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FINAL ENGINEERING REPORT

Oneida (Sconondoa Street) Former Manufactured Gas Plant Site

City of Oneida, Madison County, New York

NYSDEC Site No. 7-27-008

June 2021

I, Michael J. Benoit, certify that I am currently a New York State-registered Professional Engineer, I had direct primary responsibility for the implementation of the subject construction programs, and certify that the Remedial Designs were implemented, and that all construction activities were completed, in substantial conformance with the DER-approved Remedial Designs.

All use restrictions, institutional controls, engineering controls, and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

A Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site, including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

June 25, 2021

Michael J. Benoit, PE — Date

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City of Oneida, Madison County, New York

NYSDEC Site No. 7-27-008

Prepared for:

National Grid

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June 2021

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ACRONYMS AND ABBREVIATIONS

AECOM	AECOM Technical Services, Inc.
Arcadis	Arcadis of New York, Inc.
AROD	Amended Record of Decision
ATL	Atlantic Testing Laboratories, Limited
BBL	Blasland, Bouck & Lee, Inc.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CKD	cement kiln dust
COC	constituent of concern
Colden	Colden Corporation
cPAH	carcinogenic polycyclic aromatic hydrocarbon
cy	in-situ cubic yard
DBH	diameter at breast height
DIP	ductile iron pipe
Earth Tech	Earth Tech, Inc.
ECL	Environmental Conservation Law
ESMI	ESMI of New York, LLC
FER	Final Engineering Report
GAC	granular activated carbon
gpm	gallon per minute
H2H	H2H Associates, LLC
HASP	Health and Safety Plan
HDPE	high-density polyethylene
LRI	LAND Remediation, Inc.
LTTD	low temperature thermal desorption
MAB	M.A. Bongiovani, Inc.
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid

NGVD29	National Geodetic Vertical Datum of 1929
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Places
PAH	polycyclic aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
PCB	polychlorinated biphenyl
PDI	pre-design investigation
Phoenix	Phoenix Environmental Laboratories, Inc.
PM_{10}	particulate matter less than 10 micrometers in diameter
POTW	publicly-owned treatment works
ppm	parts per million
RBA	Ryan-Biggs Associates, PC
ROD	Record of Decision
SCO	soil cleanup objective
SES	Synapse Engineering Solutions
SMP	Site Management Plan
Spectrum	Spectrum Analytical, Inc.
SVOC	semi-volatile organic compound
Synapse	Synapse Engineering, PLLC
TestAmerica	TestAmerica Laboratories, Inc.
Thew	Thew Associates PE-LS, PLLC
TWA	time-weighted average
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound

WMI	Waste Management, Inc.

1 INTRODUCTION

1.1 General

This Final Engineering Report (FER) has been prepared by Arcadis of New York, Inc. (Arcadis), on behalf of National Grid, to document the remediation and related construction activities performed at the former manufactured gas plant (MGP) site located at 215 Sconondoa Street in the City of Oneida, Madison County, New York (hereinafter referred to as the "Site") and in the associated off-Site area. The Site is currently in the New York State Superfund Program (identified as Site No. 7-27-008), which is administered by the New York State Department of Environmental Conservation (NYSDEC). On November 7, 2003, Niagara Mohawk Power Corporation (National Grid's predecessor) and NYSDEC entered into a multi-site Order on Consent (Index No. A4-0473-0000), which requires National Grid to implement a full remedial program for several former MGP sites across New York State, including the Site.

The Site and off-Site area, which are each described in further detail in Section 2.2 of this FER, were remediated in three separate construction phases (identified herein as the "Phase 1 Remedial Action", "Phase 2 Remedial Action", and "Phase 3 Remedial Action") between January 2008 and December 2012. The remediation activities were conducted in accordance with the: (1) *Record of Decision* (ROD; NYSDEC 2000), *Amended Record of Decision* (AROD; NYSDEC 2002), and *Explanation of Significant Difference* (NYSDEC 2007), which are collectively referred to herein as the "Decision Documents"; and (2) *Remedial Design/Remedial Action Work Plan – Phase 1 Area and Phase 1 Area Extension* (Phase 1 RD/RA Work Plan; Arcadis 2007), *Phase 1 Remedial Action – Addendum to Work Plan and Contractor Submittals* (Phase 1 Addendum; National Grid 2008a), *Phase 2 Remedial Design/Remedial Action Work Plan* (Phase 2 RD/RA Work Plan; Arcadis 2008), and *Phase 3 Remedial Design/Remedial Action Work Plan* (Phase 3 RD/RA Work Plan; Arcadis 2011), which are collectively referred to herein as the "RD/RA Work Plans". This FER has been prepared in accordance with Section 5.8 of NYSDEC's *Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010) and other applicable NYSDEC guidelines.

1.2 Report Organization

The remainder of this FER is organized into seven sections as follows:

- Section 2 (Site Background), presents general information regarding the pre-remediation conditions at the Site and in the off-Site area, including the investigations and evaluations conducted by National Grid and its consultants;
- Section 3 (Phase 1 Remedial Action), summarizes the remediation and related construction activities performed at the Site during the Phase 1 Remedial Action;
- Section 4 (Phase 2 Remedial Action), summarizes the remediation and related construction activities performed in the off-Site area during the Phase 2 Remedial Action;

- Section 5 (Phase 3 Remedial Action), summarizes the remediation and related construction activities performed at the Site and in the adjacent portion of the off-Site area during the Phase 3 Remedial Action;
- Section 6 (Nature and Extent of Remaining MGP-Related Impacts), summarizes the nature and extent of remaining MGP-related impacts in soil and groundwater at the Site and in the off-Site area;
- Section 7 (Institutional and Engineering Controls), summarizes the institutional and engineering controls that have been established on the Site; and
- Section 8 (References), presents a list of reference documents used in the preparation of this FER.

2 SITE BACKGROUND

2.1 General

This section provides general information regarding the pre-remediation conditions at the Site and in the off-Site area, including the investigations and evaluations conducted by National Grid and its consultants.

2.2 Site Location and Description

The Site is located at 215 Sconondoa Street in the City of Oneida, Madison County, New York (Figure 1), and is identified as Block 2, Lot 16 on Section 030.64 of the City of Oneida Tax Map. The approximately 2.1-acre property is roughly triangular in shape, and is generally bounded by vacant City-owned properties (tax parcels 030.64-2-15 and 030.65-1-2) to the north and west, Sconondoa Street to the south, and a privately-owned commercial property (tax parcel 030.65-1-3) to the east (Figure 2). The Site boundaries are more fully described in the metes and bounds description included on the property survey map in Appendix A.

As of the date of this FER, the property contains a vacant, single-story office building/garage (hereinafter referred to as the "Service Center Building") and is surrounded by a six-foot high chain-link fence with barbed wire. An active gas regulator station is located on the southeast corner of the property. Surface topography is generally flat with a gentle slope to the north. The Site and surrounding area are zoned for commercial and industrial use.

The off-Site area occupies an area of approximately 4.4 acres and comprises portions of several City of Oneida- or privately-owned properties located along the alignment of an open drainage ditch, which is hereinafter referred to as the "Tailrace", and an isolated area located at the confluence of the Tailrace and Oneida Creek (hereinafter, the "Confluence"). For the purpose of this FER, the off-Site area is described in terms of these two subareas. The approximate limits of the off-Site Tailrace area and off-Site Confluence area are shown on Figure 2.

The Tailrace, a tributary of Oneida Creek, begins at the outfall of a nominal 42-inch diameter storm sewer on City of Oneida-owned property to the west of the Site and follows a relatively straight course northeast for approximately 1,250 feet along the toe of an abandoned railroad embankment. The embankment rises between approximately 15 and 20 feet above the surrounding ground surface. Storm water run-off enters the Tailrace through: (1) a nominal 42-inch diameter storm sewer outfall at the head of the Tailrace; (2) a nominal 36-inch diameter storm sewer outfall located along the northern bank of the Tailrace approximately 150 feet downstream of the nominal 42-inch diameter storm sewer outfall; and (3) small open drainage ditch (identified on Figure 2 as the "Eastern Ditch"), which intersects the southern bank of the Tailrace approximately 210 feet northeast of the Site. Surface water in the Tailrace discharges to Oneida Creek through a nominal 48-inch diameter pipe that passes beneath the flood control levee. The downgradient end of the pipe is equipped with a flap gate that closes when the surface water level in Oneida Creek rises above the invert elevation of the pipe. Oneida Creek is classified by NYSDEC as a Class C water body.

2.3 Site History

2.3.1 Operational History

Manufactured gas production in Oneida began in 1868 with the formation of the Oneida Gas Light Company, which constructed a gas works on Cedar Street (roughly 700 feet southwest of the Site). By 1895, the Cedar Street gas works consisted of coal retorts, a coal shed, a gas holder, and a purifying room. In 1896, the Oneida Gas Light Company purchased a tannery facility on the north side of Sconondoa Street and began demolishing the existing structures, which included a bark shed, a bark mill, a two-story store house, and a three-story building containing tanning pits, a dry loft, and storage rooms. Between 1896 and 1899, the Cedar Street gas works was decommissioned, and a new gas works was constructed on Sconondoa Street at the site of the former tannery. The early gas works at the Site consisted of coal retorts, a scrubber room, a purifier room, a lime storage room, a coal house, and a 25,000-cubic-foot gas holder. The Oneida Light and Power Company, which formed separately between 1897 and 1901 to produce electricity, constructed a building on the eastern portion of the gas works property to house its six dynamos (Parsons Engineering Science, Inc. [Parsons] 1997).

Various modifications to the Site operations and layout took place over time. The electric plant was decommissioned by 1914 and a 100,000-cubic-foot distribution gas holder was installed at the north end of the Site. Between 1909 and 1914, purification operations were converted from lime sludge to wood shavings and the 25,000-cubic-foot distribution holder may have been converted to a relief holder. The Adirondack Power and Light Corporation converted operations from coal gas to carburetted water gas in 1920. Two superheaters and a separator were installed in the former electric room and the former coal gas building was converted for storage. Two oil tanks, a cistern, and three purifiers were also installed to support the carburetted water gas operations (Parsons 1997).

The New York Power and Light Corporation phased out the manufactured gas operations at the Site between 1928 and 1930. The 25,000-cubic-foot and 100,000-cubic-foot gas holders were used to store gas that was piped in from the Harbor Point MGP in Utica, New York. In 1930, the 25,000-cubic-foot relief holder, cistern, oil tanks, and purifiers were removed. The carburetted gas production room was demolished in 1942. The remaining MGP structures, including the 100,000-cubic-foot gas holder, were demolished between 1963 and 1964 to make way for the Niagara Mohawk Power Corporation service center. The Service Center Building was expanded in 1974 and has remained essentially unchanged since that time (Parsons 1997).

2.3.2 Regulatory History

Niagara Mohawk Power Corporation (National Grid's predecessor) and NYSDEC entered into a multi-site Order on Consent (Index No. D0-0001-9210) on December 12, 1992. The Order on Consent required National Grid to implement a full remedial program for several former MGP sites across New York State, including the Site. Order on Consent Index No. D0-0001-9210 was superseded and replaced by Order on Consent Index No. A4-0473-0000 on November 7, 2003.

2.4 Previous Investigations and Evaluations

Several investigations and evaluations have been conducted at the Site and in the off-Site area to characterize existing (pre-remediation) conditions. The results of these activities, which were the basis for the remedy selected by NYSDEC and set forth in the Decision Documents, were presented in the following documents:

- *Final Report for PSA/IRM Study* (Engineering-Science, Inc. 1994);
- *Remedial Investigation Report* (Parsons 1997);
- *Final Feasibility Study Report* (Parsons 1998);
- *Proposal to Revise the Selected Site Remedy* (Proposal to Revise the Remedy; Blasland, Bouck & Lee, Inc. [BBL] 2001);
- *Tailrace/Oneida Creek Confluence Sampling Results* (Confluence Sampling Report; National Grid 2002a);
- *Response to October 29, 2002 NYSDEC Comments Regarding the Tailrace/Oneida Creek Confluence Sampling Results* (National Grid 2002b);
- *Supplemental Site Investigations Summary Report* (National Grid 2006); and
- *Review of Current Site/Project Conditions and Proposed Adjustments to Remedial Approach* (National Grid 2007).

2.5 Site Geology and Hydrogeology

Subsurface investigations determined that the Site and surrounding area are generally underlain by four main overburden units, which consist of (from uppermost to lowermost unit) fill, peat, glacial lacustrine beach and delta deposits, and lacustrine silty clay.

The Site is covered by up to approximately 15 feet of fill, with the thickest area of fill located in the southwest corner of the property. The remainder of the property is underlain by between approximately 5 and 8 feet of fill. The fill at the Site is a heterogeneous mixture of silt, sand, gravel, and anthropologic materials, including wood, metal, slag/ash, concrete, and brick. The fill unit is discontinuous in the off-Site Tailrace area north and northeast of the Site and, where present, generally consists of railroad bedding material, apparent dredge spoils (along the Tailrace), refuse, and other debris.

A relatively continuous layer of peat lies beneath the fill. The peat unit is the uppermost native deposit found beneath the Site. The peat is absent in localized areas of the Site, possibly as a result of historical construction/redevelopment. To the north and northeast of the Site, the peat gradually grades horizontally into a silt/clayey silt. The peat is generally 1 to 4 feet thick where encountered beneath the Site.

An alternating glacial lacustrine sequence of silt, sands, and gravels lies below the fill and peat units. The glacial lacustrine sequence consists of sand and gravel layers up to approximately 9 feet thick and silt and fine sand layers up to approximately 24 feet thick. The lowest overburden unit observed is a stiff, reddish-brown silty clay containing occasional fine sand partings. Depending on location and surface

elevation, the depth to the top of this unit ranges between approximately 19 and 55 feet below ground surface (bgs).

Groundwater is typically located between approximately 5 and 11 feet bgs at the Site, and between approximately 0.5 and 8 feet bgs in the off-Site Tailrace area. The groundwater table is found within the fill, peat, and/or upper portion of the glacial lacustrine deposits. The shallow groundwater flow direction is generally to the northeast and toward the Tailrace, eastern ditch, and Oneida Creek. The majority of shallow groundwater is assumed to flow within the sand and gravel units, which comprise the upper portion of the glacial lacustrine deposits. The deeper groundwater flow direction (between approximately 20 and 40 feet bgs) is generally to the northeast and toward Oneida Creek. The silty clay unit is believed to act as a confining unit with respect to the material below. Groundwater located beneath this unit is believed to be derived from distant recharge area(s).

Because it receives a large volume of storm water run-off from the City of Oneida, the surface water level in the Tailrace fluctuates rapidly and in proportion to the duration and intensity of a given storm event. During and immediately following a storm event, the surface water level rises above the surrounding groundwater level, which results in a temporary reversal of groundwater flow direction away from the Tailrace. The groundwater flow direction returns to normal (towards the Tailrace) when the surface water level in the Tailrace recedes below the surrounding groundwater level. During severe storm events, the rising surface water level in Oneida Creek causes the flap gate at the end of the Tailrace to close. Surface water in the Tailrace backs up, overtops the banks of the channel, and inundates the surrounding area, thereby raising the surrounding groundwater level. The flap gate at the end of the Tailrace re-opens once the surface water level in Oneida Creek recedes below the invert elevation of the discharge pipe.

2.6 Pre-Remediation Nature and Extent of MGP-Related Impacts

As described in the Decision Documents, environmental media at the Site and in the off-Site area were impacted by waste by-products of the gas manufacturing process – specifically, coal tar and purifier waste. Coal tar, a reddish-brown to black non-aqueous phase liquid (NAPL), contains a complex mixture of organic chemicals, including volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Chief among these compounds are benzene, toluene, ethylbenzene, and xylenes (collectively, “BTEX”) and a more general class of SVOCs known as polycyclic aromatic hydrocarbons (PAHs). The specific PAHs of concern, as identified in the Decision Documents, are acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. The sum of the individual concentrations of these 17 PAHs is hereinafter referred to as “total PAHs”.

Purifier waste is typically found as a dark mixture of wood chips and often contains high concentrations of cyanide. Although some cyanide compounds are highly toxic, there is evidence that the cyanide compounds typically leached from purifier waste are in a chemically complexed form, which is significantly less toxic than free cyanide (CN-). As described in the ROD, cyanide was generally found to be co-located with areas with high concentrations of BTEX and PAHs in environmental media. Collectively, BTEX, PAHs, and cyanide are considered the primary constituents of concern (COCs) at the Site and in the off-Site area.

The pre-remediation nature and extent of MGP-related impacts in environmental media at the Site and in the off-Site area were summarized in: (1) Tables 1A through 1E of the ROD; (2) Table 1 of the AROD; and (3) Table 1 of the Confluence Sampling Report.

2.7 Remediation Goals

The remediation goals for the remedial program, as presented in the ROD, were established through the remedy selection process set forth in Title 6, Part 375 of the New York Codes, Rules, and Regulations (NYCRR), and include the following:

- Eliminate, to the extent practicable, the contamination present within Site soils;
- Eliminate, to the extent practicable, the contamination present in off-Site Tailrace area soils and sediments;
- Eliminate, to the extent practicable, the off-Site migration of groundwater that exceeds New York State Class GA ambient water quality standards or guidance values;
- Eliminate the potential for direct human or animal contact with contaminated soils, sediments, and groundwater; and
- Eliminate, to the extent practicable, the migration of NAPL through removal or hydraulic containment.

To achieve these goals, remediation levels were established for the environmental media at the Site and in the off-Site Tailrace area. These remediation levels are summarized in Table 1 below.

Table 1. Remediation Levels

Analyte	Units	Remediation Level
Site Soil		
Benzene	mg/kg	0.28
Ethylbenzene	mg/kg	25
Toluene	mg/kg	6.9
Total Xylenes	mg/kg	5.5
Total PAHs[3]	mg/kg	500
Off-Site Soil and Sediment		
Benzene	mg/kg	0.28
Ethylbenzene	mg/kg	25
Toluene	mg/kg	6.9
Total Xylenes	mg/kg	5.5
Total PAHs[3,4]	mg/kg	7.7
Total cPAHs[5,6]	mg/kg	10
Groundwater		
Benzene	µg/L	1

Analyte	Units	Remediation Level
Ethylbenzene	µg/L	5
Toluene	µg/L	5
Total xylenes	µg/L	5
Acenaphthene	µg/L	20
Anthracene	µg/L	50
Benzo(a)anthracene	µg/L	0.002
Benzo(a)pyrene	µg/L	ND
Benzo(b)fluoranthene	µg/L	0.002
Benzo(k)fluoranthene	µg/L	0.002
Chrysene	µg/L	0.002
Fluoranthene	µg/L	50
Fluorene	µg/L	50
Indeno(1,2,3-cd)pyrene	µg/L	0.002
Naphthalene	µg/L	10
Phenanthrene	µg/L	50
Pyrene	µg/L	50
Total cyanide	µg/L	200

Table Notes:

1. mg/kg, milligram per kilogram.
2. µg/L, microgram per liter.
3. Total PAHs is expressed as the sum of concentrations of acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene.
4. The remediation level of 7.7 mg/kg for total PAHs applies to off-Site soil and sediment at depths less than or equal to 2 feet bgs.
5. Total carcinogenic PAHs (cPAHs) is the sum of concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
6. The remediation level of 10 mg/kg for total cPAHs applies to off-Site soil and sediment at depths greater than 2 feet bgs.
7. ND, non-detect.

2.8 Selected Remedy

The primary elements of the selected remedy for the Site and off-Site area, as set forth in the Decision Documents, are summarized as follows:

1. Excavation, to the extent feasible, of contaminated soils and sediments exceeding the remediation levels from the areas and to the depths identified on Figure 2 of the AROD.
2. On-Site re-use of excavated soils meeting the applicable remediation levels.

3. Off-Site treatment/disposal of excavated soils and sediments not meeting applicable remediation levels in accordance with applicable laws and regulations.
4. Restoration of the off-Site Tailrace area upon the completion of remediation. A restoration plan will be developed during the remedial design which will balance the Tailrace's current status as a major component of the City on Oneida's storm water conveyance system with the need to maintain the Tailrace as a wildlife habitat. In any area of the restoration where soil could be classified as sediment, the material placed to restore that area will have a total PAH concentration less than 4 parts per million (ppm).
5. For the two areas where NAPL-impacted soils will remain (shown on Figure 3 of the AROD and described in further detail in Sections 6.2.1 and 6.2.2 of this FER), the following actions will be undertaken, as necessary, during implementation of the remedy:
    - The extent of residual materials will be documented and characterized during the excavation adjacent to the areas. If this residual material is determined to encompass an area significantly larger than identified in previous investigations, or if characterization of the physical properties indicate a greater potential for migration, an investigation will be undertaken as part of the construction to delineate these areas beyond the excavation limits identified by the Decision Documents.
    - The use of in-situ treatment technologies would be evaluated in the event substantial quantities of NAPL are detected at the excavation limits or by the delineation efforts described above.
    - Before backfilling, National Grid would consider the use of such technologies as oxygen release compound or other chemical additions to facilitate the in-situ destruction of MGP-related constituents. These technologies could incorporate the use of either NAPL collection or injection systems that could be installed before backfilling excavations.
6. Development of a long-term monitoring plan to monitor the areas of residual MGP-related impacts that remain along the boundaries of the Site and off-Site area at the conclusion of the remedial construction effort. Incorporated into the overall monitoring program will be a focused plan for both the Sconondoa Street and the railroad embankment areas. This plan will consist of NAPL monitoring wells installed within or in the immediate vicinity of residual MGP-related impacts identified during the remedial design/construction effort. In addition to the NAPL monitoring wells, sentinel wells will be installed downgradient of these areas to monitor dissolved-phase concentrations of COCs in groundwater. The groundwater monitoring program will also review the dissolved-phase concentrations of COCs in the groundwater attenuating through naturally-occurring biological processes. If monitoring demonstrates that the attenuation rate is not sufficient, additional remedial technologies, such as air sparging, addition of oxygen-release compounds, and/or the consideration of chemical oxidation, will be evaluated as part of the long-term monitoring of the Site and off-Site area. The performance goals will include compliance with groundwater quality standards and guidance values.
7. Execution of an environmental easement for the Site, which will prohibit the property from ever being used for purposes other than for appropriate industrial or commercial enterprises without the express written waiver of such prohibition by NYSDEC and the New York State Department of Health (NYSDOH). Appropriate industrial or commercial uses of the property would have to be consistent

with any applicable zoning ordinances, but would not include enterprises that draw susceptible portions of the community to the property for activities that may lead to exposures to residual MGP-related impacts (e.g., day care, child care, medical treatment facilities, some recreational enterprises, etc.). Provided the remedy achieves the remedial goals, as identified in the ROD and summarized in Section 2.7 of this FER, there will be no land use restrictions for the City of Oneida- or privately-owned properties in the off-Site Tailrace area. However, for those areas of the Site, as well as any properties in the off-Site Tailrace area, where groundwater will not initially meet groundwater quality standards and guidance values, groundwater use restrictions will have to be established.

8. Execution of additional deed restrictions for both the Sconondoa Street and railroad embankment areas to restrict potential future exposure scenarios associated with any residual subsurface MGP-related impacts. The potential exists for both municipal and private utility workers to be exposed in the Sconondoa Street area and, to a lesser extent, in the area of the force main under the embankment. Associated with this deed restriction effort will be the identification of subsurface excavation protocols that would be necessary to protect future utility worker scenarios, as well as address the handling, transportation, and proper disposal of any excavated materials with MGP-related impacts.

Subsequent to the issuance of the AROD, and based on the results of the July 2002 investigation in Oneida Creek, an additional remedial excavation area was added in the off-Site Confluence area. The remedial excavation limits for that area were shown or indicated on Figure 2 of the Confluence Sampling Report.

2.9 Overview of Remedial Actions Performed

The Site and off-Site area were remediated in three separate phases (identified herein as the “Phase 1 Remedial Action”, “Phase 2 Remedial Action”, and “Phase 3 Remedial Action”) between January 2008 and December 2012. The remediation activities were performed in accordance with the NYSDEC-approved RD/RA Work Plans and generally included the following:

- Excavation of approximately 65,337 in-situ cubic yards (cy) of soil and debris to depths ranging from approximately 5 to 20 feet bgs;
- Demolition and removal of former building foundations, underground facilities, and former MGP structures located within the remedial excavation limits, including gas holder and purifier foundations;
- Off-Site treatment/disposal of approximately 57,407 cy of excavated soil and debris exceeding the soil remediation levels;
- Collection, treatment, and discharge of approximately 6,914,473 gallons of construction wastewater;
- Backfilling on-Site remedial excavation areas with a combination of the following:
    - Clean imported fill material meeting the soil cleanup objectives (SCOs) for commercial use, as set forth in Table 375-6.8(b) of 6 NYCRR 375; and
    - Approximately 6,954 cy of excavated material meeting the applicable soil remediation levels set forth in the ROD and summarized in Table 1 of this FER;
- Backfilling off-Site remedial excavation areas with a combination of the following:

  - Clean imported fill material meeting the SCOs for residential use, as set forth in Table 375-6.8(b) of 6 NYCRR 375; and
  - Approximately 2,558 cy of excavated material meeting the applicable soil remediation levels set forth in the ROD and summarized in Table 1 of this FER;
- Replacement of existing culverts and utilities, including: (1) the nominal 42-inch diameter storm sewer line and a portion of the nominal 36-inch diameter storm sewer line that discharge to the Tailrace; (2) a water service line and sanitary sewer line for the Service Center Building; and (3) a portion of the nominal 30-inch diameter sanitary sewer line that passes beneath the Tailrace; and
- Restoration of the Site, off-Site area, and other areas disturbed during the remediation activities.

The horizontal limits of excavation for each phase of remediation are shown on Figure 3.

3 PHASE 1 REMEDIAL ACTION

3.1 General

This section summarizes the primary components of the Phase 1 Remedial Action, which was conducted at the Site between January and November 2008 in accordance with the Phase 1 RD/RA Work Plan and Phase 1 Addendum. The as-built survey drawings and representative photographs for the Phase 1 Remedial Action are provided in Appendices B-1 and C-1, respectively, of this FER.

3.2 Contractors and Consultants

The Phase 1 Remedial Action was conducted on behalf of National Grid by Earth Tech, Inc. (Earth Tech; now, AECOM Technical Services, Inc. [AECOM]) of Latham, New York. Table 2 below identifies the key Earth Tech subcontractors and suppliers that also had significant roles on the project.

Table 2. Earth Tech Subcontractors and Suppliers

Subcontractor/Supplier	Role	Contact Information
Atlantic Testing Laboratories, Limited	Geotechnical Testing Laboratory	301 Saint Anthony Street Utica, New York 13501
Callanan Industries, Inc.	Source of Crushed Stone	Oxbow Quarry 6375 Tuttle Road Canastota, New York 13032 NYSDEC Mine ID No. 70017 NYSDOT Source No. 2-11R
ESMI of New York, LLC Low-Temperature Thermal Desorption Facility	Disposal Facility for Conditionally-Exempt MGP-Impacted Soil and Debris	304 Towpath Road Fort Edward, New York 12828
Johnson's Sand Bed, Inc.	Source of General Fill Material	1483 Middle Road Oneida, New York 13421 NYSDEC Mine ID No. 70093
Leitz Enterprises, Inc.	Source of Clay Fill Material	Leitz Clay Pit 162 Mcintyre Road Frankfort, New York 13340 NYSDEC Mine ID No. 60788
M.A. Bongiovanni, Inc.	Pile Driving for Temporary Excavation Support Systems	1400 Jamesville Avenue PO Box 147 Colvin Station Syracuse, New York 13205
Madison County Solid Waste Department County Landfill	Disposal Facility for Non-Regulated Debris	6663 Buyea Road Canastota, New York 13032
Oneida-Herkimer Solid Waste Authority Regional Landfill	Disposal Facility for Non-Regulated Debris	7044 State Route 294 Boonville, New York 13309

Subcontractor/Supplier	Role	Contact Information
Phoenix Environmental Laboratories, Inc.	Chemical Testing Laboratory	587 East Middle Turnpike Manchester, Connecticut 06040
Siemens Water Technologies Corporation	Recycling Facility for Used Granular Activated Carbon Media from Temporary Wastewater Treatment System	118 Park Road Darlington, Pennsylvania 16115
Snyder Construction Company, Inc.	Source of Subbase Material (Run-of-Bank Gravel)	Munnsville Gravel Bed – Pratts Road 1264 Glenwood Avenue Oneida, New York 13421 NYSDEC Mine ID No. 70106
Thew Associates PE-LS, PLLC	Construction Surveys	9478 River Road Marcy, New York 13403
Waste Management, Inc. High Acres Landfill	Disposal Facility for Non-Regulated Debris	425 Perinton Parkway Fairport, New York 14450
CWM Chemical Services, LLC Model City Facility	Disposal Facility for Used Ion Exchange Resin Media from Temporary Wastewater Treatment System	1550 Balmer Road Model City, New York 14107

Arcadis provided daily observation and documentation of the work performed by Earth Tech and managed and administered the Earth Tech contract on behalf of National Grid.

3.3 Pre-Construction, Mobilization, and Site Preparation Activities

3.3.1 Soil Characterization and Monitoring Well Decommissioning

Arcadis conducted soil characterization and monitoring well decommissioning activities at the Site between December 3 and December 7, 2007. The scope of these activities was presented in a November 21, 2007 letter from National Grid to NYSDEC (National Grid 2007b) and generally involved the: (1) drilling of seven soil borings; (2) collection of representative soil samples for chemical testing; and (3) decommissioning of two monitoring wells (MW-ES-2 and MW-ES-3). Soil characterization activities were conducted to facilitate the disposal of materials to be excavated during the Phase 1 Remedial Action. Monitoring wells MW-ES-2 and MW-ES-3 were decommissioned since both were located within and extended below the limits of excavation for the Phase 1 Remedial Action. The results of these activities were presented in the Phase 1 Addendum, which was approved by NYSDEC on March 12, 2008.

Based on the results of the soil characterization activities described above and a review of historical soil sampling data for the Site, National Grid submitted a letter to NYSDEC on February 29, 2008 (National Grid 2008c) proposing the re-use of certain excavated materials as subsurface backfill during the Phase 1

Remedial Action. Specifically, the letter proposed the re-use of materials located within the top 6 feet of Cells II through IV based on the following considerations:

- The Phase 1 RD/RA Work Plan and AROD contain provisions for the re-use of excavated materials if such materials are not visibly impacted (i.e., do not contain free phase NAPL) and do not contain COCs at concentrations greater than the applicable Site remediation levels specified in the AROD;
- There were no historical observations of NAPL or exceedances of the applicable Site remediation levels within the top 6 feet of the Phase 1 excavation areas;
- There were no observations of NAPL within the top 6 feet of the seven soil borings drilled within the Phase 1 excavation areas during the December 2007 field activities;
- Chemical testing results for soil samples collected from the 0- to 6-foot depth interval at the soil borings located within Cells II through IV (i.e., soil borings SC-3 through SC-7) were all less than the applicable Site remediation levels; and
- Materials within Cells II through IV were characterized during the December 2007 field activities at a frequency consistent with that specified in the Phase 1 RD/RA Work Plan, namely one sample for every 500 in-situ cubic yards (cy).

The existing materials located within the top 6 feet of Cell I were not proposed for re-use as backfill since benzene and total xylenes were detected at concentrations greater than the applicable Site remediation levels in one of the two samples collected from the 0- to 6-foot depth interval within that area. National Grid's proposal was approved by NYSDEC on April 8, 2008. The chemical testing results for the existing soils generally located within the top 6 feet of Cells II through IV, which were re-used on-Site as subsurface backfill during the Phase 1 Remedial Action, are provided in Appendix D-1.

3.3.2 Pre-Construction Meeting

A pre-construction meeting was held at the Site on January 31, 2008 to discuss the planned scope and sequence of construction activities. The meeting was attended by representatives of NYSDEC, National Grid, Arcadis, Earth Tech, and the City of Oneida. Topics covered at the pre-construction meeting included project communications, health and safety, community air monitoring, community relations, site security, work hours, and project schedule.

3.3.3 Permits and Approvals

National Grid obtained a floodplain development permit and a wastewater discharge permit from the City of Oneida. The floodplain development permit was required due to the Site's location within the 100-year flood zone of Oneida Creek (as identified by the Flood Emergency Management Agency's Flood Insurance Rate Maps). The wastewater discharge permit allowed National Grid to discharge treated construction wastewater to the City of Oneida's publicly-owned treatment works (POTW). All other permits required to implement the Phase 1 Remedial Action were obtained by Earth Tech or its subcontractors.

3.3.4 Pre-Mobilization Submittals

Before mobilizing to the Site, Earth Tech prepared several required submittals, including an Operations Plan, a Health and Safety Plan (HASP), and a Contingency Plan. At that time, Earth Tech also prepared and submitted an alternate design for the temporary excavation support system specified in the Phase 1 RD/RA Work Plan. The proposed system consisted of PZC-18 steel sheet piling and internal bracing (i.e., wales and struts), and divided the Phase 1 excavation area into four separate excavation areas (Cells I, II, III, and IV). Following review by National Grid and Arcadis, National Grid elected to use Earth Tech's alternate design for the temporary excavation support system.

Earth Tech's Operations Plan, HASP, Contingency Plan, and alternate design for the temporary excavation support system were provided in the Phase 1 Addendum, which was approved by NYSDEC on March 12, 2008.

3.3.5 Mobilization

Personnel, equipment, materials, and incidentals were mobilized to the Site beginning on February 4, 2008. At that time, a NYSDEC-approved project sign was erected at the Site entrance.

3.3.6 Pre-Construction Topographic Survey

Thew Associates PE-LS, PLLC (Thew) performed a pre-construction survey to: (1) document existing conditions in the area of the Site where the remediation activities would be performed; (2) demarcate the horizontal limits of excavation for each excavation area; and (3) establish horizontal and vertical survey control on a minimum 20-foot by 20-foot grid within the excavation areas. Survey control was maintained throughout the remedial excavation, backfilling, and restoration activities to ensure the proper execution, construction, and documentation of the work.

3.3.7 Utility Clearance and Mark-Out

Earth Tech coordinated with an appropriate utility locator service to: (1) demarcate existing subsurface utilities in the area of the Site; and (2) confirm that there were no active utilities that would be affected by the remediation activities.

3.3.8 Temporary Erosion and Sediment Controls

Temporary erosion and sediment controls, including silt fencing and hay bales, were installed by Earth Tech before initiating ground-intrusive activities at the Site, and were inspected and maintained throughout the project. An oil-absorbent boom was also installed and maintained within the stretch of Tailrace located to the north of the Site.

3.3.9 Clearing and Site Access Controls

Existing surface features and debris, including telephone poles, transformers, sheds, fencing, bollards, and a soil/debris pile, were cleared from the work area by National Grid and Earth Tech to facilitate the remediation activities. The soil/debris pile was relocated to a material staging area (once constructed) where the soils were sampled by Arcadis to determine their suitability for use on-Site as backfill within the

Phase 1 excavation areas. The sample collected from the soil pile was submitted to TestAmerica Laboratories, Inc. (TestAmerica) for analysis of VOCs, SVOCs, polychlorinated biphenyls (PCBs), pesticides, herbicides, and metals. The chemical testing results were submitted electronically to NYSDEC on May 13, 2008 and are provided in Appendix D-1 of this FER. The chemical testing results for the soil pile materials met the applicable SCOs for commercial use, as set forth in Table 375-6.8(b) of 6 NYCRR 375, and were therefore suitable for use as backfill during the project. NYSDEC approved the use of the soil pile materials on May 16, 2008.

In conjunction with the clearing activities described above, Site access controls, consisting of both temporary and permanent chain-link fencing, were also established to prevent access to the work area by unauthorized personnel and vehicles.

3.3.10 Material Staging, Decontamination, and Containment Areas

Material staging, decontamination, and containment areas were constructed prior to initiating excavation activities at the Site. During the construction of the material staging area, abandoned (inactive) gas piping with coal tar wrap (a non-friable asbestos-containing material) was encountered in the area of the former gas regulator station. Once exposed, the piping was properly cut, removed, and staged on minimum six-mil polyethylene sheeting adjacent to the Service Center Building for characterization and subsequent disposal at the Waste Management, Inc. (WMI) High Acres landfill in Fairport, New York.

3.3.11 Sampling and Analysis of Imported Fill Materials

Earth Tech's sources of general fill material and subbase material (run-of-bank gravel) were sampled to verify their suitability for use on the project. Samples were submitted by Earth Tech to Phoenix Environmental Laboratories, Inc. (Phoenix) and were analyzed for VOCs, SVOCs, PCBs, pesticides/herbicides, and metals. The chemical testing results for the general fill material and subbase material were submitted to NYSDEC on February 26, 2008 (National Grid 2008b) and are provided in Appendix D-1 of this FER.

In addition to the above, approximately 90 cy of clay fill material was used within portions of Cells I, II, and III to assist in the control of groundwater infiltration through the sheet pile interlocks. NYSDEC verbally approved the use of the clay fill material on May 15, 2008. Upon delivery to the Site, a sample of the material was collected by Arcadis and submitted to TestAmerica for chemical testing. The sample was analyzed for VOCs, SVOCs, PCBs, pesticides/herbicides, and metals. The chemical testing results for the clay fill material were submitted electronically to NYSDEC on June 2, 2008 and are provided in Appendix D-1 of this FER.

The chemical testing results for Earth Tech's general fill material, subbase material, and clay fill material met the applicable SCOs for commercial use, as set forth in Table 375-6.8(b) of 6 NYCRR 375, and were therefore suitable for use as backfill during the project.

3.4 Temporary Excavation Support System

3.4.1 Installation

As described above in Section 3.3.4, the temporary excavation support system for each excavation area consisted of a perimeter sheet pile wall that was internally braced with steel wales and struts. Prior to installation, Thew surveyed and marked-out the sheet pile alignment for each remedial excavation area. Pre-trenching was then conducted, generally to a depth of approximately 4 feet bgs, along the surveyed sheet pile alignment to remove potential surface and shallow subsurface obstructions. A hydrophilic waterstop sealant was then applied to the female sheet pile interlock to reduce the potential for groundwater infiltration through the installed sheet pile wall.

Sheet piles were installed with a vibratory hammer to the minimum tip elevations specified in Earth Tech's alternate design. The first 34 sheet piles were installed by Earth Tech and the remaining 395 sheet piles were installed by M.A. Bongiovanni, Inc. (MAB). Excavation activities were initiated once the sheet piles for a given excavation area were installed, and internal bracing (consisting of steel wales and struts) was installed once the excavation was advanced to the required intermediate elevation specified in Earth Tech's alternate design.

3.4.2 Removal

The removal of the temporary excavation support system in each excavation area generally began once the excavation had been backfilled to the required intermediate elevation specified in Earth Tech's alternate design, at which point the internal bracing was removed. Sheet pile removal/decontamination activities were generally initiated once the excavation area had been backfilled to within 18 inches of final grade. Sheet piles in Cells I and II were removed by MAB and sheet piles in Cells III and IV were removed by Earth Tech. Sheet piles were decontaminated as they were being removed from the ground. If NAPL was observed on a sheet pile during this process, the pile was wrapped in polyethylene sheeting and relocated to a material staging area for further decontamination. Once removed and decontaminated, sheet piles were either (1) inspected and prepared for re-installation in other remedial excavation areas or (2) staged for subsequent demobilization.

3.5 Remedial Excavation

Excavations in each area were advanced to the horizontal and vertical limits shown or indicated on the as-built survey drawings (Appendix B-1). To the extent practicable, excavated soil and debris were loaded directly into transport vehicles for disposal at the ESMI of New York, LLC (ESMI) low-temperature thermal desorption (LTTD) facility in Fort Edward, New York. In instances when direct loading was not practicable (e.g., due to scheduling, the availability of transport vehicles, etc.), excavated materials were stored in temporary stockpiles located within either the remedial excavation areas or a material staging area. The final horizontal and vertical limits of excavation in each remedial excavation area were surveyed by Thew and approved by NYSDEC's on-site representative in the field before backfilling activities were initiated.

Post-excavation confirmation sampling was not conducted because the remedial excavation areas were generally advanced to the pre-determined limits set forth in the AROD. Those pre-determined limits were

based on the results of the preliminary site assessment (Engineering Science, Inc. 1994), remedial investigation (Parsons 1997), and pre-design investigation (BBL 2001), which were summarized on the figures included in Attachment A of the *Review of Current Site/Project Conditions and Proposed Adjustments to Remedial Approach* (National Grid 2007). Those pre-remediation soil investigation summary figures have been included in Appendix L of this FER. The temporary excavation support systems for the remedial excavation areas also prevented the collection of post-excavation confirmation samples. Monitoring well locations, post-remediation groundwater sampling results, and the approximate extent of shallow groundwater containing dissolved-phase COCs at concentrations greater than the applicable New York State Class GA ambient water quality standards or guidance values are shown on Figure 4 of this FER.

Table 3 below summarizes the volume and disposition (disposal or re-use) of material excavated from each remedial excavation area during the Phase 1 Remedial Action.

Table 3. Remedial Excavation Summary for the Phase 1 Remedial Action

Remedial Excavation Area	Approximate Excavation Volume (cy)		
	Disposal	Re-Use as Subsurface Backfill	Total
Cell I	3,524	0	3,524
Cell II	2,481	873	3,354
Cell III	2,361	590	2,951
Cell IV	1,848	693	2,541
Total	**10,214**	**2,156**	**12,370**

Table Notes:

1. Re-use soils in Cells II, III, and IV were visually inspected by Arcadis and NYSDEC's on-site representative during the excavation activities to verify the absence of NAPL. Once excavated, re-use soils were temporarily stockpiled on polyethylene sheeting within or adjacent to the excavation areas, and were covered with polyethylene sheeting when no loading or unloading activities were occurring.

Remedial excavation areas were dewatered using localized sumps and submersible pumps. As further described in Section 3.10.2 of this FER, groundwater resulting from dewatering operations was treated at the Site using a temporary wastewater treatment system and discharged to the City of Oneida POTW in accordance with the wastewater discharge permit.

Soil excavated from below the groundwater table was amended with either lime kiln dust or cement kiln dust (CKD) prior to loading to help reduce excess moisture. Excavated debris (e.g., concrete, brick, etc.) was down-sized as required by the disposal facilities. Excavated debris that was not suitable for disposal at the ESMI LTTD facility, including wood piles and concrete from the demolition of the portion of the

former holder foundation located within Cell II[1], was disposed of at either the WMI High Acres landfill (wood piles) or the Madison County landfill (concrete).

Before loading excavated soil and debris, the bed and sidewalls of each transport vehicle were lined with polyethylene sheeting. After each vehicle was loaded, a non-mesh tarpaulin was secured over the top of the bed, and the wheels and undercarriage were inspected to identify (and remove, if necessary) any visible soil or debris. A shipping document was then prepared and signed by Arcadis (as National Grid's authorized representative) for each vehicle before it left the Site. Truck traffic, both to and from the Site, followed the designated truck route established for the project.

3.6 Backfilling

Backfilling activities in each remedial excavation area were initiated with NYSDEC concurrence that (1) the target excavation depth had been achieved and (2) no standing water or NAPL was present at the base of the excavation. Remedial excavation areas were backfilled to within 18 inches of final grade with a combination of re-use material and imported fill material, as summarized in Table 4 below.

Table 4. Backfill Summary for the Phase 1 Remedial Action

Remedial Excavation Area	Approximate Backfill Volume (cy)		
	Re-Use Material[1]	Imported Fill Material	Total
Cell I	120[2]	3,140	3,260
Cell II	873[3]	2,229	3,102
Cell III	693[4]	2,037	2,730
Cell IV	590[5]	1,760	2,350
Total	**2,276**	**9,166**	**11,442**

Table Notes:

1. Re-use material was used at depths greater than 6 feet bgs.
2. Re-use material used as backfill in Cell I consisted of the soil pile material generated during the Site clearing activities.
3. Re-use material used as backfill in Cell II consisted of re-use soil from Cell II.
4. Re-use material used as backfill in Cell III consisted of re-use soil from Cell IV.
5. Re-use material used as backfill in Cell IV consisted of re-use soil from Cell III.

Backfill materials were generally placed in 12-inch compacted lifts throughout each remedial excavation area. In-place density tests were performed by Atlantic Testing Laboratories, Limited (ATL) to confirm that the compaction requirements had been achieved.

[1] The remainder of the former holder foundation, which was located to the west and outside of Cell II, was removed during the Phase 3 Remedial Action.

3.7 Site Restoration and Demobilization

Following the completion of backfilling activities within each remedial excavation area, a woven geotextile fabric was placed above the compacted backfill material and covered with 12 inches of compacted subbase material (run-of-bank gravel). The subbase material was then graded and surveyed at each removal depth tracking location to confirm that the excavation areas had been brought to within 6 inches of final grade. ATL performed in-place density tests at several locations across the remedial excavation areas to confirm that the compaction requirements had been achieved. Finally, 6 inches of crushed stone was placed, lightly compacted, and graded to restore the Phase 1 remedial excavation areas to final grade.

Other restoration activities included the following:

- Repair of the curb box for monitoring well MW-ES-7, which had been damaged during the construction/removal of the material staging area;
- Repair of an electrical connection and some minor concrete damage along the northwest side of the Service Center Building;
- Placement, compaction, and grading of additional fill/gravel within the access road located to the east of the Site to repair cracks and depressions; and
- Re-alignment/installation of temporary security fencing along the northern and eastern perimeter of the Site (generally along the former alignment of the chain-link fence).

A final inspection of the project area was conducted on November 13, 2008 and was attended by representatives of National Grid, Arcadis, Earth Tech, and NYSDEC. Following confirmation that all restoration activities had been completed, Earth Tech demobilized the remaining equipment, materials, and temporary facilities from the Site. Demobilization activities were substantially complete by the end of November 2008.

3.8 Odor, Vapor, and Dust Control

Odor, vapor, and dust controls were proactively employed during the remediation activities to mitigate the potential for odor, vapor, and dust emissions from the Site. Such controls included, but were not necessarily limited to, the following:

- Covering material stockpiles when no loading or unloading activities were occurring;
- Spraying BioSolve Pinkwater solution on soils during active excavation/load-out;
- Periodically foaming excavation faces/excavated soils before work breaks and at the end of the work day;
- Covering open excavation faces with polyethylene sheeting during extended periods of inactivity;
- Removing soil and debris from, and spraying water on, active haul routes;
- Hauling excavated materials and clean fill materials in properly tarped/covered transport vehicles; and
- Restricting vehicle speeds on-Site and on active haul routes.

3.9 Community Air Monitoring

Real-time air monitoring for total VOCs and particulate matter less than 10 micrometers in diameter (PM_{10}) was performed by Earth Tech during all ground-intrusive or dust-generating construction activities. Monitoring was performed using a perimeter air monitoring system generally consisting of four portable air monitoring stations and a portable weather station. Each air monitoring station contained: (1) a portable, data-logging photoionization detector for monitoring the airborne concentration of total VOCs; and (2) a portable, data-logging aerosol photometer for monitoring the airborne concentration of PM_{10}. Total VOC and PM_{10} monitoring equipment were housed in portable, weather-tight enclosures, and were programmed to alert project personnel (via alarm) if the 15-minute time-weighted average (TWA) concentration of total VOCs or PM_{10} exceeded the project action levels of 5.0 ppm or 150 micrograms per cubic meter ($\mu g/m^3$), respectively.

Air monitoring stations were deployed at the start of each work day before any ground-intrusive or dust-generating construction activities were initiated. One upwind and three downwind monitoring locations were selected at the perimeter of the work area based on the prevailing wind direction and the nature and location of work activities anticipated to be performed during the day. Wind direction was monitored throughout the day, and stations were re-located or re-assigned, as appropriate, if the wind direction shifted more than 60 degrees from the original upwind direction. Total VOC and PM_{10} data were generally downloaded from the air monitoring stations at the end of each work day and were stored at the project site in a computer database. The total VOC and PM_{10} air monitoring results for the Phase 1 Remedial Action are summarized in Appendix E-1 of this FER.

There were no exceedances of the total VOC action level (5.0 ppm) and six exceedances of the PM_{10} action level (150 $\mu g/m^3$) during the Phase 1 Remedial Action. For each PM_{10} exceedance, the following actions were taken:

- NYSDEC and NYSDOH were promptly notified;
- Corrective measures were implemented by Earth Tech; and
- A follow-up e-mail was sent to NYSDEC, NYSDOH, and the City of Oneida identifying the cause of the exceedance and the corrective measures implemented in response to the exceedance.

3.10 Waste Management

3.10.1 Solid Waste

A total of approximately 18,312 tons of solid waste was generated during the Phase 1 Remedial Action. Table 5 below summarizes the disposal facilities used on the project (by waste type) and the total estimated weight of material disposed of at each facility.

Table 5. Solid Waste Disposal Summary for the Phase 1 Remedial Action

Waste Stream	Disposal Facility	Estimated Weight (tons)
Excavated Soil and Debris	ESMI LTTD Facility	17,869
Crushed Stone from Temporary Material Staging, Containment, and Decontamination Areas	Oneida-Herkimer Solid Waste Authority Regional Landfill	208
Concrete Debris	Madison County Landfill	187
Geomembrane from Material Staging, Containment, and Decontamination Areas Wood Piles from Former Holder Foundation Abandoned Gas Piping from Former Gas Regulator Station	WMI High Acres Landfill	42
Used Granular Activated Carbon Media from Temporary Wastewater Treatment System	Siemens Water Technologies Corporation	4
Used Ion Exchange Resin Media from Temporary Wastewater Treatment System	CWM Chemical Services, LLC Model City Facility	2
Total	**--**	**18,312**

Copies of the shipping documents for each waste stream listed in Table 5 above are provided in Appendix F-1.

3.10.2 Construction Wastewater

A total of approximately 1,215,476 gallons of construction wastewater was generated, treated on-Site, and discharged to the City of Oneida POTW during the Phase 1 Remedial Action. The temporary wastewater treatment system for the project was designed to accommodate a nominal flow rate of 50 gallons per minute (gpm), and generally included the following components:

- One influent settling and separation (weir-type) tank (18,100-gallon capacity);
- One air stripper;
- One influent storage (frac-type) tank (21,000-gallon capacity);
- Four bag filter housing units with bag filters;
- Two treatment media vessels, each filled with liquid-phase granular activated carbon (GAC);

- Two treatment media vessels, each filled with ion exchange resin;
- Two effluent storage (frac-type) tanks (each with 21,000-gallon capacity); and
- Pumps, process piping, fittings, gages, valves, sample ports, instrumentation, and accessories.

The system was assembled and operated within a fully-lined containment area to prevent the accidental release of untreated wastewater. Treated wastewater was discharged to a sanitary sewer manhole located to the east of the Site.

Start-up testing was performed at the beginning of the project to verify the effectiveness of the system and involved the collection, treatment, testing, and discharge of two 20,000-gallon batches of groundwater extracted from Cell I. Thereafter, treated construction wastewater was discharged on a continuous basis and routine permit compliance samples were collected from the treated wastewater at a frequency of one sample for every 50,000 gallons discharged. Samples were submitted by Arcadis to TestAmerica for analysis of benzene, ethylbenzene, toluene, total xylenes, naphthalene, total cyanide, oil and grease, and pH. Chemical testing results for the permit compliance samples were compared to the discharge limits established in the wastewater discharge permit and were submitted on a periodic basis to the City of Oneida.

The chemical testing results for the permit compliance samples collected during the Phase 1 Remedial Action are presented in Appendix G-1 of this FER. As indicated therein, all results were below the discharge limits established in the City of Oneida wastewater discharge permit.

3.11 Deviations from the RD/RA Work Plan

The following is a summary of the deviations from the Phase 1 RD/RA Work Plan:

1. As described in Section 3.3.4, Earth Tech prepared an alternate design for the temporary excavation support system specified in the Phase 1 RD/RA Work Plan. In general, the alternate design divided the Phase 1 excavation area into four separate excavation areas (Cells I through IV) and used different bracing configurations. The alternate design did not affect the overall horizontal or vertical limits of excavation specified in the Phase 1 RD/RA Work Plan.
2. National Grid elected to leave temporary steel sheet piling in place along the northern, eastern, and western sides of Cell I, and along the western sides of Cells II through IV, for use during subsequent remediation phases. This decision was documented in a June 26, 2008 e-mail from Arcadis to NYSDEC and had been previously discussed amongst National Grid, Arcadis, Earth Tech, and NYSDEC during construction progress meetings held on June 19 and June 26, 2008.
3. National Grid elected to restore the Phase 1 excavation areas with crushed stone surfacing instead of the asphalt pavement specified in the Phase 1 RD/RA Work Plan. This decision was made in consideration of the future remediation phases to be conducted and the likelihood that new pavement (if installed) would be damaged during those activities and require future repair or replacement. For similar reasons, National Grid also elected to forego the installation of new chain-link fencing along the northern and eastern perimeter of the Site (temporary fencing was installed during restoration activities to secure the Site at the end of the Phase 1 Remedial Action).

4 PHASE 2 REMEDIAL ACTION

4.1 General

This section summarizes the primary components of the Phase 2 Remedial Action, which was conducted in the off-Site Tailrace area and off-Site Confluence area between June 2009 and May 2011 in accordance with the Phase 2 RD/RA Work Plan and *Cell 3A Remediation Plan* (AECOM 2010). The *Cell 3A Remediation Plan* included an alternate design for the remediation of Cell 3A (identified in the Phase 2 RD/RA Work Plan as the "Jet Grout Area"). In lieu of excavating to the top of the 30-inch diameter asbestos-cement sanitary sewer line and solidifying in-place (via jet grouting) underlying soil to elevation 400.0 feet above the National Geodetic Vertical Datum of 1929 (NGVD29), the alternate design involved the excavation of soil to elevation 400.0 feet NGVD29 and removal and replacement of the manhole and portion of the sanitary sewer line located within the excavation area.

The as-built survey drawings and representative photographs for the Phase 2 Remedial Action are provided in Appendices B-2 and C-2, respectively, of this FER.

4.2 Contractors and Consultants

The Phase 2 Remedial Action was conducted on behalf of National Grid by AECOM of Latham, New York. Table 6 below identifies the key AECOM subcontractors and suppliers that also had significant roles on the project.

Table 6. AECOM Subcontractors and Suppliers

Subcontractor/Supplier	Role	Contact Information
Callanan Industries, Inc.	Source of Crushed Stone and Riprap	Oxbow Quarry 6375 Tuttle Road Canastota, New York 13032 NYSDEC Mine ID No. 70017 NYSDOT Source No. 2-11R
CME Associates, Inc.	Geotechnical Testing Laboratory	PO Box 1824 8560 Brewerton Road Cicero, New York 13039
Columbia Analytical Services, Inc.	Chemical Testing Laboratory	1 Mustard Street Suite 250 Rochester, New York 14609
Environmental Contracting & Construction Services, LLC	Removal of Asbestos-Cement Sewer Pipe in Cell 3A	6286 East Taft Road Syracuse, New York 13212
ESMI of New York, LLC Low-Temperature Thermal Desorption Facility	Disposal Facility for Conditionally-Exempt MGP Remediation Waste	304 Towpath Road Fort Edward, New York 12828
HSE Consulting Services, LLC	Community Air Monitoring	8636 Brewerton Road Cicero, New York 13039

Subcontractor/Supplier	Role	Contact Information
Johnson's Sand Bed, Inc.	Source of General Fill Material	1483 Middle Road Oneida, New York 13421 NYSDEC Mine ID No. 70093
M.A. Bongiovanni, Inc.	Pile Driving for Temporary Excavation Support Systems and Sewer Bypass Pumping	1400 Jamesville Avenue PO Box 147 Colvin Station Syracuse, New York 13205
Madison County Solid Waste Department County Landfill	Disposal Facility for Non-Regulated Soil and Debris	6663 Buyea Road Canastota, New York 13032
N&M Enterprises, Inc. (dba Nick's Landscaping)	Supplier of Topsoil	2296 Lake Road Oneida, New York 13421
Reddington Services	Hydroseeding	1071 Rose Valley Road Cold Brook, New York 13324
Seneca Meadows, Inc. Landfill	Disposal Facility for Railroad Ties	1786 Salcman Road Waterloo, New York 13165
Snyder Construction Company, Inc.	Source of Subbase Material (Run-of-Bank Gravel)	Munnsville Gravel Bed – Pratts Road 1264 Glenwood Avenue Oneida, New York 13421 NYSDEC Mine ID No. 70106
TestAmerica Laboratories, Inc.	Chemical Testing Laboratory for Topsoil	10 Hazelwood Drive Amherst, New York 14228
Thew Associates PE-LS, PLLC	Construction Surveys	9478 River Road Marcy, New York 13403
Thomas Drilling and Blasting Corporation	Tieback Installation	PO Box 200, Route 9 Spofford, New Hampshire 03462

Arcadis provided daily observation and documentation of the work performed by AECOM, and Synapse Engineering Solutions (SES) managed and administered the AECOM contract on behalf of National Grid. Colden Corporation (Colden) served as the asbestos project monitor and performed asbestos air sampling on behalf of National Grid during the removal of the portion of 30-inch diameter asbestos-cement sewer line located within Cell 3A.

4.3 Pre-Construction, Mobilization, and Site Preparation Activities

4.3.1 Soil Characterization and Monitoring Well Decommissioning

Arcadis conducted soil characterization and monitoring well decommissioning activities in the off-Site Tailrace area between March 2 and March 12, 2009. The scope of these activities was presented in a November 3, 2008 letter from National Grid to NYSDEC (National Grid 2008d) and generally involved the:

(1) drilling of 23 soil borings; (2) collection of representative soil samples for chemical testing; and (3) decommissioning of monitoring wells MW-101, MW-104, MW-ES-5 and piezometers P-3D, and P-3S. The soil characterization activities were conducted to facilitate the disposal of materials to be excavated during the Phase 2 Remedial Action. Decommissioning activities were conducted to remove wells/piezometers that: (1) were located either within or immediately adjacent to the horizontal limits of excavation for the Phase 2 Remedial Action and (2) extended below the vertical limits of excavation for the Phase 2 Remedial Action.

In conjunction the above activities and at the request of NYSDEC, an additional soil boring was drilled to the east of the Site to investigate the potential presence and extent of NAPL blebs that, during the Phase 1 Remedial Action, had been observed in the groundwater leaking through the eastern sheet pile wall of Cell II. The additional soil boring was drilled (1) approximately 5 feet east of the surveyed location of the leak in the Cell II sheet pile wall and (2) to a total depth of 20 feet bgs. NAPL was not observed in the soil samples collected from the boring. A representative of NYSDEC was present to observe the drilling and soil sampling activities, and the results were summarized in electronic correspondence from Arcadis to NYSDEC on March 17, 2009.

4.3.2 Permits and Approvals

4.3.2.1 Threatened/Endangered Species Assessment and Tree Clearing

National Grid and Arcadis coordinated with the United States Fish and Wildlife Service (USFWS) to identify potential threatened/endangered species in the area of the Site. Of the three threatened/endangered species known to exist in Madison County, only the Indiana bat (*Myotis sodalis*) had the potential to be affected by the construction activities.

The Indiana bat habitat includes caves and mines (hibernacula) and wooded areas with trees equal to or greater than 9 inches in diameter (maternity colonies) or 5 inches in diameter (roosting). While there are no caves or mines in the area of the Site, trees in the wooded areas surrounding the off-site Tailrace area (especially south of the Tailrace) required removal to facilitate the construction activities. In order to mitigate potential impacts to the Indiana bat, USFWS required that National Grid complete all tree clearing activities between October 2008 and April 17, 2009 (while the Indiana bat is hibernating).

The pre-construction tree clearing activities were performed by National Grid between March 30 and April 15, 2009. Table 7 below summarizes the number and species of trees greater than six inches in diameter at breast height (DBH) that were cleared by National Grid before the start of construction.

Table 7. Pre-Construction Tree Clearing Summary for the Phase 2 Remedial Action

Tree Species	Number of Trees Greater than 6” DBH		
	North of Tailrace	South of Tailrace	Total
Green Ash (*Fraxinus pennsylvanica*)	0	71	71

Tree Species	Number of Trees Greater than 6" DBH		
	North of Tailrace	South of Tailrace	Total
White Ash (*Fraxinus americana*)	3	0	3
Box Elder (*Acer negundo*)	14	8	22
Cottonwood (*Populus deltoides*)	0	4	4
American Elm (*Ulmus Americana*)	8	2	10
Red Maple (*Acer rubrum*)	1	0	1
Silver Maple (*Acer saccharinum*)	0	3	3
Walnut (*Juglans nigra*)	3	1	4
Willow (*Salix alba*)	1	1	2
Snag[1] of Unknown Species	2	5	7
Total	**32**	**95**	**127**

Table Notes:

1. Snag refers to a standing dead or dying tree, often missing a top or most of the smaller branches.

4.3.2.2 Cultural Resources Investigation

A Phase IA cultural resources investigation of the Site and off-site Tailrace area was performed on behalf of National Grid by Panamerican Consultants, Inc. (Panamerican) to: (1) assess archaeological sensitivity; and (2) evaluate the potential for identifying intact cultural resources during the Phase 2 Remedial Action. The results of the investigation were submitted to the New York State Office of Parks, Recreation, and Historic Places (NYSOPRHP) on March 9, 2009. In its report, Panamerican concluded that there was a very low probability of intact prehistoric or historic cultural resources within the project area on account of the continued disturbance and redevelopment of the land through the years (Panamerican 2009). A "no impact" determination was subsequently issued by NYSOPRHP on March 11, 2009.

4.3.2.3 Nationwide Permit and Water Quality Certification

A pre-construction notification and joint permit application for United States Army Corps of Engineers (USACE) Nationwide Permit No. 38 and NYSDEC Section 401 Water Quality Certification were submitted

to USACE and NYSDEC on November 6, 2008. Supplemental information requested by USACE was submitted to both USACE and NYSDEC on March 11, 2009. The Section 401 Water Quality Certification was issued by NYSDEC on March 30, 2009 and authorization to perform work under Nationwide Permit No. 38 was granted by USACE on April 7, 2009.

The required compliance certification, stating that the project was completed in accordance with the Nationwide Permit No. 38 authorization, was submitted to USACE on September 8, 2011.

4.3.2.4 Wastewater Discharge Permits

National Grid obtained a State Pollution Discharge Elimination System (SPDES) equivalency permit from NYSDEC on June 4, 2009 that allowed National Grid to directly discharge treated construction wastewater generated during the project to Oneida Creek. The SPDES equivalency permit was obtained as a contingency measure in the event that the City of Oneida POTW was unable to accept project-related discharges due to high flow/wet weather conditions. However, all treated wastewater generated during the Phase 2 Remedial Action was ultimately discharged to the City of Oneida POTW, and the SPDES equivalency permit was never used during the project.

National Grid and Arcadis also coordinated with the City of Oneida to renew the wastewater discharge permit previously issued for the Phase 1 Remedial Action. On February 1, 2010, the City of Oneida issued an amendment to the existing permit that: (1) extended the permit through the completion of the Phase 3 Remedial Action; (2) increased the volume of treated construction wastewater that could be discharged to the POTW from 50,000 gallons per day to 100,000 gallons per day; and (3) reduced the required sampling frequency for treated construction wastewater from one sample for every 50,000 gallons discharged to one sample for every 100,000 gallons discharged.

4.3.2.5 Floodplain Development Permit

The floodplain development permit previously issued by the City of Oneida for the Phase 1 Remedial Action had no expiration date and therefore did not need to be renewed for the Phase 2 Remedial Action.

4.3.2.6 Asbestos Variance

On September 29, 2010, Colden Corporation (Colden), on behalf of National Grid, filed an asbestos variance petition with the New York State Department of Labor (NYSDOL) for the removal of the portion of asbestos-cement sewer line located within Cell 3A. The asbestos variance was granted by NYSDOL on September 30, 2010. A copy of the asbestos variance is included in Colden's asbestos monitoring report (Colden 2010), which is provided in Appendix H of this FER.

4.3.3 Sanitary Sewer Inspection

On March 30, 2009, Arcadis performed a televised inspection of the portion of the 30-inch diameter asbestos-cement sanitary sewer line that passes below the Tailrace to the east of the Site. The inspection was performed to assess and document the pre-construction condition of the sanitary sewer line located within Cell 3A (identified in the Phase 2 RD/RA Work Plan as the "Jet Grout Area"). As further described in Sections 4.5 and 4.7.1 below, a portion of the sanitary sewer line was removed and replaced in conjunction with the remediation activities in Cell 3A.

4.3.4 Pre-Construction Meeting

A pre-construction meeting was held at the Site on May 13, 2009 to discuss the planned scope and sequence of construction activities. The meeting was attended by representatives of NYSDEC, National Grid, SES, Arcadis, AECOM, and the City of Oneida. Topics covered at the pre-construction meeting included project communications, health and safety, community air monitoring, community relations, security, work hours, and project schedule.

4.3.5 Mobilization

AECOM personnel, equipment, materials, and incidentals were mobilized to the Site in June 2009.

4.3.6 Initial Contractor Submittals

AECOM prepared several initial submittals, including an Operations Plan, a HASP, and a Contingency Plan. The HASP and Contingency Plan were submitted electronically to NYSDEC on June 26, 2009.

4.3.7 Pre-Construction Topographic Survey

Thew performed a pre-construction survey to: (1) document existing conditions in the portion of the off-Site area where the remediation activities would be performed; (2) demarcate the horizontal limits of excavation for each remedial excavation area; and (3) establish horizontal and vertical survey control on a minimum 15-foot by 15-foot grid within the remedial excavation areas. Survey control was maintained throughout the remedial excavation, backfilling, and restoration activities to ensure the proper execution, construction, and documentation of the work.

4.3.8 Utility Clearance and Mark-Out

AECOM coordinated with an appropriate utility locator service to: (1) demarcate existing subsurface utilities in the area of the Site and off-Site Tailrace area; and (2) confirm that there were no unknown active utilities that would be affected by the remediation activities.

4.3.9 Temporary Erosion and Sediment Controls

Temporary erosion and sediment controls, including silt fencing, hay bales, and stone check dams, were installed by AECOM before initiating ground-intrusive activities, and were inspected and maintained throughout the project. A turbidity curtain was also installed and maintained in Oneida Creek during the remediation of Cells 9 and 9A. Oil-absorbent booms were installed and maintained at several locations within the Tailrace and temporary bypass channel during the Phase 2 Remedial Action.

4.3.10 Access Controls

Existing surface features and debris were cleared from the work area by AECOM to facilitate the remediation activities. AECOM also installed temporary project signage and established access controls, consisting of existing or temporary chain-link fencing and gates, to prevent access to the work area by unauthorized personnel and vehicles.

4.3.11 Material Staging, Decontamination, and Containment Areas

Material staging, decontamination, and containment areas were constructed by AECOM prior to initiating excavation activities.

4.3.12 Temporary Bypass Channel

A temporary bypass channel was constructed south of and parallel to the Tailrace to convey storm water during the remedial excavation, backfilling, and restoration activities in the Tailrace. The construction of the temporary bypass channel involved the excavation of approximately 1,460 cy of soil, which was stockpiled on a temporary basis within a material staging area and re-used as backfill in Cells 1, 3, and 4 in accordance with the Phase 2 RD/RA Work Plan. The two existing storm sewers that discharge to the Tailrace – a nominal 42-inch diameter storm sewer on City-owned property to the west of the Site and a nominal 36-inch diameter storm sewer on City-owned property to the north of the Site – were cut outside of the limits of excavation and were connected to new manholes MH-1 and MH-2, respectively. Temporary 36-inch diameter high-density polyethylene (HDPE) piping was then installed from each manhole to the temporary bypass channel. Storm water conveyed by the temporary bypass channel was reintroduced into the eastern end of the Tailrace (in the area of Cell 8B) through two temporary 48-inch diameter HDPE pipes.

Two 4,500-gpm self-priming pumps were positioned at the eastern end of the temporary bypass channel (on the flood control levee), and were used to pump storm water from the temporary bypass channel directly to Oneida Creek during (1) the remediation of Cell 8B and (2) potential flooding or heavy precipitation events.

4.3.13 Temporary Access Road

A temporary access road was constructed between and parallel to the Tailrace and temporary bypass channel to facilitate construction activities during the Phase 2 Remedial Action. The temporary access road generally consisted of a woven geotextile (separation layer) and 12 inches of compacted gravel.

4.3.14 Sampling and Analysis of Imported Fill Materials

AECOM's sources of general fill material, subbase material (run-of-bank gravel), clay fill material, and topsoil were sampled to verify their suitability for use on the project. Samples were submitted by AECOM to Columbia Analytical Services, Inc. (general fill material, subbase material, and clay fill material) and TestAmerica (topsoil), and were analyzed for VOCs, SVOCs, PCBs, pesticides/herbicides, and metals. The topsoil sample was also analyzed for pH and organic content. The chemical testing results were submitted electronically to NYSDEC on June 26, 2009 (general fill material and subbase material), October 8, 2009 (clay fill material), and April 5, 2011 (topsoil), and are provided in Appendix D-2 of this FER.

The chemical testing results for AECOM's fill materials met the applicable SCOs for residential use, as set forth in Table 375-6.8(b) of 6 NYCRR 375, and were therefore suitable for use as backfill during the project.

4.4 Temporary Excavation Support Systems

4.4.1 Installation

The temporary excavation support system for each remedial excavation area employed either: (1) new PZC-18 steel sheet piling (Cells 1, 3A, 4 through 7, 8A, 8B, 9, and 9A): or (2) a combination of new PZC-18 sheet piling and existing PZC-18 sheet piling that had been installed and left in place during the Phase 1 Remedial Action (Cells 2 and 3). Prior to installation, Thew surveyed and marked-out the sheet pile alignment for each remedial excavation area. Pre-trenching was then conducted, generally to a depth of approximately 4 feet bgs, along the surveyed sheet pile alignment to remove potential surface and shallow subsurface obstructions. A hydrophilic waterstop sealant was then applied to the female sheet pile interlock to reduce the potential for groundwater infiltration through the installed sheet pile wall.

Sheet piles were installed to the minimum tip elevations specified in Phase 2 RD/RA Work Plan using a vibratory hammer. Excavation activities were initiated once the sheet piles for a given remedial excavation area were installed, and internal bracing (consisting of steel wales and struts) or external bracing (consisting of an internal steel wale and drilled/grouted tieback anchors), as appropriate, was installed once the excavation was advanced to the required intermediate elevation specified in the Phase 2 RD/RA Work Plan.

4.4.2 Sheet Pile Deflection Monitoring

Angular tiltmeters were mounted on sheet piles at up to six locations around the perimeter of each remedial excavation area to monitor sheet pile deflection while excavating and backfilling in each area. Tiltmeter readings were generally collected twice per work day (in the morning and afternoon) until the remedial excavation area was backfilled to the required intermediate elevation specified in the Phase 2 RD/RA Work Plan.

4.4.3 Removal

The removal of the temporary excavation support system in each remedial excavation area generally began once the excavation had been backfilled to the required intermediate elevation specified in the Phase 2 RD/RA Work Plan, at which point the internal bracing was removed (Cells 1, 2, 3, 3A, and 8B) or the tieback anchors were cut and abandoned in place (Cells 4 through 7). Sheet pile removal/decontamination activities were generally initiated once the remedial excavation area had been backfilled to within 18 inches of final grade. Sheet piles were decontaminated as they were being removed from the ground. If NAPL was observed on a sheet pile during this process, the pile was wrapped in polyethylene sheeting and relocated to a material staging area for further decontamination. Once removed and decontaminated, sheet piles were either (1) inspected and prepared for re-installation in other remedial excavation areas or (2) staged for subsequent demobilization.

In accordance with the Phase 2 RD/RA Work Plan, temporary sheet piles were left in place along the southeastern and southwestern sides of Cell 1 for use during the Phase 3 Remedial Action. In addition, although not specified in the Phase 2 RD/RA Work Plan, a portion of the sheet pile wall (19 sheet piles total) separating Cells 3A and 4 was cut approximately 18 inches below final grade and left in place.

4.5 Remedial Excavation

Excavations in each remedial excavation area were advanced to the horizontal and vertical limits shown or indicated on the as-built survey drawings (Appendix B-2). As noted on those drawings, portions of several remedial excavation areas were either over-excavated or under-excavated relative to the target excavation elevations specified in the Phase 2 RD/RA Work Plan. Over-excavation (i.e., excavation deeper than the target excavation elevation) was conducted to the extent practicable, given constructability restrictions, to remove discrete areas or lenses of MGP-impacted soil that extended below the target excavation elevations. Under-excavation (i.e., excavation shallower than the target excavation elevation) was generally conducted, with NYSDEC concurrence, where the clean clay confining unit was encountered above the target excavation elevation.

In Cell 4, a gravel lens containing NAPL was encountered below the target excavation elevation that, due to constructability restrictions, could not be completely removed. The remaining portion of the impacted gravel lens was located between approximately 16.4 and 20.3 feet bgs within a roughly 10-foot by 10-foot depression in the top of the clay confining unit. The area was surveyed and a 6-inch diameter polyvinyl chloride recovery well (identified as RW-1 on Figure 4) was subsequently installed in that area to passively collect and remove the remaining NAPL in the gravel lens. The construction log for recovery well RW-1 is provided in Appendix I of this FER.

In addition, during the excavation of Cell 9, MGP-impacted sediment was observed within Cell 9 up to the western sheet pile wall and the western portion of the northern sheet pile wall. On September 16, 2010, a limited investigation, consisting of sediment probing and sampling, was conducted by Arcadis under the supervision of NYSDEC to delineate the extent of MGP-impacted material to the west and north of Cell 9 (outside of the Cell 9 design excavation limits). Based on the results of that investigation and at the request of NYSDEC, new excavation areas were added along the northern and western sides of Cell 9, and were collectively designated as “Cell 9A”. On October 18, 2010, USACE and NYSDEC’s Region 7 permitting representative were notified of the additional excavation activities to be performed in Oneida Creek under Nationwide Permit No. 38 and the NYSDEC Section 401 Water Quality Certification.

The remediation activities in Cell 3A involved the removal of the existing manhole and approximately 70 linear feet of asbestos-cement sewer pipe. The removal of the asbestos-cement sewer pipe was performed on behalf of AECOM by Environmental Contracting & Construction Services, LLC on October 4, 2010. Once removed, the asbestos-cement pipe was: (1) wrapped in two layers of six-mil polyethylene sheeting; (2) transferred into a closed-top roll-off container; and (3) disposed of at the Madison County landfill. During the removal of the pipe, Colden conducted asbestos project monitoring on behalf of National Grid. A copy of the asbestos monitoring report is provided in Appendix H of this FER.

In conjunction with the remediation activities in Cell 3A, MAB installed a temporary bypass pumping system to divert wastewater normally conveyed by the existing 30-inch diameter asbestos-cement sanitary sewer. The bypass pumping system included a primary 2,188-gpm self-priming pump and a secondary (back-up) 5,500-gpm self-priming pump. Wastewater was pumped from the upgradient manhole located east of the Site to a downgradient manhole located approximately 280 feet north of the railroad embankment. As described in Section 4.7.1, temporary bypass pumping was discontinued upon completion of the sewer and manhole restoration activities in Cell 3A.

To the extent practicable, excavated soil and debris were loaded directly into transport vehicles for disposal at the ESMI LTTD facility in Fort Edward, New York. In instances when direct loading was not practicable (e.g., due to scheduling, the availability of transport vehicles, etc.), excavated materials were stored in temporary stockpiles located within either the remedial excavation areas or a material staging area. The final horizontal and vertical limits of excavation in each remedial excavation area were surveyed by Thew and approved by NYSDEC's on-site representative in the field before backfilling activities were initiated.

Post-excavation confirmation sampling was not conducted because the remedial excavation areas were generally advanced to the pre-determined limits set forth in the AROD and Confluence Sampling Report (with such NYSDEC-approved modifications as described above and in Section 4.12 of this FER). Those pre-determined limits were based on the results of the preliminary site assessment (Engineering Science, Inc. 1994), remedial investigation (Parsons 1997), pre-design investigation (BBL 2001), and off-Site Confluence investigation (National Grid 2002a, 2002b), which were summarized on the figures included in Attachment A of the *Review of Current Site/Project Conditions and Proposed Adjustments to Remedial Approach* (National Grid 2007). Those pre-remediation soil investigation summary figures have been included in Appendix L of this FER. The temporary excavation support systems for the remedial excavation areas also prevented the collection of post-excavation confirmation samples. Monitoring well locations, post-remediation groundwater sampling results, and the approximate extent of shallow groundwater containing dissolved-phase COCs at concentrations greater than the applicable New York State Class GA ambient water quality standards or guidance values are shown on Figure 4 of this FER.

Table 8 below summarizes the volume and disposition (disposal or re-use) of material excavated from each remedial excavation area during the Phase 2 Remedial Action.

Table 8. Remedial Excavation Summary for the Phase 2 Remedial Action

Remedial Excavation Area	Approximate Excavation Volume (cy)		
	Disposal	Re-Use as Subsurface Backfill[1]	Total
Cell 1	4,081	0	4,081
Cell 2	3,498	40	3,538
Cell 3	995	0	995
Cell 3A (former Jet Grout Area)	914	0	914
Cell 4	4,079	0	4,079
Cell 5	3,796	0	3,796
Cell 6	6,713	0	6,713
Cell 7	5,819	1,056	6,875
Cell 8A	2,004	0	2,004
Cell 8B	314	0	314

Remedial Excavation Area	Approximate Excavation Volume (cy)		
	Disposal	Re-Use as Subsurface Backfill[1]	Total
Cell 9	205	0	205
Cell 9A	31	0	31
Total	**32,449**	**1,096**	**33,545**

Table Notes:

1. Re-use materials in Cells 2 and 7 were visually inspected by Arcadis and NYSDEC's on-site representative during the remedial excavation activities to verify the absence of NAPL. Once excavated, re-use materials were temporarily stockpiled in a material staging area or on polyethylene sheeting within or adjacent to the remedial excavation areas, and were covered with polyethylene sheeting when no loading or unloading activities were occurring.

Remedial excavation areas were dewatered using localized sumps and submersible pumps. As further described in Section 4.11.2 of this FER, groundwater resulting from dewatering operations was treated at the Site using a temporary wastewater treatment system and discharged to the City of Oneida POTW in accordance with the wastewater discharge permit.

Soil excavated from below the groundwater table was amended with CKD prior to loading to help reduce excess moisture. Excavated debris (e.g., concrete, brick, etc.) was down-sized as required by the disposal facilities. Excavated debris that was not suitable for disposal at the ESMI LTTD facility, including the asbestos cement sewer pipe from Cell 3A, wood railroad ties, concrete, and stone, was disposed of at either the Seneca Meadows, Inc. landfill (wood railroad ties) or the Madison County landfill (concrete and stone).

Before loading excavated soil and debris, the bed and sidewalls of each transport vehicle were lined with polyethylene sheeting. After each vehicle was loaded, a non-mesh tarpaulin was secured over the top of the bed, and the wheels and undercarriage were inspected to identify (and remove, if necessary) any visible soil or debris. A shipping document was then prepared and signed by Arcadis (as National Grid's authorized representative) for each vehicle before it left the project site. Truck traffic, both to and from the project site, followed the designated truck route established for the project.

4.6 Backfilling

Backfilling activities in each remedial excavation area were initiated with NYSDEC concurrence that: (1) the target excavation elevation had been achieved or a clean clay confining unit had been encountered; and (2) no standing water or NAPL was present at the base of the excavation. Remedial excavation areas were generally backfilled to within 12 inches or less of final grade with either imported fill material (Cells 3A, 5, 7, 8A, 8B, 9, and 9A) or a combination of re-use material and imported fill material (Cells 1, 2, 3, 4, and 6), as summarized in Table 9 below.

Table 9. Backfill Summary for the Phase 2 Remedial Action

Remedial Excavation Area	Approximate Backfill Volume (cy)		
	Re-Use Material[1]	Imported Fill Material	Total
Cell 1	543[2]	3,064	3,607
Cell 2	40[3]	3,282	3,322
Cell 3	774[2]	168	942
Cell 3A (former Jet Grout Area)	0	865[4]	865
Cell 4	145[2]	3,474	3,619
Cell 5	0	3,299	3,299
Cell 6	1,056[5]	5,557	6,613
Cell 7	0	6,766	6,766
Cell 8A	0	1,917	1,917
Cell 8B	0	273	273
Cell 9	0	2146	214
Cell 9A	0	446	44
Total	**2,558**	**28,923**	**31,481**

Table Notes:

1. Re-use material was used as backfill at depths greater than 6 feet bgs.
2. Re-use material used as backfill in Cells 1, 3, and 4 consisted entirely of re-use soil resulting from the construction of the temporary bypass channel.
3. Re-use material used as backfill in Cell 2 consisted entirely of concrete and stone debris resulting from the demolition of the buried railroad bridge abutments in Cell 2.
4. Cell 3A was backfilled with a combination of 3/4-inch stone and general fill material as shown on the as-built survey drawings (Appendix B-2).
5. Re-use material used as backfill in Cell 6 consisted entirely of re-use soil from Cell 7.
6. Cell 9 and the western portion of Cell 9A were backfilled to within approximately 6 inches of final grade with run-of-bank gravel. The northern portion of Cell 9A was not backfilled; it was allowed to silt in naturally.

Backfill materials were generally placed in 12-inch compacted lifts throughout each remedial excavation area. In-place density tests were performed by CME Associates, Inc. to confirm that the compaction requirements had been achieved. Backfill materials in Cells 9 and 9A were compacted to the extent practicable, and no compaction testing was performed those areas.

4.7 Site Restoration and Demobilization

4.7.1 Restoration

A new 30-inch diameter ductile iron pipe (DIP) and new pre-cast concrete manhole were installed in Cell 3A to replace the portion of existing 30-inch diameter asbestos-cement pipe and existing manhole that were removed during the remedial excavation activities. The new 30-inch DIP was connected to the upgradient and downgradient ends of the existing sanitary sewer using flexible couplings with concrete collars. Approximately 30 linear feet of the new DIP, generally where the pipe crosses below the Tailrace, was encased in fiber-reinforced concrete since less than 3 feet of cover would be provided above the top of the pipe. Temporary bypass pumping was discontinued upon completion of the sanitary sewer restoration activities in Cell 3A.

The channel of the Tailrace was restored to final grade with approximately 9 inches of riprap. A portion of the channel, generally located north of the Site at the outlet of the nominal 36-inch diameter storm sewer outfall, was restored to final grade with a concrete revetment mattress. The southern bank of the Tailrace and other previously-vegetated areas were restored to final grade with 6 inches of topsoil, which was seeded at a rate of approximately one pound per 1,000 square feet with the specified mixture of grass species. Seeded areas were covered with erosion control blankets, and silt fencing was installed and maintained until new grass was established. A new pre-cast concrete headwall was installed at the end of the Tailrace in Cell 8B. The headwall was connected to the existing nominal 48-inch diameter corrugated metal pipe beneath the flood control levee using a short section of new 48-inch diameter HDPE pipe and a flexible coupling. Cell 9 and the western portion of Cell 9A were restored to final grade with approximately 6 inches of riprap.

The temporary access road located south of the Tailrace was removed and was used in the construction of a new gravel access road north of the Tailrace along the toe of the railroad embankment. New culverts, consisting of 48-inch diameter HDPE pipe, were installed in Cells 2 and 7 where the new access road crossed the Tailrace.

The temporary bypass channel was backfilled and all temporary bypass piping was removed upon completion of the Tailrace restoration activities.

4.7.2 Final Inspection

A final inspection of the project site was conducted on May 19, 2011 and attended by representatives of National Grid, SES, Arcadis, AECOM, NYSDEC, and the City of Oneida.

4.7.3 Post-Construction Topographic Survey

Thew performed a post-construction survey to document the final (as-built) topographic conditions and features within the project work limits. Those conditions are depicted on the as-built survey drawings provided in Appendix B-2 of this FER.

4.7.4 Demobilization

Following confirmation that all restoration activities had been completed, AECOM demobilized the remaining personnel, equipment, materials, and temporary facilities from the project site. Demobilization activities were substantially complete by May 19, 2011.

4.8 NAPL Monitoring and Removal

Between February 15, 2010 and May 26, 2011, approximately 145 gallons of a NAPL/groundwater mixture was removed from recovery well RW-1 during the Phase 2 Remedial Action. NAPL monitoring and removal activities were generally performed on a daily basis between February 15, 2010 and March 17, 2010, on a weekly basis between March 17, 2010 and June 17, 2010, and on a monthly basis between June 17, 2010 and May 26, 2011. For each monitoring event, an oil-water interface probe was used to: (1) determine the presence or absence of NAPL; and (2) measure the depth to groundwater, depth to NAPL (where present), and total depth of the well. In general, NAPL accumulations greater than 1.0 foot in thickness were removed, to the extent practicable, using a peristaltic pump and disposable polyethylene tubing. Removed NAPL and groundwater were transferred into 55-gallon drums, which were stored within the Service Center Building at the Site. Table J-1 in Appendix J of this FER summarizes the NAPL thickness measurements and approximate volume of NAPL/groundwater removed from recovery well RW-1 for each monitoring event (including those monitoring events conducted in 2011 and 2012 after the completion of the Phase 2 Remedial Action).

4.9 Odor, Vapor, and Dust Control

Odor, vapor, and dust controls were proactively employed during the remediation activities to mitigate the potential for odor, vapor, and dust emissions from the project site. Such controls included, but were not necessarily limited to, the following:

- Covering material stockpiles when no loading or unloading activities were occurring;
- Spraying BioSolve Pinkwater solution on soils during active excavation/load-out;
- Periodically foaming excavation faces/excavated soils before work breaks and at the end of the work day;
- Covering open excavation faces with polyethylene sheeting during extended periods of inactivity;
- Removing soil and debris from, and spraying water on, active haul routes;
- Hauling excavated materials and clean fill materials in properly tarped/covered transport vehicles; and
- Restricting vehicle speeds on temporary access roads and active haul routes.

4.10 Community Air Monitoring

Real-time air monitoring for total VOCs and PM_{10} was performed by HSE Consulting Services, LLC during all ground-intrusive or dust-generating construction activities. Monitoring was performed using a perimeter air monitoring system generally consisting of four portable air monitoring stations and a

portable weather station. Each air monitoring station contained: (1) a portable, data-logging photoionization detector for monitoring the airborne concentration of total VOCs; and (2) a portable, data-logging aerosol photometer for monitoring the airborne concentration of PM_{10}. Total VOC and PM_{10} monitoring equipment were housed in portable, weather-tight enclosures, and were programmed to alert project personnel (via alarm) if the 15-minute TWA concentration of total VOCs or PM_{10} exceeded the project action levels of 5.0 ppm or 150 µg/m^3, respectively.

Air monitoring stations were deployed at the start of each work day before any ground-intrusive or dust-generating construction activities were initiated. One upwind and three downwind monitoring locations were selected at the perimeter of the work area based on prevailing wind direction and the nature and location of work activities anticipated to be performed during the day. Wind direction was monitored throughout the day, and stations were re-located or re-assigned, as appropriate, if the wind direction shifted more than 60 degrees from the original upwind direction. Total VOC and PM_{10} data were generally downloaded from the air monitoring stations at the end of each work day and were stored at the project site in a computer database. Community air monitoring results for total VOCs and PM_{10} were reported to NYSDEC and NYSDOH on a weekly basis. Those results are summarized in Appendix E-2 of this FER.

There were no exceedances of the total VOC action level (5.0 ppm) and two exceedances of the PM_{10} action level (150 µg/m^3) during the Phase 2 Remedial Action. For each PM_{10} exceedance, the following actions were taken:

- NYSDEC and NYSDOH were promptly notified;
- Corrective measures were implemented by AECOM; and
- A follow-up e-mail was sent to NYSDEC, NYSDOH, and the City of Oneida identifying the cause of the exceedance and the corrective measures implemented in response to the exceedance.

4.11 Waste Management

4.11.1 Solid Waste

A total of approximately 59,456 tons of solid waste was generated during the Phase 2 Remedial Action. Table 10 below summarizes the disposal facilities used on the project (by waste type) and the total estimated weight of material disposed of at each facility.

Table 10. Solid Waste Disposal Summary for the Phase 2 Remedial Action

Waste Stream	Disposal Facility	Estimated Weight (tons)
Excavated Soil and Debris	ESMI LTTD Facility	58,911
Concrete and Stone Debris	Madison County Landfill	530
Railroad Ties	Seneca Meadows, Inc. Landfill	15
Total	**--**	**59,456**

Copies of the shipping documents for each waste stream listed in Table 10 above are provided in Appendix F-2 of this FER.

4.11.2 Construction Wastewater

A total of approximately 4,814,817 gallons of construction wastewater was generated, treated on-Site, and discharged to the City of Oneida POTW during the Phase 2 Remedial Action. The temporary wastewater treatment system for the project was designed to accommodate a nominal flow rate of 50 gpm, and generally included the following components:

- One influent settling and separation (weir-type) tank (18,100-gallon capacity);
- One air stripper;
- One influent storage (frac-type) tank (21,000-gallon capacity);
- Four bag filter housing units with bag filters;
- Two treatment media vessels, each filled with liquid-phase GAC;
- Two treatment media vessels, each filled with ion exchange resin;
- Two effluent storage (frac-type) tanks (each with 21,000-gallon capacity); and
- Pumps, process piping, fittings, gages, valves, sample ports, instrumentation, and accessories.

The system was assembled and operated within a fully-lined containment area to prevent the accidental release of untreated wastewater. Treated wastewater was discharged to a sanitary sewer manhole located to the east of the Site.

Start-up testing was performed at the beginning of the project to verify the effectiveness of the system and involved the collection, treatment, testing, and discharge of two 20,000-gallon batches of groundwater extracted from Cell 1. Thereafter, treated construction wastewater was discharged on a continuous basis. Routine permit compliance samples were initially collected from the treated wastewater at a frequency of one sample for every 50,000 gallons discharged. Beginning on December 14, 2009, the sampling frequency was reduced to one sample for every approximately 100,000 gallons discharged with the approval of the City of Oneida. Samples were submitted by Arcadis to TestAmerica for analysis of benzene, ethylbenzene, toluene, total xylenes, naphthalene, total cyanide, oil and grease, and pH. Chemical testing results for the permit compliance samples were compared to the discharge limits established in the wastewater discharge permit and were submitted on a periodic basis to the City of Oneida.

The chemical testing results for the permit compliance samples collected during the Phase 2 Remedial Action are presented in Appendix G-2 of this FER. As indicated therein, all results were below the discharge limits established in the City of Oneida wastewater discharge permit.

4.11.3 NAPL

NAPL and groundwater removed from recovery well RW-1 between February 15, 2010 and July 13, 2010 (approximately 142 gallons total) and disposable equipment used during the NAPL monitoring and removal activities were disposed of at the Clean Harbors El Dorado, LLC incineration facility located in El Dorado, Arkansas. A copy of the shipping document is provided in Appendix F-2 of this FER.

4.12 Deviations from the Design Documents

The following is a summary of the deviations from the Phase 2 RD/RA Work Plan and *Cell 3A Remediation Plan* (AECOM 2010):

1. PZC-18 steel sheet piles were used in lieu of the AZ 18-700 steel sheet piles specified in the Phase 2 RD/RA Work Plan.
2. Portions of several remedial excavation areas were either over-excavated or under-excavated relative to the target excavation elevations specified in the Phase 2 RD/RA Work Plan. Over-excavation (i.e., excavation deeper than the target excavation elevation) was conducted to the extent practicable, given constructability restrictions, to remove discrete areas or lenses of MGP-impacted soils that extended below the target excavation elevations. Under-excavation (i.e., excavation shallower than the target excavation elevation) was generally conducted, with NYSDEC concurrence, where the clean clay confining unit was encountered above the target excavation elevation.
3. The alignment of the sheet pile wall separating Cell 1 and Cell 2 was shifted approximately 18 feet southwest of the location shown in the Phase 2 RD/RA Work Plan to accommodate the installation of manhole MH-2 and associated bypass piping. Since Cell 1 and Cell 2 had the same target excavation elevation, this change did not affect the overall excavation volume for the project.
4. The buried concrete and stone railroad bridge abutments encountered in Cell 2 were demolished and, with NYSDEC concurrence, were used as subsurface backfill in Cell 2.
5. A portion of the sheet pile wall (19 sheet piles total) separating Cell 3A and Cell 4 was cut approximately 18 inches below final grade and left in place.
6. In Cell 4, a gravel lens containing NAPL was encountered below the target excavation elevation that, due to constructability restrictions, could not be completely removed. The remaining portion of the impacted gravel lens was located between approximately 16.4 and 20.3 feet bgs within a roughly 10-foot by 10-foot depression in the top of the clay confining unit. Recovery well RW-1 was subsequently installed in this area to passively collect and remove the remaining NAPL in the gravel lens. Approximately 145 gallons of a NAPL/groundwater mixture was removed from recovery well RW-1 during the Phase 2 Remedial Action.
7. Soils generally located in the top four feet of Cell 7 (approximately 1,056 cy) were visually inspected by Arcadis and NYSDEC's on-site representative during the remedial excavation activities to verify the absence of NAPL and were separately stockpiled and sampled by Arcadis on May 13, 2010 to determine their suitability for re-use as subsurface backfill. Samples were analyzed by TestAmerica for VOCs, SVOCs, and metals. The chemical testing results for the Cell 7 re-use soils met the applicable Tailrace remediation levels, as set forth in AROD, and were submitted electronically to

NYSDEC on May 27, 2010. The Cell 7 soils were approved for re-use (as subsurface backfill in Cell 6) by NYSDEC on June 3, 2010. The chemical testing results for the Cell 7 re-use soils are provided in Appendix D-2 of this FER.

8. During the excavation of Cell 9, MGP-impacted sediment was observed within Cell 9 up to the western sheet pile wall and the western portion of the northern sheet pile wall. On September 16, 2010, a limited investigation, consisting of sediment probing and sampling, was conducted by Arcadis under the supervision of NYSDEC to delineate the extent of MGP-impacted material to the west and north of Cell 9 (outside of the Cell 9 design excavation limits). Based on the results of that investigation and at the request of NYSDEC, new excavation areas were added along the northern and western sides of Cell 9, and were collectively designated as “Cell 9A”. Excavations were advanced to a depth of approximately 6 inches below existing grade in the northern portion of Cell 9A and up to approximately 6 feet below existing grade in the western portion of Cell 9A. The western portion of Cell 9A was backfilled to within 6 inches of final grade with run-of-bank gravel and was restored with 6 inches of riprap. The northern portion of Cell 9A was not backfilled, but was allowed to silt in naturally.

5 PHASE 3 REMEDIAL ACTION

5.1 General

This section summarizes the primary components of the Phase 3 Remedial Action, which was conducted at the Site and in the adjacent portion of the off-Site Tailrace area between November 2011 and December 2012 in accordance with the Phase 3 RD/RA Work Plan. The as-built survey drawings and representative photographs for the Phase 3 Remedial Action are provided in Appendices B-3 and C-3, respectively, of this FER.

5.2 Contractors and Consultants

The Phase 3 Remedial Action was conducted on behalf of National Grid by LAND Remediation, Inc. (LRI) of Averill Park, New York. Table 11 below identifies the key LRI subcontractors and suppliers that also had significant roles on the project.

Table 11. LRI Subcontractors and Suppliers

Subcontractor/Supplier	Role	Contact Information
Atlantic Testing Laboratories, Limited	Geotechnical Testing Laboratory	301 Saint Anthony Street Utica, New York 13501
Butler Fence Company, Inc.	Fence Installation	536 State Fair Boulevard Syracuse, New York 13204
Callanan Industries, Inc.	Source of Crushed Stone	Oxbow Quarry 6375 Tuttle Road Canastota, New York 13032 NYSDEC Mine ID No. 70017 NYSDOT Source No. 2-11R
Casella Waste Systems, Inc., Ontario County Landfill	Disposal Facility for Non-Regulated Soil and Debris	3555 Post Farm Road Stanley, New York 14561
Colden Corporation	Health and Safety Monitoring and Community Air Monitoring (December 1, 2011 through January 24, 2012)	28 Washington Street Ballston Spa, New York 12020
ESMI of New York, LLC Low-Temperature Thermal Desorption Facility	Disposal Facility for Conditionally-Exempt MGP Remediation Waste	304 Towpath Road Fort Edward, New York 12828
Gerber Top Soil, LLC	Source of Topsoil	7250 Oxbow Road Kirkville, New York 13082 NYSDEC Mine ID No. 70466

Subcontractor/Supplier	Role	Contact Information
H2H Associates, LLC	Health and Safety Monitoring and Community Air Monitoring (January 25, 2012 through November 9, 2012) Geotechnical and Structural Monitoring	179 River Street Troy, New York 12180
Mr. Edward L. Horn, PE	Pre- and Post-Construction Structural Surveys	55 Longwood Drive Clifton Park, New York 12065
Johnson's Sand Bed, Inc.	Source of General Fill Material	1483 Middle Road Oneida, New York 13421 NYSDEC Mine ID No. 70093
Lan-Co Companies, Inc.	Sidewalk Installation and Paving	7330 Eastman Road North Syracuse, New York 13212
Lawn Tech, Inc.	Seeding/Landscaping	5835 Bull Hill Road Lafayette, New York 13084
Phoenix Environmental Laboratories, Inc.	Chemical Testing Laboratory	587 East Middle Turnpike Manchester, Connecticut 06040
Ryan-Biggs Associates, PC	Design of Alternate Excavation Support System	257 Ushers Road Clifton Park, New York 12065
Snyder Construction Company, Inc.	Source of Subbase Material (Run-of-Bank Gravel)	Munnsville Gravel Bed – Pratts Road 1264 Glenwood Avenue Oneida, New York 13421 NYSDEC Mine ID No. 70106
Spectrum Analytical, Inc.	Chemical Testing Laboratory	11 Almgren Drive Agawam, Massachusetts 01001
Thew Associates PE-LS, PLLC	Construction Surveys	9478 River Road Marcy, New York 13403

Arcadis provided daily observation and documentation of the work performed by LRI, and Synapse Engineering, PLLC (Synapse) managed and administered the LRI contract on behalf of National Grid.

5.3 Pre-Construction, Mobilization, and Site Preparation Activities

5.3.1 Soil Characterization and Monitoring Well Decommissioning

Arcadis conducted soil characterization and monitoring well decommissioning activities at the Site between August 22 and August 26, 2011. The scope of these activities was presented in a July 20, 2011 letter from National Grid to NYSDEC (National Grid 2011a) and generally involved the: (1) drilling of 14

soil borings; (2) collection of representative soil samples for chemical testing; and (3) decommissioning of monitoring well MW-ES-1. Piezometers P-1 and TR-PZ-A were scheduled to be decommissioned as part of the field effort, but could not be located. The soil characterization activities were conducted to facilitate the disposal of materials to be excavated during the Phase 3 Remedial Action. Monitoring well MW-ES-1 was decommissioned since it was located within and extended below the vertical limits of excavation for the Phase 3 Remedial Action.

Based on the results of the soil characterization activities described above and a review of historical soil sampling data for the Site, National Grid submitted the *Phase 3 Remedial Action – Material Handling and Re-Use Plan* (Phase 3 Re-Use Plan; National Grid 2011b), which proposed the re-use of certain excavated materials as subsurface backfill during the Phase 3 Remedial Action. Specifically, the Phase 3 Re-Use Plan proposed the re-use of existing materials generally located within the top 6 feet of Cell C, the majority of Cell A, and the northern half of Cell F, and within the top 2 feet of Cell D, Cell E, and the southern half of Cell F, based on the following considerations:

- The Phase 3 RD/RA Work Plan and AROD contain provisions for the re-use of excavated materials if such materials are not visibly impacted (i.e., do not contain free phase NAPL) and do not contain COCs at concentrations greater than the applicable Site remediation levels specified in the AROD;
- There were no historical observations of NAPL or exceedances of the applicable Site remediation levels within the top 6 feet of soil in Cell A, Cell C, and the northern half of Cell F;
- There were no historical observations of NAPL or exceedances of the applicable Site remediation levels within the top 2 feet of soil in Cell D, Cell E, and the southern half of Cell F;
- There were no observations of NAPL within the top 6 feet of any of the soil borings drilled within the Phase 3 remedial excavation areas during the August 2011 field activities; and
- Chemical testing results for soil samples collected from the materials proposed for re-use during the August 2011 field activities were less than the applicable Site remediation levels.

The existing materials in Cell B and the southern portion of Cell A were not proposed for re-use as backfill since benzene, toluene, and total xylenes were detected at concentrations greater than the applicable Site remediation levels within the top 6 feet of soil boring SC-39 (located in Cell B). The Phase 3 Re-Use Plan was approved by NYSDEC on November 18, 2011. The chemical testing results for the existing soils that were re-used on-Site as subsurface backfill during the Phase 3 Remedial Action are provided in Appendix D-3 of this FER.

5.3.2 Pre-Construction Meeting

A pre-construction meeting was held at the Site on November 10, 2011 to discuss the planned scope and sequence of construction activities. The meeting was attended by representatives of NYSDEC, National Grid, Synapse, Arcadis, LRI, and the City of Oneida. Topics covered at the pre-construction meeting included project communications, health and safety, community air monitoring, community relations, security, work hours, and project schedule.

5.3.3 Permits and Approvals

The floodplain development permit and wastewater discharge permit previously issued by the City of Oneida for the Phase 1 Remedial Action remained valid for the Phase 3 Remedial Action. All other permits required to implement the Phase 3 Remedial Action were obtained by LRI.

5.3.4 Mobilization

LRI personnel, equipment, materials, and incidentals were mobilized to the Site in November 2011. At that time, field offices for NYSDEC, National Grid, Arcadis, and LRI personnel were also established within the Service Center Building.

5.3.5 Initial Contractor Submittals

Upon mobilizing to the Site, LRI prepared several initial submittals, including an Operations Plan, a HASP, and a Contingency Plan. At that time, Ryan-Biggs Associates, PC (RBA) prepared (on behalf of LRI) an alternate design for the temporary excavation support system specified in the Phase 3 RD/RA Work Plan. In general, the alternate design divided the Phase 3 remedial excavation area into six separate excavation areas (Cells A through F) and used different bracing configurations. Following review by National Grid and Arcadis, National Grid elected to use RBA's alternate design for the temporary excavation support system.

LRI's Operations Plan, HASP, and Contingency Plan were submitted electronically to NYSDEC on January 11, 2012, December 16, 2011, and January 3, 2012, respectively. RBA's alternate design for the temporary excavation support system was submitted electronically to NYSDEC on January 26, 2012.

5.3.6 Pre-Construction Topographic Survey

Thew performed a pre-construction survey on December 1, 2011 to: (1) document existing conditions in the area of the Site where the remediation activities would be performed; (2) demarcate the horizontal limits of excavation for each remedial excavation area; and (3) establish horizontal and vertical survey control on a minimum 15-foot by 15-foot grid within the remedial excavation areas. Survey control was maintained throughout the remedial excavation, backfilling, and restoration activities to ensure the proper execution, construction, and documentation of the work.

5.3.7 Utility Clearance and Mark-Out

Overhead power lines and utility poles located along the northern side of Sconondoa Street in the vicinity of the Site were relocated by National Grid before the remediation activities were initiated. Upon mobilizing to the Site, LRI contacted Dig Safely New York and coordinated with National Grid and the City of Oneida to: (1) demarcate existing subsurface utilities in the area of the Site; and (2) where necessary, disconnect, deactivate, or relocate active utilities that would be affected by the remediation activities. Included in this effort were the disconnection of the water and sanitary sewer lines servicing the Service Center Building and the temporary removal and relocation (by National Grid) of a portion of the active natural gas line located beneath the northern edge of Sconondoa Street (to the south of Cells D and E).

In conjunction with National Grid's gas line relocation work, LRI exposed several abandoned (inactive) natural gas lines extending into the Site along the southern sheet pile alignment of Cells D and E. The inactive gas lines were not physically connected to the active gas line along Sconondoa Street, and were subsequently removed (intact) from the excavation and staged on minimum six-mil polyethylene sheeting.

Suspected asbestos-containing wrapping was observed on five of the eight pipes removed from the southern sheet pile alignment of Cells D and E. Bulk samples of the pipe wrapping and wipe samples of the exterior and interior surfaces of each pipe were collected on behalf of LRI by Colden to characterize the piping for disposal. Bulk and wipe samples were analyzed by Spectrum Analytical, Inc. (Spectrum) for asbestos and PCBs, respectively. Testing confirmed the presence of asbestos in the wrapping on three pipes, and PCBs were detected at concentrations ranging between 0.48 ppm and 1.4 ppm (below regulatory limit of 50 ppm) in six of the 10 wipe sample collected from the exterior surfaces of the pipes. PCBs were not detected in any of the wipe samples collected from the interior surfaces of the pipes. The abandoned gas piping was loaded into a covered roll-off container lined with minimum six-mil polyethylene sheeting and was disposed of at the Ontario County landfill.

5.3.8 Temporary Erosion and Sediment Controls

Temporary erosion and sediment controls, including silt fencing and hay bales, were installed by LRI before any ground-intrusive activities were initiated. Thereafter, temporary erosion and sediment controls were inspected on a weekly or more frequent basis to verify their continued effectiveness and integrity. Any deficiencies observed during those inspections were promptly corrected by LRI.

5.3.9 Clearing and Site Access Controls

Existing surface features and debris were cleared from the work area by LRI to facilitate the remediation activities. LRI also installed temporary project signage and established access controls to prevent access to the work area by unauthorized personnel and vehicles. Along Sconondoa Street, the existing chain-link fencing and slide gate were removed, and temporary jersey-type concrete traffic barriers, chain-link fencing, and gates were installed. The remainder of the work area was secured with either temporary or permanent chain-link fencing.

5.3.10 Material Staging, Decontamination, and Containment Areas

Material staging, decontamination, and containment areas were constructed by LRI prior to initiating excavation activities.

5.3.11 Sampling and Analysis of Off-Site Fill Materials

LRI's sources of general fill material, subbase material (run-of-bank gravel), and topsoil were sampled to verify their suitability for use on the project. Samples were submitted by LRI to Phoenix and were analyzed for VOCs, SVOCs, PCBs, pesticides/herbicides, and metals. The topsoil sample was also analyzed for pH and organic content. The chemical testing results for the general fill material, subbase material, and topsoil are provided in Appendix D-3 of this FER.

The chemical testing results for LRI's fill materials met the applicable SCOs for commercial use, as set forth in Table 375-6.8(b) of 6 NYCRR 375, and were therefore suitable for use as backfill during the project.

5.4 Temporary Excavation Support Systems

5.4.1 Installation

The temporary excavation support system for each remedial excavation area employed: (1) new PZC-18 steel sheet piling (Cells B and C); (2) a combination of new PZC-18 steel sheet piling and existing PZC-18 sheet piling that had been installed and left in place during the Phase 1 and Phase 2 Remedial Actions (Cells A and F); or (3) a combination of new PZC-18 and PZC-26 steel sheet piling (Cells D and E). Prior to installation, Thew surveyed and marked-out the sheet pile alignment for each remedial excavation area. Pre-trenching was then conducted, generally to a depth of approximately 4 feet bgs, along the surveyed sheet pile alignment to remove potential surface and shallow subsurface obstructions. A hydrophilic waterstop sealant was then applied to the female sheet pile interlock to reduce the potential for groundwater infiltration through the installed sheet pile wall.

Sheet piles were installed to the minimum tip elevations specified in RBA's alternate design using a vibratory hammer. Excavation activities were initiated once the sheet piles for a given remedial excavation area were installed, and internal bracing (consisting of steel wales and struts) or external bracing (consisting of a sheet pile deadman anchor), as appropriate, was installed once the excavation was advanced to the required intermediate elevation specified in RBA's alternate design.

5.4.2 Removal

The removal of the temporary excavation support system in each remedial excavation area generally began once the excavation had been backfilled to the required intermediate elevation specified in RBA's alternate design, at which point the bracing (where present) was removed. Sheet pile removal/decontamination activities were generally initiated once the remedial excavation area had been backfilled to within 18 inches of final grade. Sheet piles were decontaminated as they were being removed from the ground. If NAPL was observed on a sheet pile during this process, the pile was wrapped in polyethylene sheeting and relocated to a material staging area for further decontamination. Once removed and decontaminated, sheet piles were either (1) inspected and prepared for re-installation in other remedial excavation areas or (2) staged for subsequent demobilization.

5.5 Geotechnical and Structural Monitoring

5.5.1 Pre-Construction Structural Surveys

On December 23, 2011, Mr. Edward L. Horn, PE performed structural surveys of the buildings located at the following properties:

- 201 Sconondoa Street (occupied two-story commercial building);
- 210 Sconondoa Street (vacant four-story commercial building);

- 214 Sconondoa Street (occupied one-story commercial building); and
- 215 Sconondoa Street (Service Center Building).

The surveys were performed to assess and document the pre-construction structural and cosmetic condition of the buildings at and adjacent to the Site, with a particular focus on existing joints, cracks, foundation settlement, and areas of existing or on-going deterioration/damage.

5.5.2 Optical Surveying

Five temporary reflective survey targets were installed on the western side of the Service Center Building to monitor building movement during the remediation of Cells B and D. The location of each reflective survey target was surveyed by LRI on January 10, 2012 to establish baseline conditions. Thereafter, reflective survey targets were surveyed by LRI on a daily or more frequent basis during the installation and removal sheet piles, and while excavating and backfilling, in Cells B and D.

5.5.3 Crack-Width Monitoring

Existing wall/foundation cracks observed in the 201, 210, 214, and 215 Sconondoa Street buildings during the pre-construction structural surveys were fitted with crack-width gauges on January 10 and January 11, 2012. Two gauges were installed at each of the 201, 210, and 214 Sconondoa Street buildings and four gauges were installed in the Service Center Building at the Site. Crack-width gauges were monitored by H2H Associates, LLC (H2H) on a daily basis during the installation and removal of sheet piles, and while excavating and backfilling in each remedial excavation area. Relative to the baseline conditions established on January 11, 2012, there were no significant changes observed in the width or condition of the existing wall/foundation cracks monitored at the 201, 210, and 214 Sconondoa Street buildings.

The settlement of the interior floor slab on the western side of the Service Center Building at the Site resulted in additional (new) cracking in the interior masonry walls and the expansion of existing cracks previously observed during the pre-construction structural surveys. As described in Section 5.9.1.3, the cracks in the interior masonry walls on the western side of the Service Center Building were sealed and repaired by LRI during the restoration activities.

5.5.4 Vibration Monitoring

Vibration monitoring was performed by H2H at up to six locations at and around the Site on January 10 and January 11, 2012 (to establish baseline conditions), and on a daily basis during the installation and removal of sheet piles in each remedial excavation area. Monitoring was generally performed over an eight-hour period each day using portable, data-logging seismographs equipped with triaxial geophones. The seismographs continuously measured peak particle velocities, and were programmed to alert project personnel (via alarm) if peak particle velocities exceeded the following action levels:

- 0.8 inch per second at the 201, 210, and 214 Sconondoa Street properties;
- 1.5 inches per second at the Site; and

- 2.0 inches per second above the active natural gas line located beneath the northern edge of Sconondoa Street.

Peak particle velocities, as measured by the seismographs, did not exceed the action levels at any of the monitoring locations during the Phase 3 Remedial Action.

5.5.5 Sheet Pile Deflection Monitoring

Angular tiltmeters were mounted on sheet piles at up to four locations around the perimeter of each remedial excavation area to monitor sheet pile deflection while excavating and backfilling in each area. Tiltmeter readings were generally collected by H2H twice per work day (in the morning and afternoon) until the remedial excavation area was backfilled to the required intermediate elevation specified in RBA's alternate design.

In Cells D and E, an inclinometer monitoring system, generally consisting of a vertical casing and a portable inclinometer probe, was also used to monitor deflection and lateral movement of the southern sheet pile wall. Inclinometer measurements were collected by H2H on a daily basis during the excavation and backfilling activities in Cells D and E.

5.5.6 Post Construction Structural Surveys

On November 26, 2012, Mr. Edward L. Horn, PE performed post-construction structural surveys of the buildings located at the following properties:

- 201 Sconondoa Street (occupied two-story commercial building);
- 210 Sconondoa Street (vacant four-story commercial building);
- 214 Sconondoa Street (occupied one-story commercial building); and
- 215 Sconondoa Street (Service Center Building).

The surveys were performed to: (1) assess and document the post-construction structural and cosmetic condition of each building; and (2) determine if any changes had occurred since the pre-construction surveys. With the exception of the Service Center Building, which sustained some cosmetic (non-structural) damage during the remediation of Cells B and D, there were no significant changes in the observed conditions of the buildings surrounding the Site.

5.6 Temporary Bypass Pumping System

In conjunction with the remedial excavation activities in Cell F, LRI installed a temporary bypass pumping system south of Sconondoa Street to divert storm water normally conveyed by the existing nominal 42-inch diameter storm sewer. The bypass pumping system generally consisted of two 6,000-gpm dry-priming pumps, each with a dedicated 12-inch diameter discharge line. The pumps were operated within a fully-lined containment area to prevent the accidental release of oil, and temporary chain-link fencing was installed to secure the area encompassing the pumps and discharge lines.

Storm water was pumped from the open drainage ditch south of the 210 Sconondoa Street property to an open drainage ditch located approximately 320 feet to the east. Temporary stone check dams were constructed at the outlets of the discharge lines to dissipate energy and prevent scour.

As described in Section 5.9.1.1, temporary bypass pumping was discontinued upon completion of the storm sewer restoration activities in Cell F.

5.7 Remedial Excavation

Excavations in each remedial excavation area were advanced to the horizontal and vertical limits shown or indicated on the as-built survey drawings (Appendix B-3). To the extent practicable, excavated soil and debris were loaded directly into transport vehicles for disposal at either the ESMI LTTD facility in Fort Edward, New York or, for non-regulated soil and debris, Ontario County landfill. In instances when direct loading was not practicable (e.g., due to scheduling, the availability of transport vehicles, etc.), excavated materials were stored in temporary stockpiles located within either the remedial excavation areas or a material staging area. The final horizontal and vertical limits of excavation in each remedial excavation area were surveyed by Thew and approved by NYSDEC's on-site representative in the field before backfilling activities were initiated.

Post-excavation confirmation sampling was not conducted because the remedial excavation areas were generally advanced to the pre-determined limits set forth in the AROD (with such NYSDEC-approved modifications as described in Section 5.14 of this FER). Those pre-determined limits were based on the results of the preliminary site assessment (Engineering Science, Inc. 1994), remedial investigation (Parsons 1997), and pre-design investigation (BBL 2001), which were summarized on the figures included in Attachment A of the *Review of Current Site/Project Conditions and Proposed Adjustments to Remedial Approach* (National Grid 2007). Those pre-remediation soil investigation summary figures have been included in Appendix L of this FER. The temporary excavation support systems for the remedial excavation areas also prevented the collection of post-excavation confirmation samples. Monitoring well locations, post-remediation groundwater sampling results, and the approximate extent of shallow groundwater containing dissolved-phase COCs at concentrations greater than the applicable New York State Class GA ambient water quality standards or guidance values are shown on Figure 4 of this FER.

Table 12 below summarizes the volume and disposition (disposal or re-use) of material excavated from each area during the Phase 3 Remedial Action.

Table 12. Remedial Excavation Summary for the Phase 3 Remedial Action

Remedial Excavation Area	Approximate Excavation Volume (cy)		
	Disposal	Re-Use as Subsurface Backfill[1]	Total
Cell A	3,572	2,000	5,572
Cell B	1,962	0	1,962
Cell C	1,757	1,036	2,793

Remedial Excavation Area	Approximate Excavation Volume (cy)		
	Disposal	Re-Use as Subsurface Backfill[1]	Total
Cell D	2,102	244	2,346
Cell E	2,303	378	2,681
Cell F	3,048	1,020	4,068
Total	**14,744**	**4,678**	**19,422**

Table Notes:

1. Re-use materials in Cells A, C, D, E, and F were visually inspected by Arcadis and NYSDEC's on-site representative during the remedial excavation activities to verify the absence of NAPL. Once excavated, re-use materials were temporarily stockpiled in a material staging area or on polyethylene sheeting within or adjacent to the remedial excavation areas, and were covered with polyethylene sheeting when no loading or unloading activities were occurring.

Remedial excavation areas were dewatered using localized sumps and submersible pumps. As further described in Section 5.13.2 of this FER, groundwater resulting from dewatering operations was treated at the Site using a temporary wastewater treatment system and discharged to the City of Oneida POTW in accordance with the wastewater discharge permit.

Soil excavated from below the groundwater table was amended with Calciment® prior to loading to help reduce excess moisture. Excavated debris (e.g., concrete, brick, etc.) was down-sized as required by the disposal facilities. Excavated debris that was not suitable for disposal at the ESMI LTTD facility, including wood piles, concrete, and brick, was disposed of at the Ontario County landfill.

Before loading excavated soil and debris, the bed and sidewalls of each transport vehicle were lined with polyethylene sheeting. After each vehicle was loaded, a non-mesh tarpaulin was secured over the top of the bed, and the wheels and undercarriage were inspected to identify (and remove, if necessary) any visible soil or debris. A shipping document was then prepared and signed by Arcadis (as National Grid's authorized representative) for each vehicle before it left the Site. Truck traffic, both to and from the Site, followed the designated truck route established for the project.

5.8 Backfilling

Backfilling activities in each remedial excavation area were initiated with NYSDEC concurrence that: (1) the target excavation elevation(s) had been achieved; and (2) no standing water or NAPL was present at the base of the excavation. Remedial excavation areas were generally backfilled to within 12 inches final grade with either imported fill material (Cell F) or a combination of re-use material and imported fill material (Cells A through E), as summarized in Table 13 below.

Table 13. Backfill Summary for the Phase 3 Remedial Action

Remedial Excavation Area	Approximate Backfill Volume (cy)		
	Re-Use Material[1]	Imported Fill Material	Total
Cell A	2,000[2]	3,023	5,023
Cell B	1,065[3]	799	1,864
Cell C	736[4]	1,886	2,622
Cell D	688[5]	1,516	2,204
Cell E	189[6]	2,357	2,546
Cell F	0	3,898	3,898
Total	**4,678**	**13,479**	**18,157**

Table Notes:

1. Re-use material was used as backfill at depths greater than 6 feet bgs.
2. Re-use material used as backfill in Cell A consisted entirely of re-use soil from Cell A.
3. Re-use material used as backfill in Cell B consisted of approximately 300 cy of re-use soil from Cell C and approximately 765 cy of re-use soil from Cell F.
4. Re-use material used as backfill in Cell C consisted entirely of re-use soil from Cell C.
5. Re-use material used as backfill in Cell D consisted of approximately 244 cy of re-use soil from Cell D, approximately 189 cy of re-use soil from Cell E, and approximately 255 cy of re-use soil from Cell F.
6. Re-use material used as backfill in Cell E consisted entirely of re-use soil from Cell E.

Backfill materials were generally placed in 12-inch compacted lifts throughout each remedial excavation area. In-place density tests were performed by ATL to confirm that the compaction requirements had been achieved.

5.9 Site Restoration and Demobilization

5.9.1 Restoration

5.9.1.1 Utility Restoration

A new 42-inch diameter HDPE storm sewer line and new pre-cast concrete manhole were installed in Cell F to replace the existing 42-inch diameter corrugated metal pipe and temporary manhole that were removed during the remedial excavation activities. The new 42-inch HDPE pipe was sleeved into the existing stone archway beneath Sconondoa Street and was sealed against the archway with flowable fill. Temporary bypass pumping was discontinued upon completion of the storm sewer restoration activities in Cell F.

A new 1.5-inch diameter copper water service line and a new 4-inch diameter cast iron sanitary sewer line were also installed for the Service Center Building. The utilities were installed by a licensed plumber

and were inspected and approved by the City of Oneida. The new storm sewer line, manhole, water service line, and sanitary sewer line are shown on the as-built survey drawings provided in Appendix B-3.

In addition, although not part of the project, National Grid removed and replaced a portion of the existing natural gas line located beneath the northern edge of Sconondoa Street (outside of the project limits), to the south of Cells D, E, and F. The existing 8-inch diameter cast iron gas line in this area was replaced with a new 8-inch diameter HDPE pipe.

5.9.1.2 Surface Restoration

A woven geotextile (separation fabric) was installed above the compacted backfill material in each remedial excavation area. Cells A, B, and C and portions of Cells D and E were restored to final grade with 8 inches of compacted subbase material (run-of-bank gravel) and 4 inches of crushed stone. The former driveway/parking area located south of the Service Center Building in Cell D was restored to final grade with 8 inches of compacted subbase material and 4 inches of new asphalt pavement, which consisted of a 2.5-inch NYSDOT Type 1 base course and a 1.5-inch NYSDOT Type 6 top course. In conjunction with these activities, LRI also removed and replaced the existing concrete sidewalks located south of Cells D, E, and F and an approximately 5-foot wide strip of existing asphalt pavement located along the northern edge of Sconondoa Street. The southwest portion of Cell F and parking lot of the 201 Sconondoa Street property were also restored with new asphalt pavement.

Previously-vegetated portions of Cells E and F were restored to final grade with 6 inches of compacted general fill material and 6 inches of topsoil, which was seeded at a rate of approximately 1.0 pound per 1,000 square feet with a mixture of Kentucky bluegrass (50%), creeping red fescue (30%), and perennial ryegrass (20%). Seeded areas were covered with erosion control blankets, and silt fencing was installed and maintained until new grass was established. Areas of the Tailrace that were disturbed during the Phase 3 Remedial Action were also restored to pre-construction condition.

New 6-foot chain-link fencing with barbed wire was installed around the Site to replace the existing security fencing that was removed at the beginning of the project. New swing gates – a vehicle gate along Sconondoa Street and a pedestrian gate in the northeast corner of the Site – were also installed as part of the restoration activities.

5.9.1.3 Building Restoration

LRI patched, sealed, and repaired cracks and other cosmetic damage sustained by the Service Center Building during the project. Roof drains and gutters, which had been diverted before the remediation of Cells B and D, were also restored to pre-construction condition.

5.9.2 Final Inspection

A final inspection of the project area was conducted on November 29, 2012 and was attended by representatives of National Grid, Synapse, Arcadis, LRI, NYSDEC, and the City of Oneida.

5.9.3 Post-Construction Topographic Survey

Thew performed a post-construction survey on December 4, 2012 to document the final (as-built) topographic conditions and features within the project work limits. Those conditions are depicted on the as-built survey drawings provided in Appendix B-3 of this FER.

5.9.4 Demobilization

Following confirmation that all restoration activities had been completed, LRI demobilized the remaining personnel, equipment, materials, and temporary facilities from the Site. Demobilization activities were substantially complete by the beginning of December 2012.

5.10 Odor, Vapor, and Dust Control

Odor, vapor, and dust controls were proactively employed during the remediation activities to mitigate the potential for odor, vapor, and dust emissions from the project site. Such controls included, but were not necessarily limited to, the following:

- Covering material stockpiles when no loading or unloading activities were occurring;
- Spraying BioSolve Pinkwater solution on soils during active excavation/load-out;
- Periodically foaming excavation faces/excavated soils before work breaks and at the end of the work day;
- Covering open excavation faces with polyethylene sheeting during extended periods of inactivity;
- Removing soil and debris from, and spraying water on, active haul routes;
- Hauling excavated materials and clean fill materials in properly tarped/covered transport vehicles; and
- Restricting vehicle speeds on temporary access roads and active haul routes.

5.11 Community Air Monitoring

Real-time air monitoring for total VOCs and PM_{10} was performed by either Colden or H2H during all ground-intrusive or dust-generating construction activities. Monitoring was performed using a perimeter air monitoring system generally consisting of four portable air monitoring stations and a portable weather station. Each air monitoring station contained: (1) a portable, data-logging photoionization detector for monitoring the airborne concentration of total VOCs; and (2) a portable, data-logging aerosol photometer for monitoring the airborne concentration of PM_{10}. Total VOC and PM_{10} monitoring equipment were housed in portable, weather-tight enclosures, and were programmed to alert project personnel (via alarm) if the 15-minute TWA concentration of total VOCs or PM_{10} exceeded the project action levels of 5.0 ppm or 150 µg/m^3, respectively.

Air monitoring stations were deployed at the start of each work day before any ground-intrusive or dust-generating construction activities were initiated. One upwind and three downwind monitoring locations were selected at the perimeter of the work area based on prevailing wind direction and the nature and location of work activities anticipated to be performed during the day. Wind direction was monitored

throughout the day, and stations were re-located or re-assigned, as appropriate, if the wind direction shifted more than 60 degrees from the original upwind direction. Total VOC and PM_{10} data were generally downloaded from the air monitoring stations at the end of each work day and were stored at the project site in a computer database. Air monitoring reports were prepared and submitted to NYSDEC and NYSDOH on a weekly basis to summarize the total VOC and PM_{10} monitoring results. Copies of those reports are provided in Appendix E-3 of this FER.

There were no exceedances of the total VOC action level (5.0 ppm) or PM_{10} action level (150 µg/m^3) during the Phase 3 Remedial Action.

5.12 Hydraulic Oil Spill

On September 18, 2012, a hose failure on a piece of construction equipment resulted in the release of approximately 5 gallons of hydraulic oil within portions of Cells A and F. The spill (NYSDEC Spill Number 1206034) occurred at 1:30 p.m. and was reported to NYSDEC at 4:10 p.m. on September 18, 2012. Approximately 20 tons of soil and stone contaminated by the hydraulic oil spill was subsequently excavated by LRI and disposed of at the Ontario County landfill. The spill case was closed-out by NYSDEC on November 15, 2012.

5.13 Waste Management

5.13.1 Solid Waste

A total of approximately 24,517 tons of solid waste was generated during the Phase 3 Remedial Action. Table 14 below summarizes the disposal facilities used on the project (by waste type) and the total estimated weight of material disposed of at each facility.

Table 14. Solid Waste Disposal Summary for the Phase 3 Remedial Action

Waste Stream	Disposal Facility	Estimated Weight (tons)
Excavated Soil and Debris	ESMI LTTD Facility	20,946
Brick and Concrete Debris	Ontario County Landfill	3,571
Wood Piles		
Abandoned Gas Piping		
Total	**--**	**24,517**

Copies of the shipping documents for each waste stream listed in Table 14 above are provided in Appendix F-3 of this FER.

5.13.2 Construction Wastewater

A total of approximately 884,180 gallons of construction wastewater was generated, treated on-Site, and discharged to the City of Oneida POTW during the Phase 3 Remedial Action. The temporary wastewater treatment system for the project was designed to accommodate a nominal flow rate of 50 gpm, and generally included the following components:

- One influent settling and separation (weir-type) tank (18,100-gallon capacity);
- One air stripper;
- One influent storage (frac-type) tank (21,000-gallon capacity);
- Four bag filter housing units with bag filters;
- Two treatment media vessels, each filled with liquid-phase GAC;
- Two treatment media vessels, each filled with ion exchange resin;
- Two effluent storage (frac-type) tanks (each with 21,000-gallon capacity); and
- Pumps, process piping, fittings, gages, valves, sample ports, instrumentation, and accessories.

The system was assembled and operated within a fully-lined containment area to prevent the accidental release of untreated wastewater. Once treated, wastewater was discharged to a sanitary sewer manhole located to the east of the Site.

Start-up testing was performed at the beginning of the project to verify the effectiveness of the system and involved the collection, treatment, testing, and discharge of two 20,000-gallon batches of groundwater extracted from Cell A. Thereafter, treated construction wastewater was discharged on a continuous basis and routine permit compliance samples were collected from the treated wastewater at a frequency of one sample for every 100,000 gallons discharged. Samples were submitted by LRI to either Phoenix or Spectrum for analysis of benzene, ethylbenzene, toluene, total xylenes, naphthalene, total cyanide, oil and grease, and pH. Chemical testing results for the permit compliance samples were compared to the discharge limits established in the wastewater discharge permit and were submitted on a periodic basis to the City of Oneida.

The chemical testing results for the permit compliance samples collected during the Phase 3 Remedial Action are presented in Appendix G-3 of this FER. As indicated therein, all results were below the discharge limits established in the City of Oneida wastewater discharge permit.

5.14 Deviations from the RD/RA Work Plan

The following is a summary of the deviations from the Phase 3 RD/RA Work Plan:

1. As described in Section 5.3.5 of this FER, RBA (on behalf of LRI) prepared an alternate design for the temporary excavation support system specified in the Phase 3 RD/RA Work Plan. In general, the alternate design divided the Phase 3 remedial excavation area into six separate excavation areas (Cells A through F) and used different bracing configurations. The alternate design did not affect the overall horizontal or vertical limits of remedial excavation specified in the Phase 3 RD/RA Work Plan.

2. While pre-trenching the southeast sheet pile alignment of Cell A, 52 existing steel sheet piles and an abandoned 2,000-gallon gasoline underground storage tank (UST) were encountered at a depth of approximately 4 feet bgs. The UST was found to have been previously filled with concrete and, based on available records, had been taken out of service in November 1986. In response to this discovery, the southeast sheet pile alignment of Cell A was shifted (expanded) approximately 10 feet southeast of the original alignment to encompass the UST and existing steel sheet piles. The UST and existing sheet piles were removed in conjunction with the excavation activities in Cell A. There were no signs of MGP- or petroleum-related impacts in the soils surrounding the UST.
3. Two areas in Cell A – an approximately 25-foot by 25-foot square area located in the southeast portion of the Cell A and an approximately 15-foot by 15-foot square area located in the northeast portion of the Cell A – were over-excavated by approximately 2 feet to remove MGP-impacted soil located below the specified excavation elevation. The excavated soil was disposed of at the ESMI LTTD facility with the other impacted materials excavated from Cell A.
4. The alignment and slope of the new 42-inch diameter HDPE storm sewer line in Cell F were modified during construction to accommodate the actual elevation and location of the stone archway beneath Sconondoa Street. The location of the new pre-cast concrete manhole was also modified during construction at the request of the City of Oneida.

6 NATURE AND EXTENT OF REMAINING MGP-RELATED IMPACTS

6.1 General

This section summarizes the nature and extent of potential remaining MGP-related impacts in soil and groundwater at the Site and in the off-site Tailrace area. As further described in Section 7 of this FER, institutional and engineering controls have been incorporated into the Site remedy to control exposure to these remaining MGP-related impacts, and thereby ensure the protection of public health and the environment.

6.2 Soil

As described in the AROD, there are two relatively small areas of residual NAPL that were not subject to excavation during the remediation activities. The first area (identified herein as the "Sconondoa Street Area") is located at the southern edge of the Site beneath the northern edge of Sconondoa Street, and the second area (identified herein as the "Railroad Embankment Area") is located beneath a portion of the abandoned railroad embankment on the north side of the off-Site Tailrace area. During the Phase 2 Remedial Action, a third area of residual NAPL (identified herein as the "RW-1 Area") was encountered in the off-Site Tailrace area that, at the time, could not be completely removed due to constructability restrictions. Finally, the area beneath the existing Service Center Building has been identified as an additional area of potential remaining MGP-related impacts in soil given the: (1) building's location relative to the main features of the former gas works; (2) building's proximity to MGP-related impacts observed in soil removed during the Phase 3 Remedial Action; and (3) the limited investigation data available in this area.

The approximate locations of the Sconondoa Street, Railroad Embankment, RW-1, and Service Center Building Areas are shown on Figure 4 of this FER. Each of these areas is described in further detail below.

6.2.1 Sconondoa Street Area

During the pre-design investigation (PDI), soils containing residual NAPL were observed at test pit TP-19 (located north of Sconondoa Street on the former MGP property) between approximately 6 and 10 feet bgs. The presence of several active utilities beneath and adjacent to Sconondoa Street, including a fiber optic line, natural gas lines and service feeders, sanitary and storm sewers, and a water main and water service piping, prevented further delineation to the south of this location; however, NAPL was not observed in the soil borings drilled on the south side of Sconondoa Street. With the exception of the sanitary and storm sewers, which are generally located between 5 and 10 feet bgs along this stretch of Sconondoa Street, these utilities are located above the depth interval within which NAPL was observed at test pit TP-19 and, therefore, are unlikely to serve as a preferential pathway/collection point for NAPL. Subsequent investigations of the manholes associated with the sanitary and storm sewers located beneath Sconondoa Street did not identify any evidence of MGP-related impacts within the sewers themselves.

During the Phase 3 Remedial Action, excavations along Sconondoa Street were generally advanced slightly south of and deeper than test pit TP-19, which reduced both the volume and the horizontal and vertical extent of residual NAPL in this area. Further, during those excavation activities, NAPL in the area of test pit TP-19 was generally observed to be located within and north of the remnants of a former building/structure foundation, which was removed in its entirety. In conjunction with the remedial construction effort, National Grid also removed and replaced a section of the existing natural gas line located beneath the sidewalk and northern edge of Sconondoa Street (south of the Phase 3 remedial excavation areas). There were no observations of NAPL in the soils excavated to the south of test pit TP-19 during those activities.

Collectively, the observations made during the PDI and Phase 3 Remedial Action suggest that the residual NAPL in the Sconondoa Street Area either (1) was completely removed during the remedial excavation activities, or (2) occupies a smaller/more localized area than that depicted on Figure 3 of the AROD and Figure 4 of this FER.

6.2.2 Railroad Embankment Area

During the PDI, residual NAPL was observed in soil borings SB-129 and SB-130 (located on the abandoned railroad embankment to the north of the Tailrace) between approximately 33 and 33.6 feet bgs and between approximately 32.5 and 33.6 feet bgs, respectively. NAPL was not observed in the soil borings/wells drilled to the north of soil borings SB-129 and SB-130, likely because the sand and gravel unit within which NAPL has typically been observed was not present (i.e., pinched out) in this area. In addition, groundwater samples collected from monitoring well MW-104, which was generally located downgradient from soil borings SB-129 and SB-130, did not contain dissolved-phase MGP-related COCs at concentrations greater than the applicable New York State Class GA ambient water quality standards or guidance values.

During the Phase 2 Remedial Action, excavations in the off-Site Tailrace area were generally advanced horizontally to the southern toe of the abandoned railroad embankment. In the areas located immediately south of soil borings SB-129 and SB-130, the excavations were also advanced vertically below the elevations where residual NAPL was observed during the PDI. The observations made during the excavation activities suggest that any residual NAPL remaining beneath the abandoned railroad embankment in this area is localized to the sand and gravel unit and limited in both volume and extent.

6.2.3 RW-1 Area

During the Phase 2 Remedial Action, a gravel lens containing NAPL was encountered at the bottom of one of the Tailrace remedial excavation areas that, due to constructability restrictions, could not be completely removed. The remaining portion of the impacted gravel lens was located between approximately 16.4 and 20.3 feet bgs within a roughly 10-foot by 10-foot depression in the top of a grey-brown clay confining unit.

A recovery well (identified as RW-1 on Figure 4) was subsequently installed in this area to passively collect and remove the remaining NAPL in the gravel lens. Between February 15, 2010 and August 16, 2012, approximately 147 gallons of a NAPL/groundwater mixture was removed from recovery well RW-1. The measured thickness of accumulated NAPL in recovery well RW-1, as well as the recovered volume

and recharge rate, have steadily decreased since the well was installed, suggesting that the NAPL remaining in this area has become less mobile/recoverable and could be approaching a residual state.

6.2.4 Service Center Building Area

The existing Service Center Building is located in an area of the Site that was formerly occupied by the main buildings and structures of the gas works. Soils surrounding the east side of the Service Center Building, which were removed during the Phase 3 Remedial Action, were observed to contain MGP-related impacts in the fill/overburden. Although MGP-related impacts were not observed in the three soil borings previously drilled within the garage of the Service Center Building, the potential exists for MGP-related impacts to be present in soil beneath the building.

6.3 Groundwater

Monitoring well locations and the approximate extent of shallow groundwater containing dissolved-phase COCs at concentrations greater than the applicable New York State Class GA ambient water quality standards or guidance values are shown on Figure 4.

7 INSTITUTIONAL AND ENGINEERING CONTROLS

7.1 General

This section summarizes the institutional and engineering controls that have been established on the Site to protect human health and the environment from residual MGP-related impacts in soil and groundwater at the Site. Long-term monitoring and maintenance of the institutional and engineering controls will be performed in accordance with the NYSDEC-approved *Site Management Plan* (SMP; Arcadis 2018).

7.2 Institutional Controls

The Site remedy requires that an environmental easement be placed on the property to: (1) implement, maintain, and monitor the engineering controls; (2) prevent future exposure to remaining MGP-related impacts by controlling disturbances of those subsurface impacts; and (3) limit the use and development of the Site to commercial enterprises only. The environmental easement for the Site was executed by NYSDEC on March 17, 2017, filed by National Grid with the Madison County Clerk, and recorded in the Madison County Registry of Deeds on March 28, 2017. A copy of the environmental easement and proof of filing are provided in Appendix K of this FER. The environmental easement requires compliance with the SMP and all institutional and engineering controls placed on the Site.

7.3 Engineering Controls

Exposure to remaining MGP-related impacts in soil at the Site is prevented by a soil cover system, which comprises the following:

- A woven geotextile demarcation fabric and a minimum of 12 inches of clean imported fill material meeting the SCOs for commercial use, as set forth in 6 NYCRR 375-6.8(b);
- Asphalt pavement;
- Concrete sidewalks; and
- The concrete foundation slab of the existing Service Center Building.

An Excavation Work Plan, which outlines the procedures required to be implemented in the event that the soil cover system is breached, penetrated, or temporarily removed, and any underlying remaining impacts are disturbed, is provided in Appendix B of the SMP.

8 REFERENCES

AECOM. 2010. *Cell 3A Remediation Plan*. National Grid – Phase 2 Remedial Action, Oneida-Sconondoa Street Former MGP Site, Cell 3A Remediation Plan. September 10.

Arcadis. 2007. *Remedial Design/Remedial Action Work Plan – Phase 1 Area and Phase 1 Area Extension*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for National Grid. August.

Arcadis. 2008. *Phase 2 Remedial Design/Remedial Action Work Plan*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for National Grid. November.

Arcadis. 2011. *Phase 3 Remedial Design/Remedial Action Work Plan*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for National Grid. May.

Arcadis. 2018. *Site Management Plan*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for National Grid. December.

BBL. 2001. *Proposal to Revise the Selected Site Remedy*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for Niagara Mohawk Power Corporation. August.

Colden. 2010. *Asbestos Monitoring, Oneida MGP Site, Transite Pipe Removal*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for National Grid. October 15.

Engineering Science, Inc. 1994. *Final Report for PSA/IRM Study*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for Niagara Mohawk Power Corporation. September.

National Grid. 2002a. *Tailrace/Oneida Creek Confluence Sampling Results*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. September 18.

National Grid. 2002b. *Response to October 29, 2002 NYSDEC Comments Regarding the Tailrace/Oneida Creek Confluence Sampling Results*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. November 15.

National Grid. 2006. *Supplemental Site Investigations Summary Report*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. May 30.

National Grid. 2007a. *Review of Current Site/Project Conditions and Proposed Adjustments to Remedial Approach*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. January 22.

National Grid. 2007b. *Material Characterization and Monitoring Well Decommissioning*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. November 21.

National Grid. 2008a. *Phase 1 Remedial Action – Addendum to Work Plan and Contractor Submittals*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. January 24.

National Grid. 2008b. *Phase 1 Remedial Action – Identification of Fill Sources*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. February 26.

National Grid. 2008c. *Phase 1 Remedial Action – Material Handling and Re-Use Plan*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. February 29.

National Grid. 2008d. *Phase 2 Remedial Action – Pre-Construction Activities*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. November 3.

National Grid. 2011a. *Pre-Construction Activities for Phase 3 Remedial Action*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. July 20.

National Grid. 2011b. *Phase 3 Remedial Action – Material Handling and Re-Use Plan*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. October 28.

NYSDEC. 1992. Order on Consent, Index No. D0-0001-9210. Effective December 12.

NYSDEC. 2000. *Record of Decision*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Division of Environmental Remediation. June.

NYSDEC. 2002. *Amended Record of Decision*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Division of Environmental Remediation. January.

NYSDEC. 2003. Order on Consent, Index No. A4-0473-0000. Effective November 7.

NYSDEC. 2007. *Explanation of Significant Difference*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Division of Environmental Remediation. November.

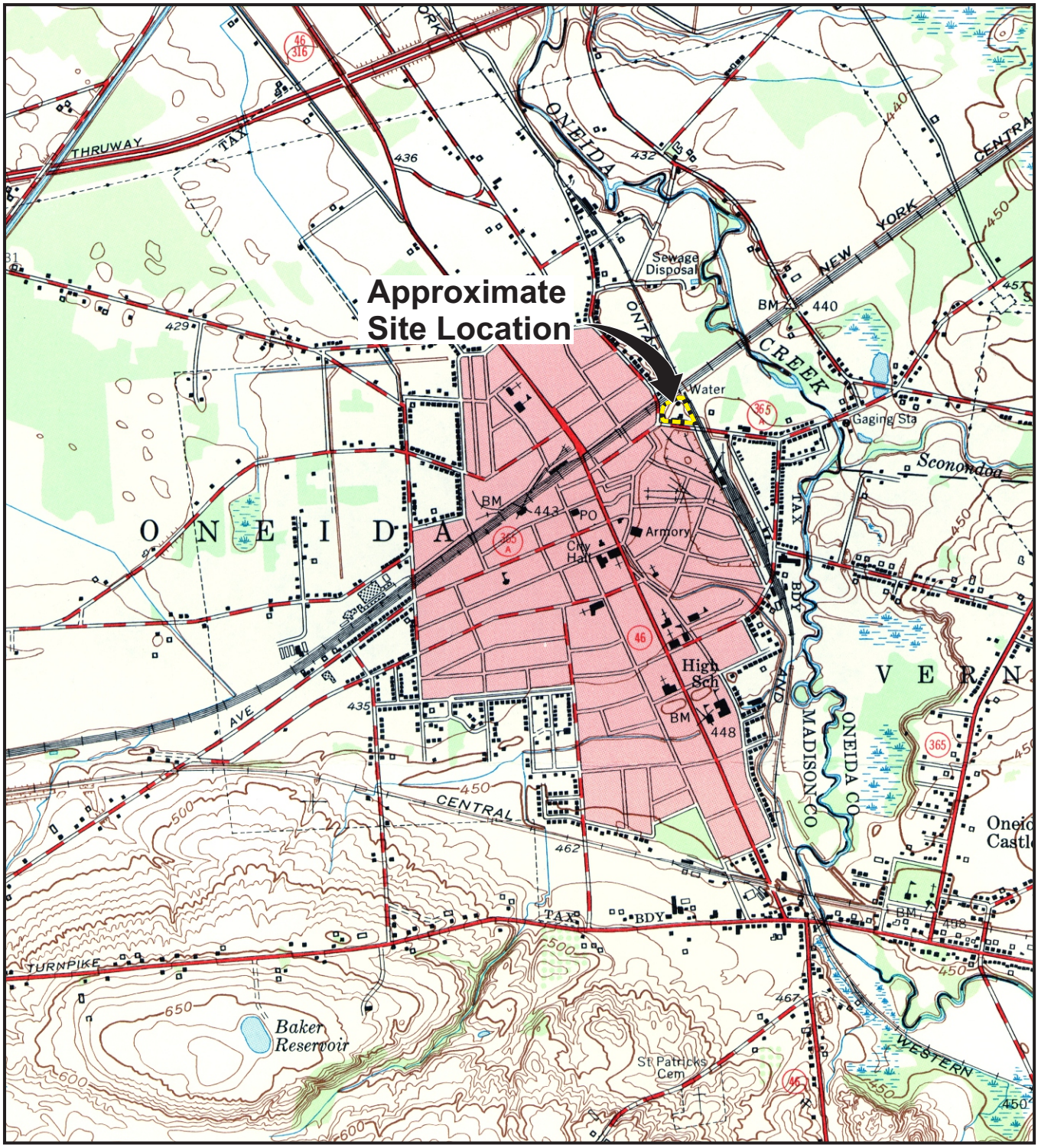
NYSDEC. 2010. *DER-10, Technical Guidance for Site Investigation and Remediation*. Division of Environmental Remediation. May.

Panamerican. 2009. *A Cultural Resource Sensitivity Assessment of the Proposed Soil Removal and Remediation of the Tailrace Channel (Storm Water Drainage) and Confluence*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for Arcadis. February.

Parsons. 1997. *Remedial Investigation Report*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for Niagara Mohawk Power Corporation. June.

Parsons. 1998. *Final Feasibility Study Report*. Oneida (Sconondoa Street) Former MGP Site, Oneida, New York. Prepared for Niagara Mohawk Power Corporation. August.

FIGURES



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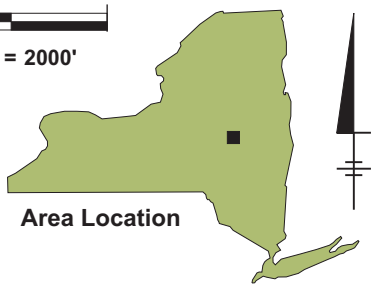
Approximate Scale: 1" = 2000'



Area Location

NATIONAL GRID
ONEIDA (SCONONDOA STREET) FORMER MGP SITE
CITY OF ONEIDA, MADISON COUNTY, NEW YORK
FINAL ENGINEERING REPORT

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

04/10/2018 SYRACUSE-ENV141-DHOWES, K.SARTORI
BIM 360 Docs\NATIONAL GRID\SCONONDOA STREET FORMER MGP SITE\2018\B0036653.0002\01-DWG\FER-fig 1-SLM.CDR

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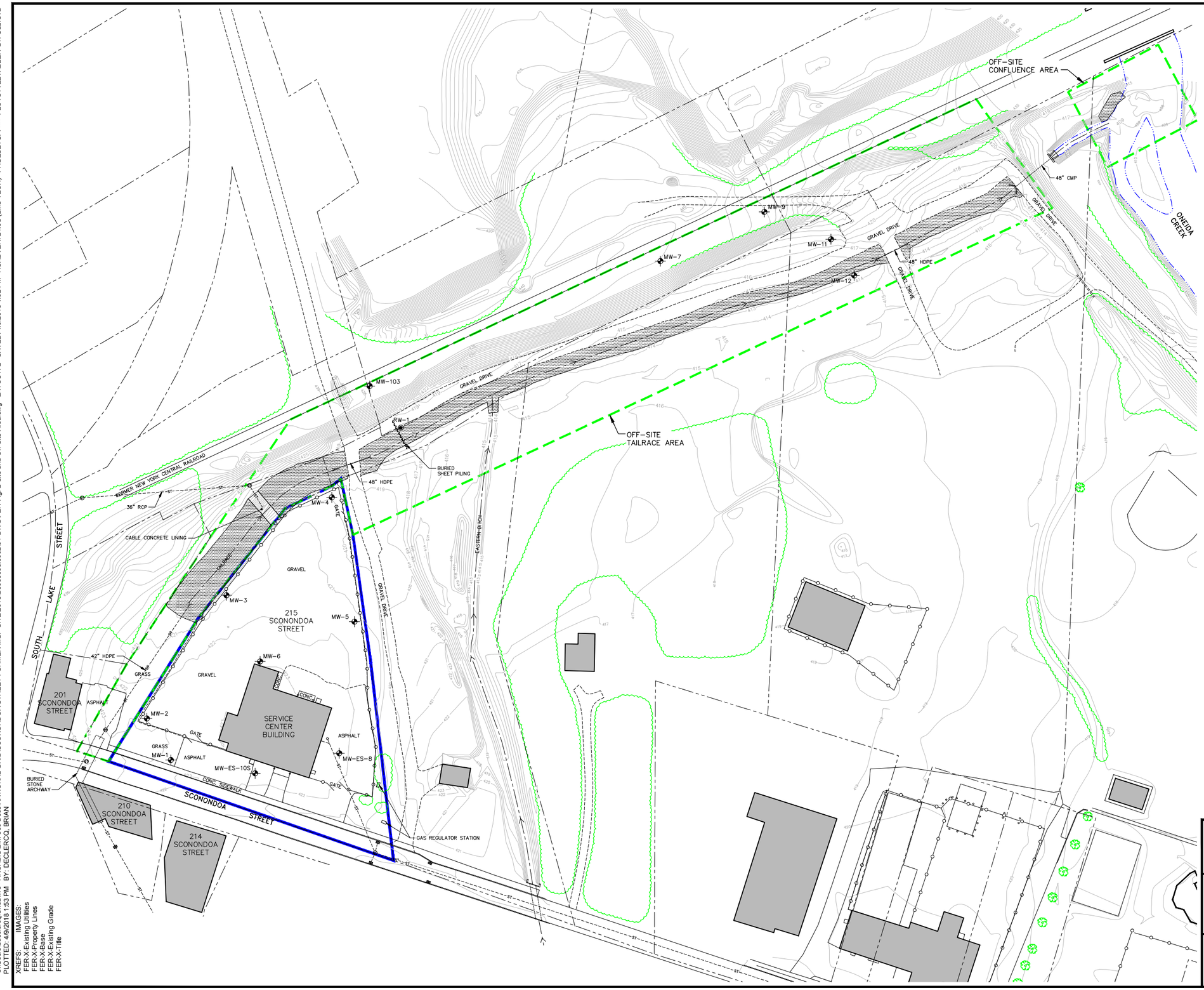


NOTES:

1. VERTICAL REFERENCE DATUM IS THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

0 60' 120'
GRAPHIC SCALE

NATIONAL GRID
ONEIDA (SCONONDOA STREET) FORMER MGP SITE
CITY OF ONEIDA, MADISON COUNTY, NEW YORK
FINAL ENGINEERING REPORT

PLAN OF SITE AND OFF-SITE AREA

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

CITY: SYRACUSE-NY DIV/GROUP: 141/ENV DB: B.GETTS LD: B.GETTS PIC: T.YOUNG PM: M.BENOIT TM: D.NODINE LYR:ON=*;OFF=*REF*
C:\Users\bdeclercq\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\SCONONDOA STREET FORMER MGP SITE\2018\B0036653.0002\01-DWG\FER-Fig. 3-Remediation Phases.dwg LAYOUT: 3 SAVED: 4/9/2018 2:29 PM ACADVER: 21.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB
PLOTTED: 4/9/2018 2:30 PM BY: DECLERCQ, BRIAN
XREFS: IMAGES:
FER-X-Existing Utilities
FER-X-Property Lines
FER-X-Base
FER-X-Existing Grade
FER-X-Title

LEGEND:

- LIMIT OF SITE
- LIMIT OF OFF-SITE AREA (APPROXIMATE)
- PROPERTY LINE (APPROXIMATE)
- TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)
- EDGE OF WATER (APPROXIMATE)
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- TREE LINE (APPROXIMATE)
- BUILDING
- CHAIN-LINK FENCE
- PZC-18 SHEET PILING
- DRAINAGE DITCH/CHANNEL AND FLOW DIRECTION
- RIPRAP
- STORM SEWER
- STORM SEWER MANHOLE
- CATCH BASIN
- CULVERT
- MONITORING WELL
- RECOVERY/MONITORING WELL
- AREA REMEDIATED DURING THE PHASE 1 REMEDIAL ACTION (JANUARY 2008 – NOVEMBER 2008)
- AREA REMEDIATED DURING THE PHASE 2 REMEDIAL ACTION (JUNE 2009 – MAY 2011)
- AREA REMEDIATED DURING THE PHASE 3 REMEDIAL ACTION (NOVEMBER 2011 – DECEMBER 2012)

NOTES:

1. VERTICAL REFERENCE DATUM IS THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

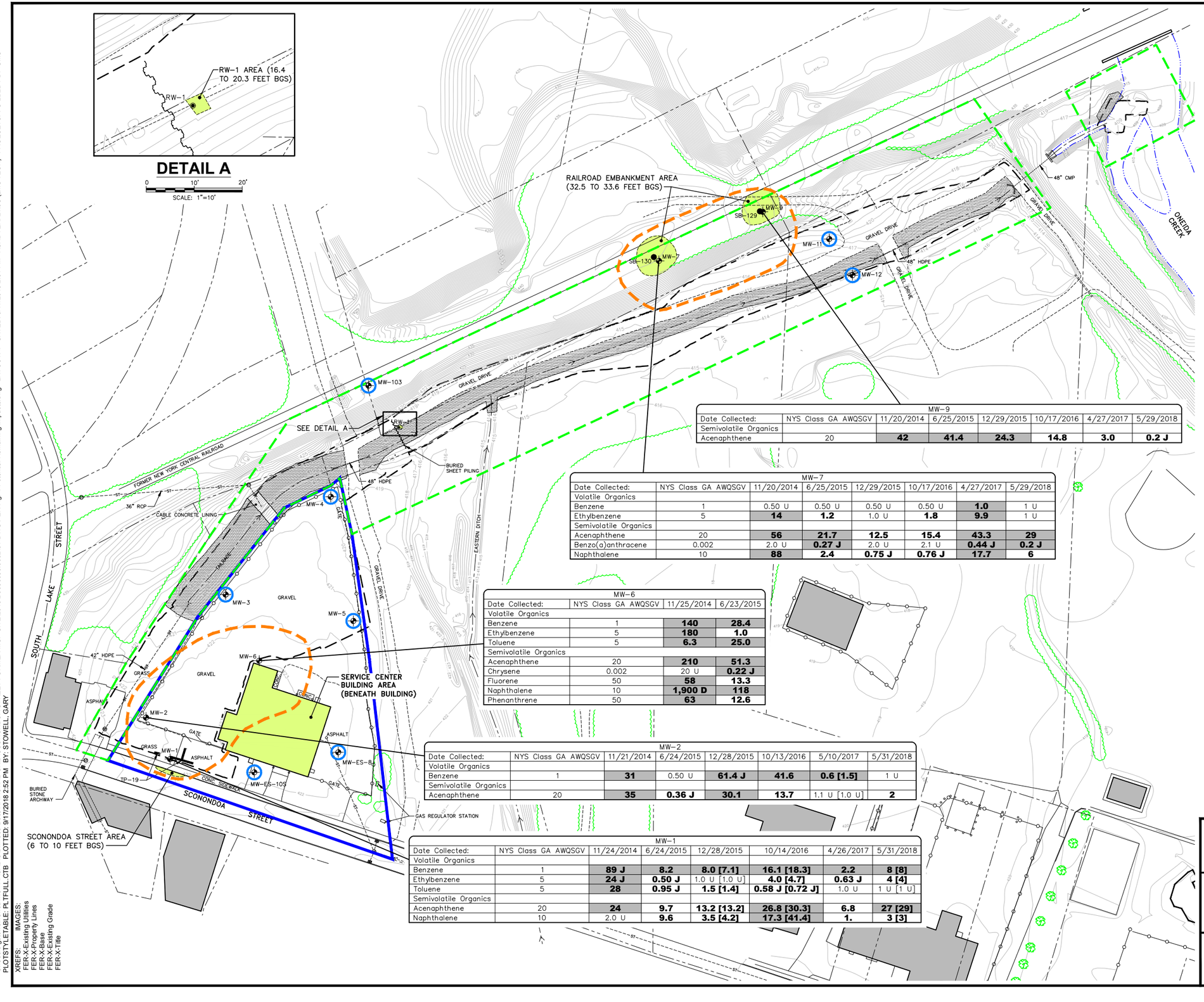
0 60' 120'
GRAPHIC SCALE

NATIONAL GRID
ONEIDA (SCONONDOA STREET) FORMER MGP SITE
CITY OF ONEIDA, MADISON COUNTY, NEW YORK
FINAL ENGINEERING REPORT

REMEDIATION PHASES

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



MW-9							
Date Collected:	NYS Class GA AWQSGV	11/20/2014	6/25/2015	12/29/2015	10/17/2016	4/27/2017	5/29/2018
Semivolatile Organics							
Acenaphthene	20	**42**	**41.4**	**24.3**	**14.8**	**3.0**	**0.2 J**

MW-7							
Date Collected:	NYS Class GA AWQSGV	11/20/2014	6/25/2015	12/29/2015	10/17/2016	4/27/2017	5/29/2018
Volatile Organics							
Benzene	1	0.50 U	0.50 U	0.50 U	0.50 U	**1.0**	1 U
Ethylbenzene	5	**14**	**1.2**	1.0 U	**1.8**	**9.9**	1 U
Semivolatile Organics							
Acenaphthene	20	**56**	**21.7**	**12.5**	**15.4**	**43.3**	**29**
Benzo(a)anthracene	0.002	2.0 U	**0.27 J**	2.0 U	2.1 U	**0.44 J**	**0.2 J**
Naphthalene	10	**88**	**2.4**	**0.75 J**	**0.76 J**	**17.7**	**6**

MW-6			
Date Collected:	NYS Class GA AWQSGV	11/25/2014	6/23/2015
Volatile Organics			
Benzene	1	**140**	**28.4**
Ethylbenzene	5	**180**	**1.0**
Toluene	5	**6.3**	**25.0**
Semivolatile Organics			
Acenaphthene	20	**210**	**51.3**
Chrysene	0.002	20 U	**0.22 J**
Fluorene	50	**58**	**13.3**
Naphthalene	10	**1,900 D**	**118**
Phenanthrene	50	**63**	**12.6**

MW-2							
Date Collected:	NYS Class GA AWQSGV	11/21/2014	6/24/2015	12/28/2015	10/13/2016	5/10/2017	5/31/2018
Volatile Organics							
Benzene	1	**31**	0.50 U	**61.4 J**	**41.6**	**0.6 [1.5]**	1 U
Semivolatile Organics							
Acenaphthene	20	**35**	**0.36 J**	**30.1**	**13.7**	1.1 U [1.0 U]	**2**

MW-1							
Date Collected:	NYS Class GA AWQSGV	11/24/2014	6/24/2015	12/28/2015	10/14/2016	4/26/2017	5/31/2018
Volatile Organics							
Benzene	1	**89 J**	**8.2**	**8.0 [7.1]**	**16.1 [18.3]**	**2.2**	**8 [8]**
Ethylbenzene	5	**24 J**	**0.50 J**	1.0 U [1.0 U]	**4.0 [4.7]**	**0.63 J**	**4 [4]**
Toluene	5	**28**	**0.95 J**	**1.5 [1.4]**	**0.58 J [0.72 J]**	1.0 U	1 U [1 U]
Semivolatile Organics							
Acenaphthene	20	**24**	**9.7**	**13.2 [13.2]**	**26.8 [30.3]**	**6.8**	**27 [29]**
Naphthalene	10	2.0 U	**9.6**	**3.5 [4.2]**	**17.3 [41.4]**	**1.**	**3 [3]**

LEGEND:

- LIMIT OF SITE
- LIMIT OF OFF-SITE AREA (APPROXIMATE)
- PROPERTY LINE (APPROXIMATE)
- TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)
- EDGE OF WATER (APPROXIMATE)
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- TREE LINE (APPROXIMATE)
- BUILDING
- CHAIN-LINK FENCE
- PZC-18 SHEET PILING
- DRAINAGE DITCH/CHANNEL AND FLOW DIRECTION
- RIPRAP
- STORM SEWER
- STORM SEWER MANHOLE
- CATCH BASIN
- CULVERT
- SB-129 SOIL BORING LOCATION
- TP-19 TEST PIT LOCATION
- MW-ES-8 MONITORING WELL
- RW-1 RECOVERY/MONITORING WELL
- HORIZONTAL LIMIT OF REMEDIAL EXCAVATION
- APPROXIMATE AREA OF POTENTIAL REMAINING NAPL IN SOIL
- MONITORING WELL WITH POST-REMEDIATION GROUNDWATER SAMPLE CONCENTRATIONS LESS THAN APPLICABLE NEW YORK STATE CLASS GA AMBIENT WATER QUALITY STANDARDS OR GUIDANCE VALUES
- APPROXIMATE LIMIT OF SHALLOW GROUNDWATER CONTAINING DISSOLVED-PHASE CONSTITUENTS OF CONCERN AT CONCENTRATIONS GREATER THAN APPLICABLE NEW YORK STATE CLASS GA AMBIENT WATER QUALITY STANDARDS OR GUIDANCE VALUES

NOTES:

1. VERTICAL REFERENCE DATUM IS THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
2. SAMPLE CONCENTRATIONS ARE PRESENTED IN UNITS OF MICROGRAMS PER LITER.
3. BOLDED CONCENTRATIONS DENOTE DETECTED ANALYTES.
4. SHADED CONCENTRATIONS EXCEED THE APPLICABLE NEW YORK STATE CLASS GA AMBIENT WATER QUALITY STANDARD OR GUIDANCE VALUE.
5. AWQSGV = AMBIENT WATER QUALITY STANDARD OR GUIDANCE VALUE.
6. J = CONCENTRATION IS LESS THAN THE REPORTING LIMIT, BUT GREATER THAN OR EQUAL TO THE METHOD DETECTION LIMIT. THE REPORTED CONCENTRATION IS AN ESTIMATE.
7. U = ANALYTE WAS NOT DETECTED IN THE SAMPLE. THE REPORTED CONCENTRATION IS THE REPORTING LIMIT.
8. D = CONCENTRATION IS BASED ON DILUTED SAMPLE ANALYSIS.

0 60' 120'
GRAPHIC SCALE

NATIONAL GRID
ONEIDA (SCONONDOA STREET) FORMER MGP SITE
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AREAS OF POTENTIAL REMAINING MGP-RELATED IMPACTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4

CITY: SYRACUSE-NY DIV/GROUP: 141/ENV DB: B.GETTS LD: B.GETTS PIC: T.YOUNG PM: M.BENOIT TM: D.NODINE LYR:ON=*;OFF=*REF*
C:\Users\gstowell\OneDrive - ARCADIS\IBM 360 Docs\NATIONAL GRID\SCONONDOA STREET FORMER MGP SITE\2018\B0036653.0002\01-DWG\FER-Fig. 4-Potential Remaining Impacts.dwg LAYOUT: 4 SAVED: 9/17/2018 2:51 PM ACADVER: 21.0S (LMS TECH) PAGESETUP: C-LD2B-PDF-GMS
PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/17/2018 2:52 PM BY: STOWELL, GARY
XREFS: IMAGES:
FER-X-Existing Utilities
FER-X-Property Lines
FER-X-Base
FER-X-Existing Grade
FER-X-Title

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