Niagara Mohawk Power Corporation

PRE-DESIGN INVESTIGATION AND SOIL BENCH-SCALE TREATABILITY STUDIES SUMMARY REPORT

Superfund Site – Operable Unit 2
Saratoga Springs, New York
EPA ID # NYD980664361

August 2016

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Certification

I, John C. Brussel, P.E., as a Professional Engineer registered in the State of New York, to the best of my knowledge, and based on my inquiry of the persons involved in preparing this document under my direction, certify that this *Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report* for Operable Unit 2 of the Niagara Mohawk Power Corporation (NMPC) Superfund site in Saratoga Springs, New York was completed in general accordance with the following:

- Section VI.10 of the Consent Decree (Civil No. 1:14-CV-1266[GTS/TWD]) between NMPC and the United States Environmental Protection Agency (EPA), filed January 12, 2015.
- EPA guidance documents, including *Guidance on Oversight of Remedial Designs and Remedial Actions performed by Potentially Responsible Parties*, (OSWER directive 9355.5-01, EPA/540/g-90-001), dated April 1990.
- The EPA-approved *Remedial Design Work Plan*, dated May 2014.
- The Record of Decision (ROD) issued by the EPA on March 29, 2013.

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
bTOC	below top of casing
CCTV	closed-circuit television
cm/sec	centimeters per second
DNAPL	dense non-aqueous phase liquid
DVD	digital video disc
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
GPR	ground penetrating radar
GPS	global positioning system
HDPE	high density polyethylene
HSA	hollow-stem auger
ISS	in-situ soil solidification/stabilization
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid
NMPC	Niagara Mohawk Power Corporation
NYCRR	New York State Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation

OU	Operable Unit
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PDI	pre-design investigation
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch
QA/QC	quality assurance/quality control
RD	Remedial Design
RDWP	Remedial Design Work Plan
RF	radio frequency
ROD	Record of Decision
SMP	Site Management Plan
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	semi-volatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
UCS	unconfined compressive strength
USGS	United States Geological Survey
VOC	volatile organic compound

1 INTRODUCTION

This Pre-Design Investigation (PDI) and Soil Bench-Scale Treatability Studies Report ("the Report") summarizes the work performed and findings of the PDI and soil treatability studies for the Operable Unit 2 Project Area (OU 2 Project Area) of the Niagara Mohawk Power Corporation (NMPC) Superfund site located in Saratoga Springs, New York. The OU 2 Project Area location is shown on Figure 1. The limits of OU 1, OU 2, and the former Spa Steel property are shown on Figure 2, and a close-up view of OU 2 is provided on Figure 3.

The PDI field activities described herein were performed by Arcadis of New York, Inc. (Arcadis) from June 2015 through July 2016 and primarily consisted of the following:

- Subsurface utility identification and mark-outs and a subsurface soil investigation to support implementation of the in-situ soil solidification/stabilization (ISS), barrier wall, and subsurface mat bench-scale treatability studies and preparation of the Remedial Design (RD) for the site.

- A groundwater investigation to support preparation of a hydraulic model for the RD.

The ISS treatability study was performed by Arcadis from August 2015 to October 2015 and involved developing and bench-scale testing various reagent mix designs to solidify manufactured gas plant- (MGP-) impacted soil from the OU 2 Project Area. The barrier wall and subsurface mat treatability study was performed by GeoSolutions, Inc. of New Kensington, Pennsylvania (GeoSolutions) from November 2015 to February 2016 and involved developing and bench-scale testing various mix designs for performing jet grouting to construct the barrier wall and subsurface mat as part of the overall remedy for the OU 2 Project Area. The goal of each study was to select one or more mix designs for full-scale implementation that will achieve proposed performance objectives, involve green remediation/sustainable efforts, and be cost-effective.

The PDI and ISS treatability studies were performed in accordance with the *Remedial Design Work Plan* (Arcadis, 2014) ("the RDWP"), which was approved by the New York State Department of Environmental Conservation (NYSDEC) in a June 24, 2014 letter to the United States Environmental Protection Agency (EPA) and approved by EPA by issuance of the January 12, 2015 Consent Decree (EPA 2015) that includes the RDWP as an appendix. The goals of the PDI and treatability studies were achieved by the activities summarized herein.

1.1 Work Plan Organization

The Report has been organized into the following sections:

Section	Purpose
Section 1 – Introduction	Presents an overview of the PDI and treatability studies and describes the proposed final remedy for the site.
Section 2 – Pre-Design Investigation	Describes the work performed and findings of the PDI and presents a summary/conclusions and recommendations based on the PDI findings.

Section	Purpose
Section 3 – Bench-Scale Treatability Studies	Describes the work performed and findings of the ISS, barrier wall, and subsurface mat treatability studies and presents a summary/ conclusions based on the studies' findings.
Section 4 – Remedial Design Schedule	Presents the anticipated project schedule for preparing the RD and implementing the remedy.
Section 5 – References	Presents a list of the documents cited in the report.

For detailed site background information, refer to the RDWP.

1.2 Description of Selected Remedy

The EPA-selected remedy proposed in the OU 2 Record of Decision (ROD; EPA 2013) generally includes the following components:

- Treating dense non-aqueous phase liquid- (DNAPL-) impacted soil via ISS in the Old Red Spring Area of the Operable Unit 2 Project Area. This remedy component includes removing the top five feet of surface soil to account for the increase in volume of the solidified material and to allow room for two feet of clean backfill.

- Removing surface soil (i.e., up to two feet below grade) in areas not targeted for ISS within the Old Red Spring Area and restoring the area with imported clean fill underlain by a demarcation layer.

- Enhancing biodegradation of impacted subsurface soil and groundwater in the Old Red Spring Area by the application of amendments, such as organic nutrients, oxygen releasing compounds, and/or chemical products.

- Plugging and abandoning the existing Old Red Spring water well and installing a replacement well with a double casing.

- Installing a containment barrier wall and a subsurface mat to encapsulate DNAPL-impacted soil under a section of Excelsior Avenue.

- Conducting long-term groundwater monitoring, including periodic sampling of monitoring wells and analysis for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals.

- Implementing institutional controls (ICs) at the properties in OU 2, which would include the development of environmental easements/restrictive covenants to be filed in the property records of Saratoga County.

- Developing a Site Management Plan (SMP) to ensure the effectiveness of the engineering and institutional controls, as well as the long-term groundwater monitoring, periodic reviews, and certifications.

- Restoring disturbed areas (including vegetated surfaces, parking lots, roadways, sidewalks, curbs, etc.) following the completion of remedial construction activities by replacing them to their original pre-construction condition and topographic contours.

- Conducting a periodic review and certification, at a frequency not exceeding five years, of institutional and engineering controls, until the EPA provides notification in writing that this certification is no longer needed.

- Considering green remediation and sustainability efforts in the design and implementation of the remedy to the extent practicable, including: (1) using renewable energy sources; (2) reducing greenhouse gas emissions; (3) encouraging low carbon technologies; and (4) recycling and reusing clean materials.

2 PRE-DESIGN INVESTIGATION

This section summarizes the work performed and results obtained for the PDI, and conclusions and recommendations based on the PDI findings. Field investigation methodologies, analytical procedures, and health and safety protocols followed during the completion of the PDI activities are presented in the RDWP.

2.1 PDI Field Activities

Prior to implementing the PDI field activities, NMPC executed access agreements with: (1) the City of Saratoga Springs for the Old Red Spring parcel and a portion of Excelsior Avenue; and (2) The Mill, LLC for work on the parking lot and mowed lawn of the Grace Fellowship Church west of the Old Red Spring parcel.

Key work activities performed as part of the PDI are described under the following subsections:

- Subsection 2.1.1 – Site Survey
- Subsection 2.1.2 – Subsurface Utility Location
- Subsection 2.1.3 – Subsurface Soil Investigation
- Subsection 2.1.4 – Hydraulic Data Collection
- Subsection 2.1.5 – Groundwater Modeling
- Subsection 2.1.6 – Old Red Spring Well Evaluation

The RDWP also proposed an ecological survey to: (1) document existing plant species (e.g., trees and shrubs) for use during site restoration; and (2) evaluate the potential presence of threatened/endangered species (if any) at or in the vicinity of the OU 2 Project Area. The ecological survey will be performed in late Summer 2016 so that more recent ecological data is incorporated into the RD.

The NYSDEC was onsite periodically to observe fieldwork associated with the subsurface utility identification, subsurface soil investigation, hydraulic data collection, and Old Red Spring well evaluation.

An analytical sample summary, which identifies the analyses performed on each PDI and treatability study soil sample, is included as Table 1.

A description of each task associated with the PDI is presented below.

2.1.1 Site Survey

Field survey activities were performed as part of the PDI by a New York State-licensed land surveyor (Thompson-Fleming Land Surveyors, PC [Thompson-Fleming] of Saratoga Springs, New York). The survey activities were performed using conventional survey and global positioning system (GPS) techniques to accomplish the following:

- Locate and stake property boundaries of the OU 2 Project Area and adjacent properties to the north and west.

- Mark the proposed horizontal limits of the ISS treatment area, barrier wall alignment, and subsurface mat area (for visual reference during implementation of the PDI field activities).

- Document boundary points for the grids established in the field for the geophysical survey.

- Document locations of overhead and subsurface utilities (in and around the proposed soil remedial activities), as identified and marked in the field by the utility locators and personnel performing a geophysical survey.

- Document locations of subsurface structures/anomalies as identified by the geophysical survey and subsurface soil investigation.

- Document final PDI soil boring locations.

- Prepare topographic mapping to show ground surface elevation contours (1-foot contours) in and around the proposed remedial limits (for later evaluation during Remedial Design and use on Contract Drawings). This included surveying locations for fence lines, roadways/sidewalks, and other features around the OU 2 Project Area.

Each of the objectives identified above was achieved by the PDI survey activities.

2.1.2 Subsurface Utility Location

Available historical and updated as-built utility drawings showed an extensive array of subsurface utilities in and around the proposed barrier wall, subsurface mat, and ISS treatment areas. No single, comprehensive figure was available showing each of the utilities in the area, and it was suspected that there may be additional utilities beyond those shown on available mapping. It was apparent that the utilities would present significant challenges for the PDI and remedy implementation. Therefore, as an initial step of the PDI, the following actions were taken to better understand the nature and extent of utilities in and around the proposed remedial area (to avoid damaging them during the PDI and to understand how they may affect the remedial approach):

- Arcadis performed a detailed visual site inspection to identify utilities present in the OU 2 Project Area in comparison to the site survey and available utility plans.

- A private utility locating service retained by Arcadis (Subsurface Utility Imaging, LLC [SUI] of Marcy, New York) performed a geophysical survey using radio frequency (RF) and ground-penetrating radar (GPR) techniques to identify and mark the location of underground utilities and obstructions at and in the immediate vicinity of: (1) the ISS area on the City-owned Old Red Spring parcel; (2) the ISS area on The Mill, LLC-owned parcel to the west; (3) the barrier wall and subsurface mat areas in Excelsior

Avenue and the associated roadway right-of-way on the Saratoga Restaurant Hospitality (Excelsior Springs banquet facility) property to the north.

- Personnel from utility owners and/or locators on behalf of the owners marked out their respective natural gas, electric, fiber-optic, sanitary and storm sewers, and water lines in response to a Dig-Safely New York ticket request issued by the Arcadis drilling and excavation subcontractor (Parratt-Wolff, Inc. of East Syracuse, New York).

The subsurface utility/structure identification activities listed above were performed on June 29 and 30, 2015 and October 26, 2015. The extensive subsurface utilities that were identified included multiple storm and sanitary sewer lines (existing and abandoned in-place), a natural gas main, an underground electric service line, an underground communications cable, and water service lines (some at different locations than those shown on the available utility drawings, and some that were not shown on the historical drawings).

Following non-intrusive utility location activities, manhole inspections were performed to document locations, sizes, depths, and construction materials of pipes entering or exiting storm and sanitary sewer manholes. Next, closed-circuit television (CCTV) inspections were performed inside storm and sanitary sewers within the remedial areas to observe and document: (1) the potential presence of cracks, gaps, or broken pipe (e.g., to evaluate the potential for the pipes to be affected by remedial activities in close proximity, including nearby grout injection for barrier wall or subsurface mat construction); and (2) the location/alignment of the pipes (e.g., to understand potential bends or changes in pipe direction, or to identify pipe-to-pipe connections that do not occur within the manholes, so that the pipes can be avoided or managed during anticipated future ISS mixing and barrier wall and subsurface mat construction).

SUI attempted to perform a CCTV inspection of a 36-inch brick storm sewer that extends approximately 15 feet below Excelsior Avenue to identify the location/alignment of the pipe. However, the pipe was completely submerged under water and visibility ahead of the camera was less than 1 foot, which was insufficient to advance the crawler carrying the camera through the pipe. A traceable ductile rodder (i.e., coated flexible metal rod) was subsequently advanced through the 36-inch brick storm sewer in an additional attempt to identify and trace the location/alignment of the pipe. An RF signal was induced through the rodder to trace the pipe at the ground surface. However, the burial depth of the sewer pipe and materials above the sewer limited the ability to trace the signal emitted through the ductile rodder. Information on the condition of the sewer and presence of lateral pipes entering the sewer was later identified in an August 2001 CCTV inspection recording included in historical project files (provided in the digital video disc [DVD] attached to this Report).

SUI also attempted to perform a CCTV inspection of an approximately 48-inch by 52-inch storm sewer box culvert that conveys stormwater flow from north to south through the OU 2 Project Area. However, field stone and masonry debris, which appeared to have collapsed from the top of the culvert, were encountered approximately 15 feet upstream from the manhole used to access the culvert (at the south end of the Grace Fellowship Church Parking lot) and prevented further inspection. Information on the condition of the box culvert was later identified in an undated historical CCTV inspection (provided on the DVD attached to this Report).

Additional subsurface utilities/structures were identified during the subsurface soil investigation, when “obstructions” were encountered during utility pre-clearance (i.e., vacuum excavation with an air knife) at selected boring locations while removing the upper 6 feet of soil before drilling using a hollow-stem auger (HSA) rig. Information on these obstructions is provided in the subsections below.

The utility locations, as identified by the above-described activities and documented by land survey activities performed by Thompson-Fleming, are shown on Figure 4. Manhole inspection forms are provided in Appendix A, and the PDI video inspections are provided on the attached DVD.

2.1.3 Subsurface Soil Investigation

The PDI subsurface soil investigation included drilling and soil sampling to achieve the following objectives:

- Further evaluate subsurface conditions and lithology, including the presence and extent of fill and obstructions in the proposed subsurface mat area and the clay confining layer depth along the barrier wall alignment.
- Evaluate handling requirements for soil to be removed as part of the remedy and transported for offsite disposal (i.e., soil to a depth of 2 feet below ground surface (bgs) throughout the OU 2 Project Area, except within Excelsior Avenue).
- Collect soil from within the proposed ISS limits (i.e., 5 to 24 feet bgs), barrier wall alignment, and subsurface mat area to support bench-scale treatability studies.
- Evaluate geotechnical properties of soil within and below the proposed ISS, barrier wall, and subsurface mat areas to support the remedial design.

The objectives listed above were achieved by the PDI subsurface soil investigation activities summarized below.

Soil borings were drilled at seven locations (locations GT-01 through GT-07, as shown on Figure 4) during the week of July 6, 2015. Drilling was performed by an Arcadis subcontractor, Parratt-Wolff, using conventional HSA drilling techniques and continuous split-spoon soil sampling. An Arcadis geotechnical engineer was onsite full-time to characterize soil recovered from the borings, collect and process samples for laboratory analysis, and perform air monitoring in accordance with the RDWP. Four of the soil boring locations shown in the RDWP were adjusted in the field to avoid utilities, as indicated below:

- ***GT-01:*** The soil boring was moved approximately 15 feet southwest from the location shown in the RDWP to avoid: (1) active overhead electric and communication lines along the northern curb of Excelsior Avenue; (2) active overhead electric lines crossing Excelsior Avenue that provide electric service to the pump in the Old Red Spring well; (3) a 12-inch diameter sanitary sewer extending below the centerline of Excelsior Avenue; (4) an underground electric line crossing beneath Excelsior Avenue and providing power to a street lamp at the intersection of Excelsior Avenue and Warren Street; and (5) the abandoned 36-inch brick storm sewer crossing diagonally below Excelsior Avenue.

- ***GT-02:*** The soil boring was moved approximately 5 feet west from the location shown in the RDWP to avoid the active overhead electric line that crosses Excelsior Avenue and provides electric service to the pump in the Old Red Spring well.

- ***GT-03:*** The soil boring was moved twice, approximately 5 feet north (GT-03A) and then 30 feet northeast (GT-03B) from the location shown in the RDWP after identifying obstructions (subsurface utilities) in Excelsior Avenue via vacuum excavation prior to HSA drilling. The subsurface utilities were identified at approximately 5 feet bgs at locations GT-03, GT-03A, and GT-03B. A fourth boring was not attempted in the area due to the proximity of active and abandoned subsurface utilities and because Arcadis determined that sufficient soil volume and visual characterization data would be obtained (alone) from borings GT-01 and GT-02 for the barrier wall and subsurface mat treatability studies.

- ***GT-05:*** The soil boring was moved approximately 10 feet south from the location shown in the RDWP after soil boring GT-02 was relocated. Arcadis relocated GT-05 to provide more uniform soil boring coverage in the ISS area south of Excelsior Avenue.

Prior to drilling using augers, soil was removed from each boring by vacuum excavation to a depth of approximately 6 feet bgs. The vacuum excavation was used as an additional precautionary safety measure beyond the above-described geophysical survey and subsurface utility location efforts to clear locations of subsurface utilities/obstructions.

Following vacuum excavation, drilling was performed to target depths using HSA methods at locations GT-01, GT-02, and GT-04 through GT-07. The borings at these locations were terminated after 5 feet of continuous clay was observed, and final boring depths ranged from 20 to 28 feet bgs. As indicated above, the soil boring at location GT-03 (and alternate locations) was not completed to the target depth because of the extensive subsurface utilities in the area.

Continuous soil sampling was performed using 2-inch-diameter split-spoon samplers, and soil recovered from each sample interval was observed and described for soil type, texture, moisture content, compactness, plasticity, and the presence/absence of impacts (e.g., non-aqueous phase liquid [NAPL]). Representative samples from each interval were also screened for the presence of volatile organic vapors using a photoionization detector (PID).

In addition to the above-described drilling activities, hand-auger borings were completed at five locations in the mowed lawn of the Old Red Spring area to support pre-excavation waste characterization sampling efforts, as detailed below. This includes two locations east of the ISS area (locations WC-1-1 and WC-1-2) and three locations south of the ISS area (locations WC-2-1, WC-2-2, and WC-2-3), as shown on Figure 4. These five locations are outside the area where ISS will be performed but within the limits of the proposed 2-foot deep soil removal in the Old Red Spring area.

Soil samples were collected from the HSA and hand-auger borings for the following purposes:

- *Evaluate Pre-ISS Excavation Soil Handling Requirements:* The OU 2 ROD calls for the removal of the top 2 feet of soil from the ISS and surrounding area prior to starting ISS. Soil from this area will ultimately be replaced by a 2-foot thick layer of imported clean fill during site restoration. Data was needed as part of the PDI to characterize the top 2 feet of soil to be removed from the ISS and surrounding area (estimated to be approximately 1,000 cubic yards) for direct-loading and transportation to an offsite disposal facility. In accordance with the RDWP, two composite soil samples (samples WC-1 and WC-2) were collected as part of the PDI to characterize the top 2 feet of soil from the ISS and surrounding area. Each composite soil sample was formed on July 8, 2016 using discrete grab subsamples from four or five soil sampling locations, as follows:

  - *Sample WC-1:* Soil from the 0- to 2-foot depth interval of borings GT-02, GT-04, WC-1-1, and WC-1-2.

  - *Sample WC-2:* Soil from the 0- to 2-foot depth interval of borings GT-06, GT-07, WC-2-1, and WC-2-2, and WC-2-3.

  Each composite sample was submitted to Accutest Laboratories of Marlborough, Massachusetts (Accutest) for laboratory analysis for polychlorinated biphenyls (PCBs), Toxicity Characteristic Leaching Procedure (TCLP) SVOCs, TCLP metals, TCLP pesticides, TCLP herbicides, ignitability, corrosivity, and reactivity. Two discrete grab samples (i.e., one of the subsamples used to form each composite sample) were also analyzed for TCLP VOCs.

- *Obtain Soil for the Bench-Scale Treatability Studies:* Approximately 5 gallons of soil were obtained from each soil boring within the proposed barrier wall, subsurface mat, and ISS areas (borings GT-01, GT-02, and GT-04 through GT-07) and placed in 5-gallon containers that were sealed and transported to the Arcadis treatability laboratory in Durham, North Carolina. The soil in each container was obtained from depths of between 5 and 22.5 feet bgs (from the corresponding boring location) and included the most heavily-impacted material encountered at the location. The soil from borings completed in the ISS areas (borings GT-04 through GT-07) was used by the Arcadis treatability laboratory for the ISS treatability study. The Arcadis treatability laboratory shipped the soil from borings completed in the barrier wall and subsurface mat areas (borings GT-01 and GT-02) to GeoSolutions of New Kensington, Pennsylvania for use in the barrier wall and subsurface mat treatability studies.

The RDWP proposed the collection of undisturbed soil samples (Shelby tubes) from below the proposed ISS area to evaluate certain in-situ soil properties (strength, consolidation) and the potential effects from the ISS process. Based on a review of available existing information from previous investigations, estimation of overburden material properties based on the boring logs, and typical jet grouting unit weights, Arcadis determined that Shelby tube collection would not be necessary during PDI activities because the proposed barrier wall was not anticipated to increase the consolidation stress on the clay any more than the existing materials. After initial PDI activities, Arcadis confirmed this assumption using standard penetration test information from the PDI and density results from the jet grouting treatability study. Arcadis estimated the sandy silt material to have a moist/saturated unit weight of 110 to 125 pounds per cubic foot (pcf). Based on jet grout density data reported during unconfined compressive strength laboratory testing during the treatability study, the unit weight of the grout to be used for the barrier wall is estimated to range between 102 and 108 pcf, resulting in less or approximately equal stress on the clay (mitigating potential settlement issues).

Upon completion, each boring was tremie-grouted to the surface (using a cement-bentonite grout). Topsoil and grass seed were spread over the top of the grouted borings located in grass-covered areas, and a concrete patch was used to restore the surface for borings in paved areas. Soil cuttings and other investigation-derived solid wastes and decontamination fluids were containerized in 55-gallon drums. NMPC's waste transportation and disposal vendor (Clean Harbors) transported the soil cuttings for offsite disposal as a non-hazardous waste based on analytical results for waste characterization samples collected by Arcadis. Liquid wastes were processed through the existing NMPC groundwater treatment system located on the former Spa Steel property.

In connection with the above-described soil sampling, Arcadis collected 5 gallons of tap/potable water from a spigot located at the Excelsior Springs banquet hall building for use during the treatability studies. The water is considered representative of that which will be obtained from the municipal water supply for use during the full-scale implementation of the ISS, barrier wall, and subsurface mat remedy. The RDWP also indicated that 5 gallons of groundwater from the OU 2 Project Area would be collected and sent to the treatability laboratory for use in developing the mix designs. However, Arcadis determined that no additional groundwater was needed for the treatability studies (other than that already mixed in with the soil recovered from the borings). The final mix designs developed by Arcadis did not include groundwater as an admixture.

2.1.4 Hydraulic Data Collection

Hydraulic data were collected during the PDI to support development of a three-dimensional groundwater flow model. The hydraulic data collection was completed during the week of July 13, 2015 and consisted of obtaining a complete, synoptic round of fluid level measurements from accessible wells and conducting specific-capacity tests at 11 monitoring wells.

An electronic interface probe was used to obtain the synoptic round of fluid level measurements. Consistent with observations during previous investigations, DNAPL was encountered in two monitoring wells (MW-EPA-05 and MW-EPA-08). The DNAPL thickness identified in these two wells was consistent with previous estimates (1.5 to 2.5 feet thick), but thickness measurement is approximate because of the small size of the wells (1-inch diameter), the viscosity of the DNAPL, and disturbance (displacement) caused by the measurement device. Both wells are located within the proposed remediation footprint where ISS will be performed. Field personnel removed the DNAPL from the wells to the extent practical and proceeded with specific capacity testing, as described below. DNAPL was not identified in any of the other OU 2 Project Area wells gauged as part of the July 2015 data collection event.

Specific-capacity testing was performed at 11 existing monitoring wells (MW-EPA-04 through MW-EPA-09, MW-SS-08-05, MW-SS-08-08, MW-SS-09-06, MW-SS-09-07, and MW-ORS-1, as shown on Figure 3). Specific capacity testing is a field method used to estimate the hydraulic conductivity of a saturated geologic medium surrounding the screened or open interval of a well. The specific capacity testing involved pumping groundwater from the wells at a constant rate and quantifying the pumping rate and magnitude of drawdown inside the tested well after a known duration of pumping. The hydraulic conductivity is calculated based on the pumping rate and drawdown measured inside the well and using a time-drawdown analysis with a semi-log data plot (Driscoll, 1986). Specific-capacity tests were attempted, but could not be performed at MW-EPA-02 (an obstruction at a depth of 7 feet below the casing of this 18-foot deep well prevented tubing from being lowered deep enough into the well for the test) and at MW-EPA-10 (which was pumped dry). The specific capacity at MW-EPA-02 was later estimated based on water level data obtained during low-flow purging and sampling of the well. Specific-capacity test field logs (and the MW-EPA-02 sampling log) are included in Appendix B. No work is proposed to address the obstruction at MW-EPA-02 because the well will ultimately be decommissioned in preparation for future remediation (construction of the subsurface mat) in the area.

Purge water and DNAPL generated by the specific-capacity testing were containerized in 5-gallon buckets and processed through the existing NMPC groundwater treatment system located on the former Spa Steel property.

The RDWP indicated that groundwater characterization sampling (i.e., to support the groundwater bioremediation design) would be performed after soil remediation activities are completed. However, groundwater characterization sampling was performed during the PDI in support of the EPA's Five Year Remedy Review for the former MGP site. Results of the sampling were provided in September 30, 2015 e-mail correspondence to the EPA (included on the attached DVD). In accordance with the RDWP, further groundwater characterization sampling will be performed after the soil remediation is completed.

2.1.5 Groundwater Modeling

A three-dimensional groundwater flow model was developed to evaluate the potential hydraulic impacts from future implementation of the remedial action selected in the OU 2 ROD. The components of the selected remedial action that were evaluated by the model include:

- The ISS monolith in the Old Red Spring Area.
- The containment barrier wall and subsurface mat beneath a section of Excelsior Avenue.

Each of these features will have lower permeabilities than the soil that exists in the OU 2 Project Area and therefore will impact groundwater flow and hydraulic head in the area. The model was used to evaluate changes in flow and hydraulic head (i.e., groundwater mounding) resulting from implementation of these components. The model was constructed using published geologic and hydrogeologic literature for the area and geologic and hydrogeologic information measured in the OU 2 Project Area (e.g., specific-capacity test results). Arcadis selected MODFLOW groundwater modeling software for constructing and calibrating a steady-state numerical groundwater flow model for the OU 2 Project Area. MODFLOW is a publicly-available groundwater flow simulation program developed by the U.S. Geological Survey (USGS) (McDonald and Harbaugh, 1988). MODFLOW is thoroughly documented, widely used by consultants, government agencies and researchers, and is consistently accepted in regulatory and litigation proceedings.

In addition, Arcadis developed and used various utilities with MODFLOW to streamline the construction and calibration of groundwater model.

A discussion of the model setup, calibration, and simulations is provided in a technical memorandum on the attached DVD.

2.1.6 Old Red Spring Well Evaluation

The Old Red Spring well evaluation was conducted in an effort to identify well construction details to develop plans for decommissioning and replacing the well as part of the OU 2 remedial action. As the initial step in the Old Red Spring well evaluation, Arcadis contacted the City of Saratoga Springs Engineering Department (City's Engineering Department) to obtain information related to the well construction and maintenance, including well depth, diameter(s), screen interval(s) and opening sizes (if the well is screened), construction materials for the casing and screen, geologic records from drilling for the well installation, pump specifications, conveyance piping plans (pipe material, size, burial depth, etc.). However, the City's Engineering Department was unable to locate or provide any information related to the well construction and operation/maintenance.

An Arcadis water supply well inspection subcontractor, Layne Christensen Company (Layne), mobilized on July 13, 2015 to conduct a down-hole camera inspection of the Old Red Spring well. Prior to the inspection, the City's Engineering Department de-energized the power source to the well pump. Layne subsequently removed the pump from the well (by hand) and lowered a video camera into the well to observe and document conditions. The camera was advanced to a depth of approximately 38 feet below the top of the well casing (bTOC), where obstructions prevented further inspection. The obstructions appeared to consist of pump wire (which was first encountered at 32 feet bTOC), nylon rope suspected to have supported a previous pump, a 1-inch diameter polyvinyl chloride (PVC) drop pipe, and potentially an abandoned pump connected to the drop pipe. Mineralization/sediment was observed around the suspected abandoned pump. Layne was unable to remove the obstructions with equipment it had onsite on July 13, 2015.

Layne remobilized to the Old Red Spring well on November 23, 2015 with additional tools and equipment to remove the obstructions encountered during the July 2015 inspection. After the well was de-energized and the existing pump was removed, Layne conducted air lifting in an attempt to remove the obstructions. Based on measurements through a 1-inch diameter PVC pipe extending down the side of the well to a depth of approximately 42.9 feet bTOC and previous observations of discarded pump wire and rope, the obstruction appeared to be approximately 4.4 feet of accumulated sediment and mineralization over an abandoned, lodged pump. Air lifting was performed using various tools/methods and was supplemented via use of a rod with cutting teeth that was dropped and turned to break up the material. The air lifting resulted in the removal of approximately 1.5 feet of material (visually characterized as clay, silt, sand, and gravel) on November 23 and 24, 2015, but it was unsuccessful in removing enough of the sediment/mineralization to allow the underlying pump to be dislodged and removed. Additional efforts were not made to remove the sediment/ mineralization and dislodge the pump based on concerns over such efforts potentially damaging the well and the understanding that the well needs to stay operational until the start of the remedial action.

Following completion of the down-hole activities in July and November 2015, Layne sanitized the well with chlorinated water and replaced the pump. The well was secured (to prevent public use of water) and allowed to discharge overnight to purge the chlorinated water. A sample was subsequently collected by the Saratoga Springs Water Department for laboratory analysis for total coliform before the well was re-opened for public use.

2.2 PDI Findings

This section summarizes the findings of the PDI field activities. As previously indicated, the surveyed locations of overhead utilities observed during the site reconnaissance and subsurface utilities/structures identified from mark-outs in response to a DigSafely New York ticket request and subsequent geophysical survey activities are shown on Figure 4. The topography in and around the proposed remedial area, as determined by survey performed by Thompson-Fleming, is shown on Figure 5.

The remainder of this section focuses on the findings of the PDI subsurface utility location efforts, PDI subsurface soil investigation, and the PDI groundwater investigation.

2.2.1 PDI Subsurface Utility Location

Subsurface utilities in the OU 2 Project Area are very extensive, as shown on Figure 4. The subsurface utilities generally consist of the following:

- ***Storm Sewers:*** Several existing (active) and former (abandoned-in-place) storm sewer pipes extend through the OU 2 Project Area. The main storm sewer is an approximately 48-inch by 52-inch storm sewer box culvert that conveys stormwater flow from north to south through the OU 2 Project Area. As indicated above, the sewer is constructed of field stone and masonry and its condition is compromised. A section of the sewer beneath the Grace Fellowship Church Parking Lot, approximately 15 feet upstream from a manhole along the south edge of the parking lot, was observed to have collapsed. Other collapsed sections were observed in historical video footage approximately 75 feet, 95 feet, and 114 feet upstream from the manhole. The collapsed section of storm sewer 114 feet upstream from the manhole is the only portion within the remedial limits. The invert elevation of the box culvert in the northern portion of the City-owned Old Red Spring Parcel (just south of Excelsior Avenue) will be evaluated by upcoming additional fieldwork in Spring 2016. The box culvert receives stormwater flow from the following structures in the area:

    - Four catch basins in or alongside Excelsior Avenue (catch basins CB-1, CB-2, CB-50, and CB-51) discharge stormwater to the box culvert via a series of polyvinyl chloride (PVC) and high density polyethylene (HDPE) pipes, as shown on Figure 4.

    - A catch basin in Warren Street (CB-6) discharges flow to a stormwater manhole (MH-6) that, in turn, discharges via a 12-inch diameter HDPE or 12-inch steel pipe (depending on location) to the box culvert.

    - A series of HDPE pipes ranging in size from 18-inch to 48-inch diameter discharge stormwater runoff from uphill sections of Excelsior Avenue (west of the OU 2 Project Area) into the box culvert.

Prior to the construction of the steel sheetpile barrier wall around the former Spa Steel property, various storm sewer pipes conveyed flow beneath (along and across) Excelsior Avenue to the box culvert. These sewers were abandoned-in-place when the barrier wall was constructed, and flow was routed to the existing HDPE pipes.

A 36-inch diameter brick storm sewer extends diagonally below Excelsior Avenue at an approximate depth of 15 feet below the pavement surface. The alignment of this abandoned pipe will be evaluated by additional PDI fieldwork to be performed in Spring 2016. This pipe was abandoned when the steel sheetpile barrier wall was constructed around the former MGP site. Stormwater flow in the area was re-routed at that time. Several storm sewer laterals (visible in historical video inspection footage and shown on Figure 4) formerly discharged flow to the 36-inch diameter brick storm sewer.

- ***Sanitary Sewers:*** An existing 12-inch steel pipe conveys sanitary flow below the approximate centerline of Excelsior Avenue, from west to east. Further east, the sewer transitions from steel to vitrified clay pipe. This sanitary sewer was rerouted when the steel sheetpile barrier wall was constructed around the former Spa Steel property. An abandoned section of the former sanitary sewer extends north to south through the approximate middle of the proposed subsurface mat area.

- ***Electric Lines:*** An active underground electric line provides electrical service to the pump for the Old Red Spring well. The underground electric line connects to a riser on a utility pole in the northwestern portion of the City-owned Old Red Spring parcel. From the utility pole, overhead electric lines extend diagonally across Excelsior Avenue and connect to the main service line that extends east to west, supported by a series of utility poles along the northern curb of Excelsior Avenue. Various overhead communications cables (fiber optic, cable television) span the utility poles along the north side of Excelsior Avenue within the OU 2 Project Area. An underground electric line also extends along the north side of Excelsior Avenue and crosses the road (immediately east of the proposed barrier wall alignment) and provides power to at least three street lights in the area.

- ***Natural Gas Main:*** An active underground natural gas line extends along the south side of Excelsior Avenue, parallel to the roadway. The size and burial depth of the gas main will be determined by utility daylighting (vacuum boring) to be performed in Spring 2016.

- ***Water Supply Piping:*** An active 20-inch diameter water main extends east to west below the northern (westbound) lane of Excelsior Avenue. One or more former (inactive/abandoned) water mains extend east to west below the southern (eastbound) lane of Excelsior Avenue, at a depth of approximately 5 feet below the road surface. An additional former water main or other subsurface utility is buried at depths of between 3 and 5 feet below the road surface and extends parallel to (approximately 2 feet north of) the existing 20-inch diameter water main.

- ***Communication Cable:*** Arcadis coordinated with Premier Utility Locating Services (Premier), Time Warner Cable (TWC), and Verizon by telephone in efforts to determine the status (active/inactive) and ownership of an underground communication line marked in the field by Premier as cable television and subsequently reported by Premier to be fiber optic. Arcadis made several calls to TWC and Verizon to discuss the “unclaimed” utility and obtain mapping showing each company’s utilities in the area. Based on subsequent radio-frequency line tracing by SUI and reconnaissance by Arcadis, the line was observed to connect to a utility pole (Bell Atlantic Pole 111-1) several hundred feet east of the OU 2 Project Area, along the south side of Excelsior Avenue. The cables were observed to be cut above a junction box on the utility pole, indicating that the communications cable is likely no longer in service.

The three-dimensional model previously developed for the OU 2 Feasibility Study (using mining visualization software [MVS] to show NAPL distribution in the OU 2 Project Area) has been updated to show the locations of subsurface utilities identified by the PDI in relation to existing site features (roadways, buildings), PDI soil borings, historical soil borings, existing monitoring wells, and geologic units. The model will be used during the RD to assess potential configurations and implementation strategies for constructing the barrier wall and subsurface mat below Excelsior Avenue. An electronic copy of the model is provided on the attached DVD.

2.2.2 PDI Soil Investigation Findings

Conditions encountered in the soil borings drilled as part of the PDI are summarized on the soil boring logs included as Appendix C. Subsurface intervals where NAPL, staining, sheens, or odors were encountered within the soil borings are summarized in Table 2. Key observations made from review of these data and information are summarized below:

- Coal tar DNAPL was encountered in each soil boring located within the proposed ISS areas (GT-02 and GT-04 through GT-07), as follows:
    - The DNAPL was in the form of “blebs” (droplets of oil-like material within the soil core). Where blebs were identified, the majority of the soil core did not appear to be visibly-impacted.
    - DNAPL blebs were limited to relatively thin soil intervals (less than approximately 0.4-feet in thickness) at depths of approximately 15 to 22 feet bgs.
    - DNAPL blebs were identified immediately above the confining silty clay unit at each location.
- NAPL was not observed in soil recovered from the soil boring located within the proposed barrier wall/subsurface mat area (GT-01).

Laboratory analytical results for the two composite soil samples collected to characterize soil from the upper 2 feet of the Old Red Spring area (i.e., from the ISS area and surrounding area where soil will be removed to a depth of 2 feet bgs as part of the soil remedial action) are presented in Table 3. Laboratory analytical data reports and electronic data deliverables (EDDs) are included on the attached DVD. The geotechnical results for the soil samples collected from the borings and used in the treatability study are discussed in Section 3.

The soil analytical results presented in Table 3 are compared to the regulatory thresholds for a hazardous waste as presented in Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR) Parts 371.3(b) through (e) and Part 371.4(e). These results are summarized as follows:

- PCBs were detected at concentrations of 0.065 (estimated) and 0.081 parts per million (ppm) in the composite soil samples, which are well-below the 1 ppm commercial soil cleanup objective presented in 6 NYCRR Part 375-6.8(b) and the 50 ppm regulatory limit for a TSCA-regulated PCB waste and New York State listed hazardous waste as presented in 6 NYCRR 371.4(e).

- The samples are not ignitable, corrosive, or reactive, and they do not exhibit a toxicity characteristic for VOCs, SVOCs, metals, pesticides, or herbicides.

The analytical results support that the soil to be removed from the upper 2 feet of the Old Red Spring area as part of the soil remedial action may be transported for offsite disposal as a non-hazardous waste. However, if conditions encountered during removal are different from those observed during in-situ characterization sampling, then additional sampling will be performed to further evaluate handling requirements.

2.2.3 Hydraulic Data Collection Summary

A complete, synoptic round of water level measurements was obtained from wells in the OU 2 Project Area and surrounding areas on July 13, 2015. The groundwater level measurements were converted to elevations and plotted on a figure for contouring (Figure 6). The pattern of the contours and groundwater flow direction are similar to those observed based on previous water level measurement rounds in the OU 2 Project Area.

Hydraulic conductivity of various hydrostratigraphic units were estimated using the specific-capacity test data collected at 11 existing monitoring wells during the week of July 13, 2015. AQTESOLV for Windows© (Duffield, 2007) (using Theis [1935] and Cooper-Jacob [1946] solutions) was used to estimate hydraulic conductivity values. The results of the hydraulic analyses are presented in the technical memorandum provided on the attached DVD, and a summary of the estimated hydraulic conductivity values is provided below. Due to limited hydraulic response at monitoring wells MW-EPA-05 and MW-EPA-09, only ranges in hydraulic conductivity values were approximated at these wells based on the well lithologic descriptions and regional information. Specific-capacity data collected from MW-EPA-10 were inconclusive as the well went dry during testing. The data reported below for MW-EPA-02 are from low-flow sampling of the well (the hydraulic conductivity testing of the well during the week of July 13, 2015 were limited by a blockage in the well, as described in Section 2.1.4).

Table 2-1
Specific Capacity Results

Well ID	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Average K (feet/day)
MW-EPA-02	8	18	2.8
MW-EPA-04	11	16	1.8
MW-EPA-05	8	18	15 to 40
MW-EPA-06	6	16	36
MW-EPA-07	12	17	1.9
MW-EPA-08	14	19	6.8
MW-EPA-09	12	17	10 to 100
MW-EPA-10	10	15	NA
MW-SS-08-05	8	18	0.11
MW-SS-08-08	8	19	5.4
MW-SS-09-06	10	20	0.92
MW-SS-09-07	12	22	8.2
MW-ORS-01	NA	NA	0.53

Note: NA = Not available.

2.2.4 Groundwater Modeling Summary

A discussion of the construction and calibration of the model and model simulations is provided in the technical memorandum included on the attached DVD. As discussed above, the model evaluated potential hydraulic effects (i.e., mounding) anticipated from future installation of the ISS monolith in the OU 2 Project Area and the containment barrier wall and subsurface mat beneath a section of Excelsior Avenue. The modeling results indicate the following for these areas:

- Groundwater mounding will likely not exceed existing ground surface grade even under an elevated high recharge condition (i.e., high precipitation) expected during a typical wet year.

- The difference in mounding between the average recharge and high recharge conditions is approximately 1 foot. Under the high recharge condition, the groundwater elevation within most of the OU 2 Project Area is expected to be approximately 3 feet bgs.

- The shallowest simulated water table (depth to water of approximately one foot) is estimated to occur at the northwest corner of the containment area below Excelsior Avenue.

- The remedial action may require excavating soil near the northern limit of the ISS area to approximately 10 feet bgs (e.g., potentially to install the subsurface mat). This excavation area can be expected to extend below the water table during construction since the model-simulated groundwater elevation in this area is approximately 6.5 feet bgs. This suggests the potential need for dewatering during excavation (unless the excavation is performed entirely within an area of solidified soil following remediation by ISS).

2.2.5 Old Red Spring Evaluation Findings

Key observations made from the Old Red Spring evaluation are provided below:

- The Old Red Spring well is located below the concrete floor slab of the Old Red Spring pavilion in a manhole immediately east of the fountain.
- The casing for the upper approximately 38 feet of the Old Red Spring well is 6-inches in diameter and constructed of threaded iron pipe. The well casing was in acceptable condition with little to minor pitting observed. As discussed in Section 2.1.6, the casing below approximately 38 feet could not be evaluated due to an obstruction.
- A STA-RITE 0.5-horsepower submersible pump supplies water to the fountain.
- The intake for the submersible pump was identified at approximately 36.5 feet bTOC.
- The abandoned electrical wire, nylon rope, 1-inch PVC drop pipe, and suspected former pump encountered in the well suggest that a previous pump failed and could not be removed from the well beyond approximately 38 feet bTOC.
- The video inspection provided no information regarding the construction of the well below 38 feet bTOC.
- The current depth of the obstruction in the well (38 feet bTOC) is well-below the lowest observed elevation of the DNAPL, which is on top of the clay surface in the OU 2 Project Area

A copy of the video footage recorded during the inspection activities is included on the attached DVD.

It is suspected that groundwater once flowed naturally under artesian conditions (i.e., potentiometric head above grade) from the Old Red Spring well. However, at some point, the water level in the well dropped to a level where artesian conditions were no longer present. It is assumed that that the City of Saratoga Springs installed the pumping system inside the well to maintain the flow that was previously observed under artesian conditions. When the pump in the Old Red Spring well is shut off, the static water level in the well is a few feet bTOC. Although this water level is much shallower than the level of the water table in nearby monitoring wells, it is still not an artesian, naturally flowing condition.

Boring logs from nearby bedrock monitoring wells and soil borings installed as part of the Remedial Investigation at the former MGP site indicate that the bedrock surface in the area is encountered approximately 120 feet bgs and that artesian conditions (i.e., water level above grade) are observed in the bedrock. Even though the Old Red Spring Evaluation yielded no well construction information below 38 feet bTOC, the fact that artesian conditions are observed in nearby bedrock monitoring wells suggests that the Old Red Spring well is likely installed in bedrock. Therefore, it is anticipated that the Old Red Spring replacement well will be more than 120 feet deep and installed with double-casing, as outlined in the OU 2 ROD.

Further efforts can be undertaken at the start of remediation (when the Old Red Spring well is taken out of service and decommissioned) to remove the mineralization/lodged pump and further evaluate the well construction in preparation for eventual replacement of the well following completion of the soil remediation. Since the well will no longer need to be operational, additional upward or downward force can be exerted on the pump in an effort to dislodge it.

Any additional information on well construction obtained during decommissioning will be taken into consideration for the design of the replacement well.

2.3 PDI Summary/Conclusions

The PDI objectives were achieved by the field activities and laboratory analyses described in this report. Data have been generated to evaluate handling requirements for the upper 2 feet of soil in the ISS area and surrounding Old Red Spring area to be removed during the soil remedial action and replaced with clean imported soil. Additional data and information have been generated with respect to the presence and extent of subsurface utilities and structures in the proposed remedial area. The following conclusions have been made based on review of the PDI data:

- The intervals where DNAPL was identified in the PDI soil borings are consistent with those where DNAPL was identified in previous soil borings completed at the site (i.e., mainly blebs extending to only approximately 0.4 feet above the top of the clay surface underlying the area). A sufficient volume of DNAPL-impacted soil was obtained for the treatability studies.

- Subsurface utilities in and around the proposed remedial areas are extensive and pose significant challenges to implementing the remedy. Utilities include, but are not limited to, multiple storm and sanitary sewer lines (existing and abandoned in-place), a natural gas main, underground electric service lines, an underground communications cable, and water service lines. Provisions will be included in the RD for temporarily deactivating, removing, and/or relocating certain utilities (where permitted by the utility owners) and jet-grouting around other utilities.

- Pole-mounted overhead lines extend parallel to the northern curb of Excelsior Avenue and over the eastern portion of the proposed ISS and barrier wall/subsurface mat areas. These lines are electric, fiber optic, and cable television services and may require temporary deactivation, removal/relocation, and/or protection during the soil remedial action based on clearance distances required for heavy equipment anticipated to be used to construct the soil remedy. The handling of these utilities will require close coordination with the utility providers, City of Saratoga Springs, and nearby property owners (The Mill, LLC and Saratoga Restaurant Hospitality).

- Groundwater modeling predicts a moderate rise in the water table due to installation of the ISS monolith in the Old Red Spring area and containment barrier wall and subsurface mat beneath a section of Excelsior Avenue. However, the water table is not predicted to reach the ground surface. Excavation in the northern portion of the ISS area (e.g., if needed to install the subsurface mat) would likely encounter the water table and may require dewatering unless the excavation is to be performed entirely within an area of solidified soil following remediation by ISS.

- A complete video camera inspection of the Old Red Spring well was not possible without risking damage to the well, which must remain operational until remedial activities start. However, a review of regional geologic information collected during the Remedial Investigation at the former MGP site and water level data from wells at and near the OU 2 Project Area provides a basis for designing a replacement Old Red Spring well. Further assessment of the well can be performed during decommissioning efforts at the start of the soil remedial action.

2.4 Recommendations

Subsurface utilities pose one of the largest challenges for the proposed RD and soil remedial action. A significant amount of work has already been performed to locate and evaluate the subsurface utilities, but further exploratory work is proposed to provide additional information for the RD. The additional exploratory work is anticipated to involve the following:

- Drilling soil-boring transects in the mowed lawn immediately east of the driveway entrance into the existing NMPC groundwater treatment building (between Excelsior Avenue and the fence to the north). The soil-boring transects will be drilled to “hit” the 36-inch brick storm sewer that formerly conveyed stormwater flow to an adjacent manhole until the existing subsurface steel sheetpile barrier wall was installed around the former MGP site. Following identification of the 36-inch diameter brick storm sewer north of Excelsior Avenue, the estimated location of the storm sewer will be projected at the ground surface (by string-line and/or survey), and a second transect will be completed south of Excelsior Avenue to confirm the location, alignment, and depth of the sewer. This is a large sewer and understanding its horizontal and vertical alignment (to the extent possible) will be helpful for the design of the barrier wall and subsurface mat below Excelsior Avenue.

- Vacuum-excavating trenches in the northern part of the OU 2 Project Area (in the mowed lawn just south of Excelsior Avenue) to uncover selected storm sewers, the natural gas main, and the underground communications conduit. This work is proposed to identify/confirm locations and gather additional information, including burial depths, sizes, construction materials, and condition for these utilities, which have not been confirmed. The sewers to be located in this area include the approximately 48-inch by 52-inch storm sewer box culvert, a 12-inch steel or HDPE storm sewer that discharges to the box culvert, and a possible abandoned storm sewer lateral that formerly discharged to the above-referenced 36-inch diameter brick storm sewer. The vacuum excavation will also allow an assessment of the potential presence of additional unidentified/unmapped utilities in the area that may affect the RD.

The above-identified activities will involve “daylighting” (exposing) the utilities (except for the deep 36-inch diameter brick storm sewer), which will allow for direct observation of conditions. Surveying will be performed to document the locations, and the existing three-dimensional MVS subsurface model will be updated to show the surveyed locations. The proposed additional subsurface utility exploratory work is anticipated to improve the forthcoming design.

The above-identified additional PDI field activities and subsequent test pitting activities were implemented in June and July 2016, following submittal of the April 2016 “draft” *Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report*. The work performed and findings of these additional investigation activities are summarized in the project correspondence included in the DVD.

3 BENCH-SCALE TREATABILITY STUDIES

This section presents details of the ISS and barrier wall/subsurface mat bench-scale treatability studies performed to evaluate various reagent mix designs to successfully immobilize and contain soil impacted by site-related constituents (e.g., NAPL; benzene, toluene, ethylbenzene, and xylenes [BTEX]; polycyclic aromatic hydrocarbons [PAHs]). The overall goal of the studies was to select appropriate mix design(s) for full-scale application (ISS and jet-grouting) that will achieve proposed performance objectives, involve green remediation/sustainable efforts, and be cost-effective. The treatability studies were designed to simulate, to the extent practical, the potential full-scale remedial process.

The ISS treatability study was performed by the Arcadis treatability laboratory in Durham, North Carolina. Laboratory set-up and preparations for the treatability study were conducted in July 2015, and mixing and testing was conducted in two phases from August 2015 through October 2015. The Arcadis treatability laboratory prepared and tested different mixtures of solidification reagents and impacted soil in a laboratory environment under controlled conditions. The impacted soil used in the ISS treatability study was collected during the PDI. The reagents consisted of materials that are locally available (Portland cement, ground-granulated blast furnace slag cement). The reagents were combined with potable water obtained from the City of Saratoga Springs municipal water supply to create a grout for mixing into the impacted soil. Arcadis subcontracted with two analytical laboratories for testing treated soils, including: (1) Geotechnics, Inc. of Raleigh, North Carolina for unconfined compressive strength (UCS), hydraulic conductivity, and other geotechnical testing; and (2) Accutest Laboratories of Marlborough, Massachusetts (Accutest) for baseline characterization and monolith leaching testing.

The barrier wall/subsurface mat jet grouting treatability study was performed by GeoSolutions of New Kensington, Pennsylvania. Laboratory set-up and preparations for the barrier wall/subsurface mat treatability study were conducted in December 2015, and mixing and testing were conducted during January and February 2016. GeoSolutions prepared and tested different mixtures of Portland cement and impacted soil in a laboratory environment under controlled conditions. The impacted soil used in the barrier wall/subsurface mat treatability study was collected during the PDI. The Portland cement was combined with potable water from the treatability laboratory to create a slurry for mixing into the impacted soil. GeoSolutions performed geotechnical testing on the solidified mixtures.

The bench-scale treatability study objectives are presented below, followed by details of the work performed, and results obtained from the studies.

3.1 Treatability Study Performance Objectives

The mix designs developed for the bench-scale treatability studies were evaluated based on the following primary criteria:

- *Minimum UCS of 50 pounds per square inch (psi) at 28 days*. As described in the RDWP, the proposed minimum strength goal was selected to adequately bind constituents in the ISS monolith and jet grout barrier wall/subsurface mat and support restoration of the roadway, parking lot, and lawn areas where soil remediation will be performed. The roadway and parking lot will need to withstand wheel loadings without settlement or deterioration.

- *Maximum hydraulic conductivity of 1x10^{-6} centimeters per second (cm/sec)*. As described in the RDWP, the reduced soil pore space and corresponding reduced hydraulic conductivity of the treated soil matrix (in the ISS area and barrier wall/subsurface mat) will result in lower mobility of pore-filling liquids (water, DNAPL) and reduced potential for leaching.

3.2 ISS Bench-Scale Treatability Study Details

This section provides details of the ISS bench-scale treatability study, including soil sample and solidification reagent materials selections, soil homogenization and testing, development of mix designs, and mixing and testing.

3.2.1 ISS Treatability Study Materials

Soil used in the ISS treatability study was collected during the PDI and containerized in 5-gallon buckets (one bucket of soil for each boring within the ISS area, for a total of four buckets). The soil samples were packaged and shipped to the Arcadis treatability laboratory in July 2015 for processing. Following sample receipt, laboratory personnel opened the buckets and visually characterized the samples for composition (lithology) and MGP-related impacts (level of NAPL saturation). Following characterization, the samples were composited into two sets of homogenates based on the extent of MGP impacts, as identified below:

- *Moderately-Impacted Soil Homogenate (Homogenate 1)* – The samples used to form this homogenate contained a greater percentage of NAPL in soil pore space (represented by the limited interval of soil immediately above the clay layer that is slightly more impacted). A small volume of this material was recovered during the PDI. Samples in this homogenate were obtained from borings GT-04 and GT-07.

- *Minimally-Impacted Soil Homogenate (Homogenate 2)* – The samples used to form this homogenate represented the majority of the soil encountered during the PDI, which consists of sand, silt, peat/organics, and/or gravel with limited visual impacts (e.g., little to no sheens or staining, residual NAPL in the form of blebs). Samples in this homogenate were obtained from borings GT-05 and GT-06.

As previously indicated, water used in the ISS treatability study was obtained from a spigot at the Excelsior Springs banquet hall building and containerized in a 5-gallon bucket. The reagents used in the ISS treatability study consisted of Type I/II Portland cement and ground-granulated blast furnace slag cement obtained from LaFarge facilities in Dover, New Hampshire and Westborough, Massachusetts, respectively.

3.2.2 Baseline Analysis of Untreated Soil Samples

Chemical and geotechnical analyses were performed on the untreated sample homogenates (for both the minimally- and moderately-impacted soil) to establish baseline levels of constituents of interest in the soil and geotechnical properties. The samples, identified as “Homogenate 1” (moderately-impacted material) and “Homogenate 2” (minimally-impacted material) (and two duplicates), were analyzed for the following:

- BTEX and PAHs in accordance with EPA SW-846 Methods 8260 and 8270, respectively, by Accutest.
- Geotechnical parameters consisting of: (1) pH using American Society for Testing and Materials (ASTM) D4972-01; (2) moisture, ash, and organic matter content (loss of ignition) by ASTM D2974-14 and American Association of State Highway and Transportation Officials (AASHTO) T267-86; (3) grain size analysis (sieve and hydrometer) by ASTM D422-63; and (4) multi-point Atterberg limits by ASTM D4318-10/AASHTO T89-10. These tests were performed by Geotechnics.

Results of these tests were considered in developing the reagent mix designs used in subsequent testing. The laboratory analytical data report presenting these results is included on the DVD attached to this report.

3.2.3 ISS Mixing and Testing of Treated Samples

A total of seven mix designs (i.e., seven different percentages of Portland cement and blast furnace slag cement) were developed for the ISS treatability study. On August 6, 2015, grouts were prepared in the proportions identified below and mixed into the untreated, moderately-impacted soil homogenates (Mix 1 through Mix 6) and minimally-impacted soil homogenates (Mix 7 through Mix 12). The proportions listed in Table 3-1 below are relative to dry weight of the untreated sample.

Table 3-1
ISS Mix Designs

Homogenate	Mix ID	Portland Cement (w/w)	Blast Furnace Slag (w/w)
Homogenate 1 (moderately-impacted)	Mix 1	1.5%	3.5%
	Mix 2	2.5%	5%
	Mix 3	7.5%	0%
	Mix 4	10%	0%
	Mix 5	3%	7%
	Mix 6	5%	10%
Homogenate 2 (minimally-impacted)	Mix 7	1.5%	3.5%
	Mix 8	5%	0%
	Mix 9	2.5%	5%
	Mix 10	7.5%	0%
	Mix 11	10%	0%
	Mix 12	3%	7%

Five common mix designs were evaluated for both Homogenate 1 and Homogenate 2 (i.e., Portland cement [PC] and ground-granulated blast furnace slag cement [BFS] in the following percentages: 1.5, 2.5, 3.0, 7.5, and 10% PC to 3.5, 5.0, 7.0, 0.0, and 0.0% BFS, respectively). A sixth (unique) mix design was applied only to Homogenate 1 (5% PC and 10% BFS), and a seventh (also unique) mix design was applied only to Homogenate 2 (5% PC and 0% BFS). The two unique mix designs were developed recognizing the different levels of impacts in the homogenates: greater impacts in Homogenate 1 (representing a worst-case scenario) and lesser impacts in Homogenate 2 (representing an average scenario). The sixth mix design contained the highest percentage of total reagents (15%) and was used in evaluating the worst-case condition. The seventh mix design contained the second lowest percentage of total reagents (5%) for the average condition. As indicated by the information above, the treatability study evaluated higher percentages of reagents for the more impacted material than the lesser impacted material.

For each mix, reagents were added as dry powders to the homogenates, and City of Saratoga Springs potable water was uniformly mixed in with the reagents and soil. The volume of potable water added to each mix ranged from approximately 0.99 to 2.14 times the weight of the total admixture (reagents) to create a mixture that was workable (i.e., achieved a suitable slump as determined by the miniature slump cone method – Modified ASTM C143-00) and hydrated the cement. Reagents and potable water were thoroughly mixed into 2.5 kilograms of minimally- or moderately-impacted homogenate soil in a stainless steel mixing bowl using stainless steel implements. The resulting soil-cement slurry was used to fill multiple molds of different sizes for different tests, as follows:

- 2-inch diameter by 4-inch high molds for UCS, hydraulic conductivity, and leachability testing.
- 1-inch diameter by 4.5-inch long centrifuge tubes for BTEX leachability testing.

The centrifuge tubes were filled to zero headspace and sealed with screw-on caps. The molds were allowed to cure at the treatability laboratory in sealed containers under indoor ambient temperature and humidity. A single 2-inch by 4-inch mold from each mix was tested using a pocket penetrometer at 1, 3, and 5 days after mold preparation. The penetration resistance testing was used as a screening tool to assist the project team in tracking the development of strength in the molds. After 7 days of curing, a 2-inch by 4-inch mold from each mix was delivered by Arcadis treatability laboratory staff to Geotechnics for laboratory testing for UCS (ASTM D1633).

The 7-day UCS results for the treated samples are presented in Table 4 and range from 0 to 62.6 psi. The results indicated that select 28-day results would meet the minimum 50 psi performance objective. Each of the treated samples and a duplicate for each sample were analyzed after 28-days of curing, and the results for four of the 12 sample/duplicate pairs (representing mixes 5, 6, 9, and 12) were greater than the 50 psi UCS performance objective. The results for those four samples/duplicates ranged from 60.5 to 173.9 psi.

Following receipt of the 28-day UCS test results, each treated sample meeting the UCS performance objective was analyzed by Geotechnics for hydraulic conductivity (ASTM D-5084). The hydraulic conductivity results ranged from 3.6×10^{-7} to 3.0×10^{-8} cm/sec. Each of the hydraulic conductivity test results met the 1×10^{-6} cm/sec maximum allowable hydraulic conductivity established in the RDWP, and were therefore considered acceptable.

The ISS mixing and testing identified four mixes meeting the performance requirements. A second phase of ISS mixing and testing was not required to optimize the mix design.

3.2.4 Selection of ISS Mix Designs and Final Testing

Mix 5 was selected for sequential monolith leaching in accordance with the Arcadis Monolith Leaching Standard Operating Procedure (SOP) presented in the RDWP. Mix 5 was selected because it achieved the UCS and hydraulic conductivity performance goals for the moderately-impacted soil using less reagents than the next successful mix (Mix 6), which will allow for a more “green”, sustainable, and cost-effective mix to treat impacted soil in the OU 2 Project Area. Although Mix 12 used the same percentages of reagents as Mix 5 (3% Portland cement and 7% ground-granulated blast furnace slag cement) and also achieved UCS and hydraulic conductivity performance objectives, Mix 12 was not selected for sequential monolith leaching because it was formed using “minimally-impacted” soil instead of the “moderately-impacted” soil that was used in Mix 5.

Sequential monolith leaching involved the following steps for the Mix 5 sample: (1) submerging the monolith in a reactor with an extraction fluid (deionized water) for 24 hours; (2) removing (extracting) the fluid for archive or analysis; (3) refilling the reactor (zero headspace extractor for BTEX, 2 liter glass jar for PAHs) with new fluid; and (4) repeating steps 1 through 3. The extracted fluid was analyzed for BTEX or PAHs after 1, 5, 10, and/or 15 volumes of fluid were extracted and replaced (e.g., one volume per day, five days per week). As required by the Monolith Leaching SOP, sequential leaching for the BTEX and PAH evaluations was conducted on separate samples (because different monolith cylinder sizes and extraction fluid volumes were required for the BTEX and PAH tests). Analysis of the leachate generated by the sequential monolith leaching was performed using EPA SW-846 Methods 8260 and 8270. The sequential monolith leaching and subsequent analyses were performed by Accutest.

After the Mix 5 samples underwent sequential monolith leaching and analysis, an untreated sample for the moderately-impacted soil homogenate (Homogenate 1) underwent a single 24-hour synthetic precipitation leaching procedure (SPLP) leaching cycle and subsequent laboratory analysis for BTEX and PAHs to provide a baseline for comparing leaching results for the treated samples (i.e., to assess the reduction in concentrations from treatment). The mass of untreated, moderately-impacted homogenate was equivalent to the mass of soil used to make the Mix 5 sample (i.e., to provide a direct comparison of results). BTEX and PAH leachate analytical results for the baseline sample and each leaching sequence for the Mix 5 (treated) sample are presented in Table 5. For purposes of evaluating the data, the following are also presented in Table 5: (1) groundwater quality standards and guidance values from NYSDEC Division of Water, Technical and Operational Guidance Series document titled “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations” (TOGS 1.1.1), dated June 1998 (last revised June 2004); (2) federal maximum contaminant levels (MCLs) for drinking water as presented in 40 Code of Federal Regulations, Chapter I, Subchapter D, Part 141.61, dated January 1991, updated July 1991, July 1992, and July 1994; and (3) percent reductions in constituent concentrations due to treatment.

As indicated in Table 5, the constituents identified at the highest concentrations in the SPLP extract of the untreated sample were acenaphthene and pyrene, but the results did not exceed the standards/guidance values presented in TOGS 1.1.1 or the federal MCLs. The concentrations of five PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and chrysene) identified in the untreated sample exceeded the 0 or 0.002 parts per billion (ppb) standard/guidance value presented in TOGS 1.1.1. In general, the already low concentrations of constituents in leachate associated with untreated soil were further reduced by the ISS bench-scale mixing/treatment.

The laboratory analytical results for the treated samples that underwent sequential monolith leaching are summarized as follows:

- BTEX laboratory analytical results for the leachate from the initial (Day 1) and final (Day 5) sequential leaching sequences were less than the groundwater quality standards presented in TOGS 1.1.1 (1 ppb for benzene and 5 ppb for the remaining constituents) and well-below the federal MCLs (which range from 5 ppb for benzene to 10,000 ppb for total xylenes). As indicated by Table 5, sequential leaching of the monolith could have been discontinued after the first cycle of leaching (Day 1) (all results at that point were less than the groundwater quality standards), but additional cycles of leaching were performed and a final round of testing was completed after the fifth leaching cycle (Day 5). The Day 5 leaching results confirmed the Day 1 leaching results (all results less than groundwater quality standards). Leaching and testing was discontinued after Day 5 because ISS by Mix 5 was demonstrated to be effective at preventing leaching of BTEX.

- The PAH analytical results after the final leaching cycle (Day 15) were less than the corresponding groundwater quality standards/guidance values for 16 of the 17 PAH constituents. The leaching analysis was performed on a monolith composed from Homogenate 1 and therefore represents a worst-case scenario. The chrysene concentration following the 15 leaching cycles was an order of magnitude less than the starting concentration and slightly greater than the 0.002 ppb water quality standard. The chrysene concentration in this final leaching test was 90% lower than the concentration in the untreated, baseline soil sample. The chrysene result was “J-qualified”, meaning that chrysene was positively identified by the laboratory, but the reported concentration is an estimated value that is below the laboratory detection limit. Note that it is difficult to measure chrysene to as low as the water quality standard, even using selective ion monitoring (as used for this treatability study). Sequential leaching and testing was discontinued after Day 15 based on the favorable results (i.e., ISS by Mix 5 was demonstrated to be effective at preventing PAH leaching). The permeability of the ISS monolith will continue to decrease as the mixture continues to cure, which will result in further PAH concentration reductions. In addition, concentrations are expected to be even lower following remediation because the material to be treated during full-scale remediation will be less impacted than the treatability study samples (the treatability study samples were biased with greater impacts).

The grout associated with the preferred mix designs will undergo additional geotechnical testing (e.g., hydration time, viscosity, density, and pH) to provide data for reference in construction. Results of the additional grout testing will be presented in the RD.

3.3 Barrier Wall/Subsurface Mat Bench-Scale Treatability Study Details

This section provides details of the barrier wall/subsurface mat bench-scale treatability study, including soil sample and solidification reagent material selection, soil homogenization and testing, development of mix designs, and two-phases of mixing and testing.

3.3.1 Barrier Wall/Subsurface Mat Treatability Study Materials

Soil used in the barrier wall/subsurface mat treatability study was collected during the PDI and containerized in 5-gallon buckets (one bucket of soil for each boring within the barrier wall and subsurface mat areas [GT-01 and GT-02], for a total of two buckets). The soil samples were packaged and shipped to the Arcadis treatability laboratory in July 2015 for initial evaluation. Following sample receipt, laboratory personnel opened the buckets and visually characterized the samples for composition (lithology) and MGP-related impacts (level of NAPL saturation). The soil generally consisted of sand, silt, and peat/organics with limited impacts (e.g., little to no sheens or staining). Following completion of the ISS treatability study and preliminary evaluation of results, the samples were shipped to GeoSolutions in December 2015 to implement the barrier wall/ subsurface mat treatability study.

GeoSolutions prepared a homogenate using approximately equal volumes of soil from GT-01 and GT-02. The reagents used in the treatability study consisted of Type I/II Portland cement from LaFarge and water from a potable source at the treatability laboratory.

3.3.2 Jet-Grout Mixing and Testing of Treated Samples

A total of six mix designs were developed for the barrier wall/subsurface mat treatability study. The mix designs were based on using two different water-to-cement ratios and three possible jet-grouted material situations that may be observed during full-scale implementing, as described below.

- *Pure Grout (Mixes 1 and 4)* – complete replacement of the soil column with grout (100% grout).
- *Low Grout (Mixes 2 and 5)* – a majority of soil with a minority of grout (approximately 20% to 25% grout relative to the soil weight).
- *High Grout (Mixes 3 and 6)* – generally equal amounts of soil and grout (approximately 42% to 50% grout relative to the soil weight).

The low grout and high grout mix designs were applied to the untreated soil homogenate in the proportions listed in Table 3-3 below (note that the Portland % listed below is relative to the dry weight of the soil except where the mix design is comprised only of grout [Portland cement and water] with no soil). The homogenate used for the jet grout mix designs consisted of saturated soil collected below the water table in the OU 2 Project Area. Portland cement was mixed separately with potable water in the laboratory to create the grout that was then mixed with saturated soil. This process simulates field conditions for the anticipated full-scale grout mixing and injection (i.e., jet grouting below the water table).

Table 3-2
Jet-Grout Mix Designs

Mix ID	Composition	Portland Cement (w/w)	Water/Cement (w/w)
Mix 1	Grout Only	100%	1.5:1
Mix 2	Homogenate & Grout	25%	1.5:1
Mix 3	Homogenate & Grout	50%	1.5:1
Mix 4	Grout Only	100%	2:1
Mix 5	Homogenate & Grout	20.8%	2:1
Mix 6	Homogenate & Grout	41.6%	2:1

As indicated above, the volume of potable water added to form the grout ranged from approximately 1.5 to 2 times the weight of the total Portland cement. For the low grout and high grout mix designs, the grout was thoroughly mixed into 2 to 5 kilograms of the homogenate soil according to the proportions in Table 3-3 above. Mixing was performed in a stainless steel mixing bowl using stainless steel implements. The resulting slurry was used to fill molds of different sizes for different tests, as follows:

- 2-inch diameter by 4-inch high molds for UCS testing.
- 3-inch diameter by 6-inch high molds for hydraulic conductivity testing.

The molds were allowed to cure at the treatability laboratory in sealed containers under indoor ambient temperature with standing water inside (high humidity). Following mixing, the molds were shipped to Geotechnics for laboratory testing for UCS (ASTM D2166-13) and hydraulic conductivity (ASTM D-5084-10) after 7 (or 8), 14, and 28 (or 34) days of curing. The UCS and hydraulic conductivity test results for the barrier wall/subsurface mat treatability study are presented in Table 6. As indicated in Table 6, each of the mix designs met the UCS performance objective after 7 (or 8) days of curing, and the UCS of each mold was greater after 28 (or 34) days of curing than after 7 (or 8) days of curing. The greatest strength gain occurred in the molds consisting of pure grout (2.3 times more strength at 28 [or 34] days vs. 7 [or 8] days), and the highest overall UCS was identified in the molds consisting of pure grout (1,649 psi and 2,130 psi). The UCS of the molds consisting of a combination of soil homogenate and grout increased by factors ranging from 1.3 to 1.7 between 7 (or 8) and 28 (or 34) days of curing.

Hydraulic conductivity testing was performed on the molds after 28 days of curing. Results for five of the six molds met the $1x10^{-6}$ cm/sec hydraulic conductivity performance objective with those results ranging from $4.7x10^{-7}$ cm/sec to approximately $7.9x10^{-10}$ cm/sec. The $2.2x10^{-6}$ cm/sec hydraulic conductivity result for Mix 6 did not meet the performance objective.

The barrier wall/subsurface mat mixing and testing identified five potential mix designs meeting performance requirements. A second phase of barrier wall/subsurface mat mixing and testing was not required to optimize the mix design.

3.4 Treatability Studies Summary and Conclusions

The objectives of the treatability studies were achieved by the mix development and testing performed as described herein. Based on the data generated during the treatability study, a total of two grout mixes (one each for ISS and jet-grouting) have been identified as candidates for the RD:

- *ISS Mix* – this consists of 3% Portland cement and 7% ground-granulated blast furnace slag cement by weight mixed with water at a ratio of 1.24 (weight water to total weight of the cement reagents).

- *Jet-Grout Mix* – this consists of pure grout and a 1.5:1 water to cement ratio.

The ISS and barrier wall/subsurface mat treatability studies data support that these mixes will produce a solidified material meeting the UCS and hydraulic conductivity performance objectives. The treatability study data also support that implementation of ISS and jet-grouting at the field-scale, in conjunction with institutional controls outlined in the RDWP and ROD, can achieve the remedial action objectives established for soil in the OU 2 Project Area. A qualified contractor will be required for successful implementation of the ISS and jet grouting.

Based on the reductions in leaching demonstrated by the ISS treatability study, the quality assurance/quality control (QA/QC) sampling analysis program presented in the RDWP for field-scale application is appropriate for the RD. This involves testing samples generated during field-scale application for UCS and hydraulic conductivity. The data show that reductions to the already low pre-treatment leaching results will occur through ISS treatment, and further testing for leachability is not needed at the field-scale.

The final ISS and jet-grout mix designs and proposed monitoring plan and other elements necessary and incidental to implementing the final remedial action for soil in the OU 2 Project Area will be presented in the RD.

4 REMEDIAL DESIGN SCHEDULE

This section presents the anticipated schedule for preparing and implementing the soil RD. NMPC will begin preparing the RD in advance of EPA review and approval of this report. The intermediate (60%), pre-final (90%), and final (100%) RD are scheduled to be submitted to the EPA in July 2016, January 2017, and April 2017, respectively. To streamline the design preparation and review process, conference calls/meetings will be held with the EPA and other stakeholders at routine intervals and following the 60% and 90% design submittals to discuss comments related to the design and to build consensus on issues.

NMPC anticipates conducting contractor bidding and procurement in late summer/early fall 2017, following approval of the final RD. A Remedial Action Work Plan, incorporating the remedial action approach developed by the successful Contractor, will be submitted to the EPA within 90 days following award of the remedial action contract (e.g., by end of December 2017).

The majority of soil remedy is anticipated to be implemented during the spring/summer 2018 construction season. No remedial work will be performed during a mandatory ‘stand-down’ period (i.e., last week of July 2018 through Labor Day 2018) that coincides with the Saratoga Springs horse racing season. Final remedial activities (e.g., site restoration) will be completed, as needed, following the stand-down period.

A detailed schedule for preparing and implementing the RD is presented in Appendix D.

5 REFERENCES

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TABLES

FIGURES

APPENDIX A

Manhole Inspection Forms

APPENDIX B

Hydraulic Conductivity Test Logs

APPENDIX C

Soil Boring Logs

APPENDIX D

Anticipated Project Schedule

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TABLES

Table 1
Summary of Sampling Locations and Laboratory/Geotechnical Analyses

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Sample ID	Depth	Date Analyzed	Analytical							Geotechnical						
			TCLP Parameters	I/C/R	PCBs	BTEX	PAHs	SPLP		UCS					Hydraulic Conductivity	Geotechnical Design Parameters
								BTEX	PAHs	7-Day	8-Day	14-Day	28-Day	34-Day		
In-Situ Soil Waste Characterization Samples																
WC-1	0-2	7/10/2015 to 7/17/2015	X	X	X											
WC-2	0-2	7/10/2015 to 7/17/2015	X	X	X											
ISS Bench-Scale Treatability Study Samples																
Homogenate 1 (Moderately-Impacted)	- -	8/5/2015				X [X]	X [X]									
	- -	8/26/2015														X
	- -	9/23/2015						X								
	- -	9/24/2015							X							
Homogenate 2 (Minimally-Impacted)	- -	8/5/2015				X [X]	X [X]									
	- -	8/26/2015														X
Mix 1	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 2	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 3	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 4	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 5	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
	- -	9/18/2015													X	
	- -	9/23/2015						X								
	- -	9/24/2015							X							
	- -	9/27/2015						X								
	- -	9/29/2015							X							
	- -	10/3/2015							X							
	- -	10/8/2015							X							
Mix 6	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
	- -	9/18/2015													X	
Mix 7	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 8	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 9	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
	- -	9/18/2015													X	
Mix 10	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 11	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
Mix 12	- -	8/17/2015								X						
	- -	9/8/2015											X [X]			
	- -	9/18/2015													X	
Subsurface Mat/Barrier Wall Bench-Scale Treatability Study Samples																
Mix 1	- -	1/12/2016								X						
	- -	1/19/2016										X				
	- -	2/2/2016													X	
	- -	2/8/2016												X		
Mix 2	- -	1/12/2016								X						
	- -	1/19/2016										X				
	- -	2/2/2016													X	
	- -	2/8/2016												X		
	- -	1/12/2016								X						

Table 1
Summary of Sampling Locations and Laboratory/Geotechnical Analyses

Niagara Mohawk Power Corporation
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			Analytical							Geotechnical						
								SPLP		UCS						
Sample ID	Depth	Date Analyzed	TCLP Parameters	I/C/R	PCBs	BTEX	PAHs	BTEX	PAHs	7-Day	8-Day	14-Day	28-Day	34-Day	Hydraulic Conductivity	Geotechnical Design Parameters
Mix 3	- -	1/19/2016										X				
	- -	2/2/2016													X	
	- -	2/8/2016												X		
Mix 4	- -	1/19/2016									X					
	- -	1/25/2016										X				
	- -	2/8/2016											X		X	
Mix 5	- -	1/19/2016									X					
	- -	1/25/2016										X				
	- -	2/8/2016											X		X	
Mix 6	- -	1/19/2016									X					
	- -	1/25/2016										X				
	- -	2/8/2016											X		X	

Notes:

1. Samples were collected by Arcadis.
2. Duplicate samples are identified in brackets [ ].
3. TCLP Parameters = volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides, and herbicides.
4. I/C/R = ignitability, corrosivity, and reactivity.
5. Laboratory analysis was performed by Accutest Laboratories of Marlborough, Massachusetts for one or more of the analyses listed below:
   - Toxic Characteristic Leaching Procedure (TCLP) extraction by United States Environmental Protection Agency (USEPA) SW-846 Method 1311 and analysis by:
     - VOCs using USEPA SW-846 Method 8260C.
     - SVOCs using USEPA SW-846 Method 8270D.
     - Metals using USEPA SW-846 Methods 6010C and 7470A.
     - Pesticides using USEPA SW-846 Method 8081B.
     - Herbicides using USEPA SW-846 Method 8151.
   - Ignitability using USEPA SW-846 Method 1020.
   - Corrosivity as pH using USEPA SW-846 Chapter 7 Method.
   - Reactivity using USEPA SW-846 Chapter 7 Method.
   - Polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082A.
   - Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) using USEPA SW-846 Method 8260.
   - Polynuclear Aromatic Hydrocarbons (PAHs) using USEPA SW-846 Method 8270.
   - Synthetic Precipitation Leaching Procedure (SPLP) extraction by USEPA SW-846 Method 1312 and analysis by:
     - BTEX using USEPA SW-846 Method 8260C.
     - PAHs using USEPA SW-846 Methods 8270D selected ion monitoring (SIM).
6. Samples were submitted for geotechnical testing for one or more of the following parameters:
   - Moisture content by American Society for Testing and Materials (ASTM) D2216-10.
   - Loss of ignition by ASTM D2974-14, American Association of State Highway and Transportation Organization (AASHTO) T267-86.
   - pH by ASTM D4972-01 (2007).
   - Multi-point Atterberg limits by ASTM D4318-10 / AASHTO T89-10.
   - Sieve and hydrometer by ASTM D422-63 (2007).
   - Unconfined compressive strength (UCS) by ASTM D1633-00 (Method B) for in-situ soil solidificaiton treatability study samples.
   - UCS by ASTM D2166-13 / AASHTO T208-10 Modified-Peak Load Only) (SOP S-30) for barrier wall/subsurface mat treatability study samples.
   - Hydraulic conductivity by ASTM D5084-10.
7. An **X** indicates analysis was conducted.
8. - - = A depth is not applicable for the sample.

Table 2
Soil Exhibiting NAPL, Staining, Sheens, or Odors

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Sample ID/ Depth Interval	Sample Description
GT-01	
8-10	Faint odor.
14-15	Faint odor.
GT-02	
10-11	Organic odor.
12-14	MGP-like odor.
14-15.5	Strong odor, sheen throughout, bleb at 15.3 ft and 15.5 ft bgs. 15-15.5 feet bgs heavy staining.
15.5-16	Odor and sheen.
GT-04	
6-9	Odor.
9-11	Organic odor.
11-13	Faint MGP odor.
14-16	MGP odor, staining and sheen, blebs at 15.0 ft, 15.3 ft, and 15.4 ft bgs.
16-17	Heavy MGP odor, staining and sheen, bleb at 16.3 ft bgs.
17-18	Slight MGP odor.
GT-05	
13-14	Minor odor.
14-15	Faint odor.
15-16	Odor.
16-17	Faint odor.
17-20	Odor.
20-22.5	Strong odor, blebs at 21.4 ft, 21.6 ft, and 21.8 ft bgs, sheen. Heavy odor, heavy sheen at 22 ft bgs.
GT-06	
9-13	Organic odor.
14.5-15	Organic odor.
15-16	Faint odor.
16-17.5	Strong odor, staining, sheen. Bleb at 17.4 ft bgs, heavy coating.
GT-07	
7.5-12	Organic odor.
14-15	Staining, MGP odor.
15-16	Staining, sheen, coating on gravel, heavy MGP odor.
16-17	Staining, strong odor, bleb at 16.2 ft bgs.
17-22	Faint MGP odor (possibly from sides of spoon).

Table 3
Soil Analytical Results for Waste Characterization Parameters

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Location ID: Date Collected:	NYSDEC Part 371 TCLP Criteria	WC-01 07/08/15	WC-02 07/08/15
PCBs (ppm)			
Aroclor 1016	- -	<0.036	<0.039
Aroclor 1221	- -	<0.036	<0.039
Aroclor 1232	- -	<0.036	<0.039
Aroclor 1242	- -	<0.036	<0.039
Aroclor 1248	- -	<0.036	<0.039
Aroclor 1254	- -	0.026 J	0.039
Aroclor 1260	- -	0.039	0.042
TCLP VOCs (ppm)			
1,1-Dichloroethene	0.7	<0.20	<0.20
1,2-Dichloroethane	0.5	<0.20	<0.20
1,4-Dichlorobenzene	7.5	<0.20	<0.20
2-Butanone	200	<1.0	<1.0
Benzene	0.5	<0.10	<0.10
Carbon tetrachloride	0.5	<0.20	<0.20
Chlorobenzene	100	<0.20	<0.20
Chloroform	6	<0.20	<0.20
Tetrachloroethene	0.7	<0.20	<0.20
Trichloroethene	0.5	<0.20	<0.20
Vinyl chloride	0.2	<0.20	<0.20
TCLP SVOCs (ppm)			
1,4-Dichlorobenzene	7.5	<0.050	<0.050
2,4,5-Trichlorophenol	400	<0.10	<0.10
2,4,6-Trichlorophenol	2	<0.10	<0.10
2,4-Dinitrotoluene	0.13	<0.10	<0.10
2-Methylphenol	200	<0.10	<0.10
3&4-Methylphenol	- -	<0.10	<0.10
Hexachlorobenzene	0.13	<0.050	<0.050
Hexachlorobutadiene	0.5	<0.050	<0.050
Hexachloroethane	3	<0.050	<0.050
Nitrobenzene	2	<0.050	<0.050
Pentachlorophenol	100	<0.10	<0.10
Pyridine	5	<0.10	<0.10
TCLP Pesticides (ppm)			
Chlordane	- -	<0.0050	<0.0050
Endrin	0.02	<0.00050	<0.00050
Heptachlor	0.008	<0.00050	<0.00050
Heptachlor epoxide	- -	<0.00050	<0.00050
Lindane	0.4	<0.00050	<0.00050
Methoxychlor	10	<0.00050	<0.00050
Toxaphene	0.5	<0.025	<0.025
TCLP Herbicides (ppm)			
2,4,5-TP (Silvex)	1	<0.010	<0.010
2,4-D	10	<0.010	<0.010
TCLP Metals (ppm)			
Arsenic	5	<0.0100	<0.0100
Barium	100	0.370 B	0.520
Cadmium	1	0.00220 B	0.000800 B
Chromium	5	0.00590 B	0.000600 B
Lead	5	0.00790 B	<0.0100
Mercury	0.2	<0.000200	<0.000200
Selenium	1	<0.0250	<0.0250
Silver	5	<0.00500	<0.00500
Miscellaneous			
Corrosivity as pH	- -	6.9	7.2
Cyanide Reactivity (ppm)	- -	<1.6	<1.8
Flashpoint (deg F)	- -	>230	>230
Sulfide Reactivity (ppm)	- -	<54	<58

Table 3
Soil Analytical Results for Waste Characterization Parameters

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

1. Samples were collected by Arcadis on the dates indicated.
2. PCBs = Polychlorinated biphenyls.
3. TCLP = Toxicity Characteristic Leaching Procedure.
4. VOCs = Target Compound List (TCL) Volatile Organic Compounds.
5. SVOCs = TCL Semi-Volatile Organic Compounds.
6. Samples were analyzed by Accutest Laboratories (Accutest) located in Marlborough, Massachusetts using extraction by United States Environmental Protection Agency (USEPA) SW-846 Method 1311 and by:
   - VOCs using UESPA SW-846 Method 8260C.
   - SVOCs using USEPA SW-846 Method 8270D.
   - Pesticides using USEPA SW-846 Methods 8081.
   - Herbicides using USEPA SW-846 Methods 8151.
   - Metals using USEPA SW-846 Methods 6010C/7470A.
7. Samples were analyzed by Accutest for:
   - PCBs using USEPA SW-846 Method 8082A.
   - Ignitability using USEPA SW-846 Method 1020.
   - Corrosivity using USEPA SW-846 Chapter 7 Method.
   - Reactive cyanide and sulfide using USEPA SW-846 Chapter 7 Methods.
8. Concentrations reported as follows:
   - TCLP VOCs, TCLP SVOCs, and TCLP Inorganics: in milligrams per liter (mg/L), which is equivalent to parts per million (ppm).
   - PCBs, cyanide, reactive cyanide and sulfide, DRO, GRO, and total sulfur: in milligrams per kilogram (mg/kg), which is equivalent to ppm.
   - Ignitability (flashpoint): degrees Fahrenheit.
   - pH: standard units.
9. Data qualifiers are defined as follows:
   < - Constituent not detected at a concentration above the reported detection limit.
   B - Compound was found in blank.
   J - Indicates that the associated numerical value is an estimated concentration.
10. Results have not been validated.

Table 4
ISS Treatability Study Mix Designs and Geotechnical Test Results for Treated Samples

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Sample ID	Soil Homogenate	Weight of Untreated Soil Sample (grams)		Soil Moisture (%)	Reagent Composition				Total Admixture Weight (grams)	Ratio of Water to Admixture	Water Added to Make Grout (mL)	Geotechnical Test Results					
					% (by dry weight)		Weight (grams)					Slump		UCS (psi)		Flex Wall Permeability (cm/sec)	Sample Selected for Leaching
		Dry	Wet		PC	GGBFS	PC	GGBFS				Min. (cm)	Std. (Inch)	7-Day	28-Day		
Mix 1	Moderately-Impacted	1,719.2	2,500	31.23%	1.5%	3.5%	25.8	60.2	86	1.81	156	3.2	4.63	0.0	0.0 [0.0]	- -	No
Mix 2					2.5%	5.0%	43	86	129	1.49	192	3.6	4.91	10.7	19.9 [22.3]	- -	No
Mix 3					7.5%	- -	128.9	0	129	1.67	216	3.7	4.98	23.9	19.7 [20.5]	- -	No
Mix 4					10.0%	- -	171.9	0	172	1.36	234	4.2	5.34	27.0	34.8 [33.5]	- -	No
Mix 5					3.0%	7.0%	51.6	120.3	172	1.24	213	3.9	5.13	20.4	78.1 [79.3]	3.6 x 10^{-7}	Yes
Mix 6					5.0%	10.0%	86	171.9	258	0.99	255	3.7	4.98	38.1	134.2 [141.0]	1.3 x 10^{-7}	No
Mix 7	Minimally-Impacted	1,702.9		31.88%	1.5%	3.5%	25.5	59.6	85	2.04	173	3.9	5.13	0.0	0.0 [0.0]	- -	No
Mix 8					5.0%	- -	85.1	0	85	2.14	182	3.5	4.84	13.7	12.5 [13.9]	- -	No
Mix 9					2.5%	5.0%	42.6	85.1	128	1.39	178	3.4	4.77	23.8	60.5 [74.5]	8.1 x 10^{-8}	No
Mix 10					7.5%	- -	127.7	0	128	1.90	243	4.2	5.34	19.6	26.3 [22.0]	- -	No
Mix 11					10.0%	- -	170.3	0	170	1.16	198	3.8	5.06	38.7	50.3 [46.0]	- -	No
Mix 12					3.0%	7.0%	51.1	1192	170	1.18	201	3.8	5.06	62.6	173.9 [160.9]	3.0 x 10^{-8}	No

Notes:

1. Samples were collected, composited, and homogenized by Arcadis.
2. UCS = unconfined compressive strength.
3. Samples were analyzed by Geotechnics, Inc. (Geotechnics) located in Raleigh, North Carolina by:
   - UCS using American Society for Testing and Materials (ASTM) Method D1633-00 (Method B).
   - Flex wall permeability using ASTM Method D5084-10.
4. Duplicate results are presented in brackets.
5. PC = Portland cement.
6. GGBFS = ground granulated blast furnace slag.
7. mL = milliliter.
8. S.U. = standard unit.
9. g/cm^3 = grams per cubic centimeter.
10. Min. = miniature.
11. cm = centimeter.
12. Std. = standard.
13. psi = pounds per square inch.
14. cm/sec = centimeters per second at 20 degrees Celsius.
15. NA = not analyzed.

Table 5
ISS Treatability Study Leaching Results for Treated and Untreated Samples (ppb)

Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Location ID:	NYSDEC Groundwater Standards and Guidance Values	Federal MCLs	Homogenate #1 (untreated sample)	Mix 5 (treated sample)				
Date Analyzed:	(Exceedances in Bold Font)	(Exceedances Shaded)		Cycle 1	Cycle 5	Cycle 10	Cycle 15	% Reduction
BTEX in Leachate								
Benzene	1	5	<1	<1	<1	NA	NA	100%
Ethylbenzene	5	700	<1	0.64 J	0.42 J	NA	NA	34%
Toluene	5	1,000	<1	<1	<1	NA	NA	100%
Xylenes (total)	5	10,000	<1	1.1	0.61 J	NA	NA	45%
PAHs in Leachate								
2-Methylnaphthalene	- -	- -	0.11 J	3.6	3	3.3	1.4	61%
Acenaphthene	20	- -	2.4	1.9	1.5	1.7	0.86	64%
Acenaphthylene	- -	- -	0.16	0.22	0.12	0.14	0.072 J	67%
Anthracene	50	- -	0.12	0.15	0.13	0.14	0.073 J	51%
Benzo(a)anthracene	0.002	- -	**0.15**	<0.05	<0.05	<0.05	<0.05	100%
Benzo(a)pyrene	0	0.2	**0.058 J**	<0.1	<0.1	<0.1	<0.1	100%
Benzo(b)fluoranthene	0.002	- -	**0.033 J**	<0.05	<0.05	<0.05	<0.05	100%
Benzo(ghi)perylene	- -	- -	0.017 J	<0.1	<0.1	<0.1	<0.1	100%
Benzo(k)fluoranthene	0.002	- -	**0.043 J**	<0.1	<0.1	<0.1	<0.1	100%
Chrysene	0.002	- -	**0.15**	<0.1	**0.016 J**	<0.1	**0.015 J**	90%
Dibenzo(a,h)anthracene	- -	- -	<0.1	<0.1	<0.1	<0.1	<0.1	100%
Fluoranthene	50	- -	0.89	0.067 J	0.066 J	0.066 J	0.049 J	94%
Fluorene	50	- -	0.25	0.57	0.48	0.54	0.29	49%
Indeno(1,2,3-cd)pyrene	0.002	- -	<0.1	<0.1	<0.1	<0.1	<0.1	100%
Naphthalene	10	- -	0.18	**20.1**	**12.1**	**12**	5.6	72%
Phenanthrene	50	- -	0.048 J	0.67	0.63	0.83	0.38	43%
Pyrene	50	- -	1.6	0.081 J	0.081 J	0.086 J	0.063 J	96%

Notes:

1. Results are presented in parts per billion (ppb), which is equivalent to micrograms per liter (ug/L).
2. MCL = maximum contaminant level.
3. BTEX = benzene, toluene, ethylbenzene, and xylenes.
4. PAHs = polycyclic aromatic hydrocarbons.
5. Data qualifiers are defined as follows:
    < - Constituent not detected at a concentration above the reported detection limit.
    J - Indicates that the associated numerical value is an estimated concentration.
6. Percent reductions were assumed to be 100% for compounds not identified above detection limits.
7. Baseline concentrations used to calculate the percent reductions were the greater concentration of Homogenate #1 or Mix 5 (Cycle 1) for each compound. NYSDEC groundwater standards/guidance values are from the NYSDEC Division of Water, Technical and Operational Guidance Series (TOGS) document titled "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" (TOGS 1.1.1) dated June 1998, revised April 2000 and June 2004.
8. Federal MCLs for drinking water presented in 40 Code of Federal Regulations, Chapter I, Subchapter D, Part 141.61, dated January 1991, updated July 1991, July 1992, and July 1994.
9. Bold font designates values that exceed the NYSDEC groundwater quality standards/guidance values.
10. Shading designates values that exceed the Federal MCLs.
11. - - = No TOGS 1.1.1 Water Quality Standard/Guidance Value or Federal MCLs listed.
12. NA = Not Analyzed.
13. Results have not been validated.

Table 6
Barrier Wall/Subsurface Mat Treatability Study Geotechnical Test Results for Treated Samples

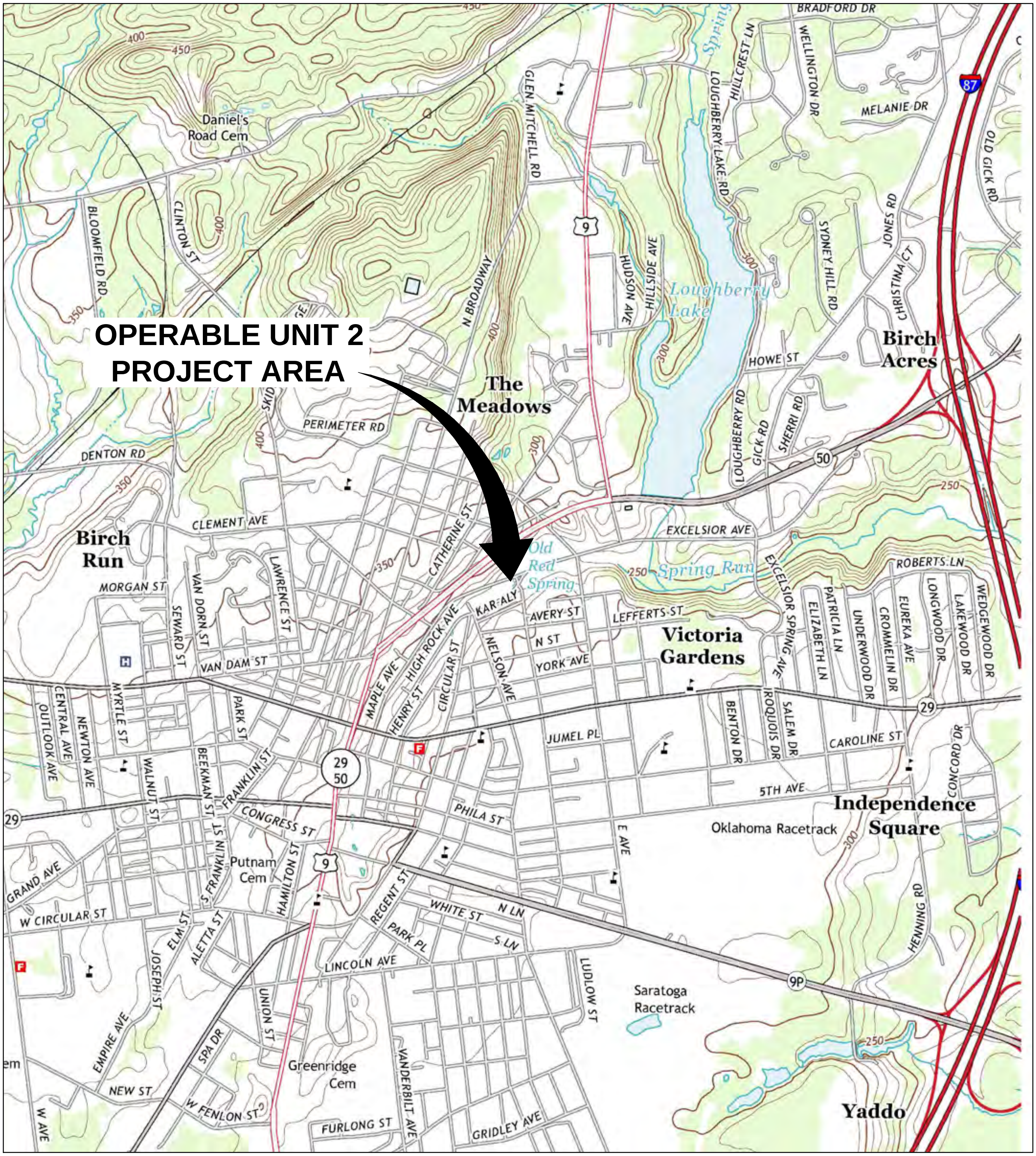
Niagara Mohawk Power Corporation
Superfund Site - Operable Unit 2 Project Area
Saratoga Springs, New York
Pre-Design Investigation and Soil Bench-Scale Treatability Studies Summary Report

Sample ID	Portland Cement (% by weight)	Water-to-Cement Ratio	UCS (psi)					Flex Wall Permeability (cm/sec)
			7-Day	8-Day	14-Day	28-Day	34-Day	
Mix 1	100.0%	1.5:1	722	- -	1,062	- -	1,649	Approx. 7.9 x 10^{-10}
Mix 2	25.0%		126	- -	170	- -	165	2.9 x 10^{-7}
Mix 3	50.0%		124	- -	227	- -	194	2.5 x 10^{-7}
Mix 4	100.0%	2:1	- -	919	919	2,130	- -	9.0 x 10^{-9}
Mix 5	20.8%		- -	80	94	114	- -	4.7 x 10^{-7}
Mix 6	41.6%		- -	69	97	116	- -	2.2 x 10^{-6}

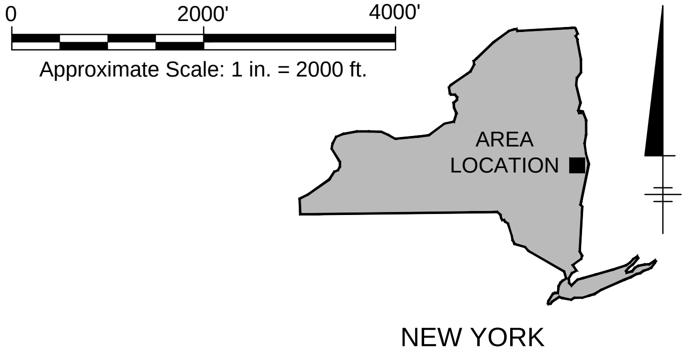
Notes:

1. Samples were collected by Arcadis.
2. Samples were composited and homogenized by GeoSolutions, Inc. of New Kensington, Pennsylvania.
3. UCS = unconfined compressive strength.
4. Samples were analyzed by Geotechnics, Inc. (Geotechnics) located in East Pittsburgh, Pennsylvania by:
   - UCS using American Society for Testing and Materials (ASTM) Method D2166-13/AASHTO T-208-10 (Modified-Peak Load Only) (SOP-30).
   - Flex wall permeability using ASTM Method D5084-10.
5. psi = pounds per square inch.
6. cm/sec = centimeters per second at 20 degrees Celsius.

FIGURES



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SARATOGA SPRINGS, NY, 2013.



NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

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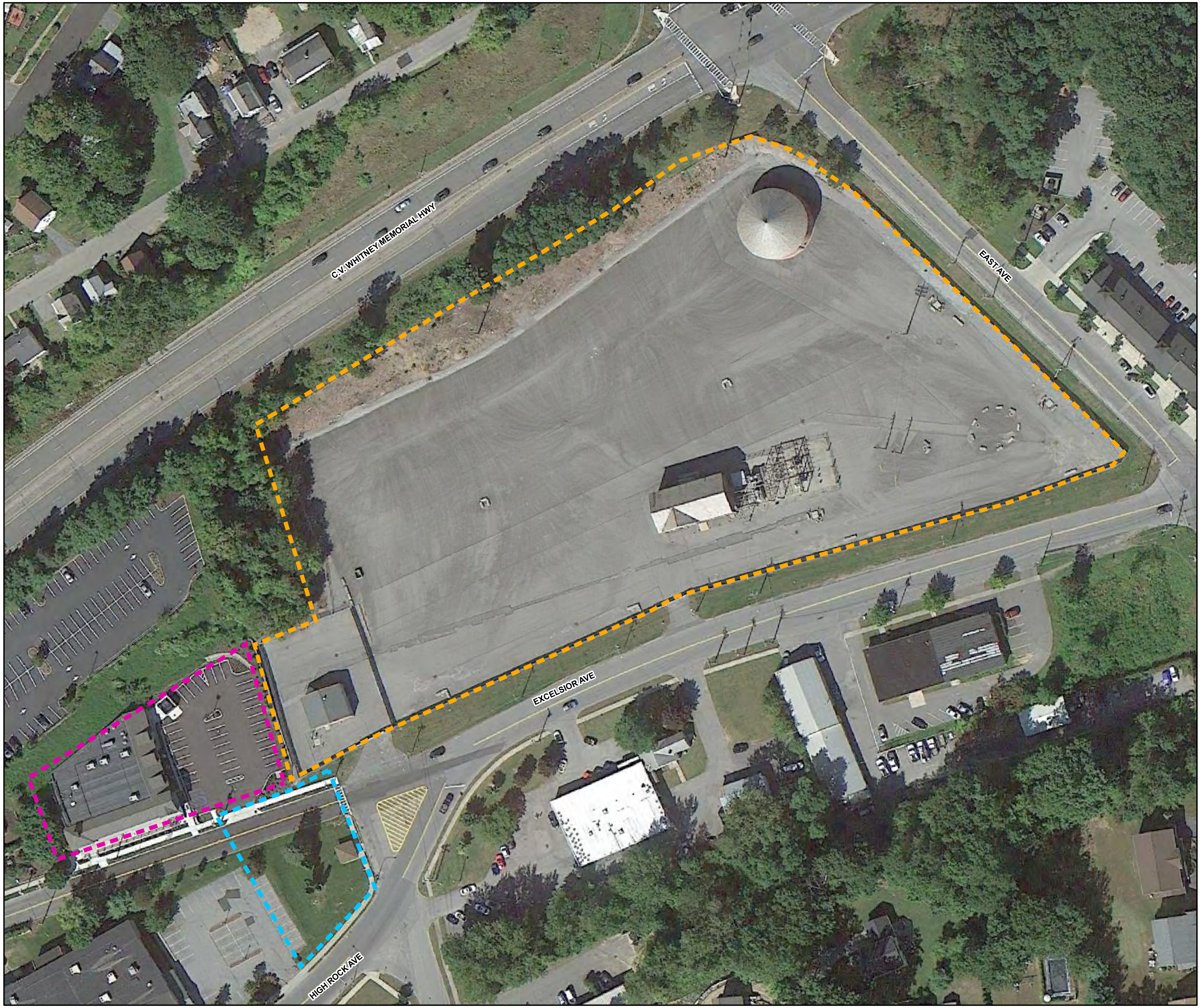

NOTE:

1. 2013 IMAGERY PROVIDED BY GOOGLE EARTH PRO.

NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK
PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

OPERABLE UNITS 1 AND 2 LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

City:SYR Div/Group: SWG Created By: Jayme Rapp Last Saved By: ksinsabaugh
Nat Grid Saratoga Springs (36641.1.2)
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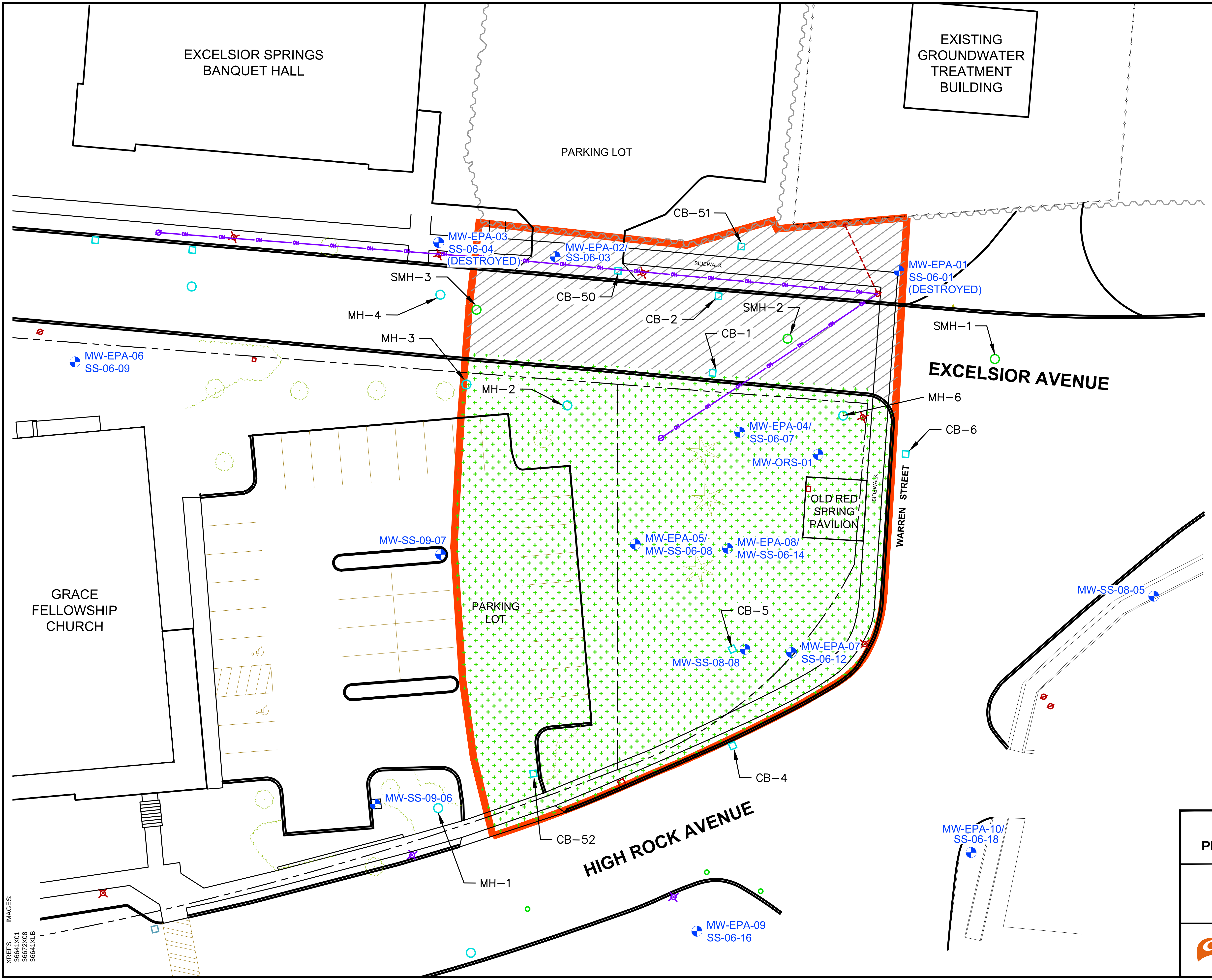

LEGEND:

●	MONITORING WELL LOCATION
▭	BUILDING/STRUCTURE
— - —	PROPERTY LINE
∿∿∿	SHEETPILE WALL
—○—	FENCE
□	CATCH BASIN
○	SANITARY SEWER MANHOLE
○	STORM SEWER MANHOLE
⌀	UTILITY POLE
⊗	ELECTRIC VAULT
—OH—OH—	OVERHEAD UTILITY LINE
- - -	GUY WIRE
✳ ○	TREE
🟩	OLD RED SPRING AREA
▨	EXCELSIOR AVENUE CORRIDOR
🟥	OPERABLE UNIT 2

NOTES:

1. BASE MAPPING WAS COMPILED FROM A SURVEY PERFORMED BY THOMPSON/ FLEMING LAND SURVEYORS, LLC, SARATOGA SPRINGS, NEW YORK, DATE JULY 8, 2015 AND A FIGURE PROVIDED BY CDM-SMITH TITLED 'SITE PLAN', DATED 11-03-2008 AT A SCALE OF 1"=60'.
2. PDI = PRE-DESIGN INVESTIGATION.

0 30' 60'
GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

OPERABLE UNIT 2 LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3

CITY: SYRACUSE NY DIV/GROUP: ENVCAD DB: E. KRAHMER, K.SARTORI LD:(Opt) PIC:(Opt) PM:(Reqd) TM: M. HYSELL LYR:(Opt)ON=*;OFF=*REF*
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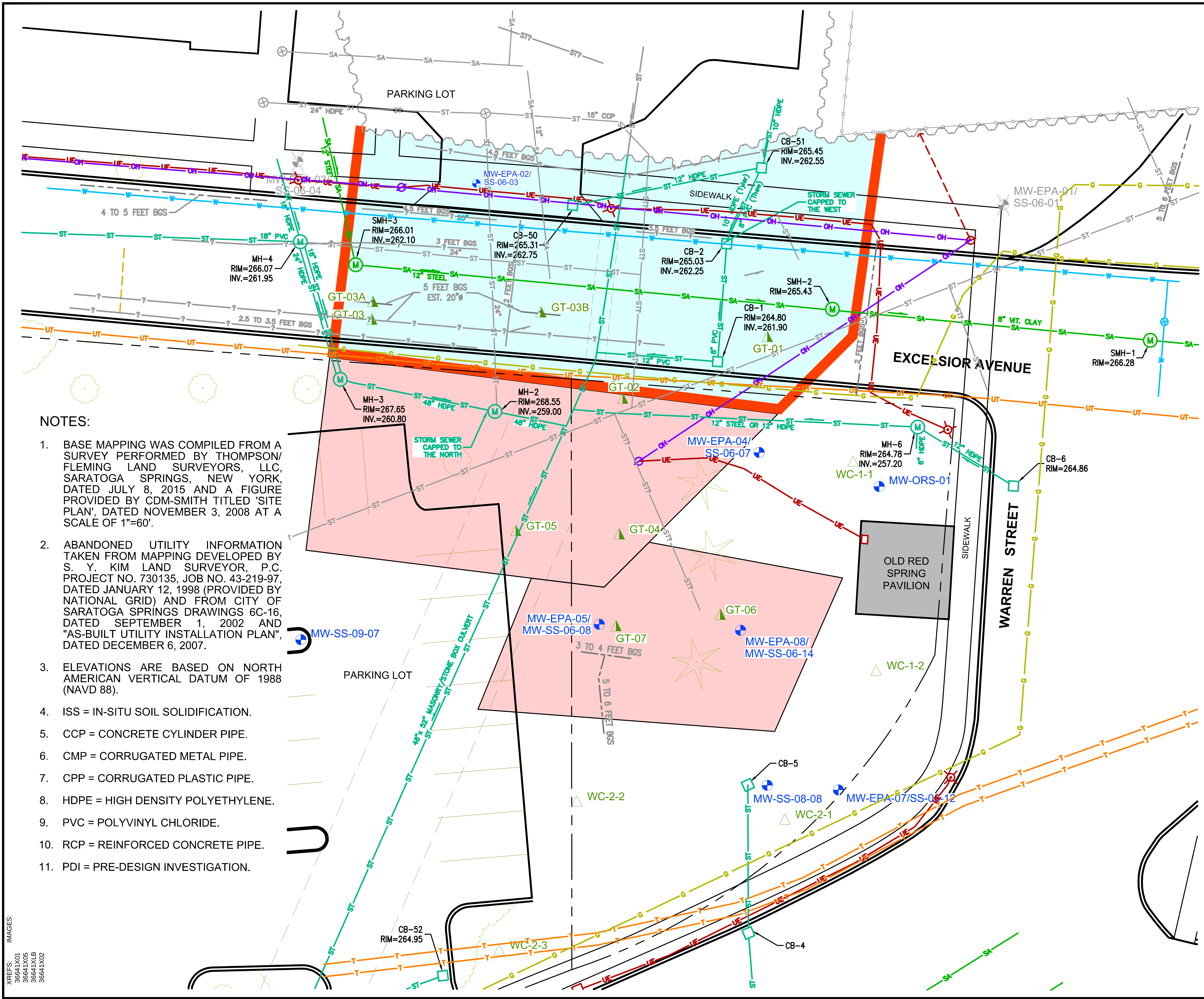


NOTES:

1. BASE MAPPING WAS COMPILED FROM A SURVEY PERFORMED BY THOMPSON/ FLEMING LAND SURVEYORS, LLC, SARATOGA SPRINGS, NEW YORK, DATED JULY 8, 2015 AND A FIGURE PROVIDED BY CDM-SMITH TITLED 'SITE PLAN', DATED NOVEMBER 3, 2008 AT A SCALE OF 1"=60'.
2. ABANDONED UTILITY INFORMATION TAKEN FROM MAPPING DEVELOPED BY S. Y. KIM LAND SURVEYOR, P.C. PROJECT NO. 730135, JOB NO. 43-219-97, DATED JANUARY 12, 1998 (PROVIDED BY NATIONAL GRID) AND FROM CITY OF SARATOGA SPRINGS DRAWINGS 6C-16, DATED SEPTEMBER 1, 2002 AND "AS-BUILT UTILITY INSTALLATION PLAN", DATED DECEMBER 6, 2007.
3. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. ISS = IN-SITU SOIL SOLIDIFICATION.
5. CCP = CONCRETE CYLINDER PIPE.
6. CMP = CORRUGATED METAL PIPE.
7. CPP = CORRUGATED PLASTIC PIPE.
8. HDPE = HIGH DENSITY POLYETHYLENE.
9. PVC = POLYVINYL CHLORIDE.
10. RCP = REINFORCED CONCRETE PIPE.
11. PDI = PRE-DESIGN INVESTIGATION.

LEGEND:

🟧	PROPOSED BARRIER WALL
🟦	PROPOSED SUBSURFACE MAT
🟥	PROPOSED ISS TREATMENT
▲	PDI SOIL BORING LOCATION
△	APPROXIMATE WASTE CHARACTERIZATION SAMPLING LOCATION
◐	MONITORING WELL LOCATION
∿∿∿	EXISTING SUBGRADE SHEET PILE BARRIER WALL
▬	BUILDING/STRUCTURE
— - —	PROPERTY LINE
—○—○—	FENCE
—W—	WATER LINE
—G—	GAS LINE
—SA—	SANITARY SEWER (with FLOW DIRECTION ARROW)
—ST—	STORM SEWER (with FLOW DIRECTION ARROW)
—OH—	OVERHEAD UTILITY LINE
—UE—	UNDERGROUND ELECTRIC LINE
—UT—	UNDERGROUND TELEPHONE LINE
——	ABANDONED UTILITY
—ST?—	UNCONFIRMED HISTORICAL STORM SEWER
— — —	LINEAR FEATURE
—?—	UNKNOWN UTILITY
- - -	GUY WIRE
CB-1 ☐	CATCH BASIN
SMH-1 Ⓜ	SANITARY SEWER MANHOLE
MH-1 Ⓜ	STORM SEWER MANHOLE
⊗	FORMER MANHOLE
⌀	UTILITY POLE
⊠	ELECTRIC VAULT
✳ ○	TREE

0 20' 40'

GRAPHIC SCALE

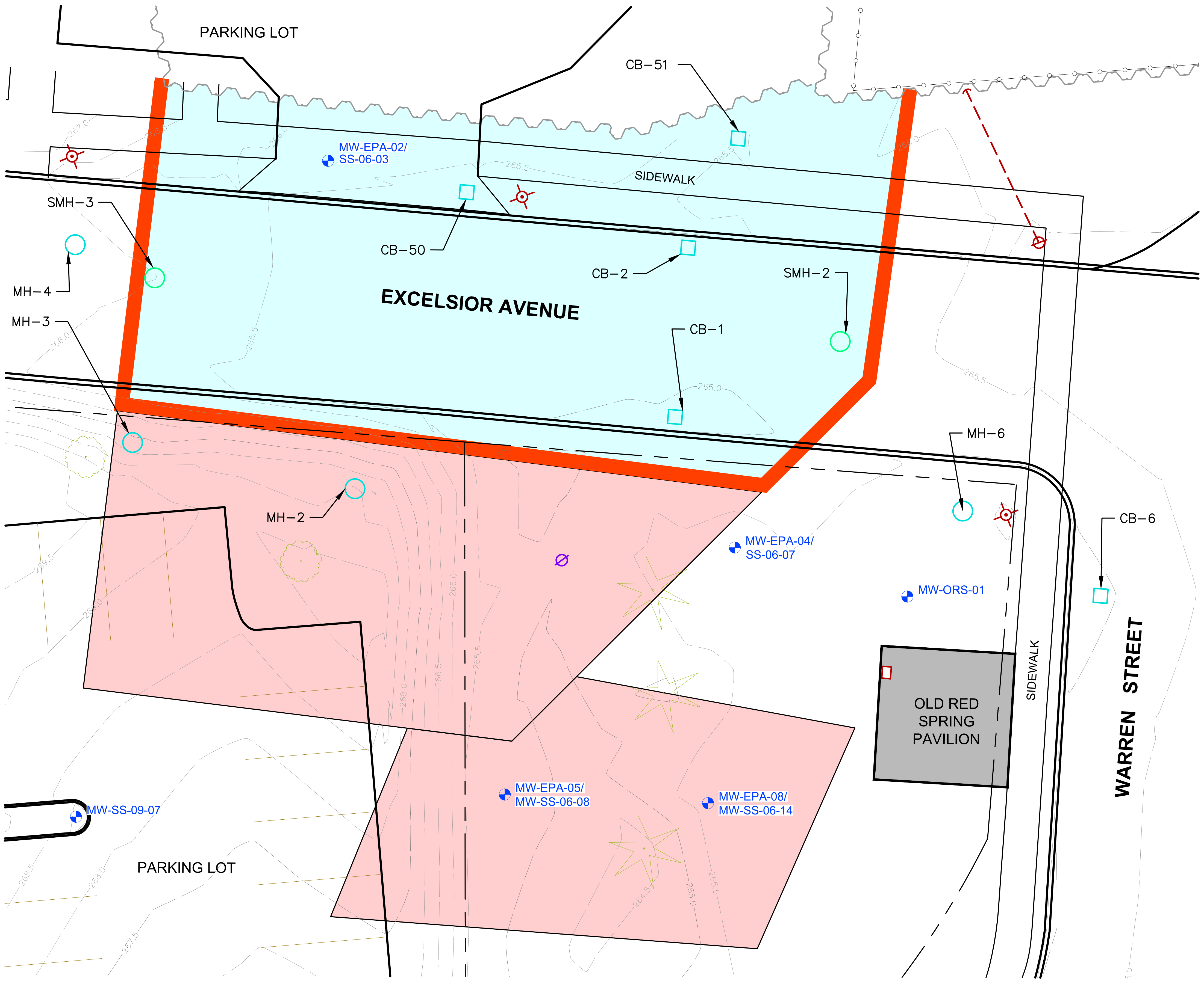
NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

PDI SOIL BORINGS AND UTILITY LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4



LEGEND:

🟧	PROPOSED BARRIER WALL
▭	PROPOSED SUBSURFACE MAT
🟥	PROPOSED ISS TREATMENT
◉	MONITORING WELL LOCATION
— — 266.0 — —	TOPOGRAPHIC CONTOURS
▨	BUILDING/STRUCTURE
—— — — ——	PROPERTY LINE
—o—o—o—	FENCE
— — — —	GUY WIRE
□	CATCH BASIN
○	SANITARY SEWER MANHOLE
○	STORM SEWER MANHOLE
Ø	UTILITY POLE
⊗	ELECTRIC VAULT
✳ ○	TREE

NOTES:

1. BASE MAPPING WAS COMPILED FROM A SURVEY PERFORMED BY THOMPSON/ FLEMING LAND SURVEYORS, LLC, SARATOGA SPRINGS, NEW YORK, DATE JULY 8, 2015 AND A FIGURE PROVIDED BY CDM-SMITH TITLED 'SITE PLAN', DATED 11-03-2008 AT A SCALE OF 1"=60'.
2. PDI = PRE-DESIGN INVESTIGATION.
3. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

0 15' 30'

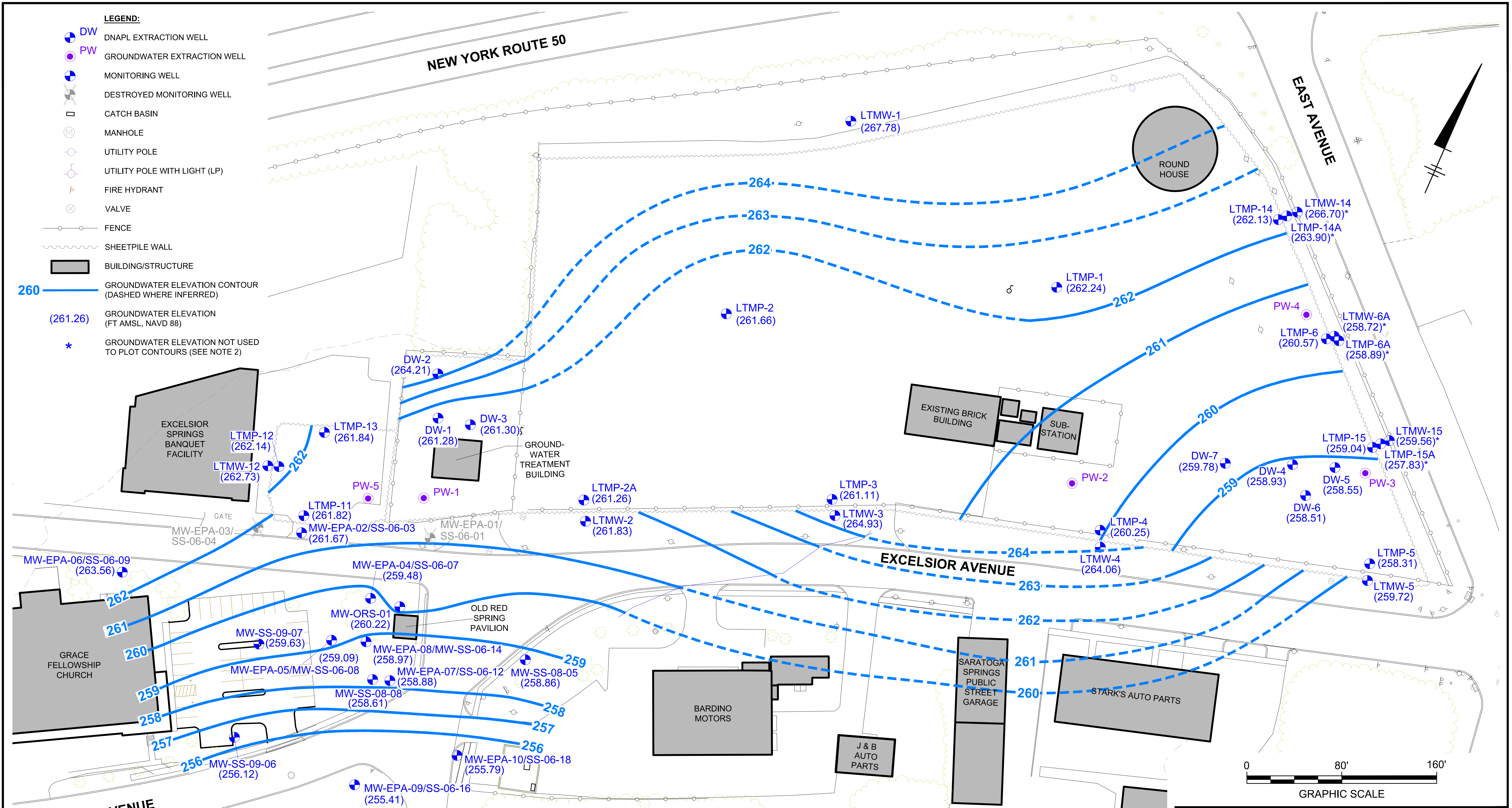
GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK
PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

EXISTING TOPOGRAPHY AND PROPOSED REMEDIAL LIMITS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5



LEGEND:

DW	DNAPL EXTRACTION WELL
PW	GROUNDWATER EXTRACTION WELL
	MONITORING WELL
	DESTROYED MONITORING WELL
▭	CATCH BASIN
Ⓜ	MANHOLE
	UTILITY POLE
	UTILITY POLE WITH LIGHT (LP)
	FIRE HYDRANT
⊗	VALVE
	FENCE
	SHEETPILE WALL
▬	BUILDING/STRUCTURE
260	GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
(261.26)	GROUNDWATER ELEVATION (FT AMSL, NAVD 88)
*	GROUNDWATER ELEVATION NOT USED TO PLOT CONTOURS (SEE NOTE 2)

NOTES:

1. BASE MAPPING WAS COMPILED FROM A SURVEY PERFORMED BY THOMPSON/FLEMING LAND SURVEYORS, LLC, SARATOGA SPRINGS, NEW YORK, DATED JULY 8, 2015 AND A FIGURE PROVIDED BY CDM-SMITH TITLED 'SITE PLAN', DATED 11-03-2008 AT A SCALE OF 1"=60'.
2. WATER LEVELS OBTAINED FROM WELLS LOCATED ALONG THE OUTSIDE OF THE EASTERN BARRIER WALL WERE NOT INCORPORATED INTO THIS CONTOUR MAP GIVEN THE PROXIMITY OF THESE WELLS TO A FRENCH DRAIN LOCATED ALONG THE OUTSIDE OF THE BARRIER WALL.
3. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

NIAGARA MOHAWK POWER CORPORATION
SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK
PDI AND BENCH-SCALE SOIL TREATABILITY STUDIES SUMMARY REPORT

SHALLOW OVERBURDEN GROUNDWATER CONTOURS - JULY 13, 2015

ARCADIS Design & Consultancy for natural and built assets

FIGURE
6

CITY: SYRACUSE NY DIV/GROUP: ENVCAD DB: E. KRAHMER, K.SARTORI LD:(Opt) PIC:(Opt) PM:(Reqd) TM: M. HYSELL LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0036641\0001\00002\REPORT\OU-2-SSR\36641W06.dwg LAYOUT: 6 SAVED: 3/31/2016 10:39 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: LB-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/31/2016 2:35 PM BY: SARTORI, KATHERINE
XREFS: 36641XLB 36641X03 PILING WALL 36641X04 IMAGES:

APPENDIX A

Manhole Inspection Forms

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: CB-1
Municipality Ownership: City SS
Time: 830
Weather: 60s Sunny
Street Location: Excelsior Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Fair

1) Manhole Cover:

☒ In Pavement ☐ Centerline of Road [✓ ☐ Edge of Road]
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.7' (In)
Height if above grade — (In)
Depth if below grade — (In)
Cover Type: [✓ ☐ Open Grate] ☐ Solid

2) Manhole:

3.3' Depth

Construction: [✓ ☐ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 3'
Benchwall with Channel: ☐ Yes ☒ No
Sump: ☒ Yes ☐ No
Signs of Surcharge: ☐ Yes ☐ No
Approximate Height of Surcharge: — (Ft)
Depth from Invert to Rim: — (Ft)
Roots: ☐ Yes ☒ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

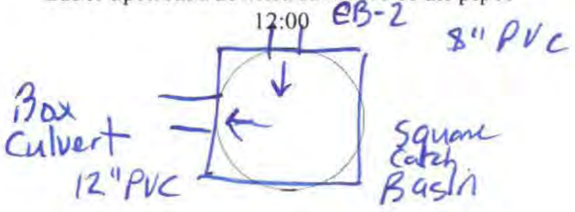
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☐ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	12	9		
Pipe Size (In)	8	12		
Rim to Invert (In)	2.95	3.10		
Pipe Material	PVC	PVC		
Flow Depth (In)	~1	~1		
Flow Color	Cl	Cl		
Drop Connection:	—	—		
Rim to Invert (In)	—	—		
Rim to Dam (In)				

Sediment:

None	X	X		
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Sediment/Debris in CB-1
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☒ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:

Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

ARCADIS
Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No. CB-2
Municipality Ownership: SS City
Time: 915
Weather 60s/70s Sunny
Street Location: Excelsior Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Fair

1) Manhole Cover:

☑ In Pavement ☐ Centerline of Road [✓ ☐ Edge of Road]
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.7' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: [✓ ☐ Open Grate] ☐ Solid

3.3' depth

2) Manhole:

Construction: [✓ ☐ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 3'
Benchwall with Channel: ☐ Yes [✓ ☐ No]
Sump: ☐ Yes [✓ ☐ No]
Signs of Surcharge: ☐ Yes [✓ ☐ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes [✓ ☐ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

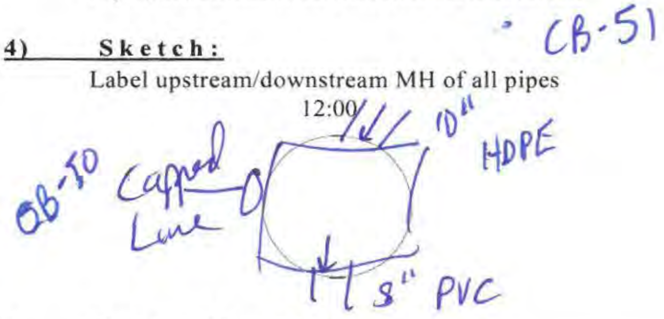
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ ☐ No]

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	1	6		
Pipe Size (In)	10	~~12~~ 8		
Rim to Invert (In)	2.8	2.90		
Pipe Material	HDPE	PVC		
Flow Depth (In)	~1	~1		
Flow Color	Cl	Cl		
Drop Connection:	–			
Rim to Invert (In)	–			
Rim to Dam (In)	–			

Sediment:

None	X	X		
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Sediment Free in Mahole
Other Observations:

6) Sample Observations

Collected: ☐ Yes [✓ ☐ No]
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:

Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

G:\Clients\National Grid\Ogdensburg\1 1 Draft Reports and Presentations\Sewer Investigation WP\Attachment A - Manhole Inspection Log.wpd

ARCADIS

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: CB-4
Municipality Ownership: SS City
Time: 1200
Weather: 70s Rain
Street Location: High Rock Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover:

[✓ In Pavement] ☐ Centerline of Road [✓ Edge of Road]
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.6' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type [✓ Open Grate] ☐ Solid

2) Manhole:

Construction [✓ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 2.6'
Benchwall with Channel: ☐ Yes [✓ No]
Sump: [✓ Yes] ☐ No
Signs of Surcharge: ☐ Yes [✓ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)

No water in System

Roots: ☐ Yes [✓ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

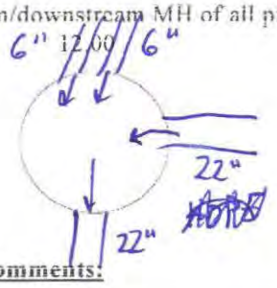
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ No]

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

	①	②		
Clock Position	12	12	3	6
Pipe Size (In)	6"	6"	22"	22"
Rim to Invert (In)	1.9'	1.9'	3.2'	3.15'
Pipe Material	CMP		RCP	
Flow Depth (In)	—	—	—	—
Flow Color	—	—	—	—
Drop Connection: Rim to Invert (In)	—	—	—	—
Rim to Dam (In)	—	—	—	—
	—	—	—	—

Sediment:

None	☒			
Firm Silt				
Rocks, Gravel Sand	✓	✓		
Other	✓	✓		
Depth (In)	~2"	~2"		

Dirt/Leaves etc.

Additional Sediment Descriptions: Debris/Sediment in Manhole
Other Observations:

6) Sample Observations

Collected: ☐ Yes [✓ No]
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:

Composition:
PID Reading:

7) Notes and Comments:

① western 5-4
② Eastern SB-4B

RCP- Reinforced Concrete Pipe
CMP- Corrugated Metal Pipe

Additional Information on reverse side: ☐

Inspector's Signature

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: CB-5
Municipality Ownership: SS City
Time: 1215
Weather: 70s Rain
Street Location: High Rock Ave
Sheet: of
Manhole Not Inspected due to: [✓ Buried] ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Poor Condition

Manhole was Filled in with Sediment/Debris

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☑ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter ~2.6' (In)
Height if above grade (In)
Depth if below grade (In)
Cover Type: ☐ Open Grate ☐ Solid

2) Manhole:

Construction: [✓ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 2.6
Benchwall with Channel: ☐ Yes [✓ No]
Sump: ☐ Yes ☐ No
Signs of Surcharge: ☐ Yes ☐ No
Approximate Height of Surcharge: (Ft)
Depth from Invert to Rim: (Ft)
Roots: ☐ Yes ☐ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

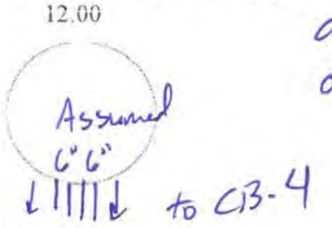
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☐ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



at 1.7' top of one pipe is visible

5) Pipe Inspections:

Clock Position
Pipe Size (In)
Rim to Invert (In)
Pipe Material
Flow Depth (In)
Flow Color
Drop Connection:
Rim to Invert (In)
Rim to Dam (In)

Sediment:

None
Firm Silt
Rocks, Gravel Sand
Other
Depth (In)

Additional Sediment Descriptions:
Other Observations:

6) ~~Sample Observations~~

Collected: ☐ Yes ☐ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

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Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: CB-50
Municipality Ownership: SS City
Time: 1130
Weather: 70s Cloudy
Street Location: Excelsior Ave (Parking Lot Per Banquet Hall)
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Fair Condition

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☐ In Grassed Area [✓ In Sidewalk/Concrete] ☐ In R.O.W.
Cover Diameter 2.7' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: [✓ Open Grate] ☐ Solid

2) Manhole:

Construction: [✓ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 2.7'
Benchwall with Channel: ☐ Yes [✓ No]
Sump: [✓ Yes] ☐ No
Signs of Surcharge: ☐ Yes [✓ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes [✓ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

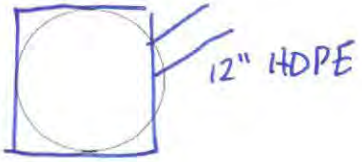
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ No]

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes
12:00



5) Pipe Inspections:

Clock Position	2			
Pipe Size (In)	12			
Rim to Invert (In)	2.6'			
Pipe Material	HDPE			
Flow Depth (In)	–			
Flow Color	–			
Drop Connection:	–			
Rim to Invert (In)	–			
Rim to Dam (In)	–			

Sediment:

None	✓			
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Some Sediment in CB
Other Observations:

6) Sample Observations

Collected: ☐ Yes [✓ No]
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

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Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: CB-51
Municipality Ownership: SS City
Time: 1000
Weather: 70s Sunny
Street Location: Excelsior Ave
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☐ In Grassed Area [✓ In Sidewalk/Concrete] ☐ In R.O.W.
Cover Diameter 2.6' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: [✓ Open Grate] ☐ Solid

2) Manhole:

Construction: [✓ Precast] ☐ Block ☐ Brick ☐ 3.3'
Size: ☐ 2.6'
Benchwall with Channel: ☐ Yes [✓ No]
Sump: [✓ Yes] ☐ No
Signs of Surcharge: ☐ Yes [✓ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes [✓ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

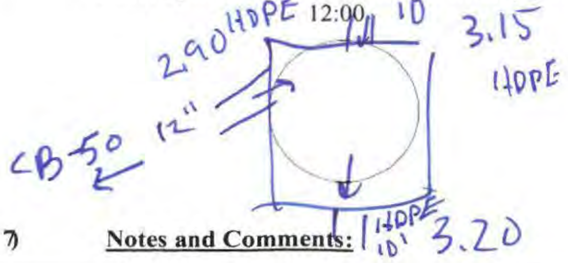
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ No]

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	12	11	6	
Pipe Size (In)	10	12	10	
Rim to Invert (In)	3.15	2.90	3.2	
Pipe Material	HDPE	→		
Flow Depth (In)	~2-4"	–	1	
Flow Color	Muddy H2O	–	Cl	
Drop Connection:				
Rim to Invert (In)				
Rim to Dam (In)				

Sediment:

None	✓	✓	✓	
Firm Silt				
Rocks, Gravel Sand	✓			
Other				
Depth (In)	~1" Couple spots			

Additional Sediment Descriptions: Some sediment/Debris in Ha Catch Basin
Other Observations:

6) Sample Observations

Collected: ☐ Yes [✓ No]
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Municipality Ownership: SS City
Street Location: High Rock Ave
Date: 6/30/15
Time: 1315
Sheet: of
Manhole No.: CB-52
Weather: 70s Rain

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover: Parking Lot

☑ In Pavement ☐ Centerline of Road ☐ Edge of Road
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.6' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☑ Open Grate ☐ Solid

2) Manhole:

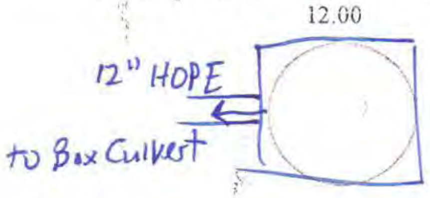
Construction: ☑ Precast ☐ Block ☐ Brick ☐
Size: ☐ 2.6'
Benchwall with Channel: ☐ Yes ☑ No
Sump: ☑ Yes ☐ No
Signs of Surcharge: ☐ Yes ☑ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft) 5.35' Deep
Roots: ☐ Yes ☑ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

3) Other Structures:
Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☑ No

If yes, attach additional information and sketch.

4) Sketch:
Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	9			
Pipe Size (In)	12			
Rim to Invert (In)	4.65'			
Pipe Material	HDPE			
Flow Depth (In)	~2"			
Flow Color	Clear with some Debris			
Drop Connection:	–			
Rim to Invert (In)	–			
Rim to Dam (In)	–			

Sediment:

None	✓			
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Some sediment in Manhole
Other Observations:

6) Sample Observations
Collected: ☐ Yes ☑ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

ARCADIS
Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Municipality Ownership: High Rock Ave
Street Location: SS City
Date: 6/30/15
Time: 1330
Sheet: of
Manhole No.: MH-1
Weather: 70, Rain

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☑ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 19' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate [✓ Solid]

2) Manhole:

Construction: ☐ Precast ☐ Block [✓ Brick] ☐
Size: ☐ [illegible]
Benchwall with Channel: ☐ Yes [✓ No] 9' Deep
Sump: ☐ Yes [✓ No]
Signs of Surcharge: ☐ Yes [✓ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes [✓ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

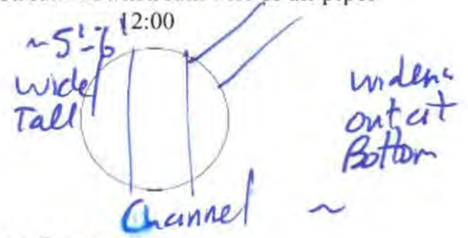
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ No]

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	2	12		
Pipe Size (In)	12	5-6"		
Rim to Invert (In)	6'	9'		
Pipe Material	HDPE	Brick Culvert		
Flow Depth (In)	~2	~ [illegible]		
Flow Color	clear	~~clear [illegible]~~		
Drop Connection:	–	with some debris		
Rim to Invert (In)		Cloudy		
Rim to Dam (In)	–	→		

Sediment:

None	✗			
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions:
Other Observations:

6) Sample Observations

Collected: ☐ Yes [✓ No]
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: MH-2
Municipality Ownership: SS City
Time: 1545
Weather: 70s Rain
Street Location: Excelsior Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☑ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 26' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☑ Solid

2) Manhole:

Construction: ☑ Precast ☐ Block ☐ Brick ☐
Size: ☐ ~ 5' inside bottom
Benchwall with Channel: ☐ Yes ☑ No
Sump: ☑ Yes ☐ No
Signs of Surcharge: ☐ Yes ☑ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft) ~9.5' Deep
Roots: ☐ Yes ☑ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

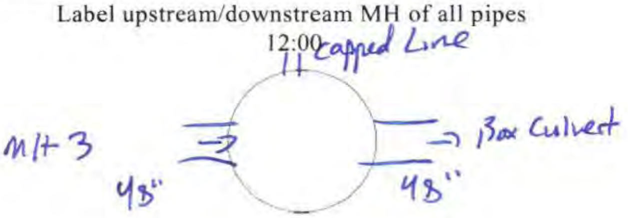
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☑ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	9	3		
Pipe Size (In)	48"	48"		
Rim to Invert (In)	9	9.5		
Pipe Material	HDPE			
Flow Depth (In)	~4"	~4"		
Flow Color	Clear	with	some	Debris
Drop Connection:	–	–		
Rim to Invert (In)	–	–		
Rim to Dam (In)	–	–		

Sediment:

None	✓	✓		
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Some Sediment in Manhole
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☑ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

ARCADIS

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: MH-3
Municipality Ownership: SS City
Time: 1600
Weather: 70s Rain
Street Location: Excelsior Ave
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☑ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.7' (In)
Height if above grade – (In)
Depth if below grade (In)
Cover Type: ☐ Open Grate ☑ Solid

2) Manhole:

Construction: ☑ Precast ☐ Block ☑ Brick ☐ some brick in top layer
Size: ☐
Benchwall with Channel: ☐ Yes ☑ No
Sump: ☐ Yes ☑ No
Signs of Surcharge: ☐ Yes ☑ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft) 9.5' Deep
Roots: ☐ Yes ☑ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

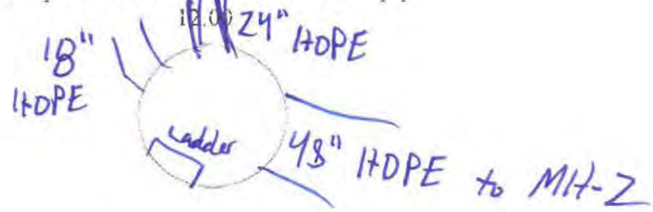
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☑ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	10	12	4	
Pipe Size (In)	18"	24"	48"	
Rim to Invert (In)	6.35'	7.35'	7.5'	
Pipe Material	HDPE			
Flow Depth (In)	~2"	~2"	~4"	
Flow Color	Clear with some			
	Debris			
Drop Connection:	–	–	–	
Rim to Invert (In)				
Rim to Dam (In)	–	–		

Sediment:

None	✓	✓	✓	
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Some Sediment in Manhole
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☑ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:

Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

ARCADIS
Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/29/15
Manhole No.: MH-4
Municipality Ownership: City
Time: 1300
Weather: 70s Sunny
Street Location: Excelsior Ave
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good

1) Manhole Cover: Middle of Lane

☑ In Pavement ☐ Centerline of Road ☐ Edge of Road
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 30 (In)
Height if above grade 0 (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☒ Solid

2) Manhole:

Construction: [✓ Precast] ☐ Block ☐ Brick ☐
Size: ☐ 5' ~ 5' Depth
Benchwall with Channel: ☐ Yes ☒ No
Sump: [✓ Yes] ☒ No
Signs of Surcharge: ☐ Yes ☒ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – – (Ft)
Roots: ☐ Yes [✓ No]
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

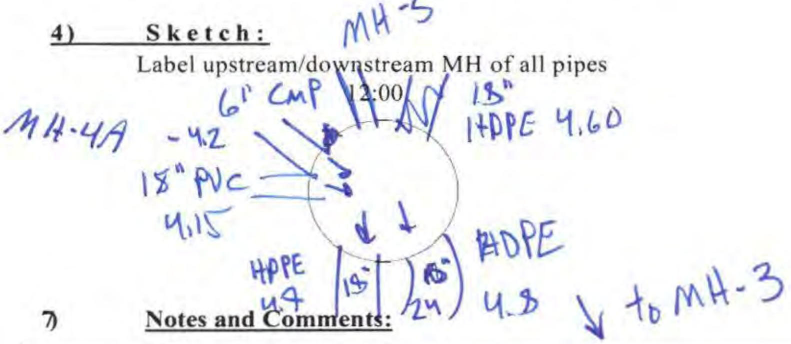
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☒ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

5) Pipe Inspections: Cl-Clear

Clock Position	9	~~10~~ 9	11	5	6
Pipe Size (In)	6	18	18	24	18
Rim to Invert (In)	4.2	4.15	4.6	4.8	4.7
Pipe Material	CMP	PVC	HDPE	"	"
Flow Depth (In)		–	1	2-3	3-4"
Flow Color		–	Cl	Cl	Cl
Drop Connection:		↓			
Rim to Invert (In)		Standing			
Rim to Dam (In)		H_2O ~1/2"			

Sediment:

None	X	X	X	
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: 2-3" of Sediment / Brick in MH
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☒ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

All measurements ~ 0.1'

ARCADIS

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: MH-6
Municipality Ownership: SS City
Time: 1730
Weather: 60s Little Rain
Street Location: Warren St
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover:

☐ In Pavement ☐ Centerline of Road ☐ Edge of Road
☑ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.6' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☑ Solid

2) Manhole:

Construction: ☑ Precast ☑ Block ☐ Brick ☐ Some Block on top of Precast Structure
Size: ☐ ~4' wide at Bottom
Benchwall with Channel: ☐ Yes ☑ No
Sump: ☑ Yes ☐ No
Signs of Surcharge: ☐ Yes ☑ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft) 7.9' Deep
Roots: ☐ Yes ☑ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

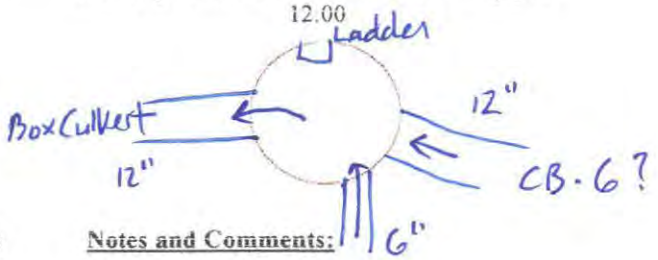
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☑ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Pipe Cracked at Seams

Clock Position	4	6	9	
Pipe Size (In)	12"	6"	12"	
Rim to Invert (In)	5.3	7.2	7.2	
Pipe Material	HDPE		Steel?	
Flow Depth (In)	-	~½"	~1"	
Flow Color	-	Clear with Debris		
Drop Connection:	–	–	–	
Rim to Invert (In)	–	–	–	
Rim to Dam (In)	–	–	–	

Sediment:

None	✓	✓		
Firm Silt			✓	
Rocks, Gravel Sand				
Other				
Depth (In)			½" Varying throughout Pipe	

Additional Sediment
Descriptions: Some Sediment/Debris in
Other Observations: Manhole

6) Sample Observations

Collected: ☐ Yes ☑ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

G:\Clients\National Grid\Ogdensburg\1 1 Draft Reports and Presentations\Sewer Investigation WP\Attachment A - Manhole Inspection Log.wpd

ARCADIS
Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: SMH-1
Municipality Ownership: SS City
Time: 1030
Weather: 70s Sunny
Street Location: Excelsior Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole:

1) Manhole Cover:

☒ In Pavement ☒ Centerline of Road ☐ Edge of Road
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 30 (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☒ Solid

2) Manhole:

Construction: ☒ Precast ☐ Block ☐ Brick ☐
Size: ☐
Benchwall with Channel: ☐ Yes ☒ No
Sump: ☐ Yes ☒ No
Signs of Surcharge: ☐ Yes ☒ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes ☒ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

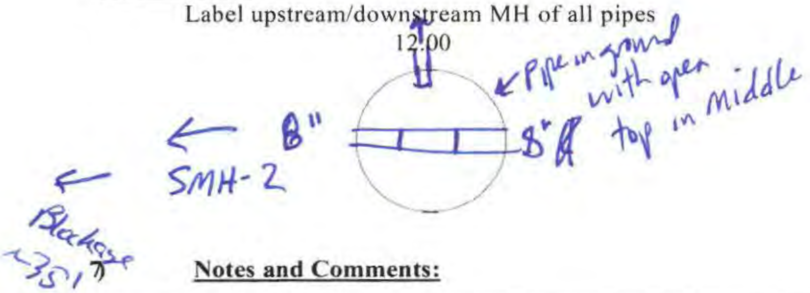
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☒ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	3	9		
Pipe Size (In)	6"	8"	} Both	
Rim to Invert (In)	7.6		}	
Pipe Material	Clay	Lined		
Flow Depth (In)	x ~~3~~ 4"			
Flow Color		Murky/unclear H2O		
Drop Connection:	–			
Rim to Invert (In)	–			
Rim to Dam (In)	–			

Sediment:

None	☒	☒		
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions: Some Debris Floating in H_2O
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☒ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:

Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

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ARCADIS
Infrastructure, environment, buildings

Operable Unit 2 of the Niagara Mohawk Power Corporation Superfund Site
Saratoga Spring, New York

MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/29/15
Manhole No.: SMH-3
Municipality Ownership: SS City
Time: 1600
Weather: 70s Sunny
Street Location: Excelsior Ave
Sheet: of

Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good

1) Manhole Cover:

☑ In Pavement [✓ Centerline of Road] ☐ Edge of Road
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 30" (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☒ Solid

2) Manhole:

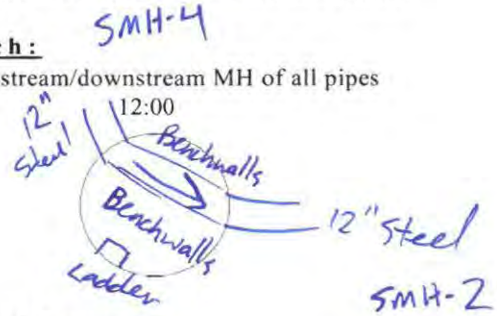
Construction: ☒ Precast ☐ Block ☐ Brick ☐
Size: ☐ 3 3.0' Depth
Benchwall with Channel: ☒ Yes ☐ No
Sump: ☐ Yes ☒ No
Signs of Surcharge: ☐ Yes [✓ No]
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes ☒ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

3) Other Structures:
Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes [✓ No]

If yes, attach additional information and sketch.

4) Sketch:
Label upstream/downstream MH of all pipes



5) Pipe Inspections:

at 35' change to PVC

Clock Position	11	3		
Pipe Size (In)	12	12		
Rim to Invert (In)	3.8'	3.9'		
Pipe Material	Steel	Steel		
Flow Depth (In)	~1	~1		
Flow Color	Cloudy white	Gray		
Drop Connection:	–	–		
Rim to Invert (In)	–	–		
Rim to Dam (In)	–	–		

Sediment:

None	X	X		
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment
Descriptions:
Other Observations:

6) Sample Observations
Collected: ☐ Yes ☒ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Additional Information on reverse side: ☐

Inspector's Signature

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MANHOLE INSPECTION LOG

Consultant: ARCADIS
Date: 6/30/15
Manhole No.: SMH-4
Municipality Ownership: w/ SS City
Time: 1530
Weather: 70s Cloudy
Street Location: Excelsior Ave in Pavement of Parking Lot
Sheet: of
Manhole Not Inspected due to: ☐ Buried ☐ Can't Find ☐ Surcharged ☐ Safety (specify):
Manhole Entered for Inspection ☐ Manhole Uncovered ☐
Condition of Manhole: Good Condition

1) Manhole Cover:

☑ In Pavement ☐ Centerline of Road ☐ Edge of Road
☐ In Grassed Area ☐ In Sidewalk/Concrete ☐ In R.O.W.
Cover Diameter 2.6' (In)
Height if above grade – (In)
Depth if below grade – (In)
Cover Type: ☐ Open Grate ☑ Solid

2) Manhole:

Construction: ☑ Precast ☐ Block ☐ Brick ☐
Size: ☐ 2.6'
Benchwall with Channel: ☑ Yes ☐ No
Sump: ☐ Yes ☑ No
Signs of Surcharge: ☐ Yes ☑ No
Approximate Height of Surcharge: – (Ft)
Depth from Invert to Rim: – (Ft)
Roots: ☐ Yes ☑ No
Infiltration/Leakage:

Spout(S) or Trickle(T)	Exact Location of Leak	Estimated GPM

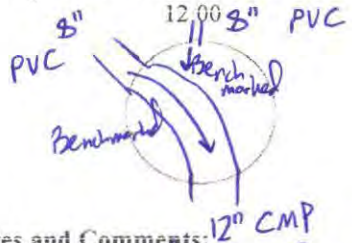
3) Other Structures:

Any additional structures/features such as overflow weir, sand-trap, etc. observed? ☐ Yes ☑ No

If yes, attach additional information and sketch.

4) Sketch:

Label upstream/downstream MH of all pipes



5) Pipe Inspections:

Clock Position	12	6	10	
Pipe Size (In)	8	12	8	
Rim to Invert (In)	4.3'	4.6'	4.4'	
Pipe Material	PVC	CMP	PVC	
Flow Depth (In)	–	~1"	~1"	
Flow Color	–	Cloudy → Some Debris		
Drop Connection:	–			
Rim to Invert (In)	–			
Rim to Dam (In)	–			

Sediment:

None	✓	✓	✓	
Firm Silt				
Rocks, Gravel Sand				
Other				
Depth (In)				

Additional Sediment Descriptions:
Other Observations:

6) Sample Observations

Collected: ☐ Yes ☑ No
If No explain:
Type: ☐ Scoop Sample ☐ Core Sample
Sample Description:
☐ Odor ☐ Sheen
☐ MGP-Related Materials
Color:
Composition:
PID Reading:

7) Notes and Comments:

Channelized Flow from 10° → 6°

Additional Information on reverse side: ☐

Inspector's Signature

APPENDIX B

Hydraulic Conductivity Test Logs

ARCADIS

Page 1 of 1

Specific Capacity Test Form

Project No. B0036641

Well ID mw-EPA-02
1" PVC

Date 07/13/15

Project Name/Location National Grid-Saratoga Springs

Weather hot, humid, 80's

Pump On —

Pump Off —

Initial Rate —

Pumpng Method —

Static Water Level 3.23

Recovery Time —

Recovery Water Level —

Well ID	DTW	Time	Rate	Notes

something obstructing well ~ 7 fbgs - could not complete pump test

Niagra Mohawk Power Corporation – Saratoga Springs, NY **Synoptic GW Sampling**

Site *Event*

GROUNDWATER SAMPLING LOG

Sampling Personnel: AG & TN **Well ID:** MW-EPA-02

Client / Job Number: National Grid, B0036641.0001 **Date:** 7/16/15

Weather: 70s Sunny **Time In:** 840 **Time Out:** 950

Well Information

Depth to Water: 4.00 (feet)

Total Depth: 16.85 (feet) Guess → based on tubing due to blockage

Length of Water Column: 12.85 (feet)

Volume of Water in Well: 0.52 (gal)

Intake depth for tubing: ~14-15 (feet)

Well Type: Flush mount ☒ Stick-Up ☐

Well Material: Stainless Steel ☐ PVC ☒

Well Locked: Yes ☐ No ☒

Measuring Point Marked: Yes ☐ No ☒

Well Diameter: [✓ 1"] 2" Other:

Purging Information

Purging Method: Peristaltic

Tubing/Bailer Material: w/ Bailer Poly

Sampling Method: Bailer/Peristaltic ~~of~~ (VOCs)

Pump Start Time: 847

Pump Stop Time: 935

Total Volume Removed: 1gal (gal)

Water-Quality Meter Type: Horiba

Did well go dry: No

Conversion Factors				
gal / ft. of water	1" ID	2" ID	4" ID	6" ID
	0.041	0.163	0.653	1.469
1 gal = 3.785 L =3785 ml = 0.1337 cubic feet				

✓ Unit Stability			
pH ✓	DO / Turb ✓	Cond. /Temp ✓	ORP ✓
∀ 0.1	∀ 10%	∀ 3.0%	∀ 10 mV

Parameter:	1	2	3	4	5	6	7	8	9
Time	855	0900	905	910	915	920			
Volume Purged (gal)		1/2 gal		3/4 gal		1 gallon	925		
Rate (mL/min)	100	100	100	100	100	100	Sample Time		
Depth to Water (ft)	4.90	4.85	4.87	4.86	4.86	4.85			
pH	7.65	7.85	7.91	7.95	7.97	7.98			
Temp. (°C)	19.21	18.62	18.65	18.53	18.62	18.63			
Conductivity (mS/cm)	3.39	3.43	3.42	3.42	3.41	3.43			
Dissolved Oxygen (mg/L)	8.53	8.13	7.65	7.29	6.98	6.83			
ORP (mV)	-161	-163	-158	-161	-164	-165			
Turbidity (NTU)	18.2	9.2	10.3	2.2	0	0			
Notes:	~3gal purged 7/15/15 in attempt to clear iron/clay like look and to set tubing past obstruction								

Sampling Information

Analyses	#	Laboratory
BTEX	3	Accutest
PAHs	2	〃

Color: Clear

Odor: None

Appearance: Clean

Sample ID: MW-EPA-02 Sample Time: 925

Duplicate: — Yes ☐ No ☒

Duplicate ID: — Dup. Time: —

Chain of Custody Signed By: TN/AG

Problems / Observations

850 initial Purge clear, no odor

100ml/min is lowest pump will go without shutting off at random times

925 - Clear, no odor

Final purge

Slight yellowish tint in 2 VOA bottles

ARCADIS

Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Well ID mw-EPA-04
1" PVC

Date 07/14/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80 J

Pump On 0915

Pump Off 0949

Initial Rate 0.122 gpm

Pumpng Method Peristaltic

Static Water Level 6.23

Recovery Time 0955

Recovery Water Level 6.80

Well ID	DTW	Time	Rate	Notes
mw-EPA-04	7.55	0917	0.122 gpm	
mw-EPA-04	7.87	0919	0.122 gpm	
mw-EPA-04	8.07	0921	0.122 gpm	measured rate - remained the same
mw-EPA-04	8.12	0923	0.122 gpm	
mw-EPA-04	8.20	0926	0.118 gpm	measured rate - pump turned all the way up
mw-EPA-04	9.26	0929	0.118 gpm	
mw-EPA-04	9.31	0931	0.118 gpm	
mw-EPA-04	9.31	0933	0.118 gpm	4.94 ft. in mw-ORS-01
mw-EPA-04	9.31	0936	0.118 gpm	measured rate - remained the same
mw-EPA-04	9.31	0939	0.118 gpm	4.94 ft. in mw-ORS-01
mw-EPA-04	9.34	0943	0.118 gpm	
mw-EPA-04	09.34	0946	0.118 gpm	measured rate - stayed the same
mw-EPA-04	09.34	0950	0.118 gpm	4.95 ft. in mw-ORS-01

*~4 gals purged *

ARCADIS

Page 1 of 1

Specific Capacity Test Form

Project No. B0036441

Well ID mw-EPA-05 1" PVC

Date 07/14/15

Project Name/Location National Grid - Saratoga

Weather hot/humid, 80s

Pump On 1442

Pump Off 15:01

Initial Rate 0.132 gpm

Pumpng Method Peristaltic

Static Water Level 8.98

Recovery Time 15:06

Recovery Water Level 6.23

Well ID	DTW	Time	Rate	Notes
mw-EPA-05	8.80	1444	0.132 gpm	
mw-EPA-05	9.05	1447	0.132 gpm	
mw-EPA-05	9.08	1449	0.132 gpm	
mw-EPA-05	9.08	1451	0.132 gpm	
mw-EPA-05	9.05	1455	0.119 gpm	measured rate - pump maxed out
mw-EPA-05	9.08	1458	0.119 gpm	
mw-EPA-05				

* ~ 2.5 gal purged

* Product in well. Looks like it is "suspended" in water
Still some slight product coming out @ ~ 15:00 - turn pump off so no more product ~~is~~ produced

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Specific Capacity Test Form

Project No. B0036644

Well ID mw-EPA-06
1" PVC

Date 07/14/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 1336

Pump Off 14:10

Initial Rate 0.142

Pumpng Method Peristaltic

Static Water Level 5.95

Recovery Time 1415

Recovery Water Level 5.98

Well ID	DTW	Time	Rate	Notes
mw-EPA-06	6.09	1338	0.142	
mw-EPA-06	6.09	1340	0.142	
mw-EPA-06	6.09	1342	0.142	
mw-EPA-06	6.12	1346	0.132	measurd rate - pump is maxed out
mw-EPA-06	6.11	1349	0.132	
mw-EPA-06	6.11	1351	0.132	
mw-EPA-06	6.10	1353	0.132	measured rate - stayed the same
mw-EPA-06	6.09	1355	0.132	
mw-EPA-06	6.10	1358	0.132	
mw-EPA-06	6.10	1404	0.132	
mw-EPA-06	6.10	1407	0.132	measured rate - stayed the same
mw-EPA-06	6.10	1410	0.132	

~4.5 gallons Removed

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Page 1 of 1

Specific Capacity Test Form

Project No. B00 36641

Well ID mw-EPA-07 1" PVC

Date 07/13/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 14:13

Pump Off 14:46

Initial Rate 0.128

Pumpng Method Peristaltic

Static Water Level 6.76

Recovery Time 14:51

Recovery Water Level 7.06

Well ID	DTW	Time	Rate	Notes	Drawdown
mw-EPA-07	7.25	14:15	0.128	mw-SS-08-08 = 6.42	
mw-EPA-07	7.30	14:17	0.128		
mw-EPA-07	7.35	14:19	0.128		
mw-EPA-07	7.38	14:21	0.128		
mw-EPA-07	7.38	14:23	0.128		
mw-EPA-07	7.38	14:25	0.128	mw-SS-08-08 = 6.49	
mw-EPA-07	7.38	14:28	0.128		
mw-EPA-07	7.40	14:30	0.128		
mw-EPA-07	7.46	14:32	0.128	mw-SS-08-08 = 6.53	
mw-EPA-07	7.46	14:35	0.128		
mw-EPA-07	7.47	14:40	0.118	mw-SS-08-08 = 6.56	
mw-EPA-07	7.50	14:43	0.118		
mw-EPA-07	7.52	14:46	0.118		0.76
		+ ~4 gals.	purged		

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Well ID mw-EPA-08
1" PVC

Date 07/13/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 13:15

Pump Off 13:49

Initial Rate 0.132gpm

Pumpng Method Peristaltic

Static Water Level 6.41

Recovery Time 13:57

Recovery Water Level 6.55

Well ID	DTW	Time	Rate	Notes	Drawdown
mw-EPA-08	6.99	13:19	0.132gpm		
mw-EPA-08	7.07	13:22	0.132 gpm		
mw-EPA-08	7.18	13:24	0.132 gpm	mw-EPA-05 = 6.12	
mw-EPA-08	7.18	13:26	0.132 gpm		
mw-EPA-08	7.21	13:29	0.132 gpm		
mw-EPA-08	7.22	13:31	0.132 gpm	mw-EPA-05 = 6.06	
mw-EPA-08	7.22	13:34	0.132 gpm		
mw-EPA-08	7.22	13:36	0.132 gpm		0.81
mw-EPA-08	7.23	13:39	0.132 gpm	mw-EPA-05 = 6.10	~~0.81~~
mw-EPA-08	7.23	13:42	0.132 gpm		
mw-EPA-08	7.23	13:45	0.132 gpm		
mw-EPA-08	7.23	13:49	0.132 gpm		0.82

*~ 4.5 gal purged

product in bottom of well

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Project Name/Location National Grid Saratoga Springs

Well ID MW-EPA-09
1" PVC

Date 7/14/15

Weather 80s Sunny

Pump On 0824

Pump Off 0856

Initial Rate 0.130 gpm

Pumpng Method Peristaltic

Static Water Level 10.23

~~1" PVC Well~~ ag.

Recovery Time 0901

Recovery Water Level 10.23

Well ID	DTW	Time	Rate	Notes
MW-EPA-09	10.35	0825	0.130 gpm	
MW-EPA-09	10.35	0827	0.130	
MW-EPA-09	10.35	0829	0.122	* pump turned all the way up, measured rate
MW-EPA-09	10.35	0831	0.122	
MW-EPA-09	10.35	0833	0.122	measured rate – remained the same
MW-EPA-09	10.35	0835	0.122	
MW-EPA-09	10.35	0837	0.122	measured rate
MW-EPA-09	10.35	0840	0.122	
MW-EPA-09	10.35	0843	0.122	measured rate
MW-EPA-09	10.35	0846	0.122	
MW-EPA-09	10.35	0849	0.122	measured rate
MW-EPA-09	10.35	0852	0.122	
MW-EPA-09	10.35	0855	0.122	measured rate

~4gal purged

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Page 1 of 1

Specific Capacity Test Form

Project No. B0036644

Well ID MW-EPA-10
1" PVC

Date 07/14/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 13:16

Pump Off —

Initial Rate —

Pumpng Method Peristaltic

Static Water Level 11.09

DTB = 14.68

Recovery Time —

Recovery Water Level —

Well ID	DTW	Time	Rate	Notes
well went dry after ~ 1 min. of pumping				

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Well ID mw-SS-08-05
2" PVC

Date 07/13/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid 80's

Pump On 10:07

Pump Off 11:00

Initial Rate 500 mL/68 sec.
0.117 gpm

Pumpng Method Peristaltic

Static Water Level 8.81

Recovery Time 1105

Recovery Water Level 12.92

Well ID	DTW	Time	Rate	Drawdown	Notes
mw-SS-08-05	9.16	10:09	0.117 gpm		
mw-SS-08-05	9.41	10:11	0.117 gpm		
mw-SS-08-05	9.50	10:12	0.117 gpm		
mw-SS-08-05	9.65	10:14			
mw-SS-08-05	9.93	10:16			
mw-SS-08-05	10.05	10:17	0.106 gpm		
mw-SS-08-05	10.33	10:20	0.106 gpm		
mw-SS-08-05	10.51	10:22			
mw-SS-08-05	10.75	10:24		1.94	
mw-SS-08-05	10.91	10:26		2.10	
mw-SS-08-05	*11.73	10:30	0.085 gpm		*may have incorrectly recorded WL
mw-SS-08-05	11.46	10:32			
mw-SS-08-05	11.71	10:34			
mw-SS-08-05	11.86	10:36	0.066 gpm		
mw-SS-08-05	12.22	10:40			
	~~12.45~~	10:42			Turned flow down to 0.058
mw-SS-08-05	12.45	10:44	0.058		
mw-SS-08-05	12.52	10:45			
mw-SS-08-05	12.71	10:51	0.035		Turned flow down to 0.035
mw-SS-08-05	12.80	10:54			
mw-SS-08-05	12.93	10:59	0.028	4.12	Turned flow down to 0.028
	12.92	1105			

* 4 gallons Removed

$500 = mL = \frac{0.132\ gal.}{1.13\ min.} = 0.117\ gal/min$

$spec.\ cap. = \frac{gpm}{ft.}$

$\frac{500\ mL}{75\ sec.} = 400\ \frac{mL}{min.}$

$\frac{0.132\ gal.}{1.25\ min} = \cancel{0.8}\ 0.106\ gpm$

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Project Name/Location National Grid- Saratoga Springs

Well ID MW-SS-08-08
2" PVC

Date 07/14/15

Weather hot, humid, 80's

Pump On 11:12

Pump Off 11:49

Initial Rate 0.189 gpm

Pumpng Method Peristaltic

Static Water Level 6.47

Recovery Time 11:58

Recovery Water Level 6.68

Well ID	DTW	Time	Rate	Notes
MW-SS-08-08	7.07	11:14	0.189 gpm	
MW-SS-08-08	7.26	11:16	0.189 gpm	
MW-SS-08-08	7.32	11:18	0.189 gpm	6.87 ft = WL @ MW-EPA-07
MW-SS-08-08	7.34	11:20	0.189 gpm	measured flowrate - stayed same
MW-SS-08-08	7.35	11:22	0.189 gpm	
MW-SS-08-08	7.38	11:25	0.189 gpm	6.88 ft = WL @ MW-EPA-07
MW-SS-08-08	7.39	11:27	0.189 gpm	measured flow rate - stayed same
MW-SS-08-08	7.41	11:30	0.189 gpm	
MW-SS-08-08	7.42	11:33	0.189 gpm	WL = 6.90 ft @ MW-EPA-07
MW-SS-08-08	7.44	11:36	0.189 gpm	measured flow rate - stayed same
MW-SS-08-08	7.46	11:39	0.189 gpm	WL = 6.92 ft @ MW-EPA-07
MW-SS-08-08	7.45	11:42	0.189 gpm	
MW-SS-08-08	7.45	11:45	0.189 gpm	measured rate was the same, 6.98 ft. @ MW-EPA-07
MW-SS-08-08	7.46	11:48	0.189 gpm	

* ~ 7.5 gal purged

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Well ID mw-ss-09-06
2" PVC

Date 07/13/15

Project Name/Location National Grid- Saratoga Springs

Weather hot, humid, 80's

Pump On 1533

Pump Off 1615

Initial Rate 0.085 gpm

Pumpng Method Peristaltic

Static Water Level ~11.57 (may have been higher-pump on a few sec. before getting level)

Recovery Time 1621

Recovery Water Level 11.65

Well ID	DTW	Time	Rate	Notes
mw-ss-09-06	11.65	1536	0.085	
mw-ss-09-06	11.70	1539	0.085	
mw-ss-09-06	11.71	1541	0.085	
mw-ss-09-06	11.71	1544	0.052	
mw-ss-09-06	11.71	1546		
		1550		Pump stops producing water/pump stops
mw-ss-09-06	11.66	1554		Pump restarted
mw-ss-09-06	11.80	1557	0.066	
mw-ss-09-06	11.85	1559	0.066	
mw-ss-09-06	11.96	1602	0.066	
mw-ss-09-06	12.03	1604	0.066	
mw-ss-09-06	12.05	1607	0.066	
mw-ss-09-06	12.08	1610	0.066	
mw-ss-09-06	12.07	1615	0.066	

*2.5 gallons Removed

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Specific Capacity Test Form

Page 1 of 1

Project No. B0046641

Well ID mw-ss-09-07
2" PVC

Date 07/14/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 1023

Pump Off 10:58

Initial Rate 0.189 gpm

Pumpng Method Peristaltic

Static Water Level 9.20

Recovery Time 11:03

Recovery Water Level 9.55

Well ID	DTW	Time	Rate	Notes
	[illegible]	[illegible]		
mw-ss-09-07	9.65	10:25	0.189 gpm	
mw-ss-09-07	10.05	10:28	0.189 gpm	
mw-ss-09-07	10.15	10:32	0.189 gpm	
mw-ss-09-07	10.17	10:34	0.189 gpm	Rate measured - rate remains the same
mw-ss-09-07	10.18	10:36	0.189 gpm	
mw-ss-09-07	10.20	10:40	0.189 gpm	
mw-ss-09-07	10.20	10:43	0.189 gpm	Rate measured - stayed the same
mw-ss-09-07	10.21	10:46	0.189 gpm	
mw-ss-09-07	10.21	10:48	0.189 gpm	Rate measured - stayed the same
mw-ss-09-07	10.24	10:52	0.189 gpm	
mw-ss-09-07	10.24	10:55	0.189 gpm	[illegible] Rate measured - stayed the same
mw-ss-09-07	10.24	10:58	0.189 gpm	

* ~7 gal. purged *

* orange precipitate purged out initially

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Specific Capacity Test Form

Page 1 of 1

Project No. B0036641

Well ID MW-ORS-01
2" PVC well

Date 07/13/15

Project Name/Location National Grid - Saratoga Springs

Weather hot, humid, 80's

Pump On 11:18

Pump Off 12:02

Initial Rate 0.149

Pumpng Method Peristaltic

Static Water Level 4.86

Recovery Time 12:07

Recovery Water Level 5.61

Well ID	DTW	Time	Rate	Notes	Drawdown
MW-ORS-01	5.25	11:21	0.149 gpm		
MW-ORS-01	5.46	11:23	0.149 gpm		
MW-ORS-01	6.66	11:26	0.149 gpm		
MW-ORS-01	5.63	11:28	0.149 gpm	MW-EPA-04 = 6.14 ft.	
MW-ORS-01	5.76	11:31	0.141 gpm		
MW-ORS-01	5.81	11:33	0.141 gpm	MW-EPA-04 = 6.14 ft.	
MW-ORS-01	5.85	11:35	0.141 gpm		
MW-ORS-01	5.90	11:37	0.141 gpm		
MW-ORS-01	5.97	11:39	0.141 gpm		
MW-ORS-01	6.00	11:42	0.141 gpm	MW-EPA-04 = 6.14 ft.	1.14 ft.
MW-ORS-01	6.05	11:45	0.141 gpm		
MW-ORS-01	6.11	11:48	0.141 gpm	MW-EPA04 = 6.15 ft.	
MW-ORS-01	6.20	11:52	0.132 gpm		1.34 ft.
MW-ORS-01	6.22	11:55	0.132 gpm	MW-EPA-04 = 6.15 ft.	
MW-ORS-01	6.25	11:58	0.132 gpm		
MW-ORS-01	6.27	12:01	0.132 gpm		1.41 ft.

+ ~6.6 gal. removed

APPENDIX C

Soil Boring Logs

Date Start/Finish: 7/7/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Mark Eaves
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551227.47
Easting: 685427.30

Borehole Depth: 20' bgs
Surface Elevation: 265.06 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-01**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	265								Asphalt/subbase (Excelsior Ave).	
		NA	NA	NA	NA	NA	NA		Blind drill	
5	260									
		1	6-8	1.3	8 8 10 10	18	0.0		Mottled brown Silty SAND, medium dense, low plasticity, moist. Brown Sandy CLAY, stiff, medium plasticity, moist.	
		2	8-10	1.3	3 5 5 7	10	0.3 1.9		Mottled brown to red Silty SAND, some Gravel, faint odor, loose, moist. Brown Sandy SILT, organics, faint odor, medium stiff, low plasticity, moist.	Borehole backfilled with bentonite/grout to grade.
10	255	3	10-12	1.5	2 3 3 3	6	10.2 18.6 10.9		Dark brown, peat-like organics at 10 ft bgs, non-plastic.	
		4	12-14	1.5	3 4 3 4	7	9.2 4.6		Little Gravel, Wood/organics, soft at 12 ft bgs.	▼
15	250	5	14-16	1.8	2 3 3 6	6	3.2 0.0		Brown Silty SAND, faint odor, loose, organics, nonplastic, moist. Brown to gray Silty CLAY, medium plasticity.	

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 13 ft bgs.

Client: National Grid

Well/Boring ID: **GT-01**

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

Borehole Depth: 20' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.8	4 5 3 3	8	0.0	▤	Gray Silty CLAY, soft, wet, medium plasticity. PP = 0.5 tsf	Borehole backfilled with bentonite/grout to grade.
		7	18-20	1.8	3 3 4 3	7	0.0	▤	PP = 0.5 tsf PP = 0.5 tsf	
20	245								End of boring at 20 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/7/2015.	
25	240									
30	235									
35	230									

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 13 ft bgs.

Date Start/Finish: 7/7/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Mark Eaves
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551203.87
Easting: 685405.20

Borehole Depth: 20' bgs
Surface Elevation: 264.76 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-02**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
	265									
0 5	260	NA	NA	NA	NA	NA	NA		Blind drill	Borehole backfilled with bentonite/grout to grade.
		1	6-8	0.5	2 2 2 2	4	0.0		Light brown to dark brown Silty SAND, little Clay, loose, nonplastic to low plasticity, moist.	
10	255	2	8-10	1.2	2 1 2 1	3	0.0		Trace Gravel at 8 ft bgs.	
		3	10-12	1.5	2 3 2 2	5	0.0 0.0		Dark brown Clayey SAND, Peat-like organic material, organic odor, loose, low plasticity, moist. Dark brown SAND, little Clay and Silt, loose, nonplastic, moist.	
		4	12-14	1.0	3 3 4 3	7	10.9 9.6		Brown and dark gray Silty SAND, little clay, MGP-like odor, loose, low plasticity, wet.	▼
15	250	5	14-16	1.5	3 5 4 11	9	36.9 41.4 3.6		Brown SAND, some Silt and Clay, little Gravel, strong odor, sheen throughout, bleb at 15.3 ft and 15.5 ft bgs, loose, nonplastic to low plasticity, wet. 15-15.5 feet bgs Heavy staining Gray Sandy CLAY, odor and sheen, loose, wet.	

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 13 ft bgs.

Client: National Grid

Well/Boring ID: **GT-02**

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

Borehole Depth: 20' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.8	3 6 6 8	12	0.3		Gray CLAY, little Silt, stiff, medium to high plasticity, wet. PP = 0.75 tsf PP = 0.75 tsf PP = 1.25 tsf	Borehole backfilled with bentonite/grout to grade.
20	245	7	18-20	1.8	3 5 5 6	10	0.0		PP = 1.0 tsf PP = 0.75 tsf	
									End of boring at 20 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/7/2015.	
25	240									
30	235									
35	230									

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 13 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-02.dat Date: 8/12/2015 APG

Date Start/Finish: 7/8/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Jeromy Rauscher
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551178.05
Easting: 685415.78

Borehole Depth: 22' bgs
Surface Elevation: 264.86 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-04**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Stratigraphic Description	Well/Boring Construction
0	265	NA	NA	NA	NA	NA	NA	Blind drill	
5	260								
		1	6-8	0.5	4 3 2 2	5	3.2 4.6	Brown Silty SAND, brick fragments, odor, loose, moist. Dark gray Sandy CLAY, odor, medium stiff, low plasticity, moist.	
		2	8-10	0.7	2 2 2 1	4	4.7 10.2	Dark brown Sandy SILT, Peat-like organics, organic odor, soft, low plasticity, moist.	Borehole backfilled with bentonite/grout to grade.
10	255	3	10-12	1.8	2 2 4 4	6	3.2	Dark brown to brown SAND with Silt, faint MGP odor, loose, wet.	▼
		4	12-14	1.7	3 4 6 4	10	0.0	Dark gray CLAY, little Sand, low to medium plasticity, wet.	
15	250	5	14-16	1.3	3 9 6 7	15	13.5 110 49.7	Brown SAND, some Gravel, little Silt, wood present (possible root), MGP odor, staining and sheen, blebs at 15.0 ft, 15.3 ft, and 15.4 ft bgs, medium dense, nonplastic, wet.	

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 11 ft bgs in sand layer.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-04.dat Date: 8/12/2015 APG

Client: National Grid

Well/Boring ID: **GT-04**

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

Borehole Depth: 22' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.8	4 3 4 4	7	241.5		Brown SAND, some Gravel, little Silt, heavy MGP odor, staining and sheen, bleb at 16.3 ft bgs, medium dense, nonplastic, wet. Gray CLAY, slight MGP odor, medium stiff, high plasticity, wet.	
		7	18-20	1.8	4 3 6 4	9	0.0		No odor, medium to high plasticity at 18 ft bgs. PP = 0.5 tsf	Borehole backfilled with bentonite/grout to grade.
20	245	8	20-22	1.7	5 4 4 5	8	0.0		PP = 0.5 tsf	
									End of boring at 22 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/8/2015.	
25	240									
30	235									
35	230									

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 11 ft bgs in sand layer.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-04.dat Date: 8/12/2015 APG

Date Start/Finish: 7/7/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Mark Eaves
Drilling Method: Hollow Stem Auger
Auger Size: 4.75" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551170.13
Easting: 685396.04

Borehole Depth: 28' bgs
Surface Elevation: 268.72 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-05**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
	270									
0 5	265	NA	NA	NA	NA	NA	NA		Blind drill	
		1	6-8	0.7	6 5 3 3	8	0.0		Brown Silty SAND, loose, nonplastic, moist.	
	260	2	8-10	0.5	4 4 4 5	8	0.0		Little Clay, trace Gravel, low plasticity at 8 ft bgs. Note: Auger grinding 8-10 ft bgs.	Borehole backfilled with bentonite/grout to grade.
10		3	10-12	0.7	11 15 12 25	27	0.0		Brown and gray Clayey SAND, some Gravel, medium dense, medium plasticity, moist.	
	255	4	12-14	0.5	10 10 8 6	18	10		Brown SAND, some Clay, medium dense, low plasticity, wet. Dark brown PEAT/ROOTS, some Sand, trace Clay, minor odor, nonplastic to low plasticity, wet.	
15		5	14-16	1.7	2 3 3 3	6	2.9 3.4 11.9		Brown Silty SAND, faint odor, loose, nonplastic to low plasticity, wet. Brown SAND, some Silt, organics, odor, loose, nonplastic, wet.	

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 17 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-05.dat Date: 8/12/2015 APG

Client: National Grid

Well/Boring ID: **GT-05**

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

Borehole Depth: 28' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.6	3 3 7 11	10	3.9 3.7		Brown Silty SAND, faint odor, medium dense, low plasticity, wet. Brown SAND, little Silt and Clay, odor, medium dense, nonplastic, wet. Organic layer 17.8-18.0 ft bgs. Some Silt and Clay, loose at 18 ft bgs.	▼
	250	7	18-20	1.2	3 4 3 4	7	7.8 10.9		Light brown WOOD (probable root), organics, odor, medium dense, wet.	
20		8	20-22	0.7	10 6 11 6	17	8.9 10.4		Dark brown SAND, little Silt, strong odor, blebs at 21.4 ft, 21.6 ft, and 21.8 ft bgs, sheen, medium dense, nonplastic, wet. Heavy odor, heavy sheen at 22 ft bgs.	Borehole backfilled with bentonite/grout to grade.
	245	9	22-24	1.5	5 3 3 3	6	10.6 0.0 0.0		Light gray CLAY, medium stiff, high plasticity, wet. PP = 0.5 tsf	
25		10	24-26	1.9	2 2 3 3	5	0.0		PP = 1.0 tsf PP = 0.5 tsf	
		11	26-28	2.0	2 3 4 4	7	0.0		PP = 0.75 tsf PP = 0.5 tsf	
	240								End of boring at 20 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/7/2015.	
30										
	235									
35										

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 17 ft bgs.

Date Start/Finish: 7/8/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Jeromy Rauscher
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551171.27
Easting: 685441.43

Borehole Depth: 22' bgs
Surface Elevation: 265.72 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-06**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
0 5	265 260	NA	NA	NA	NA	NA	NA		Blind drill	Borehole backfilled with bentonite/grout to grade.
		1	6-8	1.2	1 1 2 3	3	0.0 0.0		Brown Silty SAND, brick fragments, very loose, nonplastic, moist.	
		2	8-10	1.0	2 2 1 1	3	0.0 0.0		Dark brown (Peat-like) SILT with Sand, organics, organic odor, soft, nonplastic, moist.	
10	255	3	10-12	1.2	3 3 2 3	5	0.0		1 inch layer of Sand at 10.8 ft bgs.	
		4	12-14	1.3	2 2 3 3	5	0.0 0.0		Gray CLAY, soft to medium stiff, medium plasticity, moist.	
15	250	5	14-16	1.0	2 3 5 5	8	0.0 0.2		Dark brown (Peat-like) SILT with Sand, organic odor, medium stiff, nonplastic, moist. Light brown SAND, wood/organics, faint odor, loose, nonplastic.	▼

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Water depth: 15 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-06.dat Date: 8/12/2015 APG

Client: National Grid

Well/Boring ID: **GT-06**

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

Borehole Depth: 22' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.3	3 4 3 5	7	0.9 10.1 149.6		Silty SAND, little coated Gravel, strong MGP odor, staining, sheen, loose, nonplastic, wet. Bleb at 17.4 ft bgs, heavy coating. Gray CLAY, soft, medium to high plasticity, no odor.	Borehole backfilled with bentonite/grout to grade.
		7	18-20	1.7	2 3 2 2	5	0.6 0.0		PP = 0.5 tsf PP = 0.5 tsf	
20	245	8	20-22	1.8	4 4 4 4	8	0.0		PP = 0.5 tsf	
									End of boring at 22 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/8/2015.	
25	240									
30	235									
35	230									

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 15 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-06.dat Date: 8/12/2015 APG

Date Start/Finish: 7/8/2015
Drilling Company: Parratt Wolff
Driller's Name: Jolaan Price, Jeromy Rauscher
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: Truck Rig
Sampling Method: 2" x 2' Split Spoon

Northing: 1551160.51
Easting: 685422.78

Borehole Depth: 22' bgs
Surface Elevation: 265.37 feet

Descriptions By: Kyle Warren

Well/Boring ID: **GT-07**

Client: National Grid

Location: Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
0 5	0 -5	NA	NA	NA	NA	NA	NA		Blind drill	
		1	6-8	1.7	6 3 3 2	6	0.0 0.0 0.0		Brown to light brown Silty SAND, loose, nonplastic, moist. Dark grayish brown Sandy CLAY, soft, low to medium plasticity, moist. Dark brown (almost peat) Sandy SILT, organics, organic odor, soft, moist.	Borehole backfilled with bentonite/grout to grade.
		2	8-10	1.5	4 4 4 4	8	0.0			
10	-10	3	10-12	1.0	2 2 2 4	4	2.6			
		4	12-14	1.2	3 3 4 4	7	0.0 0.0		Light brown SAND, little Silt, loose, nonplastic, moist. Gray Sandy CLAY, soft, low to medium plasticity, moist.	
15	-15	5	14-16	1.5	5 5 5 5	10	112.3 197.1		Brown Silty SAND, trace Gravel, brick pieces, staining, MGP odor, medium dense, nonplastic to low plasticity, wet. Dark brown SAND with Silt, few Gravel, staining, sheen, coating on gravel, heavy MGP odor, medium dense, low plasticity, wet.	

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Water depth: 14 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-07.dat Date: 8/12/2015 APG

Client: National Grid

Well/Boring ID: **GT-07**

Borehole Depth: 22' bgs

Site Location:
Saratoga Springs Former MGP
Saratoga, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.7	5 3 3 5	6	20.5 95.6 42.2		Dark brown SAND with Silt, trace Gravel, staining, strong odor, bleb at 16.2 ft bgs, loose, nonplastic, wet. Gray CLAY, faint MGP odor (possibly from sides of spoon), soft, medium to high plasticity, wet. PP = 0.5 tsf	
		7	18-20	1.3	5 3 5 4	8	0.0		PP = 0.75 tsf	Borehole backfilled with bentonite/grout to grade.
20	-20	8	20-22	1.7	6 5 6 5	11	0.0		PP = 0.5 tsf	
									End of boring at 22 ft bgs. Collected additional cuttings from augers for bulk sample. Borehole backfilled with extra cuttings and bentonite on 7/8/2015.	
25	-25									
30	-30									
35	-35									

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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; PP = Pocket Penetrometer; tsf = tons per square feet.

Water depth: 14 ft bgs.

Project Number: B0036641.0001 Template: G:\Rockware\LogPlot 2001\LogFiles\Templates\2007 Templates\boring_HSA 2007.ldfx
Data File: boring HSA 2007_GT-07.dat Date: 8/12/2015 APG

APPENDIX D

Anticipated Project Schedule

APPENDIX D
ANTICIPATED PROJECT SCHEDULE

REMEDIAL DESIGN AND IMPLEMENTATION
NMPC SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

	2016																																																			
	January				February				March					April				May				June					July				August					September				October				November					December			
Week	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4
Activity																																																				
Pre-Design Investigation (PDI) and Treatability Studies (TS)																																																				
Implement Barrier Wall and Subsurface Mat TS	▨	▨	▨	▨	▨	▨	▨	▨																																												
Prepare Groundwater Model	▨	▨	▨	▨	▨	▨	▨	▨																																												
Prepare PDI and TS Report					▨	▨	▨	▨	▨	▨	▨	▨	▨																																							
Submit PDI and TS Report to EPA													▲																																							
EPA Review of PDI and TS Report														▨	▨	▨	▨																																			
EPA Provides Comments on PDI and TS Report																	▲																																			
Renew Access Agreements with City of Saratoga Springs and The Mill, LLC											▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																															
Conduct Vacuum Excavation (Utility Daylighting) to Further Assess Subsurface Utility Locations/Construction																						▨	▨																													
Prepare Updated Mapping, Utility Daylighting Summary, and Plan for Additional PDI Fieldwork																								▨	▨	▨																										
Excavate Test Pits to Further Evaluate the Presence/Extent of Rubble and Previously Unidentified Subsurface Features																											▨																									
Update EVS Model																												▨	▨	▨																						
Perform Ecological & Threatened/Endangered Species Survey																									▨	▨	▨	▨	▨	▨																						
Remedial Design (RD)																																																				
Coordination Meetings/Calls [with EPA, DEC, City of Saratoga Springs, National Grid, Roohan Reality, BBL/Equinox (as needed)]																															▲	▲	▲	▲	▲										▲			▲				
Intermediate (60%) RD																																																				
Prepare 60% RD														▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨															
Submit 60% RD to EPA																																					▲															
EPA Review of 60% RD																																						▨	▨	▨	▨											
EPA Provides Comments on 60% RD																																									▲											
Conference Call/Meeting to Discuss Comments																																										▲										
Pre-Final (90%) Remedial Design																																																				
Prepare 90% RD																																										▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

APPENDIX D
ANTICIPATED PROJECT SCHEDULE

REMEDIAL DESIGN AND IMPLEMENTATION
NMPC SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

	2017																																																			
	January				February				March					April				May					June				July				August					September				October					November				December			
Week:	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4
Activity																																																				
Pre-Final (90%) Remedial Design (cont'd)																																																				
Prepare 90% RD (cont'd)	▨	▨	▨	▨	▨	▨																																														
Submit 90% RD						▲																																														
EPA Review of 90% RD							▨	▨	▨	▨																																										
EPA Provides Comments on 90% RD										▲																																										
Conference Call/Meeting to Discuss Comments											▲																																									
Final (100%) Remedial Design																																																				
Prepare 100% RD											▨	▨	▨	▨	▨																																					
Submit 100% RD to EPA															▲																																					
EPA Review of 100% RD																▨	▨	▨	▨																																	
EPA Provides Comments on 100% RD (if any)																			▲																																	
Address EPA Comments on 100% RD																				▨	▨																															
Finalize 100% RD																						▨																														
Submit Finalized RD to EPA																						▲																														
RD Approved by EPA																								▲																												
RD Fact Sheet Issued by EPA																										▲																										
Access Agreements / Access Approvals																																																				
Secure Updated Access Agreements (City of Saratoga Springs and The Mill, LLC)																		▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																						
Contractor Bidding and Procurement																																																				
Submit Remedial Action (RA) Request for Proposal (RFP) to Prospective Contractors																									▲																											
Contractor Preparation of Proposals																										▨	▨	▨	▨	▨																						
Pre-Bid Site Visit & Meeting																										▲																										
Issue Meeting Minutes/Clarifications																											▲																									
Contractor Questions Due																												▲																								
Respond to Contractor Questions																													▲																							
Contractor Bids Due																														▲																						
Review Contractor Bids																															▨	▨	▨	▨																		
National Grid Project Sanctioning																																		▨	▨	▨	▨															
Remedial Action Contract Award *(due 90 days following EPA Approval of 100% RD)*																																					▲															
Remedial Action Work Plan (RAWP)																																																				
Prepare RAWP																																						▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		
Submit RAWP to EPA *(due 90 days following award of Remedial Action Contract)*																																																		▲		
EPA Review of RAWP																																																			▨	▨

APPENDIX D
ANTICIPATED PROJECT SCHEDULE

REMEDIAL DESIGN AND IMPLEMENTATION
NMPC SUPERFUND SITE - OPERABLE UNIT 2
SARATOGA SPRINGS, NEW YORK

	2018																																																			
	January					February				March				April				May					June				July				August					September				October					November				December			
Week:	1	2	3	4	5	1	2	3	4	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4
Activity																																																				
Remedial Action Work Plan (RAWP) (cont'd)																																																				
EPA Review of RAWP (cont'd)	■	■	■	■																										Horse Racing Season																						
EPA Provides Comments on RAWP				▲																																																
Address EPA Comments on RAWP					■	■	■																																													
Finalize RAWP								■																																												
Submit Finalized RAWP to EPA								▲																																												
RAWP Approved by EPA									▲																																											
Fact Sheet Announcing Construction Issued									▲																																											
Remedial Action																																																				
Contractor Mobilization/Site Preparation										■	■	■	■																	Horse Racing																						
Remedial Construction												■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																							
Site Restoration/Demobilization																											■	■	■								■	■	■													

Assumptions:

1. The Pre-Design Investigation (PDI) and Treatability Studies (TS) Report will summarize the work performed and findings of the PDI and TS and design parameters as outlined in Sections 3.8 and 4.1 of the Remedial Design Work Plan (RDWP) (Arcadis, May 2014).
2. The 60% Remedial Design (RD) will include preliminary plans, figures, drawings, outline of required technical specifications, enhanced groundwater bioremediation desktop evaluation, design criteria, project delivery strategy, and a preliminary construction schedule (as identified in Section 7 of the RDWP).
3. The 90% RD will contain the components identified in Item #1, revised (as needed) to address agency/property owner comments on the 60% RD, plus a Field Sampling Plan (FSP), Construction Quality Assurance Plan (CQAP), Contingency Plan, Community Air Monitoring Plan (CAMP), Health and Safety Plan (HASP), Citizen Participation Plan, and updated remedial action schedule (as identified in Section 7 of the RDWP).
4. The 100% RD will contain the components identified in Item #2, revised (as needed) to address agency/property owner comments on the 90% RD.
5. The Remedial Action Work Plan (RAWP) will contain a Remedial Action Monitoring Plan; final Construction Quality Assurance Project Plan (CQAPP); updated HASP (with recommended health and safety measure for the adjacent community and general public); Performance Sampling, Monitoring and Reporting requirements; and Operation and Maintenance (O&M) Manual that shall include an Institutional Controls Implementation Assurance Plan (ICIAP) (as outlined in Appendix D to the Operable Unit 2 Consent Decree. The RAWP will incorporate the remedy implementation approach developed by the Contractor and reviewed by the Engineer.
6. New York State Department of Environmental Conservation (DEC), New York State Department of Health (DOH), City of Saratoga Springs (City) (and City's contractor, Barton & Loguidice), Roohan Realty, and BBL/Equinox review of documents will be performed concurrently with the United States Environmental Protection Agency (EPA) (and EPA's contractor, HDR, Inc.). DEC and DOH will provide comments to EPA, who in turn will provide comments to National Grid/Arcadis. Comments from the City, Roohan Realty, and BBL/Equinox will be provided within the review timeframe identified for EPA.
7. No more than one round of agency or property owner comments will be provided for each submittal, and the comments will be minimal.
8. Schedule is dependent on and subject to change based on the timeframes for agency (EPA/DEC/DOH) and property owner review of documents and scope of comments.
9. Schedule is dependent on availability of EPA, DEC, DOH, City, Roohan Realty, BBL/Equinox for meetings/conference calls.
10. No additional pre-design investigation (PDI) fieldwork is needed after the test pitting in July 2016.
11. Mutually-acceptable access agreements with the City and The Mill, LLC for the remedial construction and subsequent maintenance/monitoring can be achieved within the timeframes shown.
12. PDI and remedial activities will be limited during the Saratoga horse-track race season, which is anticipated to run from July 22, 2016 through September 5, 2016; July 21, 2017 through September 4, 2017; and July 20, 2018 through September 3, 2018.
13. Remedial action schedule is subject to change based on final scope of RD and RAWP, contractor schedule, weather conditions, and other unforeseen events.
14. Updated project schedules will be provided periodically.

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