicity, Mobility or Volume

Alternate 3 involves the removal of approximately 3,300 cy of impacted surface soil and 2,200 cy of sediment containing OLM and TLM. Removal of impacted surface soil will eliminate potential mobility of impacted surface soil via migration with erosion and wind. Dredging of impacted sediments will eliminate potential transport of OLM and TLM to other locations within the Seneca River and Canal; however, flow velocity and scour within the waterway appear to be very low.

Alternative 3 does not include measures for reduction in mass or toxicity of contaminants in subsurface soil and groundwater; however, there are no completed exposure pathways to these media under current Site use.

5.3.3.5 Short-Term Impact and Effectiveness

Implementation of Alternative 3 would have limited short-term impacts on the community and site workers. Standard measures for mitigating and monitoring dust generated during excavation and backfilling would be required. Measures for vapor

and odor mitigation would be required during dredging, dewatering and management of sediments containing OLM and TLM.

The excavation, dredging and restoration activities could be implemented over a relatively short period of time. Plans to control truck traffic and restrictions on work hours to control noise will be necessary to avoid risk and nuisance conditions within the Site area.

5.3.3.6 Implementability

Surface soil excavation, sediment dredging and restoration activities identified in Alternative 3 are common remedial actions that can be readily implemented. Dredging will require US ACOE, New York State Canal Corporation, and NYSDEC permitting and approval. The Seneca River and Canal are dredged on a regular basis; therefore, permits are expected to be readily attainable. Dredging may require isolation of the areas of impacted sediments, such as through the use of porta-dams™ if dredging is to be conducted in the dry. Relatively shallow bedrock would likely preclude the use of sheet piles to isolate impacted sediments and for stabilization of the riverbank during dredging.

Other state and local permits may be required for relatively large scale excavations. Local ordinances for excavation, noise and work hours may apply to the work. The state and local permits and approvals required for the worked are likely to be readily attainable.

5.3.3.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 3 is approximately $3.4M (Table IV), which is based on the following:

- Excavation , management and off-site treatment/disposal of approximately 3,300 cy of impacted surface soil
- Excavation, dewatering and off-site thermal treatment of approximately 2,200 cy of sediment
- Restoration of excavated land areas and the dredged portion of the Seneca River and Canal
- Groundwater monitoring consisting of sampling and VOC analysis at four monitoring wells on a semi-annual basis for a period of 30 years, which was estimated at $174,000.
- Institutional controls related to impacted subsurface soils and associated OM&M of clean soil covers placed over the impacted subsurface soils.

The cost estimation spreadsheet is provided in Appendix B.

5.3.3.8 Land Use:

The Upland and Lowland Areas of the Former MGP Site and the lowland of 193 Fall Street would remain in commercial use and the 185 Fall Street would remain in residential use. Each area would have restrictions on uses or activities that may result

in exposure to subsurface soil, including prohibition of cultivation of food crops at 185 Fall Street. No access restrictions would be required.

No restrictions on use of the Seneca River and Canal related to conditions associated with the Former MGP Site would be required.

Continued prohibition of the potable use of groundwater would be restricted in conformance with the existing ordinance.

5.3.3.9 Community Acceptance:

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

5.3.4 Alternative 4 – In Situ Solidification of Impacted Soil, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater

Alternative 4 includes the following components:

- In situ solidification/stabilization (ISS) of subsurface soil at the Former MGP Site and 185 Fall Street. Surface soils at the Former MGP Site and residential property at 185 Fall Street would be removed to variable depths to accommodate expansion of soil resulting from ISS. Surface soil at the lowland of 193 Fall Street would be also be excavated.
- Surface restoration with clean backfill with loaming and seeding or pavement.
- Dredging and off-site treatment/disposal of MGP-impacted sediments in the Seneca River and Canal and restoration of the benthic habitat.
- Institutional controls to record the locations of soil treated by ISS and for management of solidified soil if excavated in the future.
- Deed restrictions limiting the property use to restricted residential and preventing groundwater use.
- Monitored natural attenuation (MNA) of impacted groundwater in the Upland Area.

Surface soil would be removed from the impacted area of the lowland at the 193 Fall Street property to mitigate potential risk of exposure in this area. Surface soil would be removed from the land areas for off-site treatment/disposal in advance of ISS to treat impacted subsurface soil. Removal of surface soil is necessary to accommodate for increased volumes of subsurface soil resulting from ISS and to allow for placing a clean soil cover with surface restoration over solidified soil. Similar to Alternative 3, all exposed surface soil would be removed from the residential property so that fill material exceeding restricted residential standards are removed in conjunction with remediation. A total of approximately 4,700 cubic yards of surface soil will be excavated and shipped off-site for either thermal treatment or landfill disposal.

ISS would be performed on impacted subsurface soil to depths of up to approximately 23 feet bgs in the Upland Area, A total of approximately 9,600 cubic yards of subsurface soil would be treated by ISS. Because of the depths of impacts in the Upland Area and the presence of debris and buried structures, including the former gas holder, ISS would be conducted by mixing with an excavator bucket so that structures can be demolished and debris can be effectively incorporated into the solidified mixture.

The ISS mix, likely Portland cement and GGBFS, would be determined by bench scale testing using representative samples of on-site soil containing OLM and TLM. The mix design would establish targets for physical parameters such as density and shear strength and hydraulic conductivity that would result in a mixture of relatively low strength to allow for future excavation and low hydraulic conductivity that would limit infiltration and flow of groundwater that could leach contaminants from the solidified mixture. Tests for leachability (e.g., by the synthetic precipitation leaching procedure (SPLP)) would be conducted to evaluate leaching of contaminants of concern (principally benzene and naphthalene and also metals such as arsenic) from the mixture.

Upon completion of ISS, a clean soil cover with loaming and seeding or pavement would be placed above the solidified soils. The Upland Area may be paved depending on plans for future Site use. Institutional controls would be implemented to record the presence of soil treated by ISS on each of the properties and to establish requirements for management and appropriate disposal in the event that solidified soil is excavated in the future. Additional institutional controls restricting land uses and activities are not anticipated to be required.

Similar to Alternative 3, Alternative 4 would include dredging and off-site thermal treatment of impacted sediments and restoration of the benthic habitat.

Groundwater remediation in the upland area would be by MNA following source treatment by ISS. A period of 15 years was assumed for restoration of groundwater quality using MNA.

5.3.4.1 Overall Protectiveness of Human Health and the Environment

Implementation of Alternative 4 would effectively remove potential risk of exposure to impacted surface soil, subsurface soil and sediments. Removal of impacted sediments and treatment of subsurface soil using ISS would eliminate potential long-term risk to the environment posed by the presence of OLM and TLM in the soil and sediments.

ISS would effectively eliminate the source of groundwater impacts in the Upland Area by immobilizing TLM and OLM. Groundwater quality would be restored over time by MNA.

5.3.4.2 Compliance with SCGs:

Actions to remove impacted surface soil and treat subsurface soil would comply with SCGs related to mitigation of potential direct exposure to surface soils and subsurface soils. Removal of sediments would attain SCGs related to potential direct contact exposures and long-term protection of the environment.

Compliance with SCGs would involve proper management of excavated and dredged materials and other remediation wastes, such as effluent from on-site dewatering of dredged sediments and groundwater generated during monitoring related to MNA. Compliance with these SCGs should be readily attainable.

Alternative 4 will attain TOGS Class GA standards for groundwater quality through MNA.

5.3.4.3 Long-Term Effectiveness and Permanence:

Excavation of surface soil, treatment of subsurface soil using ISS and dredging of impacted sediments are effective and permanent measures to prevent potential human exposure to the impacted media. Removal of sediments and treatment of subsurface soils containing OLM and TLM and restoration of the benthic habitat provide permanent solutions to mitigate potential long-term risks to the environment.

Institutional controls are anticipated to include recording the presence and locations of solidified soils in the subsurface and requirements for management/disposal of solidified soil if excavated in the future, limit property use to restricted residential and prevent groundwater use.

ISS would be effective for treatment of the source of groundwater impacts in the Upland Area. MNA, potentially in combination with enhanced bioremediation, would restore groundwater quality to TOGS Class GA standards over time.

5.3.4.4 Reduction of Toxicity, Mobility or Volume

Implementation of Alternative 4 would reduce the mobility and volume of waste at the Site. Approximately 4,700 cubic yards of impacted surface soil would be removed and approximately 7,500 cubic yards of impacted subsurface soil would be treated, including approximately 4,500 cubic yards of impacted subsurface soil in the Upland Area that contains OLM and TLM that are sources of impacts to groundwater quality. Residual MGP wastes within the buried former gas holder and other former MGP structures would be rendered immobile within the solidified soil mixture.

Approximately 2,200 cubic yards of impacted sediments would be removed from the Seneca River and Canal for off-site thermal treatment.

Groundwater quality in the Upland Area would improve over time through processes of MNA, which would reduce contaminant concentrations and mass with time.

5.3.4.5 Short-Term Impact and Effectiveness:

Implementation of Alternative 4 would have limited short-term impacts on the community and site workers. Standard measures for mitigating and monitoring dust generated during surface soil excavation and final site restoration would be required. Dust control measures will also be required for the ISS process because significant dust can be generated during mixing of cement and GGBFS in an on-site batch plant and placing of the material for in situ mixing. Measures for vapor and odor mitigation would be required during dredging, dewatering and management of sediments containing OLM and TLM.

The excavation, ISS dredging and restoration activities would require several months for implementation. Plans to control truck traffic and restrictions on work hours to control noise will be necessary to avoid risk and nuisance conditions within the Site area.

5.3.4.6 Implementability:

Surface soil excavation, ISS, sediment dredging and restoration activities identified in Alternative 4 are common remedial actions. Although ISS may pose some challenges, each of the actions can be readily implemented.

The effective depth of ISS in the Upland Area would be 20 ft or less after removal of surface soil. Mixing of the impacted soil in the Upland Area would require incorporation of the former gas holder, other underground structures and debris in fill. Hoe-ramming or other demolition methods may be necessary to demolish subsurface structures and reduce debris to sizes appropriate for effective incorporation into the ISS mixture. However, such mixtures have been readily accomplished at similar depths at other sites.

The limited size and topography of the Former MGP Site and residential property also present logistical challenges. In addition to an excavator, a mixing plant and equipment for storage (e.g., silo) and transport of the mix material (e.g., a front end loader) are needed to perform ISS. Operation of the equipment would be challenging within the small upland area of the Site, and transporting equipment and materials between the Lowland Area and Upland Area would be particularly challenging considering the approximate 25 ft elevation difference and steep slope between the two areas.

Frequent testing of samples of the ISS/soil mixture would be required during remediation to evaluate whether the mix is in conformance with specified design parameters necessary to meet remedial goals. Sampling and testing for strength, hydraulic conductivity, and leachability, as well as field parameters such as density and slump, are typically performed at a specified frequency during the remedial action. If the soil mixture does not attain specified testing criteria, re-mixing is typically required.

Implementation of ISS would require measures to mitigate generation of dust and fugitive emissions of cement dust. With the close proximity of occupied residential and commercial properties to the Site, prevention of fugitive emissions would be a critical aspect of implementation of Alternative 4.

As described for Alternative 3, the required US ACOE, New York State Canal Corporation, and NYSDEC permits and approvals are expected to be readily attainable.

Other state and local permits and approvals under local ordinances that may be required for relatively large scale excavations and earthwork are expected to be readily attainable.

MNA is a common, readily implementable remedial action.

5.3.4.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 4 is approximately $5.5M (Table IV), which is based on the following:

- Excavation, management and off-site treatment/disposal of approximately 4,700 cy of impacted surface soil.
- ISS of a total of approximately 9,600 cubic yards of subsurface soil
- Excavation, dewatering and off-site thermal treatment of approximately 2,200 cy of sediment
- Restoration of surface areas above soil treated by ISS and the dredged portion of the Seneca River and Canal
- MNA consisting of sampling and analysis using four monitoring wells on a semi-annual basis for a period of 15 years, which was estimated at $146,000.
- Institutional controls related to recording locations and potential future management of soil treated by ISS.

The cost estimation spreadsheet is provided in Appendix B.

5.3.4.8 Land Use

The Upland and Lowland Areas of the Former MGP Site and the lowland area of 193 Fall Street would remain in commercial use and the 185 Fall Street would remain in residential use. Other than institutional controls identifying the presence and locations of soil treated by ISS, restrictions on land uses and activities are not anticipated to be required.

No restrictions on use of the Seneca River and Canal related to conditions associated with the Former MGP Site would be required.

Continued prohibition of the potable use of groundwater would be restricted in conformance with the existing ordinance. However, groundwater quality would be restored to within TOGS Class GA standards via MNA.

5.3.4.9 Community Acceptance:

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

5.3.5 Alternative 5 - Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soil, Dredging of Impacted Sediments, Enhanced Bioremediation and MNA of Impacted Groundwater

Alternative 5 is intended to restore the Site to pre-release conditions and includes the following components:

- Excavation and off-site treatment/disposal of impacted surface and subsurface soils at the Former MGP Site, the lowland portion of 193 Fall Street and the residential property at 185 Fall Street.
- Excavation backfill and surface restoration.
- Dredging and off-site treatment/disposal of MGP-impacted sediments in the Seneca River and Canal and restoration of the benthic habitat.
- Enhanced bioremediation by applying Oxygen Release Compound™ (ORC) in the completed Upland Area excavation.

- Monitored natural attenuation (MNA).

Excavations would be conducted to various depths of up to approximately 23 ft bgs in the Upland Area, up to approximately 9 ft bgs in the Lowland Area, approximately 2 ft in the lowland area of 193 Fall Street, and up to approximately 6 ft bgs in the residential property. Alternative 5 also includes removal of all exposed surface soil on the residential property in order to address fill material exceeding restricted residential standards indicative of background conditions in Seneca Falls Village.

Excavation in the Upland Area will be conducted to varying depths and will include removal of the former gas holder, other underground structures and residual MGP wastes, including TLM and OLM that are present as stringers relatively deep in glacial till that will be removed to the extent practicable. Lateral earth support and excavation dewatering will be required in the Upland Area. Use of sheeting may be limited by dense glacial till that would limit the depth that sheeting could be installed relative to the necessary depth of excavation into the till soil. Internal bracing or tiebacks may be required for lateral earth support. Excavated soil would be shipped off-site for landfill disposal or thermal treatment. Subsurface soil containing OLM or TLM would be treated off-site by thermal desorption. Dewatering effluent would require treatment and discharge/disposal. Dust and odor controls would be required during excavation of MGP-impacted soil, and a perimeter air monitoring program would be implemented to obtain data to monitor the effectiveness of or establish the need for more aggressive measures for dust and odor suppression.

Enhanced bioremediation to accelerate the restoration of groundwater quality would be conducted by applying ORC or equivalent agent directly into the excavation following completion of removal of impacted soil and prior to backfilling of the excavation. Excavations would be backfilled using clean soil from an off-site source, with surface restoration consistent with land use.

Seneca River and Canal sediments impacted by TLM, OLM, and MGP-related PAHs above background would be dredged, dewatered and shipped off-site for thermal treatment, and the benthic habitat would be restored using clean granular backfill.

Groundwater quality would be restored via MNA. Restoration of groundwater quality to regulatory standards was estimated to require 10 years.

5.3.5.1 Overall Protectiveness of Human Health and the Environment:

Implementation of Alternative 5 would effectively address current and future potential exposures to impacted media and potential long-term risks to the environment.

5.3.5.2 Compliance with SCGs:

Actions to remove impacted surface soil and subsurface soil would comply with SCGs related to surface soils and subsurface soils. Removal of sediments would attain SCGs related to potential direct contact exposures and long-term protection of the environment.

Compliance with SCGs would involve proper management of excavated and dredged materials and other remediation wastes, such as effluent from dewatering of dredged sediments, excavation dewatering, and groundwater generated during monitoring related to MNA. Compliance with these SCGs should be readily attainable.

Alternative 5 will attain NSYDEC TOGS Class GA standards for groundwater quality through MNA and enhanced bioremediation.

5.3.5.3 Long-Term Effectiveness and Permanence

Excavation of surface and subsurface soil and dredging of impacted sediments are effective and permanent measures to prevent potential human exposure to the impacted media. Removal of sediments and restoration of the benthic habitat provide permanent solutions to mitigate potential long-term risks to the environment.

The source of groundwater impacts in the Upland Area would be removed and MNA, in combination with enhanced bioremediation, would restore groundwater quality to within TOGS Class GA standards over time.

The Former MGP Site and residential properties would be restored to conditions suitable for unrestricted use with no institutional controls required.

5.3.5.4 Reduction of Toxicity, Mobility or Volume

Implementation of Alternative 5 would effectively remove the impacted surface and subsurface soils and sediments impacted by OLM and TLM.

Reduction of contaminant concentration and mass in groundwater would result from enhanced bioremediation by application of ORC or equivalent upon the completion of excavation and over time via MNA.

5.3.5.5 Short-Term Impact and Effectiveness:

Implementation of Alternative 5 would have substantial short-term impacts on the community and site workers. Measures for mitigating and monitoring dust and odors generated during surface soil excavation and final site restoration would be required. Odors generated during excavation may be somewhat limited in severity because NAPL is absent in the subsurface and impacts are limited to OLM and TLM in fill materials, underground structures and in stringers in the underlying glacial till. Measures for vapor and odor mitigation would be required during dredging, dewatering and management of sediments containing OLM and TLM.

The excavation, ISS dredging and restoration activities would require several months for implementation. Plans to control truck traffic and restrictions on work hours to control noise will be necessary to avoid risk and nuisance conditions within the Site area.

5.3.5.6 Implementability

Surface and subsurface soil excavation, sediment dredging and restoration activities identified in Alternative 5 are common remedial actions. With the exception of subsurface soil in the Upland Area, each of the actions can be readily implemented.

The limited work area in the Upland Area and topographic elevation change between the Upland Area and Lowland Area would make equipment staging and movement difficult. The proximity of the active Sunoco Gas Station and Fall Street (Route 20, a New York State highway) roadway would require excavation support and monitoring for settlement and ground loss along the western and northern property boundaries. With the close proximity of occupied residential and commercial properties to the Site, prevention of fugitive emissions would be a critical aspect of implementation of Alternative 5.

Similar to Alternatives 3 and 4 required US ACOE, New York State Canal Corporation, and NYSDEC permitting and approvals are expected to be readily attainable. It will likely be necessary to sequence dredging to be conducted in advance of soil excavation in the Lowland Area, which will extend to the riverbank. Sequencing the dredging in advance would allow for restoration of the riverbank and also for dewatering and management of dredge spoils in the Lowland area in advance of excavation in order to preclude recontamination of surface soils in that area.

Other state and local permits may be required for relatively large scale excavations. Local ordinances for excavation, noise and work hours may apply to the work. These permits are also expected to be readily attainable.

Both enhanced bioremediation and MNA are common, readily implementable remedial actions.

5.3.5.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 5 is approximately $7.94M (Table IV), which is based on the following:

- Excavation, management and off-site treatment/disposal of approximately 13,000 cy of impacted surface and subsurface soil.
- Dredging dewatering and off-site thermal treatment of approximately 2,200 cy of sediment
- Backfilling with clean granular soil in areas of excavation and dredging.
- Surface restoration by paving in the Upland Area and loaming and seeding affected areas in the Lowland Area and on the residential property.
- A one-time application of ORC followed by MNA consisting of sampling and analysis using four monitoring wells on a semi-annual basis for a period of 10 years, with an estimated NPV cost of approximately $247,000.

The cost estimation spreadsheet is provided in Appendix B.

5.3.5.8 Land Use

Implementation of Alternative 5 would restore the properties to a condition suitable for unrestricted use.

No restrictions on use of the Seneca River and Canal related to conditions associated with the Former MGP Site would be required.

Continued prohibition of the potable use of groundwater would be restricted in conformance with the existing ordinance. However, groundwater quality would be restored to within NYDEC standards via MNA, possibly in conjunction with enhanced bioremediation.

5.3.5.9 Community Acceptance

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

5.3.6 Alternative 6 – ISS in the Upland Area, Capping in the Lowland Area, Excavation and Off-Site Treatment Disposal of Surface and Subsurface Soil at the Residential Property, Dredging of Impacted Sediments; Institutional Controls, MNA of Impacted Groundwater.

Alternative 6 includes the following components:

- Excavation and off-site treatment/disposal of impacted surface soil as necessary and ISS of subsurface soil at Upland Area of the Former MGP Site.
- Capping of impacted soil in the Lowland Area of the Former MGP site and the lowland portion of 193 Fall Street.
- Excavation and off-site treatment/disposal of impacted surface and subsurface soil at the 185 Fall Street residential property.
- Dredging and off-site treatment/disposal of MGP-impacted sediments in the Seneca River and Canal and restoration of the benthic habitat.
- Institutional controls to record the presence of solidified soil in the Upland Area and to restrict uses in the Lowland Areas to protect the integrity of the cap and to prevent potential future exposure to impacted soils underlying capped areas.
- Monitored natural attenuation (MNA) of impacted groundwater in the Upland Area.

Similar to Alternative 4, surface soil would be removed to various depths within the Upland areas for off-site treatment/disposal in advance of ISS to treat impacted subsurface soil. A total of approximately 2,300 cy of surface soil would be removed from the Upland Area. ISS would be performed on impacted subsurface soil to depths of up to approximately 23 feet bgs in the Upland Area with mixing conducted using an excavator bucket, A total of approximately 4,500 cy of soil would be treated using ISS. The ISS mix, likely Portland cement and GGBFS, would be determined by bench scale testing using representative samples of on-site soil containing OLM and TLM. Upon completion of ISS, a clean soil backfill and pavement would be placed above the solidified soils.

A minimum 2-ft vegetated soil cap would be constructed in the Lowland Area and the lowland portion of 193 Fall Street to preclude potential direct contact exposure to areas of impacted soil. The caps would cover a total area of 21,700 sq ft.

Impacted surface soil and subsurface soil, involving a total of approximately 650 cy of soil, would be excavated from the residential property at 185 Fall Street for off-site landfill disposal or thermal treatment. Excavations would be backfilled with clean soil and the ground surface would be restored.

Institutional controls would be implemented to record the presence of soil treated by ISS in the Upland Area with measures for appropriate management/disposal of solidified soil if excavated in the future. Institutional controls on the Lowland Area would restrict future uses that would compromise the cap or require that a cap be incorporated into future development plans for the property. Institutional controls would also establish requirements for operation, monitoring and maintenance of the cap.

Both the Upland Area and residential property would be suitable for unrestricted future use.

Similar to Alternatives 3, 4 and 5, Alternative 6 would include dredging and off-site thermal treatment of impacted sediments and restoration of the benthic habitat.

Groundwater remediation in the Upland Area would be by MNA following source treatment by ISS.

5.3.6.1 Overall Protectiveness of Human Health and the Environment

Implementation of Alternative 6 would effectively remove potential risk of exposure to impacted surface soil, subsurface soil and sediments. Removal of impacted sediments, and treatment of subsurface soil using ISS would eliminate potential long-term risk to the environment posed by the presence of OLM and TLM in the subsurface soil in the Upland Area and sediments in the Seneca Falls River and Canal.

Capping of soil in the Lowland Area and lowlands of 193 Fall Street with institutional controls would protect from future exposure to impacted soil by direct contact.

All potential risk of exposure to residual MGP impacts in soil on the residential property would be eliminated by complete removal of impacted soil.

ISS would effectively eliminate the source of groundwater impacts in the Upland Area by immobilizing TLM and OLM. Groundwater quality would be restored over time by MNA.

5.3.6.2 Compliance with SCGs:

Actions to remove impacted surface soil and treat or remove subsurface soil in the Upland Area and on the residential property would comply with SCGs related to mitigation of potential direct exposure to surface soils and subsurface soils. Removal of sediments would attain SCGs related to potential direct contact exposures and long-term protection of the environment. Capping of the Lowland Area and lowlands of 193

Fall Street would not directly attain SCGs related to impacted soil in this area and would rely on institutional controls to mitigate potential future exposures.

Compliance with SCGs would involve proper management of excavated and dredged materials and other remediation wastes, such as effluent from dewatering of dredged sediments and groundwater generated during monitoring related to MNA. Compliance with these SCGs should be readily attainable.

Alternative 6 will attain TOGS Class GA standards for groundwater quality through MNA with enhanced bioremediation if necessary or desired to accelerate restoration of groundwater quality.

5.3.6.3 Long-Term Effectiveness and Permanence:

Remediation of the Upland Area using a combination of excavation and ISS, complete removal of soil from the residential property and dredging of impacted sediments are effective and permanent measures to prevent potential human exposure to the impacted media. Removal of sediments and treatment of subsurface soils containing OLM and TLM and restoration of the benthic habitat provide permanent solutions to mitigate potential long-term risks to the environment.

Capping of impacted soils in conjunction with implementation of institutional controls proposed for the Lowland Areas are effective and permanent measures to mitigate potential risk, provided that an effective OM&M program is implemented over the long term.

ISS would be effective for treatment of the source of groundwater impacts in the Upland Area. MNA would restore groundwater quality to TOGS Class GA standards over time.

5.3.6.4 Reduction of Toxicity, Mobility or Volume

Implementation of Alternative 6 would reduce the mobility and volume of waste at the Site. A total of approximately 3,000 cubic yards of impacted soil would be removed from the Upland Area and residential property. Approximately 4,500 cubic yards of impacted subsurface soil would be treated in the Upland Area, including soil that contains OLM and TLM which are sources of impacts to groundwater quality. Residual MGP wastes within the buried former gas holder and other former MGP structures would be rendered immobile within the solidified soil mixture.

Approximately 2,200 cubic yards of impacted sediments would be removed from the Seneca River and Canal for off-site thermal treatment.

Groundwater quality in the Upland Area would improve over time, with mass reduction through MNA processes.

5.3.6.5 Short-Term Impact and Effectiveness

Implementation of Alternative 6 would have significant short-term impacts on the community and site workers. Measures for mitigating and monitoring dust generated during surface soil excavation and final site restoration would be required. Dust control measures will also be required for the ISS process because significant dust can be generated during mixing of cement and GGBFS in an on-site batch plant and placing the material for in situ mixing. Measures for vapor and odor mitigation would be required during dredging, dewatering and management of sediments containing OLM and TLM.

The excavations, ISS, dredging and restoration activities would require several months for implementation. Plans to control truck traffic and restrictions on work hours to control noise will be necessary to avoid risk and nuisance conditions within the Site area.

5.3.6.6 Implementability:

Surface soil excavations, ISS, capping, dredging and restoration activities identified in Alternative 6 are common remedial actions. Logistical challenges related to implementation of ISS in the Upland Area are described above for Alternative 4. Each of the actions can be readily implemented.

Frequent testing of samples of the ISS/soil mixture would be required during remediation to evaluate whether the mix is in conformance with specified design parameters necessary to meet remedial goals. Sampling and testing for strength, hydraulic conductivity, and leachability, as well as field parameters such as density and slump, are typically performed at a specified frequency during the remedial action. If the soil mixture does not attain specified testing criteria, re-mixing is typically required.

Similar Alternatives 3, 4 and 5, required US ACOE, New York State Canal Corporation, and NYSDEC permits are expected to be readily attainable.

Other state and local permits and approvals that may be required for relatively large scale excavations and earthwork are also expected to be readily attainable.

Both MNA and enhanced bioremediation are common, readily implementable remedial actions.

5.3.6.7 Cost

Our opinion of the 30-year net present value (NPV) probable cost for Alternative 6 is approximately $4.3M (Table IV), which is based on the following:

- ISS of a total of approximately 4,500 cubic yards of subsurface soil.
- Excavation, management and off-site treatment/disposal of approximately 2,950 cy of impacted soil.
- Dredging, dewatering and off-site thermal treatment of approximately 2,200 cy of sediment

- Placing clean backfill in excavations, dredged areas and above solidified soil.
- Surface restoration with pavement in the Upland Area and loaming and seeding at the residential property.
- Construction of 2-ft-thick vegetated soil caps covering a total of 21,700 sq ft in the Lowland Area.
- Restoration of surface areas above soil treated by ISS and the dredged portion of the Seneca River and Canal
- MNA consisting of sampling and VOC and SVOC analysis at four monitoring wells on a semi-annual basis for a period of 15 years, estimated at $146,000 (NPV).
- Institutional controls related to recording the location of soil treated by ISS in the Upland Area and cap locations and OM&M in the Lowland Area.

The cost estimation spreadsheet is provided in Appendix B.

5.3.6.8 Land Use

The Upland and Lowland Areas of the Former MGP Site and the lowlands of 193 Fall Street would remain in commercial use and the 185 Fall Street would remain in residential use. Other than institutional controls identifying the presence and locations of soil treated by ISS and future management/disposal of excavated solidified soil, the Upland Area would be suitable for unrestricted future commercial use. The residential property would be suitable for unrestricted future use.

Future use of the Lowland Areas would be subject to restrictions on future use and activities that may compromise the integrity of the cap or result in exposure by direct contact with underlying impacted soils. If developed for commercial use in the future, maintenance of a cap could be integrated into development plans for the Lowland Areas.

No restrictions on use of the Seneca River and Canal related to conditions associated with the Former MGP Site would be required.

Continued prohibition of the potable use of groundwater would be restricted in conformance with the existing ordinance. However, groundwater quality would be restored to within TOGS Class GA standards via MNA.

5.3.6.9 Community Acceptance:

The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

6. COMPARISON OF ANALYSIS OF ALTERNATIVES

This section of the Feasibility Study contains a comparative analysis of the six remedial alternatives for the 187 Fall Street Former MGP Site, the lowland portion of 193 Fall Street and the 185 Fall Street residential property presented in Section 5.3. The nine evaluation criteria on which each alternative was evaluated are used in the comparative analysis. A summary of the comparative analysis is presented in Table V.

6.1 Overall Protectiveness of Human Health and the Environment

The no action alternative (Alternative 1) is the least protective of the human health and the environment. The current surface cover in the Upland Area provides protection from direct contact with surface soil. Engineering controls (fencing) included with the no action alternative provide protection from exposure to surface soil in the Lowland Area, the lowlands of 193 Fall Street, and on the residential property at 185 Fall Street. Although signs will be posted relative to impacted sediments in the Seneca River and Canal, no actual physical barrier to accessing impacted sediments is included in Alternative 1. Institutional controls to restrict uses that may result in potential future exposure to subsurface soils are common and generally accepted measures for protection. Alternative 1 does not contain measures for restoration of groundwater quality; however, there is no completed pathway for exposure to impacted groundwater, and an existing ordinance prohibiting potable use of groundwater is an effective, existing institutional control. Long term risk to the environment by the presence of TLM and OLM in Upland Area subsurface soils and sediments in the Seneca River and Canal are not addressed by Alternative 1.

Alternative 2 (capping) and Alternative 3 (subsurface soil removal and sediment dredging) are both protective with respect to exposures to surface soil and impacted sediments and include institutional controls that are equally protective of potential future exposure to subsurface soil. Neither Alternative 2 nor Alternative 3 include restoration of groundwater quality and neither addresses long term risk to the environment by the presence of TLM and OLM in Upland Area subsurface soils. Both Alternatives 2 and 3 involve restoration of the benthic habitat.

Alternative 4 is generally equal to Alternatives 2 and 3 with respect to protection from potential exposure to surface soil and sediments. With the implementation of ISS, Alternative 4 would be more protective than Alternatives 1, 2 and 3 with respect to potential future exposure to subsurface soil and protection of the environment from long-term risk associated with the presence of OLM and TLM in subsurface soil in the Upland Area. Implementation of MNA in conjunction with ISS provides for restoration of groundwater quality to attain TOGS Class GA standards. Dredging of impacted sediments and restoration of the benthic habitat included in Alternative 4 are equal to Alternative 3 with respect to protection of the environment from long term risk due to the presence of OLM and TLM in sediments.

Alternative 5 is the most protective of the alternatives because current and potential future risks to human health and the environment are eliminated via removal of all impacted soil, including the source of groundwater impacts, and removal of impacted sediments. Implementation of Alternative 5 would restore the properties to conditions suitable for unrestricted future use within the applicable zoning designation. However, implementation of Alternative 5 would also have negative environmental impacts due to the significant energy and resources involved in excavating and transporting large

volumes of impacted soil from the site, treatment or landfill disposal of impacted soil, and importing clean excavation backfill.

Alternative 6 provides a level of protection that is slightly lower than, but generally comparable to, Alternative 5, with reliance on institutional controls for the capping remedy in the Lowland Area of the MGP site and the lowland portion of 193 Fall Street. Implementation of Alternative 6 would have lesser adverse environmental impacts than Alternative 5 with respect to consumption of energy and resources because a much smaller volume of soil would be shipped from the site for off-site treatment/disposal and smaller quantities of clean soil would be required for backfill, site restoration and cap construction.

6.2 Compliance with Standards, Criteria and Guidance (SCGs)

Alternative 1 is the least compliant with SCGs related to remediation of impacted soil, groundwater and sediments. Engineering and institutional controls would be implemented to address potential direct exposure to surface soil. Alternatives 2 and 3 would partially comply with SCGs related to direct exposures to surface soil and sediments, but would not result in compliance with TOGS Class GA groundwater quality standards or address impacts to subsurface soil. Alternatives 4 and 5 would comply with SCGs related to each of the impacted media and include MNA, with enhanced bioremediation included in Alternative 5, to restore groundwater quality to meet regulatory standards. Alternative 6 would result in substantial compliance with SCGs, but would rely on a cap and land use restrictions to preclude contact with impacted soil in the Lowland Areas.

6.3 Long-term Effectiveness and Permanence

Alternative 1 is the least effective and permanent measure because no active remediation would occur and protection from exposure relies on maintenance of engineering controls (fencing) and enforcement of institutional controls, which may not be effective over the long term.

Alternative 2 includes measures for protection from exposures associated with contact with both surface soils and sediment. However, this alternative has limited effectiveness over the long term because it relies on long-term maintenance of caps and on long-term enforcement of institutional controls. Institutional controls are more likely to be maintained and enforced on the commercial former MGP Site and 193 Fall Street than on 185 Fall Street, if that property continues in residential use over the long term.

Alternative 3 is more effective and permanent than Alternatives 1 and 2 because it involves removal of both impacted surface soil and sediment and does not require engineering controls to limit access to areas with impacted surface soil or sediments.

Alternatives 1, 2 and 3 do not include measures for groundwater restoration or measures to address long-term impacts to the environment resulting from OLM and TLM in subsurface soil and sediment. Therefore, these alternatives are not likely permanent solutions.

Alternative 4 would be effective long-term by addressing potential current and future exposures to surface soil, subsurface soil and sediments and, through MNA, restore groundwater quality to TOGS Class GA standards. Alternative 4 addresses potential long term risk to the environment posed by OLM and TLM in subsurface soils and sediments. Alternative 4 would rely on limited institutional

controls, likely involving recording the presence and locations of solidified soil and management of solidified soil if excavated in the future.

Alternative 5 is the most effective and permanent alternative because it addresses each current and future potential human exposure and potential long-term risks to the environment, and it does not rely on engineering or institutional controls.

Alternative 6 consists of remedial actions that are permanent and effective over the long term. Alternative 6 is similar in effectiveness to Alternative 4 and 5 for remedial actions in the Upland Area and residential property. Capping, with institutional controls, is a well-established remedy that would be effective and permanent, with implementation of appropriate measures for long term monitoring and maintenance. Groundwater quality would be restored to TOGS Class GA standards over the long term via MNA. Similar to Alternatives 4 and 5, actions included in Alternative 6 would address potential long term risk to the environment posed by OLM and TLM in subsurface soils and sediments.

6.4 Reduction of Toxicity, Mobility or Volume

Alternatives 1 and 2 would not reduce the volume of waste at the Site. Through capping, Alternative 2 would reduce the mobility of impacted surface soil via erosion and the potential transport of impacted sediments in the Seneca River and Canal.

Alternatives 3 and 4 would result in removal of approximately equal volumes of impacted soil and sediments from the Site; however, implementation of Alternative 4 would result in reduction of toxicity and mobility of contaminants in subsurface soil via ISS. Alternative 4 would also result in reduction of contaminant mass in groundwater over time via MNA.

Alternative 5 would result in removal of all existing impacted soil and sediment to the extent practicable. Enhanced bioremediation and MNA would result in reduction in contaminant mass in groundwater over a relatively short time period (i.e., estimated 10 years).

The volume of impacted media removed and treated through implementation of Alternative 6 would be similar to the volume removed by Alternative 5, with the exception of impacted soil in the Lowland Area that would remain in place beneath soil caps. MNA would result in reduction in contaminant mass in groundwater over time.

6.5 Short-term Impact and Effectiveness

Alternative 1 would have the lowest level of impact to the public and on-site workers because few actions, other than installation of fencing would occur on the Site. Use of the residential property would be affected by the installation of a fence to preclude direct contact with impacted soil. Access and potential exposure of trespassers to the Lowland Area of the Site would be restricted by fencing.

Alternative 2 would have greater short-term impacts than Alternative 1 due to the construction of asphalt/cement and soil caps. Controls would be needed to mitigate potential impacts by increased traffic, noise and dust generated by construction of caps. Alternative 2 would involve land use restrictions similar to Alternative 1.

Alternative 3 would have a higher level of short term impacts on the public and site workers. Controls would be necessary for dust generated by surface soil excavation and surface restoration and for vapors

and odors generated during sediment dredging and dewatering. The volume of truck traffic would be high during excavation, dredging and site restoration. Alternative 3 would be effective in the short term because property could be returned to a condition suitable for use immediately upon completion of restoration. Remedial implementation is anticipated to require an approximately 2-month period.

Alternative 4 would have greater short term impacts to the public and site workers than Alternative 3 due to ISS operations. Alternative 3 and 4 would have similar impacts associated with surface soil excavation, dredging and site restoration. ISS during implementation of Alternative 4 could involve significant dust generation during mixing and handling of the cement/GGBFS or other ISS agent that would require mitigation and significant noise would be generated from on-site equipment operation. The time for remediation is estimated to be 3 months.

Alternative 5 would have significant short-term impacts to the public and site workers. Truck traffic involving removal and replacement of 13,000 cubic yards of soil would be substantially greater than the Alternatives 2, 3 and 4. Dust and noise generation would be substantially greater than would occur with other alternatives. Excavation of MGP impacted soil and residual MGP wastes related to buried structures would generate odors that could require use of suppressants and implementation of a perimeter air monitoring program. However, given the absence of NAPL and the relatively small quantities of OLM and TLM identified in soil, odor generation may be relatively low in comparison to typical MGP remediation projects. The estimated time to complete remediation is anticipated to be in the range of 4 to 5 months.

Alternative 6 would have short term impacts to the public and site workers that are similar to Alternative 4, but lower in magnitude due to smaller scale ISS operations and a smaller volume of surface soil excavation and off-site disposal. Capping of the Lowland Areas would be less intrusive than ISS and excavation included in Alternatives 4 and 5, respectively. The time for completion of remediation is estimated to be 2 to 3 months.

6.6 Implementability

Alternatives 1 through 4 involve institutional controls, such as land use and activity restrictions, that are readily implementable. Alternatives 1 and 2 involve access restrictions that are also readily implementable.

Alternative 2 is expected to be very difficult to implement because of the subaqueous capping element of this alternative. Permits from US ACOE, New York State Canal Corporation and NYDEC to place a cap over impacted sediments in the Seneca River and Canal may be very difficult to obtain due to the shallow depth of the waterway, and because the presence of a cap may inhibit future maintenance dredging that may be conducted in the area. If feasible, permits for Alternative 2 may require a very long time period to obtain.

Alternative 3 would likely be readily implementable. There would be few challenges involved with surface soil excavation and site restoration. Dredging of sediments is a common practice and, permits to remove the sediments and place backfill within the waterway are likely to be readily obtained.

Alternative 4 would have some challenges associated with mixing relatively deep soil and incorporating buried structures and debris into the ISS mixture in the Upland Area; however, ISS has been proven to be effective to similar depths and in similar subsurface conditions. Bench scale testing would be

required to establish an effective mix design and testing during construction would be necessary to evaluate conformance with the mix design.

Alternative 5 would be implementable, but would also include some relatively common technical and logistical challenges, such as internal bracing or tieback of lateral earth support, monitoring for potential loss of ground and settlement of adjacent structures. However, these measures are in common practice. Alternative 5 would involve generation of a substantial quantity (13,000 cubic yards) of impacted soil for off-site treatment and disposal, requiring significant testing for characterization of soil for off-site disposal. Testing and management of effluent from excavation dewatering would be required during implementation of Alternative 5. Significant effort would be required to manage dust and fugitive emissions during implementation of Alternative 5.

Alternative 6 would be more readily implementable than Alternatives 4 and 5. Alternative 6 would involve ISS of a smaller volume of soil than Alternative 4 and excavation/off site treatment/disposal of a smaller quantity of soil than both Alternatives 4 and 5. Alternative 6 would require long-term maintenance and monitoring of a cap in the Lowland Area; however, these measures are common and readily implementable on properties in commercial use.

6.7 Cost

A comparison of opinions of probable costs are presented in Table IV. The opinions of probable costs were developed on a 30-year net present value (NPV) basis using the description of alternatives and estimated quantities described in Section 5.3. Detailed cost spreadsheets are provided in Appendix B.

Alternative 5 is the highest cost at approximately $7.94M, which involves returning the Former MGP Site, lowland portion of 193 Fall Street and residential property to conditions suitable for unrestricted use. The cost for Alternative 6 (approximately $4.27M) would be lower than the costs for both Alternative 5 and Alternative 4 ($5.5M). Alternative 6 is generally equal to both Alternatives 4 and 5 in both protectiveness and long-term effectiveness and more effective in the short term (i.e., lower short-term impacts) than Alternatives 4 and 5.

Based on the above evaluation, Alternative 6 would be more cost effective in attaining remedial action objectives than the other alternatives.

6.8 Land Use

Alternatives 1, 2 and 3 would involve the greatest levels of restrictions on land use; however, each of the five remedies could be implemented with continued commercial use of the Former MGP Site and 193 Fall Street and residential use of 185 Fall Street. Institutional controls to restrict 185 Fall Street could be implemented in accordance with the local zoning designation for the property.

Alternative 4 would involve limited restriction in the Upland Area, Lowland Areas and residential property.

Alternative 5 would allow for unrestricted future use of the properties in accordance with local zoning ordinances.

Alternative 6 would result in unrestricted future use of both the residential property and Upland Area, with limited institutional control placed on the Upland Area (i.e., recording the presence/potential

future management of solidified soil). The Lowland Areas would remain undeveloped with restrictions on future development that would require either incorporation of a cap or further remedial measures to mitigate potential risk of exposure to impacted soil.

6.9 Community Acceptance

Community acceptance will be evaluated after the public review period and comments are received on the Feasibility Study.

7. RECOMMENDED REMEDIAL ALTERNATIVE

Based on the evaluations conducted for this Feasibility Study and the data presented in the RI report, Alternative 6 is recommended for implementation at the Site.

7.1 Basis for Recommendation

Alternative 6 is recommended because it is a permanent solution that addresses each completed pathway for human exposure identified at the Site, it eliminates potential long-term risk to the environment, it allows for unrestricted future use of the residential property, and involves very limited institutional controls on the Upland Area that would allow for continued commercial use of this area. Alternative 6 is likely to be more acceptable to the community than other alternatives, and it is also the most cost effective alternative that will attain the remedial action objectives for the Site. Alternative 6 would not be significantly difficult to implement.

7.2 Recommended Remedy Components

The components of Alternative 6 include the following:

- Planning documents including a health & safety plan and community air monitoring plan would be prepared in addition to remedial design plans and specifications.
- Site preparation, including clearing and grubbing of vegetation in the Lowland Area of the MGP site and the lowland portion of 193 Fall Street, and removal of pavement and a concrete building slab in the Upland Area. As described below, construction of caps in the Lowland Areas would be sequenced to occur following dredging of impacted sediments in the Seneca River and Canal.
- Excavation of MGP-impacted surface and subsurface soil and mildly impacted surface soil at 185 Fall Street. Depths will be in the range of 2 to 7 feet bgs. Shoring, underpinning or careful sequencing of excavation will be required for excavation to a depth of approximately 6 ft bgs adjacent to the residential structure at 185 Fall Street.
- Excavation and off-site treatment/disposal of impacted surface soil in the Upland Area in advance of ISS, with removal of surface soil to greater depths in areas of greater depths of impacted subsurface soil. ISS would be conducted to incorporate the gas holder and other buried structures into the solidified soil mixture.
- Excavations on the residential property and above solidified soil in the Upland Area will be backfilled using clean soil from an off-site source and surfaces will be restored consistent with intended future land uses.
- Sediments exhibiting OLM and TLM will be dredged from the Seneca River and Canal, dewatered and shipped off-site for treatment by thermal desorption. Dredging, including removal of sediments on the riverbank, would allow for restoration and stabilization of the bank prior to construction of the Lowland Area caps. Dredging prior to remediation of the Lowland Areas would also allow for dewatering and management of impacted sediments in the Lowland Areas while impacted soils remain in place, eliminating the potential for contamination of clean soil placed for the caps.
- Clean granular backfill will be placed in the dredged areas to provide a substrate for restoration of the benthic community.
- Minimum 2-ft thick vegetated soil caps will be constructed over impacted soil in the Lowland Area of the MGP site and the lowland portion of 193 Fall Street.

- Approximately four monitoring wells will be installed in the Upland Area for use in MNA.
- An MNA program for groundwater will be implemented using monitoring wells installed to monitor groundwater quality within and downgradient from the Upland Area.

7.3 Additional (Pre-Design) Investigations

The lateral and vertical extent of impacts to soil, sediment and groundwater were well established during the RI. The following pre-design investigations are recommended:

- Collection of soil samples representative of soil planned for excavation on the 185 Fall Street property for pre-characterization chemical testing to establish acceptance by a treatment/disposal facility.
- Collection of samples of impacted soil from test pits excavated in the Upland Area for bench scale testing to design the ISS mixture.
- Bench scale tests using the Upland Area soil samples mixed with varying quantities of GGBFS or alternate material (e.g., bentonite) to establish an effective ISS design. At a minimum, samples of the various mixtures should be analyzed for the following:
  - Hydraulic conductivity;
  - Leachability (SPLP tests for VOCs, SVOCs and selected metals); and
  - Compressive strength.

8. REFERENCES

1. New York State Department of Environmental Conservation, 2006. "6 NYCRR Part 375 Environmental Remediation Programs," dated December 2006.

2. New York State Department of Environmental Conservation, 2006. "DER-15 Presumptive/Proven Remedial Technologies," dated February 2007.

3. Haley & Aldrich, Inc. 2008. "Data Summary Report, Seneca Falls Former MGP Site, Site No. 8-50-010, Seneca Falls, New York," dated July 2008.

4. Haley & Aldrich, Inc. 2009. "Data Summary Report Addendum, Seneca Falls Former MGP Site, Site No. 8-50-010, Seneca Falls, New York," dated December 2009.

5. New York State Department of Environmental Conservation, 2010. "DER-10 Technical Guidance for Site Investigation and Remediation," dated May 2010.

6. Haley & Aldrich, Inc. 2013. "Remedial Investigation Report, Seneca Falls Former MGP Site, Site No. 8-50-010, Seneca Falls, New York," dated April 2013.

TABLE I
SUMMARY OF QUALITATIVE EXPOSURE ASSESSMENT
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

Media		Surface Soil						Subsurface Soil				Sediment				Groundwater			
Exposure		Dermal Contact		Ingestion		Inhalation		Dermal Contact		Ingestion		Dermal Contact		Ingestion		Dermal Contact		Ingestion	
Period		Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Location	**Receptor**																		
On-Site (Upland portion)	NYSEG Employee	No	No	No	No	No	No	No	No	No	No	n/a	n/a	n/a	n/a	No	No	No	No
	Construction Worker	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
	Utility Worker	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
On-Site (Lowland portion)	Trespasser	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	n/a	n/a	n/a	n/a	No	No	No	No
	NYSEG Employee	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	n/a	n/a	n/a	n/a	No	No	No	No
	Construction Worker	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
	Utility Worker	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
Off-Site (185 Fall Street)	Resident	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
	Construction Worker	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	n/a	n/a	n/a	n/a	No	No	No	No
Off-Site Lowland (193 Fall Street)	Trespasser	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	n/a	n/a	n/a	n/a	No	No	No	No
	Sunoco Employee	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	n/a	n/a	n/a	n/a	No	No	No	No
Seneca River and Canal	Trespasser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**Yes**	**Yes**	**Yes**	**Yes**	n/a	n/a	n/a	n/a
	Boater	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**Yes**	**Yes**	**Yes**	**Yes**	n/a	n/a	n/a	n/a

Note:
1. "n/a" = not applicable.
2. "Yes" = Potential Exposure Pathway
3. "No" = Not a Potential Exposure Pathway

TABLE II
SCREENING OF REMEDIAL TECHNOLOGIES
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

SOIL:

Technology	Description	Conclusion
No action	No remedial measures taken	**Retain** as a baseline for comparison with other alternatives
Engineering Controls	Restricts access through the usage of fencing or signage	**Eliminate** as a stand-alone technology, but retain as a component with other technologies
Institutional controls	Addresses potential risks by restricting property uses to non-residential and through a Soil Management Plan	**Eliminate** as a stand-alone technology, but retain as a component with other technologies
Surface cover/Capping	Maintain a cover (e.g., vegetaed soil, stone, pavement) over impacted areas	**Retain** as a stand-alone technology, and include as a component of other alternatives
In-situ Solidificaiton/Stabilization	Reduce mobility of constituents in-place by mixing with a binding agent and solidification	**Retain** as a technology to address impacts within the unsaturated zone and eliminate source of impacts to groundwater quality.
In-situ biological treatment	Reduce constituent concentrations in-place by enhancing natural biodegradation	**Eliminate** - not effective at addressing vadose zone impacts by OLM and TLM.
In-situ chemical oxidation	Chemical destruction of adsorbed constituents through injection of reagents	**Eliminate** as a technology to address impacts within the unsaturated zone
Self-Sustaining Treatment for Active Remediation (STAR)	Uses smoldering combustion to destroy contaminants.	**Eliminate** - implementation concerns with on-site thermal desorption due to site setting in residential area. Vadose zone impacts by OLM and TLM are relatively limited.
Excavation, on-site thermal desorption and backfill	Excavate impacted soils, treat on-site via thermal desorption, and reuse treated soil as backfill	**Eliminate** - implementation concerns with on-site thermal desorption due to site setting in residential area
Excavation, off-site treatment and disposal	Excavate impacted soils, transport off-site for treatment and/or disposal	**Retain** for further evaluation

GROUNDWATER:

Technology	Description	Conclusion
No action	No remedial measures taken	**Retain** as a baseline for comparison with other alternatives
Institutional controls	Address risks by restricting groundwater use	**Retain.** Groundwater use in the area is currently prohibited by local ordinance. Institutional controls will provide an added layer of protection.
Groundwater Monitoring /Monitored Natural Attenuation (MNA)	Groundwater sampling and analyses to evaluate potential migration and natural attenuation of dissolved phase constituents	**Eliminate** as a stand-alone technology, but include as a component of other alternatives
In-situ bioremediation	Enhancement of natural attenuation by addition of oxygen, and nutrients if needed, to increase biodegradation of constituents	**Eliminate** as a stand-alone technology, but include as a component of other alternatives
In-situ chemical oxidation	Chemical destruction of adsorbed and dissolved phase constituents through injection of reagents	**Eliminate** due to implementability constraints and effectiveness limitations
Hydraulic containment	Use of limited groundwater extraction or phytoremediation to provide containment of dissolved phase constituents and mobile NAPL	**Eliminate** due to implementability constraints and effectiveness limitations
Physical containment	Installation of a physical barrier (e.g., slurry wall) to provide containment of dissolved phase constituents and mobile NAPL	**Eliminate** due to implementability constraints and effectiveness limitations
Groundwater extraction and treatment	Groundwater extraction system with treatment and discharge	**Eliminate** as a stand-alone technology, but include as a component with upland excavation dewatering.

SEDIMENT:

Technology	Description	Conclusion
No action	No remedial measures taken	**Retain** as a baseline for comparison with other alternatives
Engineering controls	Restricts access throughthe use of signage along the waterway	**Eliminate** as a stand-alone technology, but retain as a component with other technologies
Institutional controls	Address risks by restricting access to impacted sediment areas of river.	**Eliminate -**may be difficult to implement in the river.
Capping/ Physical Containment	Installation of a physical barrier (e.g., soil cap) to provide containment of MGP-related constituents.	**Retain** for further evaluation
Dredging with with On-Site Treatment	Dredge impacted sediment and treat sediment at the Site, typically through thermal desorption	**Eliminate** - small site size, difficult access, and mixed residential/commercial setting not viable for on-site treatment
Dredging of MGP-impacted sediment	Dredge impacted soils, transport off-site for treatment and/or disposal	**Retain** for further evaluation for full scale site remediation

Notes:

1. Retained technologies may be combined for the alternatives evaluation.

TABLE III
SUMMARY OF REMEDIAL ACTION ALTERNATIVE ANALYSIS
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

CRITERIA	ALTERNATIVE 1 No Action with Engineering Controls, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 2 Capping, Engineering Controls, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 3 Excavation and Off-Site Treatment/Disposal of Surface Soils, Dredging of Impacted Sediments, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 4 In Situ Solidification of Impacted Soil, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater
Overall Protectiveness of Human Health and the Environment	- LOW - Fencing reduces potential exposure to surface soil - Institutional controls reduces potential exposure to surface soil, subsurface soil, and groundwater - Signage reduces potential exposure to sediment	- LOW/MODERATE - Soil cap reduces potential exposure to surface soil - Institutional controls reduces potential exposure to subsurface soil and groundwater - Capping reduces potential exposure to sediment and potential long-term risk to the environment	-MODERATE - Surface soil removal and restoration eliminates exposure - Institutional controls reduces potential exposure to subsurface soil and groundwater - Sediment removal and restoration eliminates potential exposure and potential long-term risk to the environment	- HIGH - Surface soil removal in conjunction with ISS and restoration eliminates exposure - Subsurface soil solidification reduces potential exposure and eliminates groundwater impacts source - Limited institutional controls to record presence of soilidified and potential future management of solidified soil, if excavated - Sediment removal and restoration eliminates exposure and potential long-term risk to the environment - Institutional controls reduces potential exposure to groundwater - Limited institutional controls to record presence/potential future management of solidified subsurface soil - Groundwater quality would be restored over time via MNA
Compliance with Standards, Criteria and Guidance (SCGs)	- NOT COMPLIANT - SCGs not addressed	- PARTIALLY COMPLIANT - SCGs not addressed directly	- PARTIALLY COMPLIANT - Surface soil SCGs addressed - Subsurface soil SCGs not addressed - Groundwater SCGs not addressed - Sediment SCGs addressed	- COMPLIANT - Surface soil SCGs addressed - Subsurface soil SCGs addressed through solidification - Sediment SCGs addressed - Groundwater SCGs addressed via MNA following source treatment via ISS
Long-term Effectiveness and Permanence	-LOW - Requires long-term O&M of fencing and signage - Requires long-term institutional controls - Requires long-term groundwater monitoring	-MODERATE - Requires long-term O&M of soil/asphalt caps - Requires long-term O&M of sediment cap - Requires long-term institutional controls - Requires long-term groundwater monitoring	-MODERATE - Requires long-term institutional controls - Requires long-term groundwater monitoring	- HIGH - Requires limited institutional controls - Groundwater quality restored via MNA
Reduction of Toxicity, Mobility or Volume	-NONE - No reduction	-LOW - Eliminates mobility of impacted surface soil - Eliminates mobility of sediment	- MODERATE - Eliminates toxicity, mobility and volume of surface soil - Eliminates toxicity, mobility and volume of sediment	- HIGH - Eliminates toxicity, mobility and volume of surface soil - Reduces toxicity and mobility of subsurface soil - Eliminates toxicity, mobility and volume of sediment - Eliminates toxicity, mobility of groundwater over time
Short-term Impact and Effectiveness	-LOW -Access restricted to Lowland Area and 185 Fall Street backyard - Access restricted to portions of Seneca River and Canal - Immediately effective	-LOW/MODERATE - Access restricted to portions of Seneca River and Canal - Limited short term impact on community and site workers during construction - Immediately effective	-LOW/MODERATE - Limited short term impact on community and site workers during construction - Immediately effective	- MODERATE/HIGH - No access restrictions required - Moderate duration with moderate to high impact on community during construction. - Air monitoring plan required to monitor and mitigate potential impacts to workers and public by dust or fugitive emissions - Immediately effective
Implementability	- READILY IMPLEMENTABLE - Fencing, signage, and engineering controls are readily implementable - Groundwater monitoring would need to be completed long-term	-IMPLEMENTABLE/MODERATELY DIFFICULT - Soil and asphalt cap are readily implementable but would require construction permitting - Sediment cap construction is implementable but permitting may be infeasible - Groundwater monitoring would need to be completed long-term	-IMPLEMENTABLE - Surface soil removal and restoration readily implementable. Required permits readily attainable - Sediment removal is implementable. Required permits anticipated to be attainable. - Groundwater monitoring would need to be completed long-term	- MODERATE - Surface soil removal in conjunction with ISS and restoration readily implementable. Permits anticipated to be readily attainable. - Subsurface soil solidification could be logistically challenging due to small Site size, topography, and subsurface conditions. - Sediment removal is readily implementable. Permits required for dredging anticipated to be attainable.
Cost	-LOW Capital: $ 186,000 Annual O&M: $ 33,000 Total NPV: $591,000	- LOW/MODERATE Capital: $ 1,500,000 Annual O&M: $ 70,000 Total NPV: $ 2,400,000	- MODERATE Capital: $ 3,000,000 Annual O&M: $ 29,000 Total NPV: $ 3,360,000	-MODERATE/HIGH Capital: $ 5,190,000 Annual O&M: $ 31,000 Total NPV: $ 5,520,000
Land Use	-RESTRICTED COMMERCIAL - No reuse of Former MGP Site - Possible change of 185 Fall Street from residential to commercial (allowed by zoning)	-RESTRICTED COMMERCIAL - Allows commercial reuse of Former MGP Site within institutional controls - Allows restricted residential reuse of 185 Fall Street within institutional controls	-RESTRICTED COMMERCIAL - Allows commercial reuse of Former MGP Site within institutional controls - Allows restricted residential reuse of 185 Fall Street within institutional controls	-RESTRICTED COMMERCIAL - Allows commercial reuse of Former MGP Site with institutional controls - Allows restricted residential reuse of 185 Fall Street with institutional controls
Community Acceptance	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

TABLE III
SUMMARY OF REMEDIAL ACTION ALTERNATIVE ANALYSIS
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

CRITERIA	ALTERNATIVE 5 Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soil, Dredging of Impacted Sediments, Enhanced Bioremediation & MNA of Impacted Groundwater	ALTERNATIVE 6 In Situ Solidification of Impacted Soil in Upland Area, Capping in Lowland Area, Excavation and Off-Site Treatment/Disposal of Impacted Soil at Residential Property, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater
Overall Protectiveness of Human Health and the Environment	-HIGH - Surface soil removal and restoration eliminates exposure - Subsurface soil removal eliminates exposure and eliminates groundwater impacts source - Sediment removal and restoration eliminates potential exposure and potential long-term risk to the environment - Institutional controls reduces potential exposure to groundwater - Enhanced bioremediation (w/ORC) would accelerate MNA of impacted groundwater	- HIGH - Surface soil removal in conjunction with ISS eliminates potential exposure in Upland Area - Capping eliminates potential exposures to impacted soil in Lowland Area - Removal of impacted surface and subsurface soil eliminates potential exposures at the 185 Fall St. residential property - Dredging of sediment eliminates potential exposure and potential long-term risk to the environment - Institutional controls reduces potential exposure to groundwater - Groundwater quality would be restored over time by MNA following source treatment by ISS - Limited institutional controls to record presence/potential future management of solidified subsurface soil in Upland Area and long-term OM&M of cap in Lowland Area - Sediment removal and restoration eliminates exposure and potential long-term risk to the environment
Compliance with Standards, Criteria and Guidance (SCGs)	-COMPLIANT - Surface soil SCGs addressed - Subsurface soil SCGs addressed - Sediment SCGs addressed - Groundwater SCGs addressed	- COMPLIANT - Surface soil SCGs addressed via excavation in Upland Area and at residential property - Subsurface soil SCGs addressed in Upland Area through solidification and on residential property through excavation - Potential exposures to Lowland Area soil addressed via capping, with institutional controls necessary to preclude potential future exposures - Sediment SCGs addressed - Groundwater SCGs addressed via MNA following source treatment via ISS
Long-term Effectiveness and Permanence	-HIGH - Eliminates the need for institutional controls - Reduces time for restoration of groundwater quality via MNA	- HIGH - Requires limited institutional controls in Upland Area and commonly implemented institutional controls in Lowland Area - Groundwater quality restored via MNA
Reduction of Toxicity, Mobility or Volume	-HIGH - Eliminates toxicity, mobility and volume of surface soil - Eliminates toxicity, mobility and volume of subsurface soil - Eliminates toxicity, mobility and volume of sediment - Eliminates toxicity, mobility of groundwater	- HIGH - Eliminates toxicity, mobility and volume of surface soil - Reduces toxicity and mobility of subsurface soil - Eliminates toxicity, mobility and volume of sediment - Eliminates toxicity, mobility of groundwater
Short-term Impact and Effectiveness	-HIGH - No access restrictions required - Moderate to long duration and potential high impact on community during construction - Air monitoring plan required to monitor and mitigate potential impacts to public and workerrs by dust or fugitive emissions - Immediately effective	- MODERATE/HIGH - No access restrictions required - Moderate duration for constuction with moderate to high impact on community and site workers during construction. - Air monitoring plan required to monitor and mitigate potential impacts to workers and public by dust or fugitive emissions - Immediately effective
Implementability	- MODERATE/DIFFICULT - Surface soil removal and restoration readily implementable but would require construction permitting - Subsurface soil removal would be logistically challenging due to small site size, deep excavation in Upland Area and topography, permitting required - Excavation dewatering effluent will require management, treatment and disposal, permitting required - Sediment removal is implementable but would require permitting	- MODERATE - Surface soil removal in conjunction with ISS and restoration readily implementable but would require construction permitting - Subsurface soil solidification could be logistically challenging due to small Site size, construction permitting required - Capping of Lowland Area would be readily implementable, construction permitting required - Excavation of surface and subsurface soil at residential property would be readily implementable, may require permits - Sediment removal is readily implementable but would require permitting
Cost	-HIGH Capital: $ 7,720,000 Annual O&M: $ 16,000 Total NPV: $ 7,94,000	-MODERATE Capital: $ 3,865,000 Annual O&M: $ 40,000 Total NPV: $ 4,270,000
Land Use	-UNRESTRICTED USE - Allows commercial reuse of Former MGP Site with no institutional controls - Allows unrestricted reuse of 185 Fall Street	-RESTRICTED COMMERCIAL - Allows commercial reuse of Former MGP Site with limited institutional controls - Allows for unrestricted future use of the residential property - Allows for restricted use of Lowland Area under commonly implemented institutional controls
Community Acceptance	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.

TABLE IV
SUMMARY OF REMEDIAL ACTION ALTERNATIVE COSTS
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

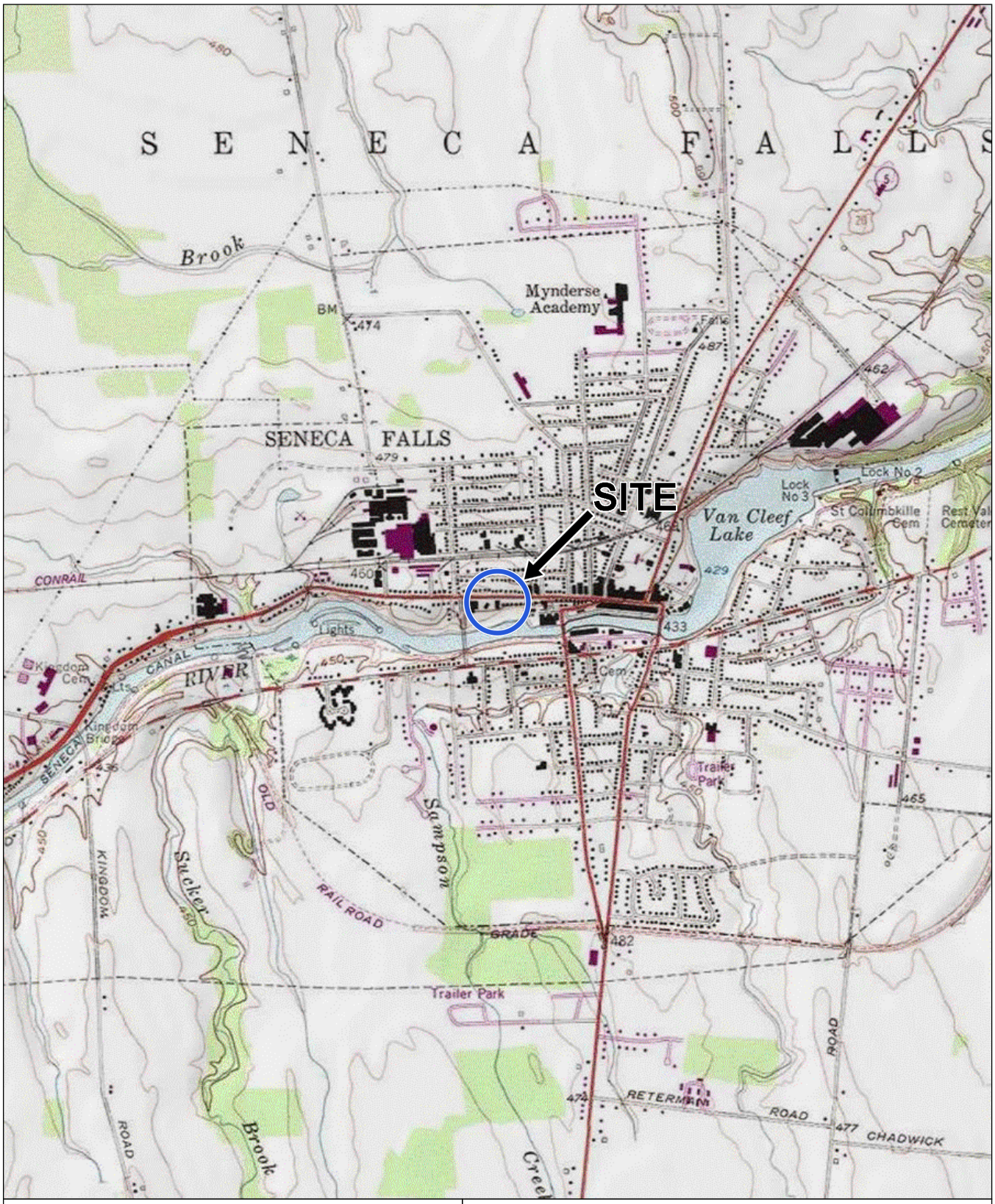
				OPINION OF PROBABLE COSTS				
				Capital Costs	Annual O&M Costs	Present Worth of O&M	Total Option Cost	TOTAL ALTERNATIVE COST
ALTERNATIVE 1 :	**NO ACTION WITH ENGINEERING CONTROLS, INSTITUTIONAL CONTROLS, GROUNDWATER MONITORING**							
	MGP Site (Upland & Lowland)	Institutional Control/Land Use Restriction	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	Lowland	Engineering Controls (Fencing)	SS-L-Fence	$ 50,449.50	$ 3,000.00	$ 37,227.00	$ 87,676.50	
	185 Fall Street	Engineering Controls (Fencing)	SS-R-Fence	$ 38,091.50	$ 3,000.00	$ 37,227.00	$ 75,318.50	
		Institutional Control/Land Use Restriction	SS-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	193 Fall Street Lowland Area	Engineering Controls (Fencing)	SS-F-Fence	$ 34,843.50	$ 3,000.00	$ 37,227.00	$ 72,070.50	
	Sediment	Institutional Controls (Signage)	Sed-Signs	$ 22,241.95	$ 2,000.00	$ 24,818.00	$ 47,059.95	
	Groundwater	Groundwater Monitoring Existing Wells	GW-MNA	$ 17,250.00	$ 15,629.60	$ 193,947.71	$ 211,197.71	
	TOTAL			**$ 185,876.45**	**$ 32,629.60**	**$ 404,900.71**	**$ 590,777.16**	**$ 590,777.16**
ALTERNATIVE 2:	**CAPPING, ENGINEERING CONTROLS, INSTITUTIONAL CONTROLS, GROUNDWATER MONITORING**							
	MGP Site (Upland & Lowland)	Institutional Control/Land Use Restriction	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	Upland	Pavement Cap	SS-U-Cap	$ 227,368.68	$ 7,000.00	$ 86,863.00	$ 314,231.68	
	Lowland	Soil Cap	SS-L-Cap	$ 194,064.71	$ 6,000.00	$ 74,454.00	$ 268,518.71	
	185 Fall Street	Soil Cap	SS-R-Exc	$ 119,831.75	$ -	$ -	$ 119,831.75	
		Institutional Control/Land Use Restriction	SS-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	193 Fall Street Lowland Area	Soil Cap	SS-F-Cap	$ 162,279.10	$ 6,000.00	$ 74,454.00	$ 236,733.10	
		Institutional Control/Land Use Restriction	SS-F-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	Sediment	Capping	Sed-Cap	$ 728,023.33	$ 24,573.75	$ 304,935.66	$ 1,032,958.99	
		Engineering Controls (Signage)	Sed-Signs	$ 22,241.95	$ 2,000.00	$ 24,818.00	$ 47,059.95	
	Groundwater	Groundwater Monitoring Existing Wells	GW-MNA	$ 17,250.00	$ 15,629.60	$ 193,947.71	$ 211,197.71	
	TOTAL			**$ 1,505,559.52**	**$ 70,203.35**	**$ 871,153.37**	**$ 2,376,712.89**	**$ 2,376,712.89**
ALTERNATIVE 3:	**EXCAVATION AND OFF-SITE TREATMENT/DISPOSAL OF SURFACE SOILS, DREDGING, INSTITUTIONAL CONTROLS, GROUNDWATER MONITORING**							
	MGP Site (Upland & Lowland)	Institutional Control/Land Use Restriction	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	Upland	Surface Soil Removal	SS-U-Exc	$ 589,640.80	$ 7,000.00	$ 86,863.00	$ 676,503.80	
	Lowland	Surface Soil Removal	SS-L-Exc	$ 424,676.74	$ -	$ -	$ 424,676.74	
	185 Fall Street	Surface Soil Removal	SS-R-Exc	$ 119,831.75	$ -	$ -	$ 119,831.75	
		Institutional Control/Land Use Restriction	SS-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	193 Fall Street Lowland Area	Surface Soil Removal	SS-F-Exc	$ 227,659.51	$ -	$ -	$ 227,659.51	
	Sediment	Dredging & Off-Site Treatment	Sed-Dredge	$ 1,603,087.37	$ -	$ -	$ 1,603,087.37	
	Groundwater	Groundwater Monitoring Existing Wells	GW-MNA	$ 17,250.00	$ 15,629.60	$ 193,947.71	$ 211,197.71	
	TOTAL			**$ 3,005,146.17**	**$ 28,629.60**	**$ 355,264.71**	**$ 3,360,410.88**	**$ 3,360,410.88**
ALTERNATIVE 4:	**ISS, DREDGING, INSTITUTIONAL CONTROLS, MNA**							
	Upland	Surface Soil Removal and ISS Subsurface Soil	S-U-ISS	$ 1,542,627.68	$ 3,000.00	$ 37,227.00	$ 1,579,854.68	
	Lowland	Surface Soil Removal and ISS Subsurface Soil	S-L-ISS	$ 1,245,233.28	$ 3,000.00	$ 37,227.00	$ 1,282,460.28	
	MGP Site (Upland & Lowland)	Institutional Control/Land Use Restriction	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	185 Fall Street	Surface Soil Removal and ISS Subsurface Soil	S-R-ISS	$ 518,820.83	$ 3,000.00	$ 37,227.00	$ 556,047.83	
		Institutional Control/Land Use Restriction	SS-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	193 Fall Street Lowland Area	Surface Soil Removal	SS-F-Exc	$ 227,659.51	$ -	$ -	$ 227,659.51	
	Sediment	Dredging & Off-Site Treatment	Sed-Dredge	$ 1,603,087.37	$ -	$ -	$ 1,603,087.37	
	Groundwater	MNA Groundwater Monitoring New Wells	GW-MNA(2)	$ 30,600.78	$ 15,629.60	$ 142,354.40	$ 172,955.18	
	TOTAL			**$ 5,191,029.45**	**$ 30,629.60**	**$ 328,489.40**	**$ 5,519,518.84**	**$ 5,519,518.84**
ALTERNATIVE 5:	**EXCAVATION AND OFF-SITE TREATMENT/DISPOSAL OF SURFACE AND SUBSURFACE SOIL, DREDGING, ENHANCED BIOREMEDIATION & MNA**							
	Upland	Surface Soil Removal	SS-U-Exc	$ 589,640.80	$ -	$ -	$ 676,503.80	
		Subsurface Soil Removal	S-U-Exc	$ 2,338,989.06	$ -	$ -	$ 2,338,989.06	
		Temporary P&T	GW-P&T	$ 100,536.00	$ 3,000.00	$ 37,227.00	$ 137,763.00	
	Lowland	Surface Soil Removal	SS-L-Exc	$ 424,676.74	$ -	$ -	$ 424,676.74	
		Subsurface Soil Removal	S-L-Exc	$ 1,978,587.02	$ -	$ -	$ 1,978,587.02	
	185 Fall Street	Surface Soil Removal	SS-R-Exc	$ 119,831.75	$ -	$ -	$ 119,831.75	
		Subsurface Soil Removal	S-R-Exc	$ 178,520.28	$ -	$ -	$ 178,520.28	
	193 Fall Street Lowland Area	Surface Soil Removal	SS-F-Exc	$ 227,659.51	$ -	$ -	$ 227,659.51	
	Sediment	Dredging & Off-Site Treatment	Sed-Dredge	$ 1,603,087.37	$ -	$ -	$ 1,603,087.37	
	Groundwater	ORC & MNA Grondwater Monitoring New Wells	GW-Bio	$ 158,485.31	$ 12,629.60	$ 88,705.03	$ 247,190.34	
	TOTAL			**$ 7,720,013.84**	**$ 15,629.60**	**$ 125,932.03**	**$ 7,932,808.87**	**$ 7,932,808.87**
ALTERNATIVE 6:	**ISS UPLAND, CAP LOWLAND, EXCAVATE RESIDENTIAL SOIL, DREDGING, MNA**							
	Upland	Surface Soil Removal and ISS Subsurface Soil	S-U-ISS	$ 1,542,627.68	$ 3,000.00	$ 37,227.00	$ 1,579,854.68	
		Institutional Controls (Deed Recordation)	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 11,500.00	
	Lowland	Soil Cap	SS-L-Cap	$ 194,064.71	$ 6,000.00	$ 74,454.00	$ 268,518.71	
		Institutional Controls (Deed Recordation)	SS_L-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	185 Fall Street	Surface Soil Removal	SS-R-Exc	$ 119,831.75	$ -	$ -	$ 119,831.75	
		Subsurface Soil Removal	S-R-Exc	$ 178,520.28	$ -	$ -	$ 178,520.28	
	193 Fall Street Lowland Area	Soil Cap	SS-F-Cap	$ 162,279.10	$ 6,000.00	$ 74,454.00	$ 236,733.10	
		Institutional Controls (Deed Recordation)	SS-F-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00	
	Sediment	Dredging & Off-Site Treatment	Sed-Dredge	$ 1,603,087.37	$ -	$ -	$ 1,603,087.37	
	Groundwater	MNA Groundwater Monitoring New Wells	GW-MNA(2)	$ 30,600.78	$ 15,629.60	$ 142,354.40	$ 172,955.18	
	TOTAL			**$ 3,865,511.67**	**$ 39,629.60**	**$ 440,170.40**	**$ 4,268,455.07**	**$ 4,268,455.07**

TABLE V
SUMMARY OF REMEDIAL ACTION ALTERNATIVE COMPARATIVE ANALYSIS
FEASIBILITY STUDY
SENECA FALLS FORMER MGP SITE
SENECA FALLS, NEW YORK

CRITERIA	ALTERNATIVE 1 No Action with Engineering Controls, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 2 Capping, Engineering Controls, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 3 Excavation and Off-Site Treatment/Disposal of Surface Soils, Dredging of Impacted Sediments, Institutional Controls, Groundwater Monitoring	ALTERNATIVE 4 In Situ Solidification (ISS) of Impacted Soil, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater	ALTERNATIVE 5 Excavation and Off-Site Treatment/Disposal of Surface and Subsurface Soil, Dredging of Impacted Sediments, Enhanced Bioremediation & MNA of Impacted Groundwater (Restoration to Pre-Release Conditions)	ALTERNATIVE 6 In Situ Solidification of Impacted Soil in Upland Area, Capping in Lowland Area, Excavation and Off-Site Treatment/Disposal of Impacted Soil at Residential Property, Dredging of Impacted Sediments, Institutional Controls, MNA of Impacted Groundwater
Overall Protectiveness of Human Health and the Environment	Least protective due to no active remediation	More protective than Alternative 1 due to soil and sediment capping	More protective than Alternatives 1 and 2 due to surface soil and sediment removal. Addresses potential direct contact exposure and potential long-term risk to environment by the presence of OLM & TLM in sediments.	More protective than Alternatives 1, 2, and 3 due to removal of surface soil in conjunction with ISS and solidification of subsurface soil. Equally protective to Alternative 3 with respect to sediment remediation.	Most protective due to removal of surface and subsurface soil and sediment. Removes source of impacts to groundwater quality. Addresses potential long-term risks to the environment posed by OLM & TLM in Upland Area subsurface soil and Seneca River and Canal sediments. Large volume of impacted soil generated for off-site treatment and disposal and large volume of clean backfill required will have negative impact on environment due to energy expended and disposal facility/landfill capacity consumed.	Similar in to Alternatives 4 and 5 for the Upland Area and residential property, respectively, and for Seneca Falls River and Canal Sediments, and mitigation of impacts to groundwater. Capping of Lowland Area with institutional controls is a proven, effective remedy for impacted surface and subsurface soils that are not a source of impacts to groundwater quality.
Compliance with Standards, Criteria and Guidance (SCGs)	Impacts to surface and subsurface soil, sediment, and groundwater would not be addressed	Impacts to surface and subsurface soil, sediment, and groundwater would not be directly addressed	Impacts to surface soil and sediment would be addressed, does not directly address subsurface soil impacts or impacts to groundwater. However, groundwater is not used as a source of drinking water and impacts to groundwater are of relatively low magnitude and limited to the Upland Area.	Addresses impacts to surface soil, subsurface soil, sediment, and groundwater	Addresses impacts to surface soil, subsurface soil, sediment, and groundwater	Addresses impacts to surface soil, subsurface soil, sediment, and groundwater.
Long-term Effectiveness and Permanence	Fencing and signage would limit exposure to surface soil and sediment	Caps and signage would limit exposure to surface soil and sediment but require long-term O&M. Would not address source of groundwater impacts and potential long-term risk to the environment posed by OLM & TLM in subsurface soil in Upland Area.	Surface soil and sediment removal would eliminate exposure to those media. Institutional controls for potential exposures to subsurface soil are generally considered effective.	Effective in the long term due to soil removal, soil solidification and sediment removal. Requires limited institutional controls for land-based remedies (principally recording of deeds) but no long-term O&M for remedial actions for soil. Source of impacts to groundwater quality would be treated by ISS, and groundwater quality would be restored over time via MNA.	Effective in the long term due to soil and sediment removal. Enhanced bioremediation in conjunction with excavation in Upland Area (ORC application) would accelerate restoration of groundwater quality. Requires no long term O&M or institutional controls.	Effective in the long term due to soil removal or solidification and sediment removal, requires long- term O&M of the Lowland Cap and groundwater monitoring during MNA. Institutional controls are limited in the Upland Area recording of deeds and common use restrictions/monitoring requirements for capping systems in the Lowland Area . No institutional controls are required for the residential property.
Reduction of Toxicity, Mobility or Volume	Provides no reduction.	Provides minimal reduction by limiting erosion or wind transport of surface soils, reduces potential disturbance and transport of sediment	Eliminates impacted surface soil and sediment. Does not address subsurface soil , including potential source of impacts to groundwater quality in the Upland Area.	Eliminates impacted surface soil and sediment, reduces toxicity and mobility of contaminants in subsurface soil. Reduces toxicity and ultimately contaminant mass in groundwater.	Eliminates impacted soil and sediment, removes source of groundwater impacts, and reduces contaminant mass in groundwater via enhanced bioremediation and MNA.	Eliminates impacted surface soil and sediment, reduces toxicity and mobility of contaminants in subsurface soil, removes all impacted soil from the residential property. Reduces toxicity and contaminant mass in impacted groundwater via MNA follow source treatment by ISS.
Short-term Impact and Effectiveness	Very limited short term impacts due to fencing and signage construction, but low effectiveness	Limited short term impacts during capping	Limited short term impacts during surface soil removal and sediment removal.	Impacts to the community and site workers during ISS construction, including traffic, noise and dust generation, would be greater than impacts associated with Alternatives 1, 2 and 3.	Impacts to community and site workers during soil excavation, traffic, noise and dust/fugitive emission generation will be greater in duration and magnitude than for Alternatives 1 through 4 and 6. Large quantities of soil and backfill will generate significant traffic.	Impacts to the community and site workers during ISS construction and excavation, resulting in traffic, noise and dust generation. Impacts would be lower in magnitude and duration than either Alternative 4 or 5.
Implementability	Readily implementable	Land-based caps would be readily implementable but would require construction permitting. Permitting of sediment cap may not be feasible.	Readily implementable. Would require permits for construction/excavation and dredging. However, permits would be readily attainable.	Implementable, but in-situ solidification (ISS) would have some logistical challenges due to the Site size, subsurface structures/obstructions, and dust/fugitive emission generation. Requires bench scale testing prior to remediation construction. ISS has been proven implementable in similar site conditions.	Implementable would not require specialized equipment. However, substantial and deep excavation will require lateral earth support, treatment/discharge of excavation dewatering effluent and other logistical challenges associated with on a small site.	Implementable, but in-situ solidification (ISS) would be logistically challenging due to the Site size, subsurface obstructions, and dust generation. Requires bench scale testing prior to remediation construction. Excavation, dredging and capping are readily implementable
Cost Effectiveness	Low capital cost, moderate long term operation, maintenance and monitoring cost.	Low to moderate capital cost, high long term cost due to cap O&M in addition to groundwater monitoring.	Moderate capital cost. Moderate long term cost.	Moderate to high capital cost due to ISS, relatively low costs for groundwater quality monitoring until groundwater quality is restored via MNA.	High capital cost for soil excavation and disposal of large quantity of soil. Relatively low cost for enhanced bioremediation and annual monitoring of MNA of impacted groundwater.	Most cost effective remedy to attain remedial action objectives. Moderate capital cost and relatively low annual costs for monitoring/maintenance of the Lowland Area cap and groundwater monitoring in conjunction with MNA.
Land Use	Limited future reuse of Former MGP Site and 185 Fall Street property	Limitations on future use of Former MGP Site Lowland Area and 185 Fall Street property due to institutional controls. Upland Area would be suitable for continued commercial use with institutional controls.	Former MGP Site and 185 Fall Street property could remain in commercial and residential uses, respectively, with certain use limitations resulting from institutional controls.	Limited future use restrictions on the Former MGP Site and 185 Fall Street property due to institutional controls accomplished through deed recordation. Former MGP Site would be suitable for continued commercial use and 185 Fall Street would continue to be suitable for residential use.	Unlimited future use of Former MGP Site and 185 Fall Street	Unrestricted future use of 185 Fall Street where no institutional controls will be required. Former MGP Site Upland Area would have limited restrictions due to the presence of solidified soil and would be suitable for continued commercial use. Institutional controls would restrict future use of the Lowland Area to preclude potential future exposure to impacted soil.
Community Acceptance	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.	-The Alternative will be presented to the public at an information session. Comments will be collected to gauge the amount of community acceptance.
Overall Summary	Not an effective or protective remedy. Used as baseline for comparison with other alternatives.	Remedy would effectively prevent potential future exposures by direct contact. However, the feasibility of capping sediments may be limited by the ability to obtain required permits. Would require long-term O&M to remain effective and long-term groundwater monitoring. Would not address OLM & TLM in Upland Area subsurface soil that is a source of impacts to groundwater quality and a potential long-term risk to the environment.	Remedy would effectively prevent potential future exposures by direct contact at moderate cost. Would require long-term O&M to remain effective and long-term groundwater monitoring. Would not address OLM & TLM in Upland Area subsurface soil that is a source of impacts to groundwater quality and a potential long-term risk to the environment.	Protective and effective over the long term. More effective and provides a higher level of protection than Alternatives 1,2, and 3. However, cost is relatively high.	Most protective and effective long term, but high cost and high level of disruption to community during construction.	Recommended remedial alternative. Highly protective of human health and the environment. Most cost effective alternative.

LEGEND:

High Ranking
Moderate Ranking
Low Ranking



SITE COORDINATES: 42°54'37"N,76°48'15"W

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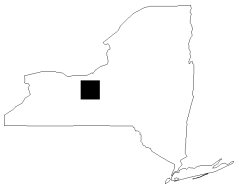


U.S.G.S. QUADRANGLE: SENECA FALLS, NY

HALEY & ALDRICH

SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

PROJECT LOCUS

SCALE: 1:24,000
JANUARY 2015

FIGURE 1

34507-021 1.PDF

FALL STREET

GAS SHUTOFF

GAS MAIN

BM-1/HYDRANT

PARKING

207

201

GAS STATION

193

187-189

185

177

175

173

171

169

DECK

50

PARKING

PARKING SERVICE

PARKING

PARKING

PARKING

MGP-IMPACTED SOIL RESIDENTIAL

MGP-IMPACTED SOIL UPLAND

MGP-IMPACTED SOIL LOWLAND

193 FALL STREET MGP-IMPACTED SOIL LOWLAND

MGP-IMPACTED SEDIMENT

PROPERTY BOUNDARY

RUMSEY STREET

SENECA RIVER & CANAL

XXX

SG-1

SG-2

TP-07-03N
TP-07-02
TP-07-03S
TP-07-01
TP-07-04
TP-07-05
TP-07-06
TP-07-07
TP-07-08
TP-07-09
TP-07-10
TP-07-11
TP-09-01
TP-09-02
TP-09-03
TP-09-04
TP-09-05

SB-07-01
SB-07-02
SB-07-03
SB-07-04
SB-07-05
SB-07-06
SB-07-07
SB-07-08
SB-07-09
SB-07-10
SB-07-11
SB-07-12
SB-07-13
SB-07-14
SB-07-15
SB-07-16
SB-07-17
SB-07-18
SB-07-19
SB-07-21
SB-07-22
SB-08-01
SB-08-02
SB-08-03

MW-07-01/SB-07-01
MW-07-02/SB-07-02
MW-07-03/SB-07-03
MW-07-04/SB-07-04
MW-07-05/SB-07-05
MW-07-06/SB-07-06
MW-08-01/SB-08-01
MW-08-02/SB-08-02
MW-08-03/SB-08-03

SS-07-01
SS-07-02
SS-07-03
SS-07-04
SS-07-05
SS-07-06
SS-09-01
SS-09-02
SS-09-03
SS-09-04
SS-09-05
SS20202
SS20203

HA-09-02
HA-09-03

SE-09-01 NA
SE-09-02 1 ft/4.5 ft
SE-09-03 3 ft/3 ft
SE-09-04 0.5 ft/4 ft
SE-09-05 1.1 ft/3 ft
SE-09-06 NA
SE-09-07 NA
SE-09-08 3 ft/3.5 ft
SE-09-08B 2.7 ft/2.7 ft
SE-09-08C 3.95 ft/3.95 ft
SE-09-08D 1.6 ft/3 ft
SE-09-09 0.65 ft/1.9 ft
SE-09-10 3.2 ft/3.8 ft
SE-09-11 NA
SE-09-12 2.2 ft/4.95 ft
SE-09-13 3.25 ft/4.3 ft
SE-09-14 2.35 ft/5.7 ft
SE-09-15 3.5 ft/3.5 ft
SE-09-16 3.95 ft/4.3 ft
SE-09-16B 2.9 ft/7.45 ft
SE-09-17 2.15 ft/3.4 ft
SE-09-18 3.4 ft/3.5 ft
SE-09-19 3.5 ft/4 ft
SE-09-20 3.4 ft/3.65 ft
SE-09-21 3.25 ft/3.25 ft
SE-09-22 3.4 ft/4.2 ft
SE-09-23 0.65 ft/4.35 ft
SE-09-25 NA
SE-09-26 3.8 ft/4.5 ft
SE-09-27 2.75 ft/3 ft
SE-09-28 1.7 ft/3 ft
SE-09-29 2.1 ft/3.2 ft
SE-09-30 2.65 ft/3.8 ft
SE-09-31 1.3 ft/3 ft
SE-09-32 1.9 ft/3.2 ft
SE-09-33 NM/5.5 ft
SE-09-34 3.5 ft/7 ft
SE-09-35 NP/4.5 ft
SE-09-36 NP/2.5 ft
SE-09-37 NP/1.9 ft
SE-09-38 NP/2.5 ft
SE-09-39 NP/1.8 ft
SE-09-40 1 ft/5 ft
SE-09-41 NA
SE-09-41B NP/0.5 ft
SE-09-42 NA
SE-09-42B NP/0.5 ft
SE-09-42C NA
SE-09-43 NA
SE-09-43B NP/3.3 ft
SE-09-44B NP/2.9 ft
SE-09-45 NA
SE-09-46 NP/1 ft
SE-09-47 NP/2.1 ft
SE-09-48 NM/2 ft
SE-09-49 NA
SE-09-50 NA
SE-09-51 NA
SE-09-52 NM/1.2 ft
SE-09-END1 1.9 ft/5 ft
SE-09-END2 2.9 ft/4.3 ft
SE-09-19B 0.5 ft/2.9 ft
SE-09-19A NA

LEGEND:

- PROPERTY LINE
- MONITORING WELL
- SOIL BORING
- SURFACE SOIL SAMPLE
- TEST PIT
- STREAM GAUGE
- HAND AUGER LOCATION
- SE-09-04 0.5 ft/4 ft — SEDIMENT LOCATION WITH THICKNESS OF SOFT SEDIMENT/DEPTH TO REFUSAL
- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS

NOTES:

1. SOIL DOT COLOR IS BASED ON COMPARISON WITH SOIL CLEANUP OBJECTIVES.
2. SEDIMENT DOT COLOR IS BASED ON MAXIMUM TOTAL PAHs PER SAMPLE LOCATION.
3. SEDIMENT EXPLORATION LOCATION SE-09-19 WAS NOT COMPLETED.
4. NA: NOT AVAILABLE
   NM: NOT MEASURED
   NP: NOT PENETRABLE
5. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

N
W E
S

0 40 80 120 160
SCALE IN FEET

SOIL TOWER LEGEND:

GROUND SURFACE
- 0 TO 1 FOOT BGS
- 1 TO 2 FEET BGS
- 2 TO 5 FEET BGS
- 5 TO 10 FEET BGS
- 10 TO 15 FEET BGS
- 15 TO 20 FEET BGS
- 20 TO 25 FEET BGS
- 25 TO 30 FEET BGS
- 30 TO 35 FEET BGS

SOIL TOWER COLOR LEGEND: COMPARED TO SOIL CLEANUP OBJECTIVES FOR COMMERCIAL OR RESIDENTIAL

- NO SAMPLE COLLECTED
- SAMPLE COLLECTED, NO EXCEEDANCE
- SAMPLE COLLECTED, ONE OR MORE EXCEEDANCES

SEDIMENT TOWER LEGEND:

TOP OF SEDIMENT
- 0 TO 0.5FOOT BGS
- 0.5 TO 1 FEET BGS
- 1 TO 1.5 FEET BGS
- 1.5 TO 2 FEET BGS
- 2 TO 2.5 FEET BGS
- 2.5 TO 3 FEET BGS

SEDIMENT TOWER COLOR LEGEND: TOTAL PAHs

- NON-DETECT TO 0.1 MG/KG
- 0.1 TO 1 MG/KG
- 1 TO 10 MG/KG
- 10 TO 100 MG/KG
- 100 TO 1000 MG/KG
- >1000 MG/KG

VISUAL/OLFACTORY OBSERVATIONS:

- NO OBSERVED IMPACTS
- ODOR OR STAINING
- MINOR TLM/OLM BLEBS
- TLM/OLM PRESENT
- REFUSAL - NO SEDIMENT PRESENT

HALEY & ALDRICH

SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

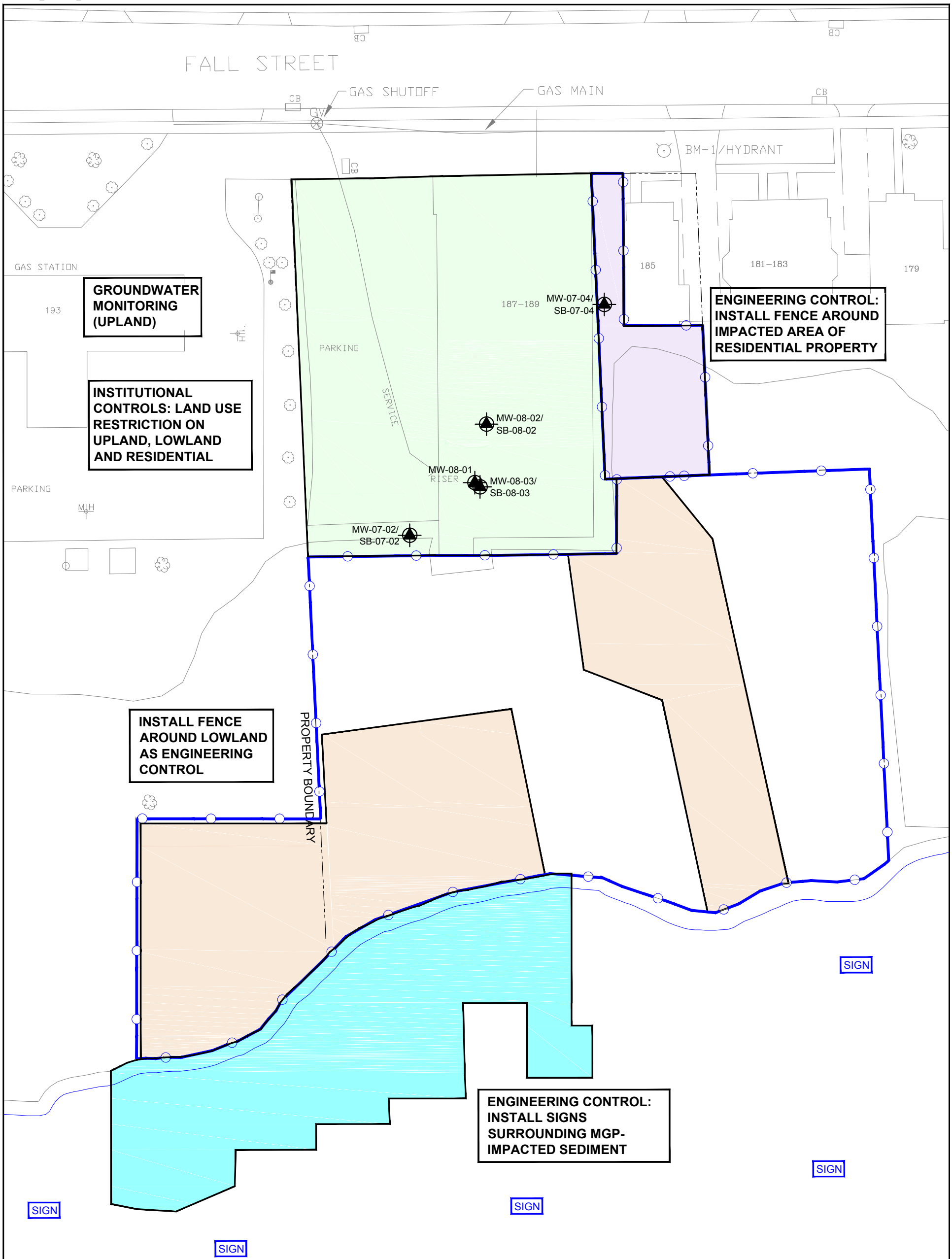
SITE PLAN

SCALE: AS SHOWN
JANUARY 2015

FIGURE 2

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-SP.DWG

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- MW-08-01 EXISTING MONITORING WELL (PRESERVED)

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

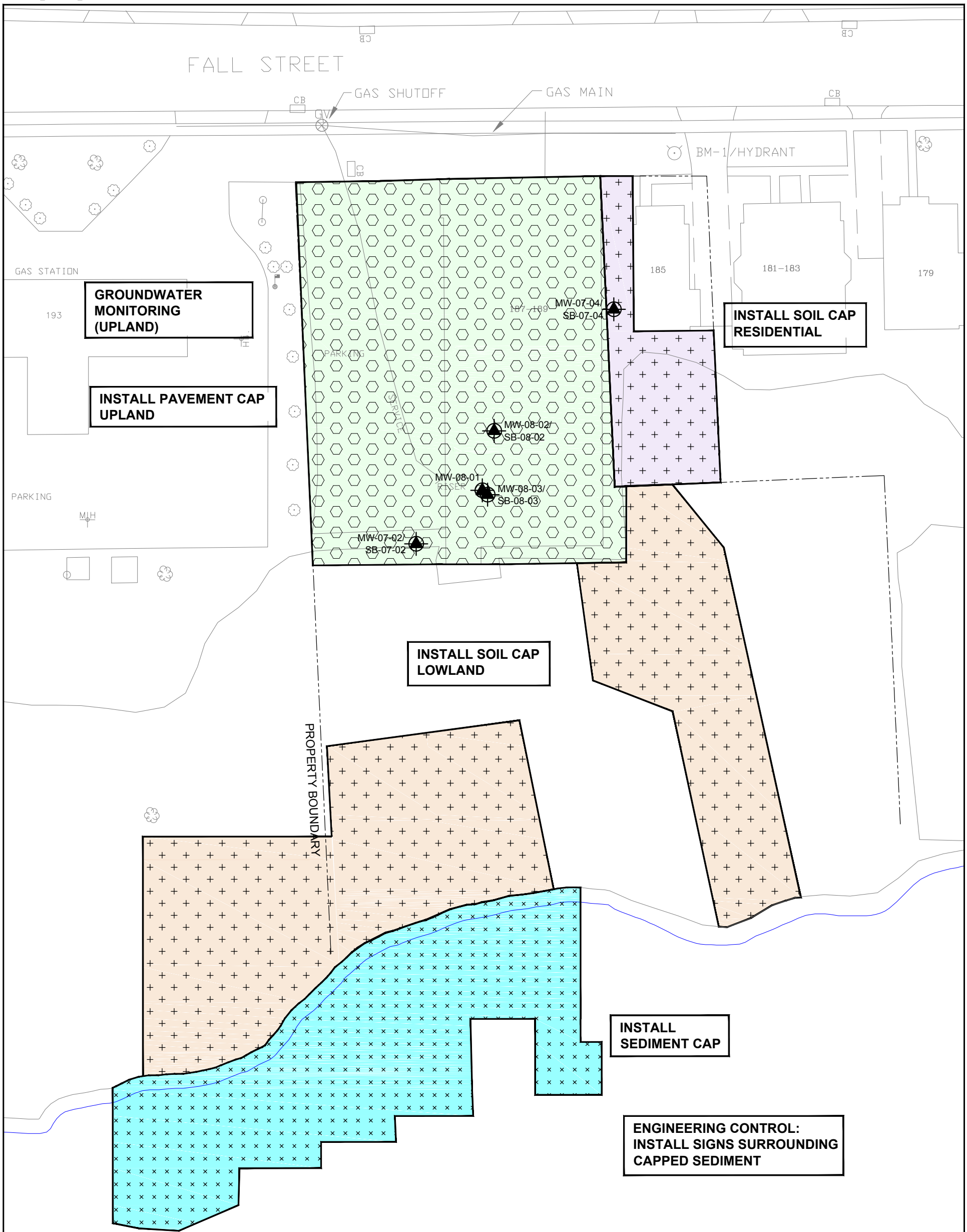
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 1

AS SHOWN
JANUARY 2015

FIGURE 3

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- PAVEMENT CAP OPTION
- SOIL CAP OPTION
- SEDIMENT CAP OPTION
- MW-08-01 EXISTING MONITORING WELL (PRESERVED)

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

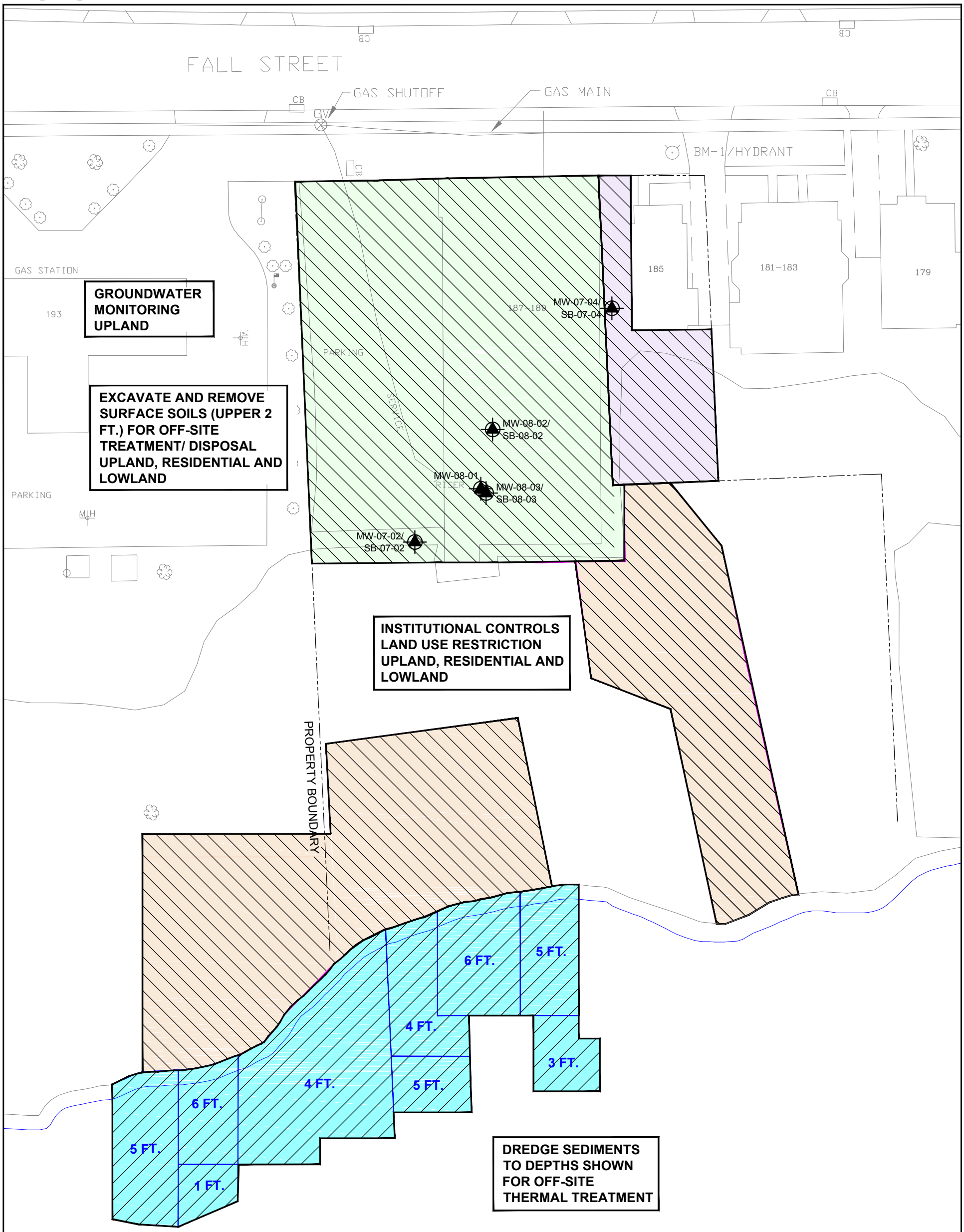
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 2

AS SHOWN
JANUARY 2015

FIGURE 4

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- SOIL EXCAVATION OPTION
- SEDIMENT DREDGING OPTION
- MW-08-01 EXISTING MONITORING WELL (PRESERVED)

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

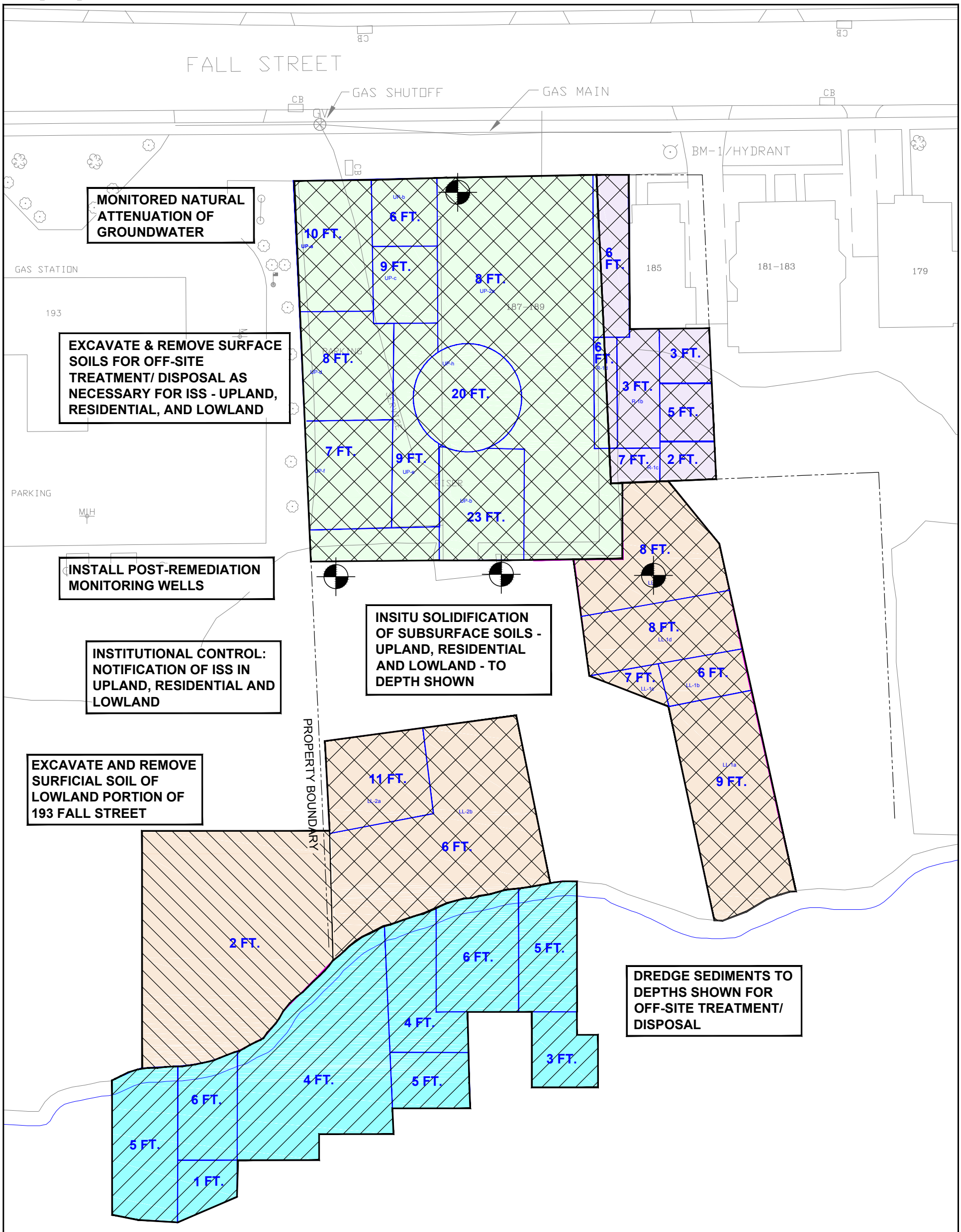
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 3

AS SHOWN
JANUARY 2015

FIGURE 5

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- ISS OPTION
- SEDIMENT DREDGING OPTION
- SOIL EXCAVATION OPTION
- POST-REMEDIATION MONITORING WELLS

SUBSURFACE PROFILE LOCATION

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

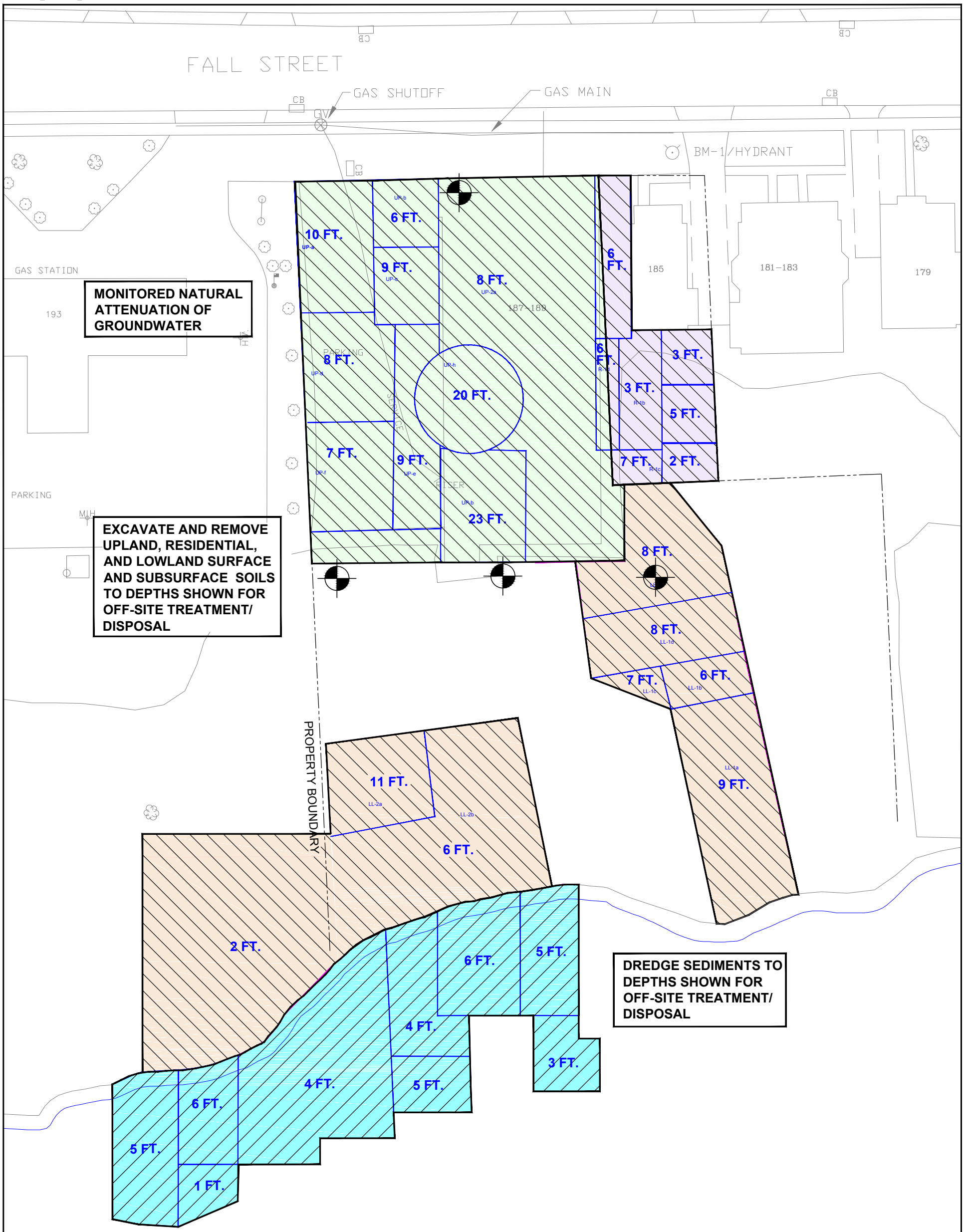
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 4

AS SHOWN
JANUARY 2015

FIGURE 6

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- SOIL EXCAVATION OPTION
- SEDIMENT DREDGING OPTION
- POST-REMEDIATION MONITORING WELLS

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

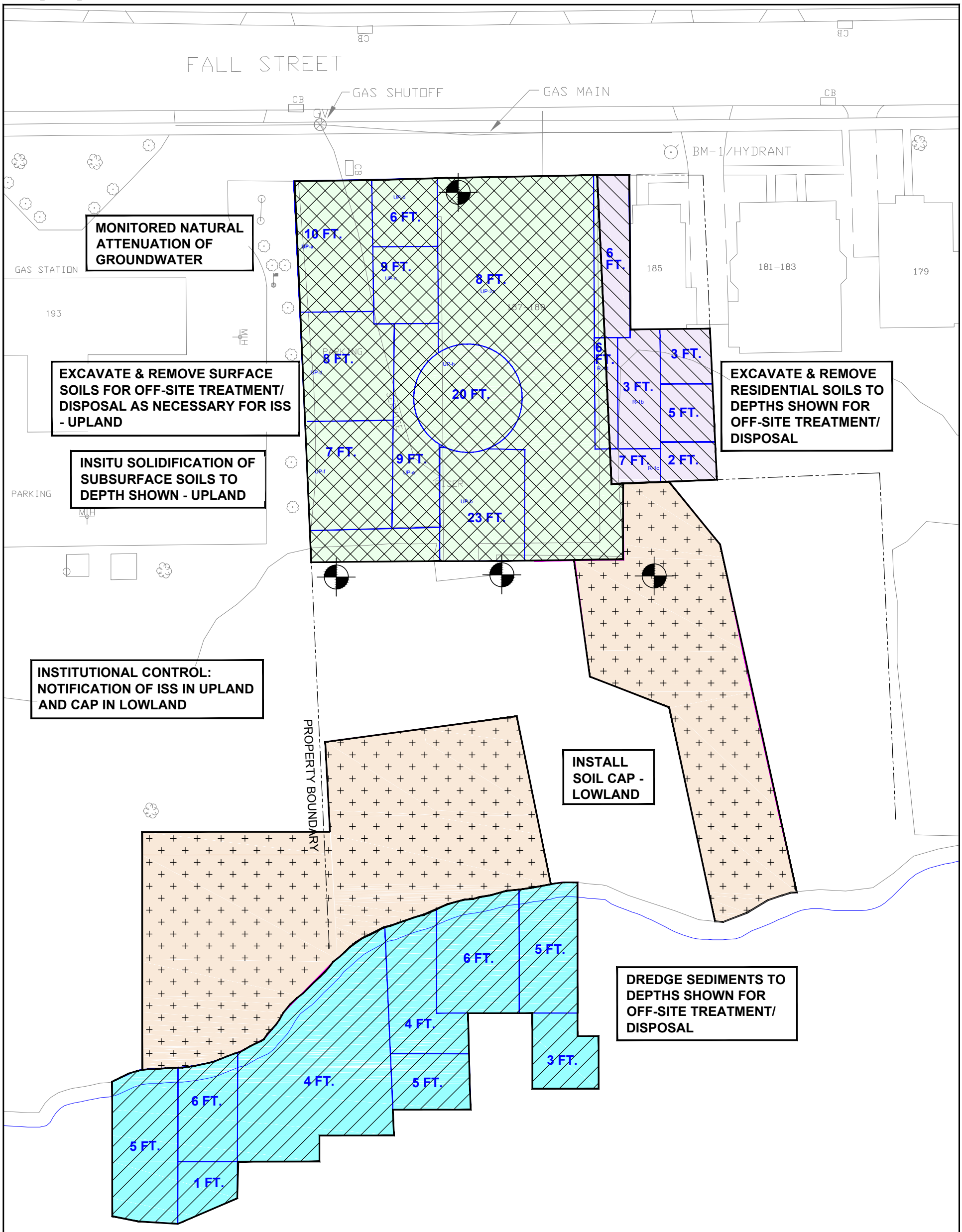
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 5

AS SHOWN
JANUARY 2015

FIGURE 7

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-021-FS-ALTS-R2.DWG



LEGEND:

- UPLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RESIDENTIAL PROPERTY - AREA OF MGP-IMPACTED SOILS
- LOWLAND PROPERTY - AREA OF MGP-IMPACTED SOILS
- RIVER - AREA OF MGP-IMPACTED SEDIMENTS
- ISS OPTION
- SEDIMENT DREDGING OPTION
- SOIL EXCAVATION OPTION
- SOIL CAP OPTION
- POST-REMEDIATION MONITORING WELLS

N W E S

0 40 80

SCALE IN FEET

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE.

HALEY & ALDRICH

SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

CONCEPTUAL DEPICTION OF ALTERNATIVE 6

AS SHOWN
JANUARY 2015

FIGURE 8

APPENDIX A

Selected Remedial Investigation Report Figures

LEGEND:

- SEDIMENT EXPLORATION LOCATION □AUGUST 200□□
- SB-07-0□ SOIL BORING □2007 AND 2008□
- MW-07-0□□ / SB07-0□ GROUNDWATER MONITORING WELL □2007 AND 2008□
- SV-07-02-SS SOIL VAPOR MONITORING POINT □2008□
- TP-07-07 TEST PIT □2007□
- STREAM GAUGE
- SS-07-03 SURFACE SOIL SAMPLE LOCATION □2007 AND 200□□
- HAND AUGER LOCATION
- SS20204 HISTORIC SURFACE SOIL SAMPLING LOCATION □2003□
- SS-2 □15X10□ HISTORIC SOIL SAMPLING AREA □1□□0□
- SW-2 / SE-2 HISTORIC SURFACE WATER □SEDIMENT SAMPLING LOCATION □1□□0□

NOTES:

1. BASE PLAN PREPARED BY NYSEG ENGINEERING SERVICES OF BIRMINGHAM, NEW YORK, 12□4□2007.
2. SEDIMENT EXPLORATION LOCATION SE-0□-1□ WAS NOT COMPLETED.

N W E S

0 50 100 150 200
SCALE IN FEET

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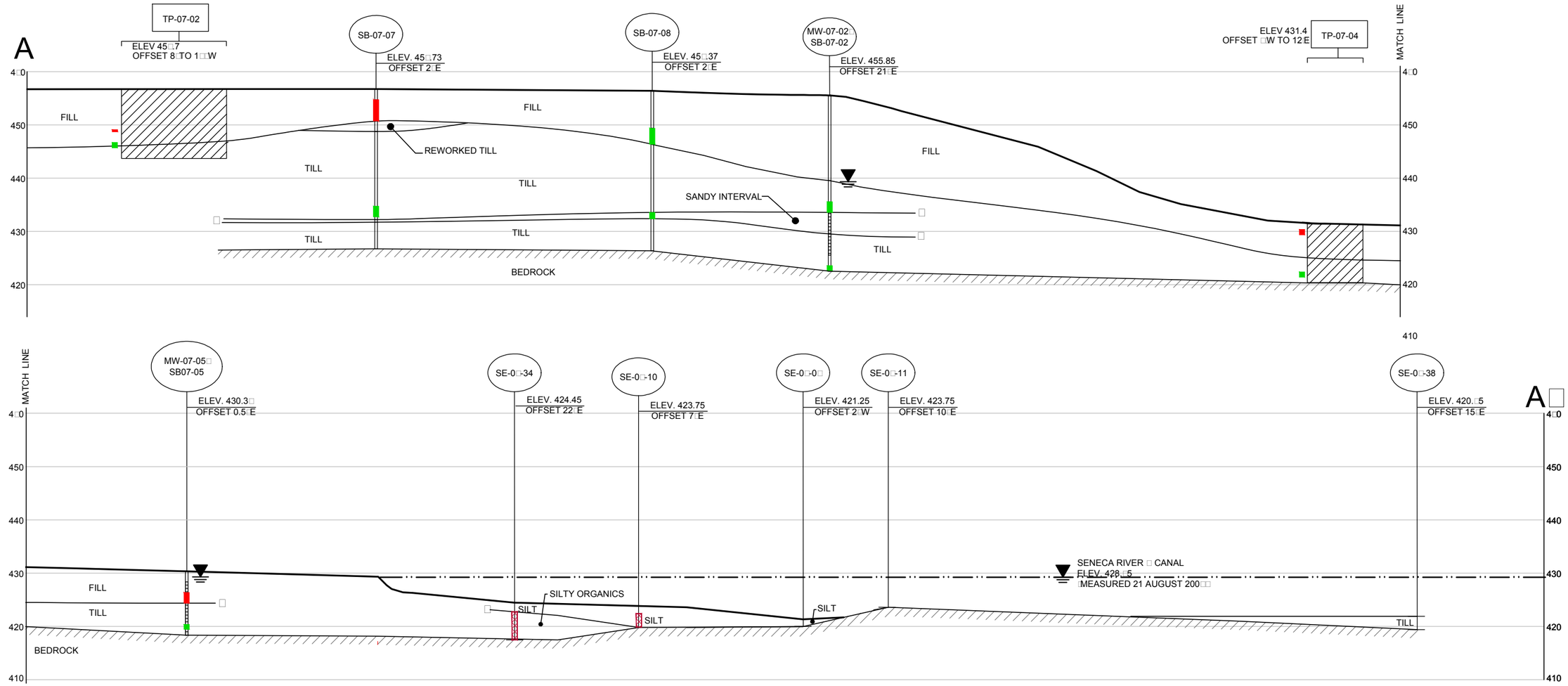
SENECA FALLS FORMER MGP
1□7 FALL STREET
SENECA FALLS, NEW YORK

EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
APRIL 2013

FIGURE 3

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS-2013\34507-020-0003_EXPL PLAN.DWG



LEGEND:

SB-07 -0□ SUBSURFACE EXPLORATION LOCATION

OFFSET 4.5□W OFFSET DISTANCE FROM SECTION LINE

CHANGE IN STRATIFICATION

GROUNDWATER ELEVATION MEASURED 21 AUGUST 200□ BY HALEY □ ALDRICH, INC.

SCREENED LENGTH

INDICATES SOIL ANALYTICAL RESULTS EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SOIL CLEANUP OBJECTIVES □SCO□□

INDICATES SOIL ANALYTICAL RESULTS DO NOT EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SCO□

TAR-LIKE MATERIAL OBSERVED

NOTES:

1. REFER TO FIGURE 3 FOR LOCATION AND ORIENTATION OF SUBSURFACE PROFILES SHOWN ON FIGURES 5A THROUGH 5D.
2. LINES REPRESENTING CHANGES IN STRATA AREA BASED UPON INTERPOLATION BETWEEN PREVIOUS SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT OTHER THAN SPECIFIC EXPLORATION LOCATIONS.
3. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIAL IS APPROXIMATE AND MAY BE GRADUAL.
4. THIS PROFILE WAS DEVELOPED BY INTERPOLATION BETWEEN WIDELY SPACED BORINGS. ONLY AT THE BORING LOCATIONS SHOULD IT BE CONSIDERED AS AN APPROXIMATELY ACCURATE REPRESENTATION AND THEN ONLY TO THE DEGREE IMPLIED BY THE NOTES ON THE BORING LOGS.

0 20 40

HORI□ONTAL AND VERTICAL SCALE IN FEET

HALEY & ALDRICH

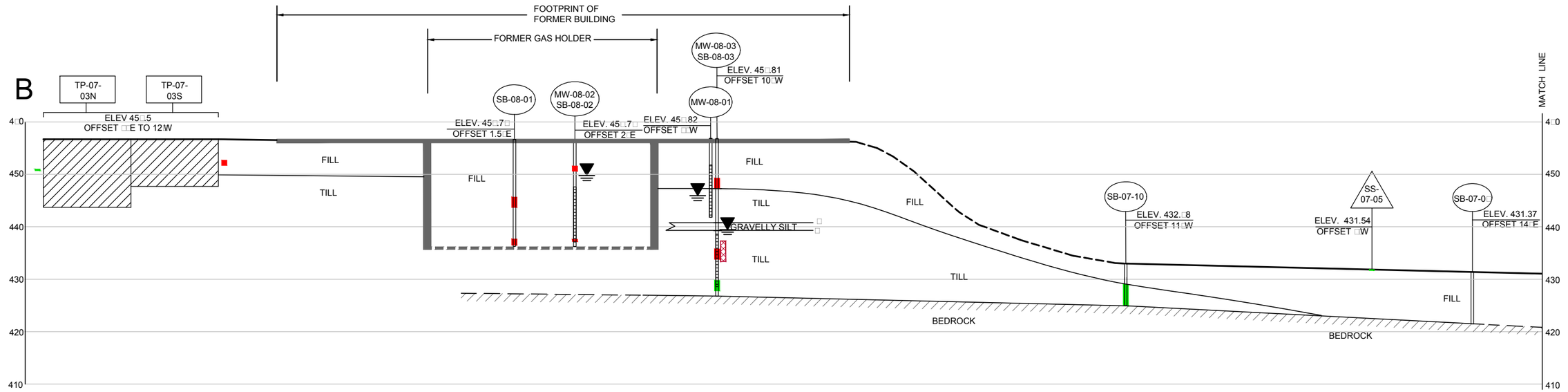
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

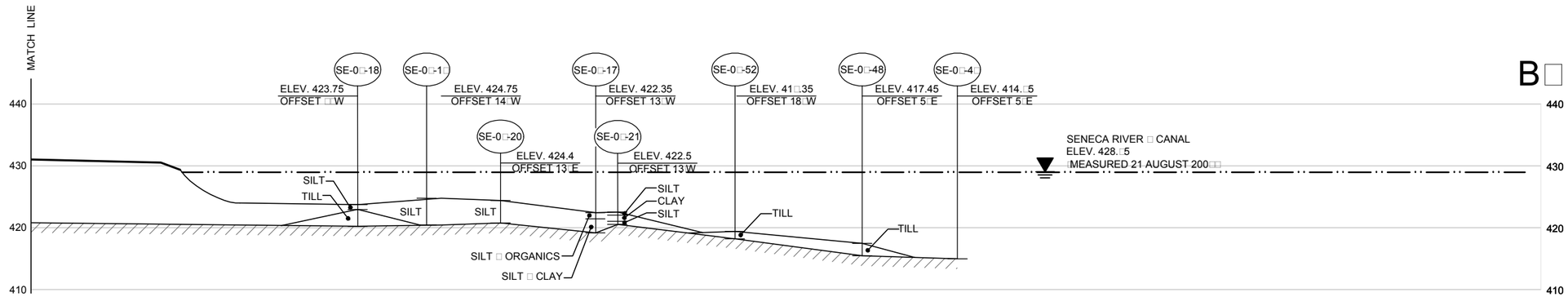
SUBSURFACE PROFILE A-A□

SCALE: AS SHOWN
APRIL 2013

FIGURE 5A

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS-2013\34507-020-0004-XSECS 2013-0405.DWG





LEGEND:

- SB-07-0□ — SUBSURFACE EXPLORATION LOCATION
- OFFSET 4.5□W — OFFSET DISTANCE FROM SECTION LINE
- CHANGE IN STRATIFICATION
- WATER ELEVATION MEASURED 21 AUGUST 200□ BY HALEY □ ALDRICH, INC.
- SCREENED LENGTH
- INDICATES SOIL ANALYTICAL RESULTS EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SOIL CLEANUP OBJECTIVES □SCO□□
- INDICATES SOIL ANALYTICAL RESULTS DO NOT EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SCO□
- TAR-LIKE MATERIAL OBSERVED

NOTES:

1. REFER TO FIGURE 3 FOR LOCATION AND ORIENTATION OF SUBSURFACE PROFILES SHOWN ON FIGURES 5A THROUGH 5D.
2. LINES REPRESENTING CHANGES IN STRATA AREA BASED UPON INTERPOLATION BETWEEN PREVIOUS SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT OTHER THAN SPECIFIC EXPLORATION LOCATIONS.
3. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIAL IS APPROXIMATE AND MAY BE GRADUAL.
4. THIS PROFILE WAS DEVELOPED BY INTERPOLATION BETWEEN WIDELY SPACED BORINGS. ONLY AT THE BORING LOCATIONS SHOULD IT BE CONSIDERED AS AN APPROXIMATELY ACCURATE REPRESENTATION AND THEN ONLY TO THE DEGREE IMPLIED BY THE NOTES ON THE BORING LOGS.

0 20 40
HORI□ONTAL AND VERTICAL SCALE IN FEET

HALEY & ALDRICH

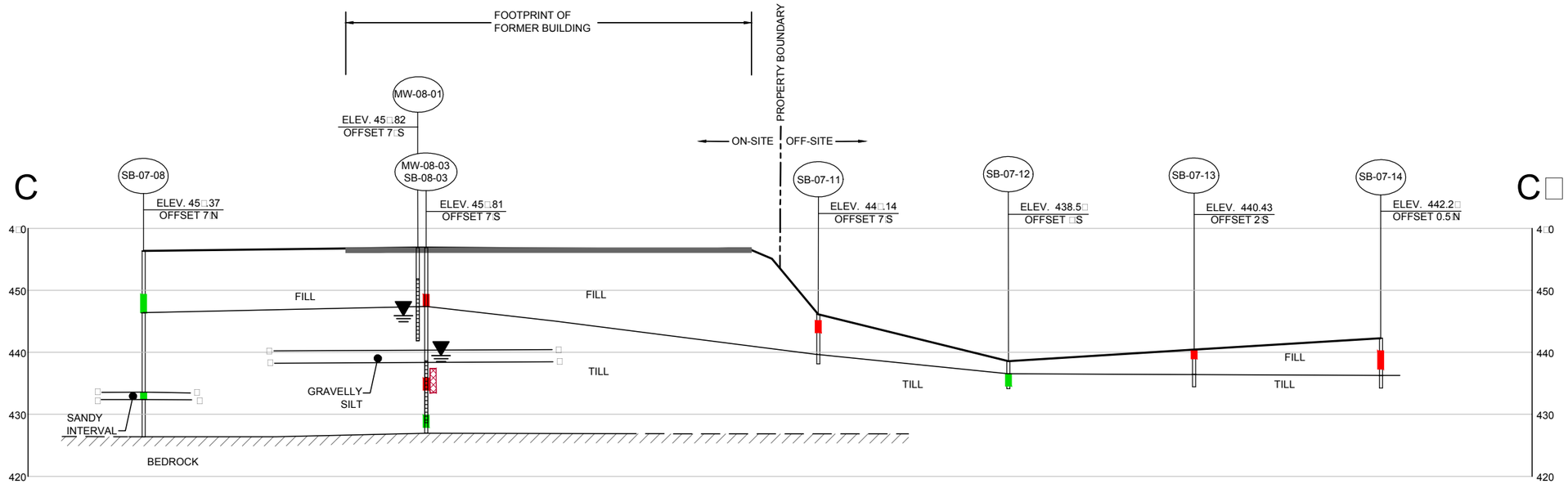
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

SUBSURFACE PROFILE B-B□

SCALE: AS SHOWN
APRIL 2013

FIGURE 5B

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS-2013\34507-020-0004-XSECS 2013-0405□DWG



LEGEND:

SB-07
-0□ SUBSURFACE EXPLORATION LOCATION

OFFSET
4.5□W OFFSET DISTANCE FROM SECTION LINE

CHANGE IN STRATIFICATION

WATER ELEVATION MEASURED 21 AUGUST 200□
BY HALEY □ ALDRICH, INC.

SCREENED LENGTH

INDICATES SOIL ANALYTICAL RESULTS EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SOIL CLEANUP OBJECTIVES □SCO□□

INDICATES SOIL ANALYTICAL RESULTS DO NOT EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SCO□

TAR-LIKE MATERIAL OBSERVED

NOTES:

1. REFER TO FIGURE 3 FOR LOCATION AND ORIENTATION OF SUBSURFACE PROFILES SHOWN ON FIGURES 5A THROUGH 5D.
2. LINES REPRESENTING CHANGES IN STRATA AREA BASED UPON INTERPOLATION BETWEEN PREVIOUS SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT LOCATIONS OTHER THAN SPECIFIC EXPLORATION LOCATIONS.
3. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIAL IS APPROXIMATE AND MAY BE GRADUAL.
4. THIS PROFILE WAS DEVELOPED BY INTERPOLATION BETWEEN WIDELY SPACED BORINGS. ONLY AT THE BORING LOCATIONS SHOULD IT BE CONSIDERED AS AN APPROXIMATELY ACCURATE REPRESENTATION AND THEN ONLY TO THE DEGREE IMPLIED BY THE NOTES ON THE BORING LOGS.

0 20 40
HORI□ONTAL AND VERTICAL SCALE IN FEET

HALEY & ALDRICH

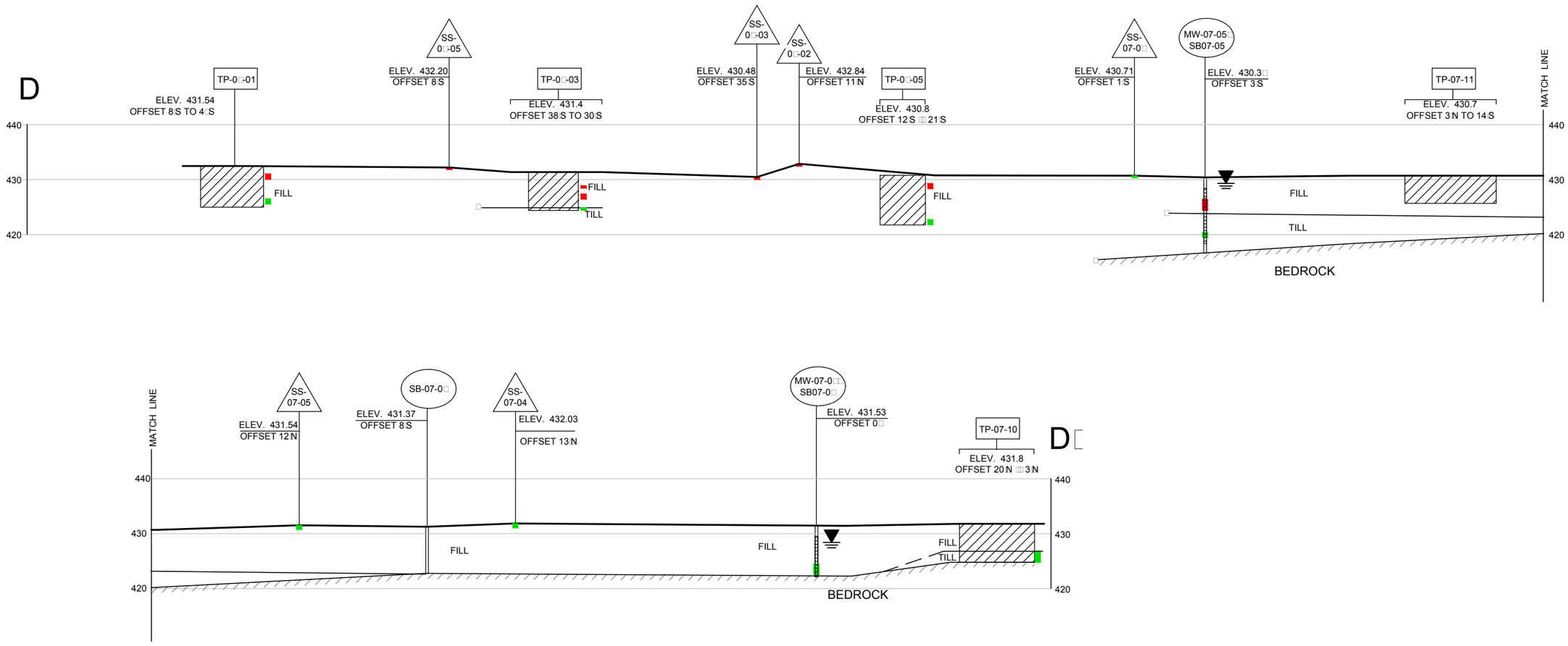
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

SUBSURFACE PROFILE C-C□

SCALE: AS SHOWN
APRIL 2013

FIGURE 5C

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS-2013\34507-020-0004-XSECS_2013-0405_□DWG



LEGEND:

SB-07 -0□ SUBSURFACE EXPLORATION LOCATION

OFFSET 4.5 □W OFFSET DISTANCE FROM SECTION LINE

CHANGE IN STRATIFICATION

WATER ELEVATION MEASURED 21 AUGUST 200□ BY HALEY □ ALDRICH, INC.

SCREENED LENGTH

INDICATES SOIL ANALYTICAL RESULTS EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SOIL CLEANUP OBJECTIVES □SCO□□

INDICATES SOIL ANALYTICAL RESULTS DO NOT EXCEED NYSDEC PART 375 RESTRICTED COMMERCIAL SCO□

TAR-LIKE MATERIAL OBSERVED

NOTES:

1. REFER TO FIGURE 3 FOR LOCATION AND ORIENTATION OF SUBSURFACE PROFILES SHOWN ON FIGURES 5A THROUGH 5D.
2. LINES REPRESENTING CHANGES IN STRATA AREA BASED UPON INTERPOLATION BETWEEN PREVIOUS SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT LOCATIONS OTHER THAN SPECIFIC EXPLORATION LOCATIONS.
3. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIAL IS APPROXIMATE AND MAY BE GRADUAL.
4. THIS PROFILE WAS DEVELOPED BY INTERPOLATION BETWEEN WIDELY SPACED BORINGS. ONLY AT THE BORING LOCATIONS SHOULD IT BE CONSIDERED AS AN APPROXIMATELY ACCURATE REPRESENTATION AND THEN ONLY TO THE DEGREE IMPLIED BY THE NOTES ON THE BORING LOGS.

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HORI□ONTAL AND VERTICAL SCALE IN FEET

HALEY & ALDRICH

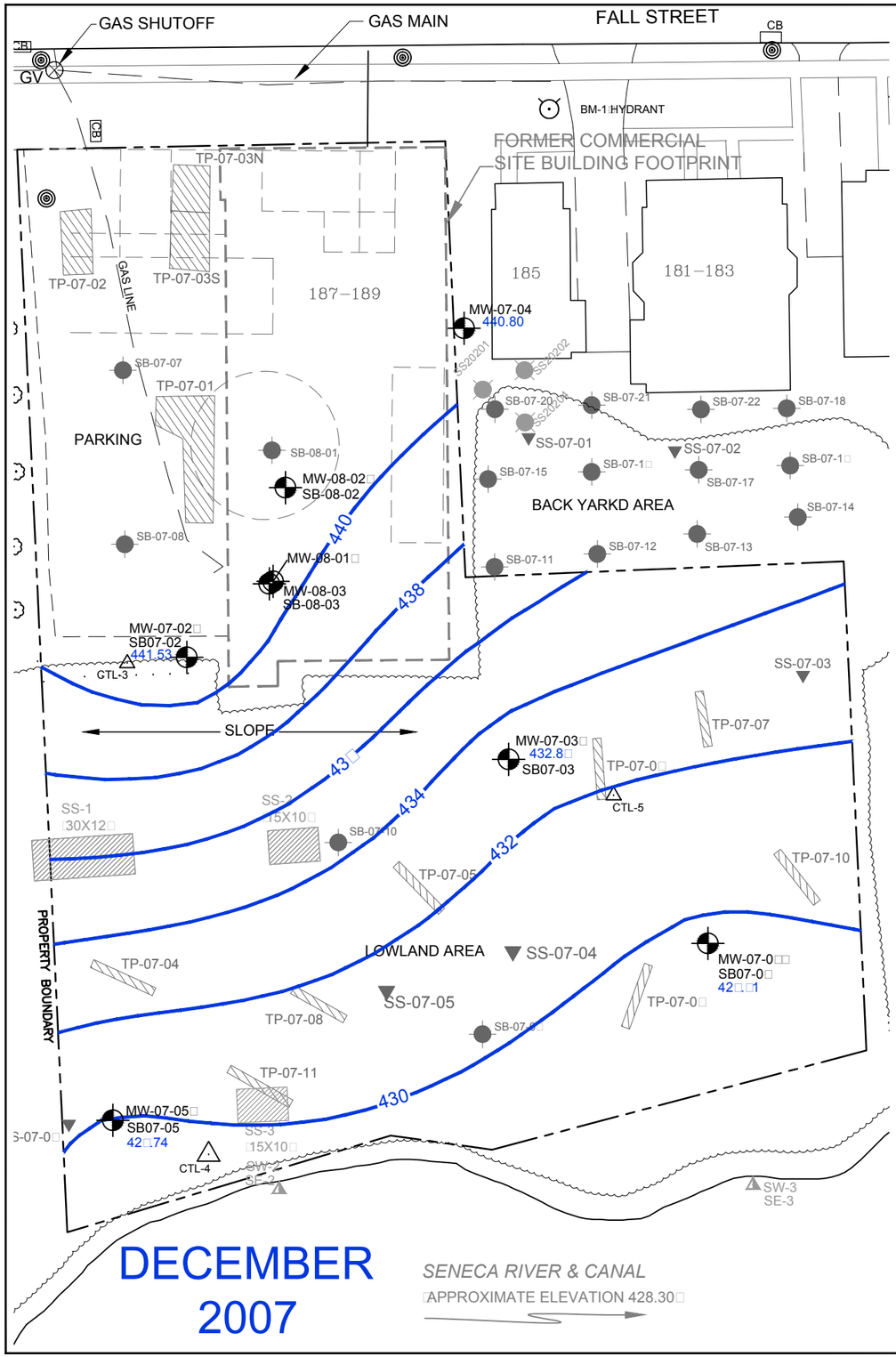
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

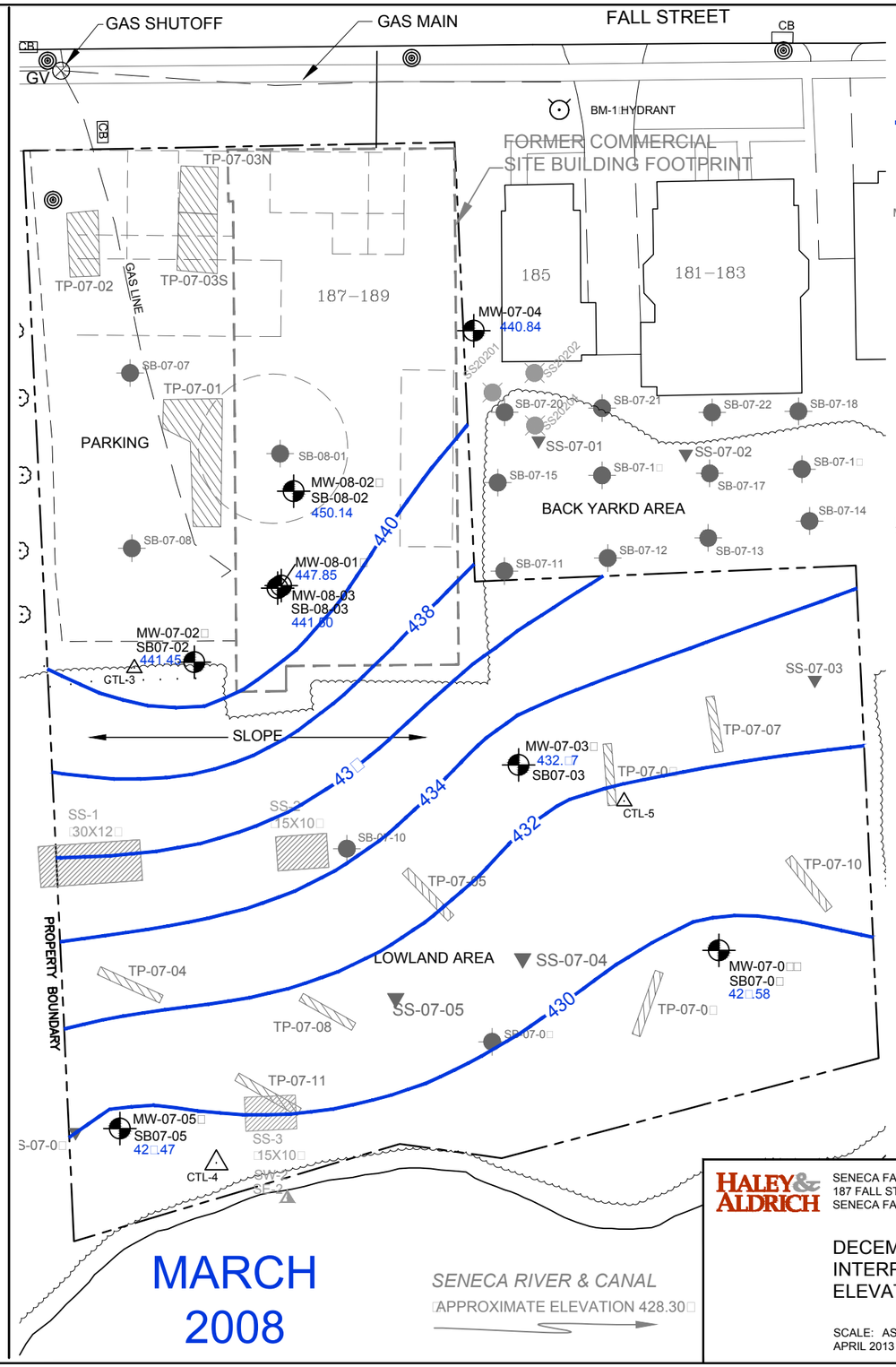
SUBSURFACE PROFILE D-D□

SCALE: AS SHOWN
APRIL 2013

FIGURE 5D

G:\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS-2013\34507-020-0004-XSECS_2013-0405_□DWG





LEGEND:

- 42 1 — GROUNDWATER ELEVATION (FT.) MEASURED ON 11 DECEMBER 2007 OR 31 MARCH 2008
- 430 — INTERPRETED GROUNDWATER ELEVATION CONTOUR (FT.) BASED DECEMBER 2007 OR MARCH 2008 GROUNDWATER MEASUREMENTS
- SB-07-0 — SOIL BORING (2007 AND 2008)
- MW-07-0 / SB07-0 — GROUNDWATER MONITORING WELL (2007 AND 2008)
- TP-07-07 — TEST PIT (2007)
- SS-07-03 — SURFACE SOIL SAMPLE LOCATION (2007)
- SS20204 — HISTORIC SURFACE SOIL SAMPLING LOCATION (2003)
- SS-2 (15X10) — HISTORIC SOIL SAMPLING AREA
- SW-2 / SE-2 — HISTORIC SURFACE WATER / SEDIMENT SAMPLING LOCATION

NOTES:

1. PERCHED GROUNDWATER ELEVATIONS FROM MW-08-01 AND MW-08-02 WERE NOT INCLUDED IN THE CONTOURING.

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SCALE IN FEET

HALEY & ALDRICH

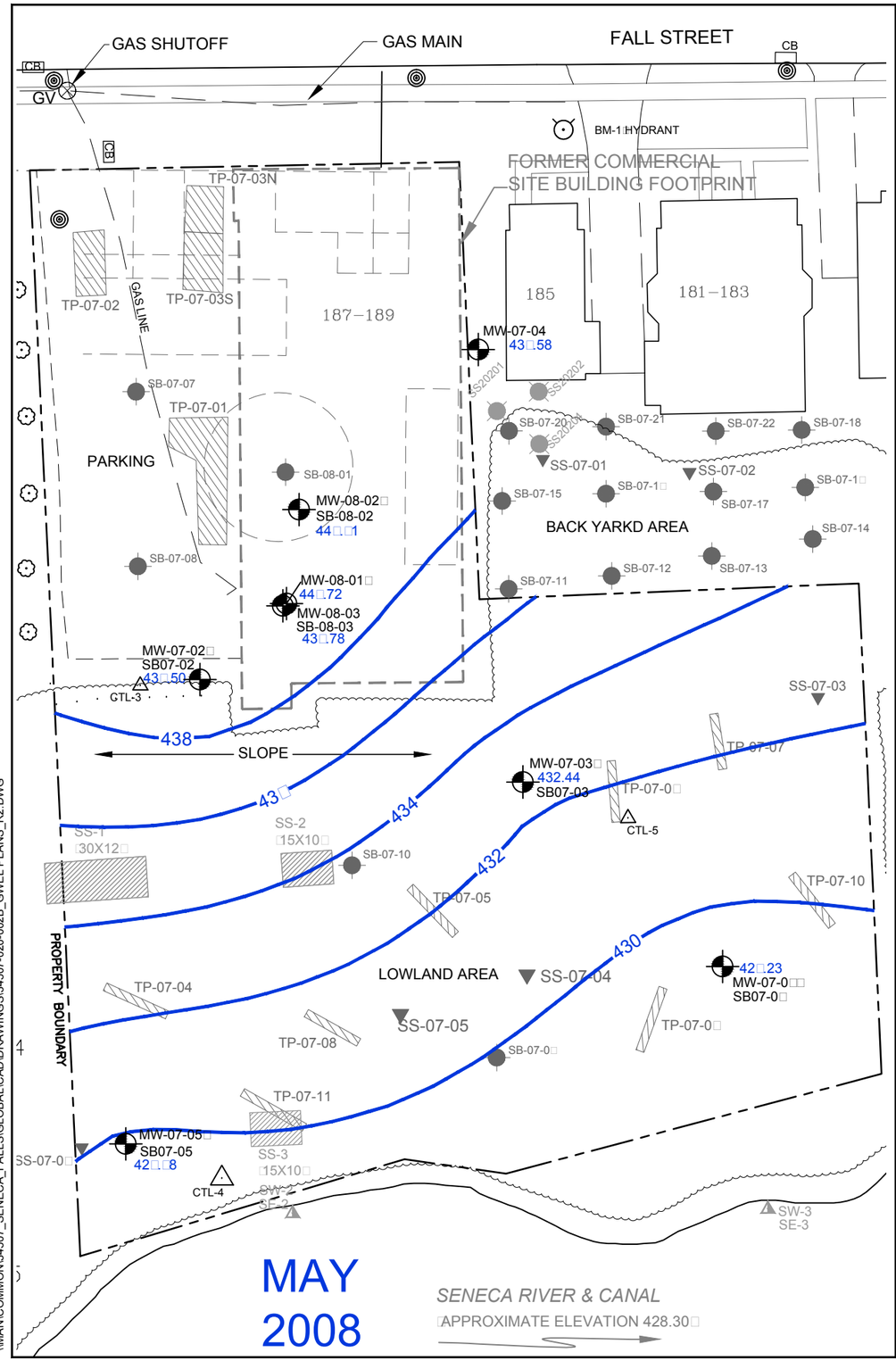
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

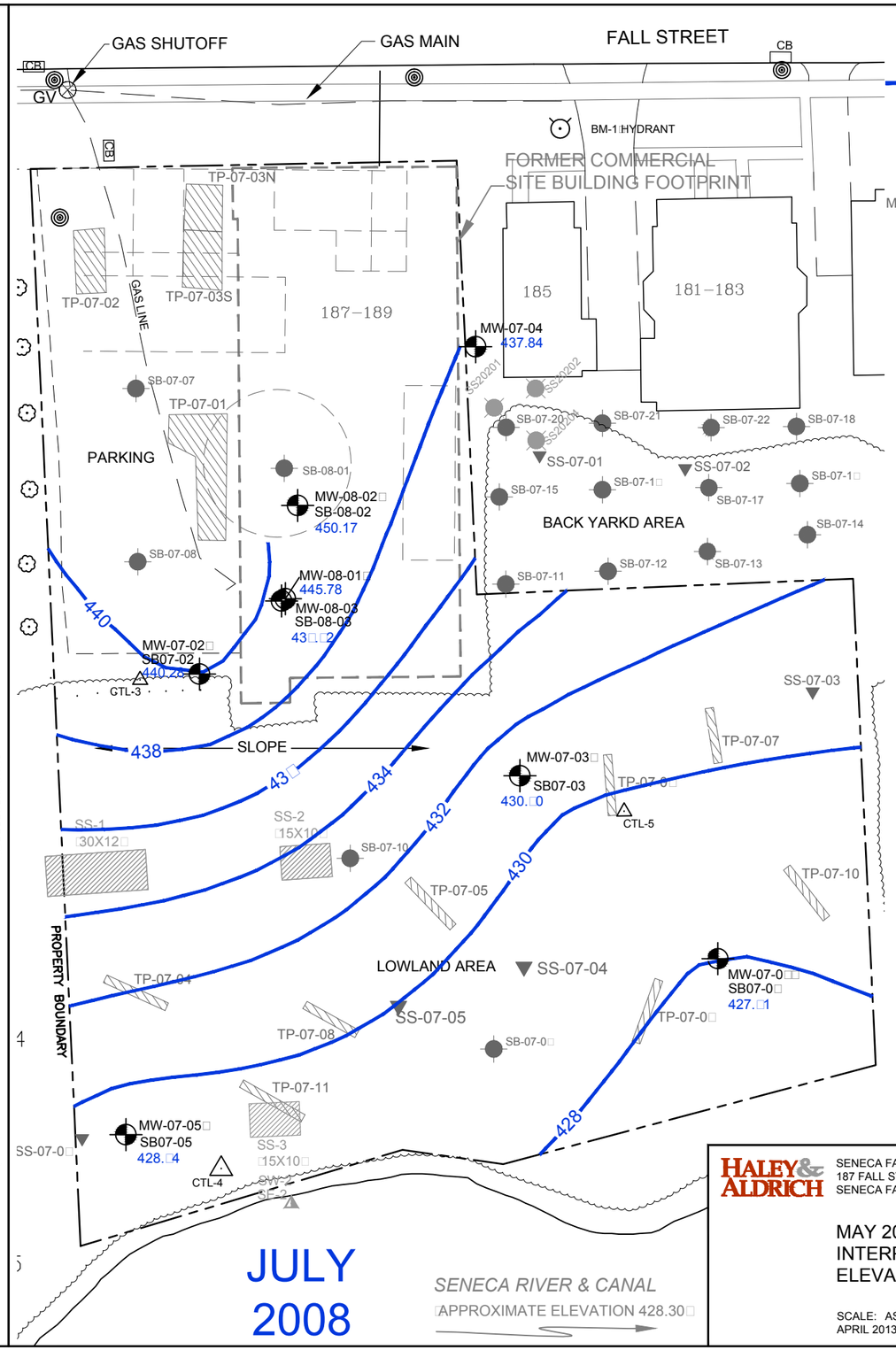
DECEMBER 2007 AND MARCH 2008
INTERPRETED GROUNDWATER
ELEVATION CONTOURS

SCALE: AS SHOWN
APRIL 2013

FIGURE

\\MANICOMMON\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-020-002B_GWEL PLANS_R2.DWG





LEGEND:

- 42□.23 — GROUNDWATER ELEVATION □FT.□ MEASURED ON 14 MAY 2008 OR 1 JULY 2008
- 430 — INTERPRETED GROUNDWATER ELEVATION CONTOUR □FT.□BASED ON MAY OR JULY 2008 GROUNDWATER MEASUREMENTS
- SB-07-0□ — SOIL BORING □2007 AND 2008□
- MW-07-0□□ / SB07-0□ — GROUNDWATER MONITORING WELL □2007 AND 2008□
- TP-07-07 — TEST PIT □2007□
- SS-07-03 — SURFACE SOIL SAMPLE LOCATION □2007□
- SS20204 — HISTORIC SURFACE SOIL SAMPLING LOCATION □2003□
- SS-2 □15X10□ — HISTORIC SOIL SAMPLING AREA □1□□0□
- SW-2 / SE-2 — HISTORIC SURFACE WATER □ SEDIMENT SAMPLING LOCATION □1□□0□

NOTES:

1. PERCHED GROUNDWATER ELEVATIONS FROM MW-08-01 AND MW-08-02 WERE NOT INCLUDED IN THE CONTOURING.

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SCALE IN FEET

HALEY & ALDRICH

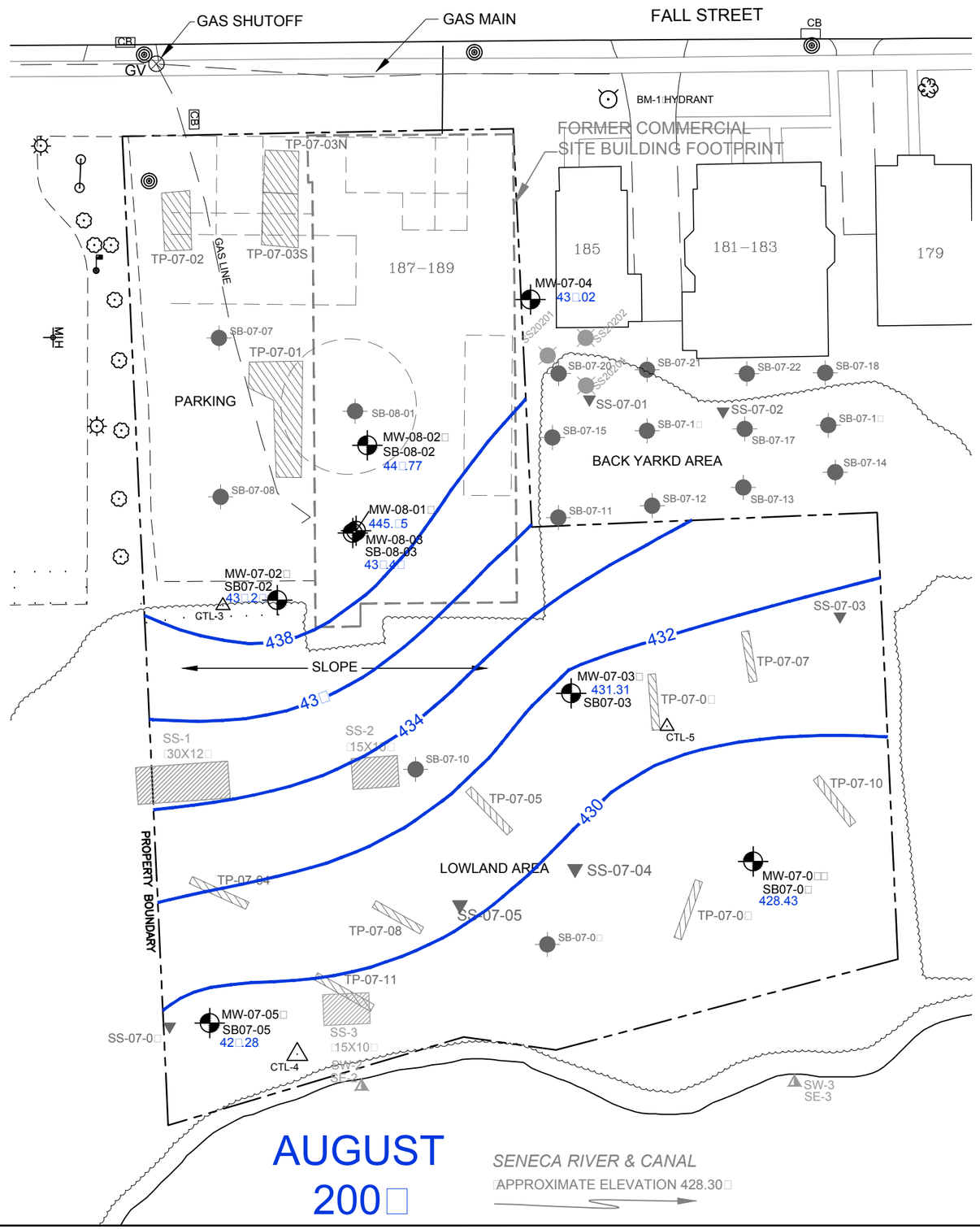
SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

MAY 2008 AND JULY 2008
INTERPRETED GROUNDWATER
ELEVATION CONTOURS

SCALE: AS SHOWN
APRIL 2013

FIGURE 7

\\MAN\COMMON\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-020-002B_GWEL PLANS_R2.DWG



LEGEND:

42□□23	GROUNDWATER ELEVATION □FT.□MEASURED ON 21 AUGUST 200□
430	INTERPRETED GROUNDWATER ELEVATION CONTOUR □FT.□ BASED ON 21 AUGUST 200□ GROUNDWATER MEASUREMENTS
SB-07-0□	SOIL BORING □2007 AND 2008□
MW-07-0□□ SB07-0□	GROUNDWATER MONITORING WELL □2007 AND 2008□
TP-07-07	TEST PIT □2007□
SS-07-03	SURFACE SOIL SAMPLE LOCATION □2007□
SS20204	HISTORIC SURFACE SOIL SAMPLING LOCATION □2003□
SS-2 □15X10□	HISTORIC SOIL SAMPLING AREA □1□□0□
SW-2 SE-2	HISTORIC SURFACE WATER □SEDIMENT SAMPLING LOCATION □1□□0□

NOTES:
1. PERCHED GROUNDWATER ELEVATIONS FROM MW-08-01 AND MW-08-02 WERE NOT INCLUDED IN THE CONTOURING.

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SCALE IN FEET

HALEY & ALDRICH

SENECA FALLS FORMER MGP
187 FALL STREET
SENECA FALLS, NEW YORK

AUGUST 200□
INTERPRETED GROUNDWATER ELEVATION CONTOURS

SCALE: AS SHOWN
APRIL 2013

FIGURE 8

\\MANICOMMON\34507_SENECA_FALLS\GLOBAL\CAD\DRAWINGS\34507-020-002B_GWEL PLANS_R2.DWG

APPENDIX B

Opinion of Probable Cost Spreadsheets

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Upland Area
Overall Scope Engineering Controls (Fencing)
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Site Preparation (Clearing/Grubbing/etc.)		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Chain Link Fencing (Material & Installation)		590	LF	$ 17.00	$ 10,030.00	JB Fence pros - fence & gate contractors (888)297-9563
Off-Site Disposal post hole spoils		100	ton	$ 75.00	$ 7,500.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 36,530.00	
Health & Safety - Level D	5%				$ 1,826.50	Engineering Judgement
Design and Permitting	15%				$ 5,479.50	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 5,479.50	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total					$ 49,315.50	
Operational & Maintenance Costs						
Verification of Engineering Controls and Notificatio		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 86,542.50**	

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Upland Area
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notifications to NYSDEC		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Upland Area
Overall Scope Capping
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Address Utility Poles on site		1	LS	$ 10,000.00	$ 10,000.00	
Demo Concrete Building Slab		973	SY	$ 12.30	$ 11,971.46	RS Means 6" thick with rebar
Off-Site Demo Debris Disposal		243	tons	$ 75.00	$ 18,249.17	
Site Grading/Regrading		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, limited grading needed
Geotextile Marker Barrier		2092	SY	$ 2.00	$ 4,184.47	To be installed beneath pavement; IPLEX 30% RD estimate, Mirafi
6" Gravel Subbase (Place & Compact)		2,092	SY	$ 5.87	$ 12,281.43	RS Means (placed & compacted)
Pavement 4" Base Course & 2" Surface Course		2,092	SY	$ 21.64	$ 45,276.01	RS Means ($13.73 4" base, $7.91 2" finish)
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 165,962.54	
Health & Safety - Level D	5%				$ -	
Design and Permitting	12%				$ 19,915.50	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 16,596.25	Engineering judgement, prior project experience
Contingency	15%				$ 24,894.38	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 227,368.68	

Operational & Maintenance Costs					
Verification of Institutional Controls and Notifications to NYSDEC	1	LS	$ 3,000.00	$ 3,000.00	
Pavement O&M	1	LS	$ 4,000.00	$ 4,000.00	
Subtotal O&M Costs				$ 7,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 86,863.00	

Rounded Total	**$ 314,231.68**

Assumptions

Upland Area = 18830
Concrete Slab thickness = 1 ft
Restoration = Pavement

1. Costs shown involve premium for construction through MGP-impacted wastes.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Upland Area
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Address Utility Poles on site	1	LS	$ 10,000.00	$ 10,000.00	
Excavation	2,232	tons	$ 35.00	$ 78,110.18	prior experience, IPLEX bids
Waste Characterization	4	sample	$ 1,000.00	$ 4,463.44	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	2,232	tons	$ 75.00	$ 167,378.96	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	223	ton	$ 90.00	$ 20,085.47	Engineering judgement, prior project experience
Geotextile Marker Barrier	2092	SY	$ 2.00	$ 4,184.47	To be installed beneath pavement; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)	1778	tons	$ 25.00	$ 44,460.04	
6" Gravel Subbase (Place & Compact)	2,092	SY	$ 5.87	$ 12,281.43	RS Means (placed & compacted)
Pavement 4" Base Course & 2" Surface Course	2,092	SY	$ 21.64	$ 45,276.01	RS Means ($13.73 4" base, $7.91 2" finish)
Air Monitoring	0	LS	$ 50,000.00	$ -	Engineering judgement, prior project experience
Odor Control	0	LS	$ 25,000.00	$ -	Engineering judgement, prior project experience
Dewatering and Treatment System	0	LS	$ 15,000.00	$ -	prior experience, IPLEX bids; assumes 10 days at $1,500 per day
Subtotal Capital Costs				$ 415,240.00	
Health & Safety - Level D 5%				$ 20,762.00	Engineering Judgement
Design and Permitting 12%				$ 49,828.80	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management 10%				$ 41,524.00	Engineering judgement, prior project experience
Contingency 15%				$ 62,286.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total				$ 589,640.80	
Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Pavement O&M	1	LS	$ 4,000.00	$ 4,000.00	
Subtotal O&M Costs				$ 7,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 86,863.00	
Rounded Total				**$ 676,503.80**	

Assumptions

Excav Dimensions (sq ft)= 18830
Excav Depth (ft) = 2
Restoration = Pavement

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Lowland Area
Overall Scope No Action
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Site Preparation (Clearing/Grubbing/etc.)		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Chain Link Fencing (Material & Installation)		860	LF	$ 17.00	$ 14,620.00	JB Fence pros - fence & gate contractors (888)297-9563
Off-Site Disposal post hole spoils		50	ton	$ 75.00	$ 3,750.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Subtotal					$ 37,370.00	
Health & Safety - Level D	5%				$ 1,868.50	Engineering Judgement
Design and Permitting	15%				$ 5,605.50	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 5,605.50	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total					$ 50,449.50	
Operational & Maintenance Costs						
Verification of Engineering Controls and Notificatio		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 87,676.50**	

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Lowland Area
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Lowland Area
Overall Scope No Action
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area		1	LS	$ 5,000.00	$ 5,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris		1	LS	$ 5,000.00	$ 5,000.00	
Site Grading/Regrading		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, slope grading necessary for capping
Geotextile Marker Barrier		1646	SY	$ 2.00	$ 3,291.56	To be installed beneath cap; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)		1399	tons	$ 25.00	$ 34,972.78	cost of material and placement
6" topsoil and vegetative cover		439	tons	$ 10.00	$ 4,388.74	Engineering judgement
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 141,653.07	
Health & Safety - Level D	5%				$ -	
Design and Permitting	12%				$ 16,998.37	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 14,165.31	Engineering judgement, prior project experience
Contingency	15%				$ 21,247.96	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 194,064.71	

Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Cap O&M (1 event annually)	1	ea	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs				$ 6,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 74,454.00	

Rounded Total	**$ 268,518.71**

Assumptions

Lowland Area = 14812 sq. ft = 0.34 acres
Cap materials = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Lowland Area
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area	1	LS	$ 10,000.00	$ 10,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris	1	LS	$ 5,000.00	$ 5,000.00	
Excavation	1,755	tons	$ 35.00	$ 61,442.37	prior experience,IPLEX bids
Waste Characterization	4	sample	$ 1,000.00	$ 3,510.99	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	1,755	tons	$ 75.00	$ 131,662.22	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	176	ton	$ 90.00	$ 15,799.47	Engineering judgement, prior project experience
Geotextile Marker Barrier	1646	SY	$ 2.00	$ 3,291.56	To be installed beneath pavement; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)	1399	tons	$ 25.00	$ 34,972.78	cost of material and placement
6" topsoil and vegetative cover	439	tons	$ 10.00	$ 4,388.74	Engineering judgement
Air Monitoring	0	LS	$ 50,000.00	$ -	Engineering judgement, prior project experience
Odor Control	0	LS	$ 25,000.00	$ -	Engineering judgement, prior project experience
Dewatering and Treatment System	0	LS	$ 15,000.00	$ -	prior experience, IPLEX bids; assumes 10 days at $1,500 per day
Subtotal Capital Costs				$ 299,068.13	
Health & Safety - Level D 5%				$ 14,953.41	Engineering Judgement
Design and Permitting 12%				$ 35,888.18	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management 10%				$ 29,906.81	Engineering judgement, prior project experience
Contingency 15%				$ 44,860.22	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total				$ 424,676.74	
Operational & Maintenance Costs					
Verification of Institutional Controls and Notifications to NYSDEC	0	LS	$ 3,000.00	$ -	
Subtotal O&M Costs				$ -	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ -	
Rounded Total				**$ 424,676.74**	

Assumptions

Excav Dimensions (sq ft)= 14812
Excav Depth (ft) = 2
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - 193 Fall St. Lowland Area
Overall Scope No Action
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Site Preparation (Clearing/Grubbing/etc.)		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Chain Link Fencing (Material & Installation)		180	LF	$ 17.00	$ 3,060.00	JB Fence pros - fence & gate contractors (888)297-9563
Off-Site Disposal post hole spoils		50	ton	$ 75.00	$ 3,750.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Subtotal					$ 25,810.00	
Health & Safety - Level D	5%				$ 1,290.50	Engineering Judgement
Design and Permitting	15%				$ 3,871.50	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 3,871.50	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total					$ 34,843.50	
Operational & Maintenance Costs						
Verification of Engineering Controls and Notificatio		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 72,070.50**	

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - 193 Fall St. Lowland Area
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - 193 Fall St. Lowland Area
Overall Scope No Action
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area		1	LS	$ 5,000.00	$ 5,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris		1	LS	$ 5,000.00	$ 5,000.00	
Site Grading/Regrading		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, slope grading necessary for capping
Geotextile Marker Barrier		751	SY	$ 2.00	$ 1,501.11	To be installed beneath cap; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)		638	tons	$ 25.00	$ 15,949.31	cost of material and placement
6" topsoil and vegetative cover		200	tons	$ 10.00	$ 2,001.48	Engineering judgement
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 118,451.90	
Health & Safety - Level D	5%				$ -	
Design and Permitting	12%				$ 14,214.23	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 11,845.19	Engineering judgement, prior project experience
Contingency	15%				$ 17,767.78	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 162,279.10	

Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Cap O&M (1 event annually)	1	ea	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs				$ 6,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 74,454.00	

Rounded Total	**$ 236,733.10**

Assumptions

193 Fall St Lowland Area = 6755 sq. ft = 0.34 acres
Cap materials = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - 193 Fall St. Lowland Area
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area	1	LS	$ 10,000.00	$ 10,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris	1	LS	$ 5,000.00	$ 5,000.00	
Excavation	801	tons	$ 35.00	$ 28,020.74	prior experience,IPLEX bids
Waste Characterization	2	sample	$ 1,000.00	$ 1,601.19	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	801	tons	$ 75.00	$ 60,044.44	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	80	ton	$ 90.00	$ 7,205.33	Engineering judgement, prior project experience
Geotextile Marker Barrier	751	SY	$ 2.00	$ 1,501.11	To be installed beneath pavement; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)	638	tons	$ 25.00	$ 15,949.31	cost of material and placement
6" topsoil and vegetative cover	200	tons	$ 10.00	$ 2,001.48	Engineering judgement
Air Monitoring	0	LS	$ 50,000.00	$ -	Engineering judgement, prior project experience
Odor Control	0	LS	$ 25,000.00	$ -	Engineering judgement, prior project experience
Dewatering and Treatment System	0	LS	$ 15,000.00	$ -	prior experience, IPLEX bids; assumes 10 days at $1,500 per day
Subtotal Capital Costs				$ 160,323.60	
Health & Safety - Level D 5%				$ 8,016.18	Engineering Judgement
Design and Permitting 12%				$ 19,238.83	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management 10%				$ 16,032.36	Engineering judgement, prior project experience
Contingency 15%				$ 24,048.54	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total				$ 227,659.51	
Operational & Maintenance Costs					
Verification of Institutional Controls and Notifications to NYSDEC	0	LS	$ 3,000.00	$ -	
Subtotal O&M Costs				$ -	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ -	
Rounded Total				**$ 227,659.51**	

Assumptions

Excav Dimensions (sq ft)= 6755
Excav Depth (ft) = 2
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Residential Property 185 West Fall St.
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Residential Property 185 West Fall St.
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Site Preparation (Clearing/Grubbing/etc.)		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Chain Link Fencing (Material & Installation)		350	LF	$ 17.00	$ 5,950.00	JB Fence pros - fence & gate contractors (888)297-9563
Off-Site Disposal post hole spoils		25	ton	$ 75.00	$ 1,875.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 26,825.00	
Health & Safety - Level D	5%				$ 1,341.25	Engineering Judgement
Design and Permitting	12%				$ 3,219.00	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 2,682.50	Engineering judgement, prior project experience
Contingency	15%				$ 4,023.75	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total					$ 38,091.50	
Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 75,318.50**	

Assumptions

Excav Dimensions (sq ft)= 3657
Excav Depth (ft) = 2
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.

Client NYSEG
Site Seneca Falls Former MGP
Area Surficial Soils (Upper 2 ft) - Residential Property 185 West Fall St.
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Residential property		1	LS	$ 2,000.00	$ 2,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris		1	LS	$ 1,000.00	$ 1,000.00	
Excavation		271	cy	$ 15.00	$ 4,063.33	prior experience, KY ISS bids
Waste Characterization		1	sample	$ 1,000.00	$ 1,386.95	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal		433	tons	$ 75.00	$ 32,506.67	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal		43	ton	$ 90.00	$ 3,900.80	Engineering judgement, prior project experience
Geotextile Marker Barrier		406	SY	$ 2.00	$ 812.67	To be installed beneath pavement; IPLEX 30% RD estimate, Mirafi
Restoration - common fill (Place & Compact)		345	tons	$ 25.00	$ 8,634.58	cost of material and placement
6" topsoil and vegetative cover		108	tons	$ 10.00	$ 1,083.56	Engineering judgement
Air Monitoring		0	LS	$ 50,000.00	$ -	Engineering judgement, prior project experience
Odor Control		0	LS	$ 25,000.00	$ -	Engineering judgement, prior project experience
Dewatering and Treatment System		0	LS	$ 15,000.00	$ -	prior experience, IPLEX bids; assumes 10 days at $1,500 per day
Subtotal Capital Costs					$ 84,388.56	
Health & Safety - Level D	5%				$ 4,219.43	Engineering Judgement
Design and Permitting	12%				$ 10,126.63	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 8,438.86	Engineering judgement, prior project experience
Contingency	15%				$ 12,658.28	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total					$ 119,831.75	
Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		0	LS	$ 3,000.00	$ -	
Subtotal O&M Costs					$ -	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ -	
Rounded Total					**$ 119,831.75**	

Assumptions

Excav Dimensions (sq ft)= 3657
Excav Depth (ft) = 2
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Upland Area
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Upland Area
Overall Scope In-Situ Solidification/Stabilization
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Bench-Scale Treatability Test		1	EA	$ 8,000.00	$ 8,000.00	recent KY ISS experience, -Timely's bench scale $7880 , MA experience (Aether LLC performed 3
Mobilization/Demobilization		1	LS	$ 60,000.00	$ 60,000.00	Engineering judgement, prior project experience
Site Preparation		1	LS	$ 65,000.00	$ 65,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Pre-excavation		2,344	cy	$ 15.00	$ 35,153.03	prior experience, KY ISS bids
Off-Site Soil Treatment/Disposal of Excess soil		3,750	tons	$ 75.00	$ 281,224.27	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
ISS		4,523	cy	$ 40.00	$ 180,919.06	Prior project experieince (KY ISS bids)
Treatment Agent		1	LS	$ 154,000.00	$ 154,000.00	prior experience, using 2013 KY bids ~ $34/cy ISS materials (Portland & GGBFS)
Debris Disposal		724	tons	$ 90.00	$ 65,130.86	Assumes 10%
12" Common fill (Place & Compact)		1,116	tons	$ 25.00	$ 27,896.49	cost of material and placement
6" Gravel Subbase (Place & Compact)		2,092	SY	$ 5.87	$ 12,281.43	RS Means (placed & compacted)
Pavement 4" Base Course & 2" Surface Course		2,092	SY	$ 21.64	$ 45,276.01	RS Means ($13.73 4" base, $7.91 2" finish)
Air Monitoring		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Subtotal					$ 1,063,881.16	
Health & Safety - Level D	5%				$ 53,194.06	Engineering Judgement
Design and Permitting	15%				$ 159,582.17	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 106,388.12	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 159,582.17	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 1,542,627.68	
Operational & Maintenance Costs						
Verification of Institutional Controls and Notifications to		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 1,579,854.68**	

Assumptions

Treatment area (SF)= 18830
Treatment Volume (cy)= 4523
Pre-excavation depth (ft) = 3-5 ft

1. Assumes Level D H&S level PPE
2. 10% debis encountered in excavation.
3. ISS depths per drawings
4. ISS via bucket mixing.

Assumed pre-exc depth (not calculated)

Area of 3 ft deep OB removal	15438
Area of 5 ft deep OB removal	3393

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Upland Area
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Address Utility Poles on site	1	LS	$ 10,000.00	$ 10,000.00	
Excavation	8,826	tons	$ 35.00	$ 308,904.22	prior experience, IPLEX bids
Waste Characterization	18	sample	$ 1,000.00	$ 17,651.67	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	8,826	tons	$ 75.00	$ 661,937.61	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	883	ton	$ 90.00	$ 79,432.51	Engineering judgement, prior project experience
Restoration - common fill (Place & Compact)	7,710	tons	$ 25.00	$ 192,749.38	
6" Gravel Subbase (Place & Compact)	0	SY	$ 5.87	$ -	*Upper 2 ft covered in SS costs - not included here*
Pavement 4" Base Course & 2" Surface Course	0	SY	$ 21.64	$ -	*Upper 2 ft covered in SS costs - not included here*
Air Monitoring	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Temporary Sheeting (N, E, W sides of excavation)	6,750	sq. ft	$ 30.00	$ 202,500.00	PZ-22 sheet pile used (same as in IPLEX Pond Outlet bid)
Dewatering and Treatment System	1	LS	$ 45,000.00	$ 45,000.00	prior experience, IPLEX bids; assumes 30 days at $1,500 per day
Subtotal Capital Costs				$ 1,647,175.39	
Health & Safety - Level D 5%				$ 82,358.77	Engineering Judgement
Design and Permitting 12%				$ 197,661.05	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management 10%				$ 164,717.54	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency 15%				$ 247,076.31	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 2,338,989.06	
Operational & Maintenance Costs					
Pavement O&M	0	LS	$ 4,000.00	$ -	*Included in SS costs - not included here*
Subtotal O&M Costs				$ -	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ -	
Rounded Total				**$ 2,338,989.06**	

Assumptions

Excav Dimensions (sq ft)= 18830
Excav Depth (ft) = varies 6-10 ft bgs
Restoration = Pavement

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.
3. Temporary earth support required on north, east and west sides of the upland excavation. Southern side will be open excavation down bank.
4. Assume 300 tons excavation per day.

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Lowland Area
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Lowland Area
Overall Scope In-Situ Solidification/Stabilization
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Bench-Scale Treatability Test		1	EA	$ 8,000.00	$ 8,000.00	recent KY ISS experience, Timely's bench scale $7880 , MA experience (Aether LLC performed 3
Mobilization/Demobilization		1	LS	$ 60,000.00	$ 60,000.00	Engineering judgement, prior project experience
Site Preparation		1	LS	$ 65,000.00	$ 65,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area		1	LS	$ 10,000.00	$ 10,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris		1	LS	$ 5,000.00	$ 5,000.00	
Pre-excavation		2,633	tons	$ 35.00	$ 92,163.56	prior experience, IPLEX bids
Off-Site Soil Treatment/Disposal of Excess soil		2,633	tons	$ 75.00	$ 197,493.33	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
ISS		2,588	cy	$ 40.00	$ 103,523.70	Prior project experieince (KY ISS bids)
Treatment Agent		1	LS	$ 125,000.00	$ 125,000.00	prior experience, using 2013 KY bids ~ $34/cy ISS materials (Portland & GGBFS)
Debris Disposal		414	tons	$ 90.00	$ 37,268.53	Assumes 10%
12" Common fill (Place & Compact)		878	tons	$ 25.00	$ 21,943.70	cost of material and placement
6" topsoil and vegetative cover		439	tons	$ 10.00	$ 4,388.74	Engineering judgement
Air Monitoring		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Subtotal					$ 858,781.57	
Health & Safety - Level D	5%				$ 42,939.08	Engineering Judgement
Design and Permitting	15%				$ 128,817.24	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 85,878.16	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 128,817.24	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 1,245,233.28	

Operational & Maintenance Costs					
Verification of Institutional Controls and Notifications to	1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs				$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 37,227.00	

Rounded Total	**$ 1,282,460.28**

Assumptions

Excav Dimensions (sq ft)= 14812
Treatment Volume (cy)= 2588
Pre-excavation depth (ft) = 3 Assumed pre-exc depth (not calculated)

1. Assumes Level D H&S level PPE
2. 10% debis encountered in excavation.
3. ISS depths per drawings

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft bgs) - Lowland Area
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area	0	LS	$ 5,000.00	$ -	*Only include if not included in the upper 2 ft option*
Off-Site Disposal of Clearing Debris	0	LS	$ 5,000.00	$ -	*Only include if not included in the upper 2 ft option*
Excavation	5,886	tons	$ 35.00	$ 206,013.63	prior experience, IPLEX bids
Waste Characterization	12	sample	$ 1,000.00	$ 11,772.21	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	5,886	tons	$ 75.00	$ 441,457.78	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	589	ton	$ 90.00	$ 52,974.93	Engineering judgement, prior project experience
Restoration - common fill (Place & Compact)	5,886	tons	$ 25.00	$ 147,152.59	*Only restore up to 2 ft below grade - Upper 2 ft covered in SS costs*
6" topsoil and vegetative cover	0	tons	$ 10.00	$ -	*Upper 2 ft covered in SS costs - not included here*
Air Monitoring	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Temporary Sheeting (2 complete excavations)	12,000	sq. ft	$ 30.00	$ 360,000.00	PZ-22 sheet pile used (same as in IPLEX Pond Outlet bid)
Dewatering and Treatment System	1	LS	$ 45,000.00	$ 45,000.00	prior experience, IPLEX bids; assumes 30 days at $1,500 per day
Subtotal Capital Costs				$ 1,393,371.14	
Health & Safety - Level D	5%			$ 69,668.56	Engineering Judgement
Design and Permitting	12%			$ 167,204.54	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%			$ 139,337.11	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%			$ 209,005.67	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 1,978,587.02	

Operational & Maintenance Costs

Subtotal O&M Costs	$	-
Percent Worth Factor (30 yrs @ 7%)		12.409
Total Present Worth O&M Cost	$	-

Rounded Total **$ 1,978,587.02**

Assumptions

Excav Dimensions (sq ft)= 14812
Excav Depth (ft) = varies 6-11 ft bgs
Excavation Volume (cy) = 3679
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.
3. Temporary earth support required on all sides of the lowland excavations.
4. Assume 300 tons excavation per day.

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft) - Residential Property 185 West Fall St.
Overall Scope Institutional Controls/Land Use Restrictions
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Land Use Restriction		1	LS	$ 10,000.00	$ 10,000.00	
Subtotal Capital Costs					$ 10,000.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting						Land Use Restriction
Construction Management	10%				$ -	
Contingency	15%				$ 1,500.00	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 11,500.00	

Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	

Rounded Total	**$ 48,727.00**

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft) - Residential Property 185 West Fall St.
Overall Scope In-Situ Solidification/Stabilization
Media Soil

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Bench-Scale Treatability Test		1	EA	$ 8,000.00	$ 8,000.00	recent KY ISS experience, Timely's bench scale $7880 , MA experience (Aether LLC performed 3 treatability tests at $2500/ea)
Mobilization/Demobilization		1	LS	$ 60,000.00	$ 60,000.00	Engineering judgement, prior project experience
Site Preparation		1	LS	$ 65,000.00	$ 65,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing		1	LS	$ 5,000.00	$ 5,000.00	prior experience, $10K/acre per recent NJ bid
Off-Site Disposal of Clearing Debris		1	LS	$ 1,000.00	$ 1,000.00	
Pre-excavation		433	tons	$ 35.00	$ 15,169.78	previous experience,IPLEX bids
Off-Site Soil Treatment/Disposal of Excess soil		433	tons	$ 75.00	$ 32,506.67	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
ISS		379	cy	$ 40.00	$ 15,168.89	Prior project experieince (KY ISS bids)
Treatment Agent		1	LS	$ 15,000.00	$ 15,000.00	prior experience, using 2013 KY bids ~ $34/cy ISS materials (Portland & GGBFS)
Debris Disposal		61	tons	$ 90.00	$ 5,460.80	Assumes 10%
12" Common fill (Place & Compact)		217	tons	$ 25.00	$ 5,417.78	cost of material and placement
6" topsoil and vegetative cover		108	tons	$ 10.00	$ 1,083.56	*Upper 2 ft covered in SS costs - not included here*
Air Monitoring		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Site Restoration		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Subtotal					$ 357,807.47	
Health & Safety - Level D	5%				$ 17,890.37	Engineering Judgement
Design and Permitting	15%				$ 53,671.12	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 35,780.75	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 53,671.12	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 518,820.83	
Operational & Maintenance Costs						
Verification of Institutional Controls and Notifications to		1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs					$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 37,227.00	
Rounded Total					**$ 556,047.83**	

Assumptions

Excav Dimensions (sq ft)= 3657
Treatment Volume (cy)= 379
Pre-excavation depth (ft) = 2 Assumed pre-exc depth (not calculated)

1. Assumes Level D H&S level PPE
2. 10% debis encountered in excavation.
3. ISS depths per drawings

Client NYSEG
Site Seneca Falls Former MGP
Area Subsurface Soils (Greater than 2 ft) - Residential Property 185 West Fall St.
Overall Scope Excavation & Off-Site Treatment/Disposal
Media Soil

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	2	day	$ 2,000.00	$ 4,000.00	2-day field survey with office support; engineering judgement
Clearing & Grubbing Lowland Area	0	LS	$ 5,000.00	$ -	*Only include if not included in the upper 2 ft option*
Off-Site Disposal of Clearing Debris	0	LS	$ 1,000.00	$ -	*Only include if not included in the upper 2 ft option*
Excavation	379	cy	$ 15.00	$ 5,688.33	prior experience, KY ISS bids
Waste Characterization	2	sample	$ 1,000.00	$ 1,941.62	prior experience, ALPHA 2013 rates
Off-Site Soil Treatment/Disposal	607	tons	$ 75.00	$ 45,506.67	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Debris Disposal	38	ton	$ 90.00	$ 3,413.00	Engineering judgement, prior project experience
Restoration - common fill (Place & Compact)	607	tons	$ 25.00	$ 15,168.89	*Only restore up to 2 ft below grade - Upper 2 ft covered in SS costs*
6" topsoil and vegetative cover	0	tons	$ 10.00	$ -	*Upper 2 ft covered in SS costs - not included here*
Air Monitoring	0	LS	$ 50,000.00	$ -	*Only include if not included in the upper 2 ft option*
Odor Control	0	LS	$ 25,000.00	$ -	*Only include if not included in the upper 2 ft option*
Temporary Sheeting (2 complete excavations)	0	sq. ft	$ 30.00	$ -	PZ-22 sheet pile used (same as in IPLEX Pond Outlet bid)
Dewatering and Treatment System	0	LS	$ 45,000.00	$ -	prior project experience, IPLEX bids; assumes 30 days at $1,500 per day
Subtotal Capital Costs				$ 125,718.51	
Health & Safety - Level D	5%			$ 6,285.93	Engineering Judgement
Design and Permitting	12%			$ 15,086.22	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%			$ 12,571.85	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%			$ 18,857.78	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 178,520.28	

Operational & Maintenance Costs

Subtotal O&M Costs	$	-
Percent Worth Factor (30 yrs @ 7%)		12.409
Total Present Worth O&M Cost	$	-

Rounded Total	**$**	**178,520.28**

Assumptions

Excav Dimensions (sq ft)= 3657
Excav Depth (ft) = varies 3-6.5 ft bgs
Excavation Volume (cy) = 379
Restoration = 2 ft soil cover

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. 10% debis encountered in excavation.
3.No temporary earth support required .
4. Assume 300 tons excavation per day.

Client NYSEG
Site Seneca Falls Former MGP
Area Groudwater - Upland
Overall Scope Monitored Natural Attenuation
Media Groundwater

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Groundwater Management Permit Application		1	LS	$ 15,000.00	$ 15,000.00	Engineering judgement, prior project experience
Replace/Install Wells		0	LS		$ -	
Subtotal Capital Costs					$ 15,000.00	
Health & Safety - Level D	5%				$ -	Engineering Judgement
Design and Permitting	12%				$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 2,250.00	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 17,250.00	
Operational & Maintenance Costs						
Verification of Institutional Controls and Notificatic		1	LS	$ 3,000.00	$ 3,000.00	
Labor(2 sample events per year)		28	HR	$ 100.00	$ 2,800.00	Engineering judgement (per event, one10-hr day on site, 2 hrs prep, 2 hrs travel)
Misc. Sampling Equipment		2	Event	$ 200.00	$ 400.00	Engineering judgement
Analytical costs (2 events, 4 wells, VOC & PAH)		8	Sample	$ 241.20	$ 1,929.60	Alpha 2013 Pricing
Annual report		1	EA	$ 7,500.00	$ 7,500.00	Engineering judgement
Subtotal O&M Costs					$ 15,629.60	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 193,947.71	
Rounded Total					**$ 211,197.71**	

Assumptions

No. Sample Events/Yr = 2
No. Samples/Event = 4
No. Samples/Day = 4
No. Days/Event = 1
Analytical Costs Include = **$ 241.20**
VOCs by 8260 $ 118.00
SVOCs by 8270 (PA $ 123.20

1. Existing wells suitable and sufficient for groundwater monitoring

Client NYSEG
Site Seneca Falls Former MGP
Area Groudwater - Upland
Overall Scope Monitored Natural Attenuation
Media Groundwater

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Groundwater Management Permit Application	1	LS	$ 15,000.00	$ 15,000.00	Engineering judgement, prior project experience
Decommission 5 Existing MWs (~130 LF)	1	LS	$ 4,100.00	$ 4,100.00	Assume 2 days at $1400 per day and $10/LF
Drilling Day Rate	4	Day	$ 1,400.00	$ 5,600.00	Prior project experience
Observation Wells (4 @ 30 ft)	120	LF	$ 10.00	$ 1,200.00	Prior project experience
Well road boxes	4	EA	$ 100.00	$ 400.00	Prior project experience
Off-Site Soil Treatment/Disposal of Drill Spoils	4	tons	$ 75.00	$ 309.38	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Subtotal Capital Costs				$ 26,609.38	
Health & Safety - Level D	5%			$ -	Engineering Judgement
Design and Permitting	12%			$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%			$ -	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%			$ 3,991.41	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 30,600.78	
Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Labor(2 sample events per year)	28	HR	$ 100.00	$ 2,800.00	Engineering judgement (per event, one10-hr day on site, 2 hrs prep, 2 hrs travel)
Misc. Sampling Equipment	2	Event	$ 200.00	$ 400.00	Engineering judgement
Analytical costs (2 events, 4 wells, VOC & PAH)	8	Sample	$ 241.20	$ 1,929.60	Alpha 2013 Pricing
Annual report	1	EA	$ 7,500.00	$ 7,500.00	Engineering judgement
Subtotal O&M Costs				$ 15,629.60	
Percent Worth Factor (15 yrs @ 7%)				9.108	
Total Present Worth O&M Cost				$ 142,354.40	
Rounded Total				**$ 172,955.18**	

Assumptions

No. Sample Events/Yr = 2
No. Samples/Event = 4
No. Samples/Day = 4
No. Days/Event = 1
Analytical Costs Include = **$ 241.20**
VOCs by 8260 $ 118.00
SVOCs by 8270 (PA $ 123.20

1. Decommission existing monitoring wells.
2. Install 4 post-remediaiton monitoring wells suitable and sufficient for groundwater monitoring

Client NYSEG
Site Seneca Falls Former MGP
Area Upland Groundwater
Overall Scope Enhanced Bioremediation
Media Groundwater

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Groundwater Management Permit Application	1	LS	$ 15,000.00	$ 15,000.00	2-day field survey with office support; engineering judgement
Decommission 5 Existing MWs (~130 LF)	1	LS	$ 4,100.00	$ 4,100.00	Assume 2 days at $1400 per day and $10/LF
Drilling Day Rate	4	Day	$ 1,400.00	$ 5,600.00	Prior project experience
Observation Wells (4 @ 30 ft)	120	LF	$ 10.00	$ 1,200.00	Prior project experience
Well road boxes	4	EA	$ 100.00	$ 400.00	Prior project experience
ORC Application	4,000	lbs	$ 15.00	$ 60,000.00	Prior project experience
Off-Site Soil Treatment/Disposal of Drill Spoils	4	tons	$ 75.00	$ 309.38	Typical T&D for off-site fixed facility thermal desorption (MA & NJ)
Pilot Test	0	LS	$ 50,000.00	$ -	Engineering judgement, prior project experience
Subtotal Capital Costs				$ 111,609.38	
Health & Safety - Level D	5%			$ 5,580.47	Engineering Judgement
Design and Permitting	12%			$ 13,393.13	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%			$ 11,160.94	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%			$ 16,741.41	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 158,485.31	

Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Labor(2 sample events per year)	28	HR	$ 100.00	$ 2,800.00	Engineering judgement (per event, one10-hr day on site, 2 hrs prep, 2 hrs travel)
Misc. Sampling Equipment	2	Event	$ 200.00	$ 400.00	Engineering judgement
Analytical costs (2 events, 4 wells, VOC & PAH)	8	Sample	$ 241.20	$ 1,929.60	Alpha 2013 Pricing
Annual report	1	EA	$ 7,500.00	$ 7,500.00	Engineering judgement
Subtotal O&M Costs				$ 12,629.60	
Percent Worth Factor (10 yrs @ 7%)				7.024	
Total Present Worth O&M Cost				$ 88,705.03	

Rounded Total	**$ 247,190.34**

Assumptions

1. Costs shown involve premium for construction through MGP-impacted wastes.
2. One time application of ORC in excavation prior to backfill
3. Two GW monitoring events per year for VOC & PAH

Analytical Costs Include = **$ 241.20**
VOCs by 8260 $ 118.00
SVOCs by 8270 (PA $ 123.20

Client NYSEG
Site Seneca Falls Former MGP
Area Upland Groundwater
Overall Scope Temporary Pump & Treat During Excavation
Media Groundwater

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 12,000.00	$ 12,000.00	Recent PA project actual cost September 2012
Temporary 4" Pumping Wells	5	EA	$ 300.00	$ 1,500.00	Engineering judgement, prior project experience
Dewatering & Onsite Treatemnt	1	LS	$ 15,000.00	$ 15,000.00	Recent PA project actual cost September 2012
Oil Water Separator	1	EA	$ 20,800.00	$ 20,800.00	0.5 cubic ft/sec $20,800 Complete unit with no Excavation and backfill (RS Means 2008)
Discharge Piping to Sewer	150	LF	$ 10.00	$ 1,500.00	
POTW Discharge	100,000	gal	$ 0.20	$ 20,000.00	Recent PA project actual cost September 2012
Subtotal Capital Costs				$ 70,800.00	
Health & Safety - Level D 5%				$ 3,540.00	Engineering Judgement
Design and Permitting 12%				$ 8,496.00	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management 10%				$ 7,080.00	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency 15%				$ 10,620.00	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 100,536.00	
Operational & Maintenance Costs					
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00	
Subtotal O&M Costs				$ 3,000.00	
Percent Worth Factor (30 yrs @ 7%)				12.409	
Total Present Worth O&M Cost				$ 37,227.00	
Rounded Total				**$ 137,763.00**	

Assumptions

1. Only temporary P&T during full scale excavation costed.

1. Sewer tie-in within 150 ft of equipment.
2. Only upland area treated.
3. The dewatering and onsite treatment lump sum cost includes equipment mobilization/demobiliation. The onsite treatment system lump sum also includes a 4"submersable pump, two 20,000 gal frac tanks, two bag filtration vessels (including bags), activated carbon filtration system (including carbon), and Header piping.

Client NYSEG
Site Seneca Falls Former MGP
Area Sediment
Overall Scope Install Signs
Media Sediment

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 5,000.00	$ 5,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		1	LS	$ 6,000.00	$ 6,000.00	Engineering judgement, prior project experience
Sign		5	EA	$ 47.00	$ 235.00	SafetySigns.com 18x24" engineering grade reflective aluminium
Sign Installation (barge)		1	LS	$ 5,000.00	$ 5,000.00	engineering judgement
Subtotal Capital Costs					$ 16,235.00	
Health & Safety - Level D	5%				$ -	
Design and Permitting	12%				$ 1,948.20	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 1,623.50	Engineering judgement, prior project experience
Contingency	15%				$ 2,435.25	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 22,241.95	

Operational & Maintenance Costs						
Sign Relacement		1	ea	$ 2,000.00	$ 2,000.00	
Subtotal O&M Costs					$ 2,000.00	
Percent Worth Factor (30 yrs @ 7%)					12.409	
Total Present Worth O&M Cost					$ 24,818.00	

Rounded Total	**$ 47,059.95**

Assumptions

1. Assume no sediment removal. Install signes from barge.
2. Approximately 1 sign replaced on annual basis to account for vandalism.

Client NYSEG
Site Seneca Falls Former MGP
Area Sediment
Overall Scope Cap Visually Impacted Sediment
Media Sediment

Captial Cost Items	Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization	1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Construction Layout Surveying	1	LS	$ 25,000.00	$ 25,000.00	Recent Remediation Costing; engineering judgement
Organo Clay Mat (material & placement)	13259	SF	$ 25.00	$ 331,475.00	CETCO (Matt Geary - 267-885-5653)
1 ft Sand Borrow Cover (Material & Placement)	786	tons	$ 75.00	$ 58,928.89	prior project bids, Ripley, MI
Surface Water Boom	400	LF	$ 40.00	$ 16,000.00	$40/LF prior project experience, Ripley, MI
Single Silt Curtain	400	LF	$ 125.00	$ 50,000.00	$125/LF prior project experience, Ripley, MI
Subtotal Capital Costs				$ 531,403.89	
Health & Safety - Level D	5%			$ -	
Design and Permitting	12%			$ 63,768.47	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%			$ 53,140.39	Engineering judgement, prior project experience
Contingency	15%			$ 79,710.58	Low end of excavation contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost				$ 728,023.33	

Operational & Maintenance Costs				
Verification of Institutional Controls and Notificatic	1	LS	$ 3,000.00	$ 3,000.00
Annual Cap Observation (1 event/yr)	1	ea	$ 5,000.00	$ 5,000.00
Cap Maintenance (1/4 area repair every 5 yr)	0.2	ea	$ 82,868.75	$ 16,573.75
Subtotal O&M Costs				$ 24,573.75
Percent Worth Factor (30 yrs @ 7%)				12.409
Total Present Worth O&M Cost				$ 304,935.66

Rounded Total	**$ 1,032,958.99**

Assumptions

Cap Dimensions (sq ft)= 13259
Cap Material= Organo Clay Reactive Core Mat

1. Assume no sediment removal. Cap in place.
2. Cap O&M to include diver observations anually and1/4 of mat area repaired every 5 years, as necessary.

Client NYSEG
Site Seneca Falls Former MGP
Area Sediment
Overall Scope Dredge Visually Impacted Sediment for Off-Site Disposal
Media Sediment

Captial Cost Items		Quantity	Unit	Unit Cost	Total Cost	Source
Mobilization/Demobilization		1	LS	$ 75,000.00	$ 75,000.00	Engineering judgement, prior project experience
Permitting Services/Regulatory Requirements		1	LS	$ 35,000.00	$ 35,000.00	Engineering judgement, prior project experience
Construction Layout Surveying		2	day	$ 25,000.00	$ 50,000.00	NiSource Costing; engineering judgement
Dredge Impacted Sediments & Transport to Shore		2,189	cy	$ 45.00	$ 98,498.33	prior project bids, Ripley, MI
Waste Characterization		11	sample	$ 1,000.00	$ 10,506.49	prior experience, ALPHA 2013 rates
Dewatering Pad		1	LS	$ 100,000.00	$ 100,000.00	prior project bids, Ripley, MI- scaled down; engineering judgement
Manage, Condition & Load Impacted Sediments		2,189	cy	$ 8.00	$ 17,510.81	prior project bids, Ripley, MI
Off-Site Soil Treatment/Disposal		3,283	tons	$ 80.00	$ 262,662.22	prior project bids, Ripley, MI
Surface Water Boom		400	LF	$ 40.00	$ 16,000.00	$40/LF prior project experience, Ripley, MI
Double Silt Curtain		400	LF	$ 250.00	$ 100,000.00	$250/LF prior project experience, Ripley, MI
Debris Disposal		328	ton	$ 90.00	$ 29,549.50	Engineering judgement, prior project experience
Backfill -Sand Borrow (Material & Placement)		2,801	tons	$ 75.00	$ 210,100.00	prior project bids, Ripley, MI
Backfill - Rip Rap (Material & Placement)		491	CY	$ 100.00	$ 49,107.41	prior project bids, Ripley, MI
Air Monitoring		1	LS	$ 50,000.00	$ 50,000.00	Engineering judgement, prior project experience
Odor Control		1	LS	$ 25,000.00	$ 25,000.00	Engineering judgement, prior project experience
Subtotal Capital Costs					$ 1,128,934.77	
Health & Safety - Level D	5%				$ 56,446.74	Engineering Judgement
Design and Permitting	12%				$ 135,472.17	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Construction Management	10%				$ 112,893.48	EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-0002, Exhibit 5-8, Remedial Design
Contingency	15%				$ 169,340.22	Low end of vertical barrier contingency. EPA/ACOE FS Cost Guide July 2000, EPA 540-R-00-002, Exhibit 5-6
Total Capital Cost					$ 1,603,087.37	

Operational & Maintenance Costs

Subtotal O&M Costs	$ -
Percent Worth Factor (30 yrs @ 7%)	12.409
Total Present Worth O&M Cost	$ -

Rounded Total **$ 1,603,087.37**

Assumptions

Dredge Area Dimensions (sq ft) 13259
Excav Depth (ft) = varies 0.5-5.5 ft
Dredge Volume (cy) = 2189
Restoration = 1 ft 4-8 inch rip rap over common borrow

1. Surface water boom and silt curtain costs include installation, maintenance, monitoring, removal and disposal
2. 10% debis encountered in excavation.

Cost Estimates for the following Options

			Tab	Total Capital Costs	Annual O&M Costs	Present Worth of O&M	Total Cost
Surficial Soil (Upper 2 ft)	Upland	No Action	--	$ -	$ -	$ -	$ -
		Engineering Controls (Fencing)	SS-U-Fence	$ 49,315.50	$ 3,000.00	$ 37,227.00	$ 86,542.50
		Institutional Control/Land Use Restriction	SS-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		Capping	SS-U-Cap	$ 227,368.68	$ 7,000.00	$ 86,863.00	$ 314,231.68
		Excavation/Off-Site Disposal	SS-U-Exc	$ 589,640.80	$ 7,000.00	$ 86,863.00	$ 676,503.80
	Lowland	No Action	--	$ -	$ -	$ -	$ -
		Engineering Controls (Fencing)	SS-L-Fence	$ 50,449.50	$ 3,000.00	$ 37,227.00	$ 87,676.50
		Institutional Control/Land Use Restriction	SS-L-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		Capping	SS-L-Cap	$ 194,064.71	$ 6,000.00	$ 74,454.00	$ 268,518.71
		Excavation/Off-Site Disposal	SS-L-Exc	$ 424,676.74	$ -	$ -	$ 424,676.74
	193 Fall Street Lowland	No Action	--	$ -	$ -	$ -	$ -
		Institutional Control/Land Use Restriction	SS-F-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		Engineering Controls (Fencing)	SS-F-Fence	$ 34,843.50	$ 3,000.00	$ 37,227.00	$ 72,070.50
		Capping	SS-F-Cap	$ 162,279.10	$ 6,000.00	$ 74,454.00	$ 236,733.10
		Excavation/Off-Site Disposal	SS-F-Exc	$ 227,659.51	$ -	$ -	$ 227,659.51
	185 West Fall Street	No Action	--	$ -	$ -	$ -	$ -
		Institutional Control/Land Use Restriction	SS-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		Engineering Controls (Fencing)	SS-R-Fence	$ 38,091.50	$ 3,000.00	$ 37,227.00	$ 75,318.50
		Excavation/Off-Site Disposal	SS-R-Exc	$ 119,831.75	$ -	$ -	$ 119,831.75
Subsurface Soil (greater than 2 ft)	Upland	No Action	--	$ -	$ -	$ -	$ -
		Institutional Control/Land Use Restriction	S-U-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		In-Situ Solidification	S-U-ISS	$ 1,542,627.68	$ 3,000.00	$ 37,227.00	$ 1,579,854.68
		Excavation/Off-Site Disposal	S-U-Exc	$ 2,338,989.06	$ -	$ -	$ 2,338,989.06
	Lowland	No Action	--	$ -	$ -	$ -	$ -
		Institutional Control/Land Use Restriction	S-L-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		In-Situ Solidification	S-L-ISS	$ 1,245,233.28	$ 3,000.00	$ 37,227.00	$ 1,282,460.28
		Excavation/Off-Site Disposal	S-L-Exc	$ 1,978,587.02	$ -	$ -	$ 1,978,587.02
	185 West Fall Street	No Action	--	$ -	$ -	$ -	$ -
		Institutional Control/Land Use Restriction	S-R-LUR	$ 11,500.00	$ 3,000.00	$ 37,227.00	$ 48,727.00
		In-Situ Solidification	S-R-ISS	$ 518,820.83	$ 3,000.00	$ 37,227.00	$ 556,047.83
		Excavation/Off-Site Disposal	S-R-Exc	$ 178,520.28	$ -	$ -	$ 178,520.28
Groundwater	Upland	No Action	--	$ -	$ -	$ -	$ -
		MNA with existing monitoring wells	GW-MNA	$ 17,250.00	$ 15,629.60	$ 193,947.71	$ 211,197.71
		MNA with replacement monitoring wells	GW-MNA(2)	$ 30,600.78	$ 15,629.60	$ 142,354.40	$ 172,955.18
		In-Situ Bioremediation (replacement wells)	GW-Bio	$ 158,485.31	$ 12,629.60	$ 88,705.03	$ 247,190.34
		Groundwater Extraction/Treatment	GW-P&T	$ 100,536.00	$ 3,000.00	$ 37,227.00	$ 137,763.00
Sediment	Canal	No Action	--	$ -	$ -	$ -	$ -
		Institutional Controls (Signage)	Sed-Signs	$ 22,241.95	$ 2,000.00	$ 24,818.00	$ 47,059.95
		Capping	Sed-Cap	$ 728,023.33	$ 24,573.75	$ 304,935.66	$ 1,032,958.99
		Dredging & Off-Site Treatment	Sed-Dredge	$ 1,603,087.37	$ -	$ -	$ 1,603,087.37