nationalgrid

Steven P. Stucker
Senior Environmental Engineer
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February 14, 2020

Mr. Matthew King
Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau C, Section A
625 Broadway, 11th Floor
Albany, NY 12233-7014

Subject: Work Plan for Supplemental Remedial Investigation Activities
Fulton (Ontario St.) Former MGP Site
Fulton, New York
NYSDEC Site No. 738050

Dear Mr. King:

Please find enclosed the document entitled, "Supplemental Remedial Investigation Work Plan Addendum No. 2, Fulton (Ontario St.) Former MGP Site, Fulton, New York" for review by the New York State Department of Environmental Conservation (NYSDEC). This work plan was prepared by Brown and Caldwell Associates on behalf of National Grid.

Following review of the enclosed document, please contact me at (315) 428-5652 to discuss any comments the NYSDEC may have on the work plan.

Sincerely,

For

Steven P. Stucker, C.P.G.
Senior Environmental Engineer

cc: D. Eaton – NYSDEC (w/out enclosure)
R. Jones - NYSDOH
J. Giordano - National Grid (w/out enclosure)
J. Marolda - Brown and Caldwell
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SRI Work Plan Addendum No. 2
Fulton (Ontario St.) Former MGP Site
Fulton, New York

Prepared for

Niagara Mohawk Power Corporation
d/b/a National Grid, Syracuse

February 2020

SRI Work Plan Addendum No. 2
Fulton (Ontario St.) Former MGP Site
Fulton, New York

Prepared for
Niagara Mohawk Power Corporation d/b/a National Grid
300 Erie Boulevard West
Syracuse, New York 13202

February 2020

Project Number: 152206

I, James L. Marolda, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

James L. Marolda, P.G., C.P.G.
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List of Abbreviations

ASP	Analytical Services Protocol
ASTM	American Society for Testing and Materials
BC	Brown and Caldwell Associates
bgs	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and isomers of Xylene
CAMP	Community Air Monitoring Plan
CLP	Contract Laboratory Program
DER	Division of Environmental Remediation
DOT	Department of Transportation
DPW	Department of Public Works
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
EDR	Environmental Data Resources
ELAP	Environmental Laboratory Approval Program
EM	Electromagnetics
FEMA	Federal Emergency Management Agency
FGLC	Fulton Gas Light Company
FSP	Field Sampling Plan
FWIA	Fish and Wildlife Impact Analysis
FWRIA	Fish and Wildlife Resource Impact Analysis
GC-FID	Gas Chromatograph-Flame Ionization Detector
GPR	Ground-Penetrating Radar
I.D.	Inside Diameter
IDW	Investigation-derived Waste
MGP	Manufactured Gas Plant
NAD	North American Datum
NAPL	Non-Aqueous Phase Liquid
NGVD	National Geodetic Vertical Datum
NYCRR	New York Codes, Rule, and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O.D.	Outside Diameter
PAHs	Polycyclic Aromatic Hydrocarbons
PID	Photoionization Detector
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan

RI	Remedial Investigation
RQD	Rock Quality Designation
SC	Site Characterization
SCOs	Soil Cleanup Objectives
SRI	Supplemental Remedial Investigation
SUNY	State University of New York
SVOCs	Semi Volatile Organic Compounds
TCL	Target Compound List
TOGS	Technical and Operational Guidance Series
USCS	Unified Soil Classification System
USEPA	United Stated Environmental Protection Agency
USGS	United States Geological Survey

Section 1

Introduction

This Remedial Investigation (RI) Work Plan describes the scope of work and procedures that will be used to conduct supplemental RI (SRI) activities at the Fulton (Ontario St.) Former Manufactured Gas Plant (MGP) Site (hereafter referred to as the “Site”). In a letter dated April 5, 2019, which accompanied the deliverable entitled “Data Summary Report, 2018 Supplemental Remedial Investigation Activities, Fulton (Ontario St.) Former MGP Site, NYSDEC Site #738050” (Brown and Caldwell Associates, April 2019) (hereinafter referred to as 2018 SRI DSR), National Grid recommended that additional RI activities be conducted at the Site to further evaluate the nature and extent of MGP-related impacts. The New York State Department of Conservation (NYSDEC) approved National Grid’s recommendation for additional investigation work in a letter dated June 19, 2019. Accordingly, this work plan, prepared by Brown and Caldwell Associates (BC), was developed on behalf of National Grid and serves as addendum No. 2 to the “Supplemental RI Work Plan, Fulton (North Ontario St.) Former MGP Site, Fulton, NY” (BC, April 2015).

Investigation activities at the Site are being conducted pursuant to the Order on Consent and Administrative Settlement between the NYSDEC and Niagara Mohawk Power Corporation, d/b/a National Grid, dated July 13, 2018 (Index No. CO 7-20180629-27). The Site was previously associated with the NYSDEC’s Voluntary Cleanup Program, under Voluntary Consent Order (VCO) Index No. D0 0001 0011 executed on January 25, 2002. The VCO was terminated as of July 13, 2018 and thus, the above-referenced Order on Consent supersedes the January 2002 VCO.

The specific objectives of the SRI are to:

1. Further evaluate the southern extent of NAPL/tar in bedrock on the off-site property west of the Site;
2. Further evaluate the extent of dissolved-phase, MGP-related constituents in bedrock groundwater on the off-site properties, west of the Site; and
3. Further evaluate groundwater flow direction in shallow bedrock groundwater.

Section 2 provides a summary of the background, geology and history of the Site. Section 3 describes the scope of work, including the technical approach and the methods and materials to be used in performing the SRI scope of work. Section 4 provides the anticipated schedule for completion of the SRI activities.

As recommended in the cover letter that accompanied the 2018 SRI DSR, continuous monitoring of water levels in select overburden and bedrock wells, in the Ontario Street sewer lift station, and in a staff gauge installed in the Oswego River was conducted during the period November 19, 2019 through December 4, 2019. The results and findings associated with these activities are incorporated into Section 2 of this work plan.

Section 2
Background

The Site location and history described below was previously provided in the "Site Characterization/Interim Remedial Measures Work Plan for Site Investigations at the Fulton Non-Owned Former MGP Site" (EECS, January 2004). It is presented again herein with slight modifications. Also provided below is a summary of the investigation findings to-date associated with the Site.

2.1 Site Location and Description

The Site is located at 0 Ontario Street in the City of Fulton, Oswego County, New York. Latitude and longitude coordinates for the property are approximately 43° 19' 41.2" north latitude and 76° 25' 0.8" west longitude. The location of the property is shown on Figure 2-1.

According to the City of Fulton Assessors Office's records, the 0 Ontario Street address is comprised of one parcel owned by Mirabito Holdings, Inc. of Binghamton, New York (formerly owned by Drake Petroleum Company, Inc., successor by merger to Mid-Valley Oil Company, Inc). The property is identified as Parcel 1-06 on Assessors Office's Map 236.47 and occupies approximately ¾ acre. The 0 Ontario Street property is zoned for commercial use.

The 0 Ontario Street property is abutted to the north by Ontario Street; to the west by Hubbard Street; to the south by another property owned by the Mirabito Holdings, Inc. that is currently occupied by a Sunoco service station; and to the east by New York State (NYS) Route 481.

A portion of the off-site property west of the area of known former MGP operations was owned by the owner of the MGP during the period of MGP operations and is referred to herein as the Parcel C Area. No MGP operations were known to have taken place in this area. The off-site property (including the Parcel C Area) is zoned for industrial use.

The topography of the majority of the Site is generally flat but with a slight decline to the northwest. The ground surface near the western and northern boundaries of the Site slopes sharply downward to Hubbard Street and Ontario Street, respectively. The elevation of the Site varies from approximately 330 feet National Geodetic Vertical Datum (NGVD) on the eastern portion of the property to approximately 320 feet NGVD along the western property boundary. On the off-site property west of the Site, the ground surface is relatively flat, with a variation in elevation from approximately 318 to 321 feet NGVD.

The United States Geological Survey (USGS) 7.5 Minute Series Fulton Quadrangle Topographic Map indicates the area in the vicinity of the Site is part of the eastern slope of the floodplain for the Oswego River. The Oswego River is located approximately 400 feet west of the Site. The June 2013 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map indicates the on-site area is designated as an "Other Area within Zone X" (areas determined to be outside the 0.2% annual chance floodplain), and the off-site area to the west is designated as an "Other Flood Area within Zone X" (areas of 0.2% annual chance flood and areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile).

2.2 Site History

The Site history presented in this section was collected from several sources including Sanborn® Maps provided by Environmental Data Resources (EDR), the Fulton Historical Society, the Fulton Public Library, “Brown’s Directory of American Gas Companies 1887-1907, 1908-1911, and 1917-1918”, “Survey of Town Gas and By-Product Production and Locations in the U.S. (1880-1950)” prepared by Radian Corporation in 1985, and the City of Fulton Assessors’ Office. Additional resources that were researched included the City Directory and aerial photograph archives maintained by EDR, but no information pertaining to the former MGP was discovered during the research of these additional resources.

According to the “Historical and Statistical Gazetteer of New York State”, which was published by Heart of the Lakes Publishing in 1980, the Fulton Gas Light Company (FGLC) was organized on June 12, 1858. The first “Brown’s Directory of American Gas Companies”, which was published in 1887, indicated the FGLC manufactured coal gas. The only schematic of the plant that was identified is on an 1890 Sanborn® Fire Insurance Map. This Sanborn® Map shows the plant to be located on the northern portion of the current 0 Ontario Street property. However, the plant was identified as being vacant on the 1890 Sanborn® Map indicating that by 1890, the former MGP was no longer in operation. Figure 2-2 shows the structures identified on the 1890 Sanborn® Map transposed onto a current Site map. The FGLC plant appears to only have operated for approximately 30 years. The results of gas chromatograph-flame ionization detector (GC-FID) fingerprint analyses performed on non-aqueous phase liquid (NAPL)-impacted soils collected during previous RI activities indicate the NAPL is tar derived from the coal carbonization processes of gas manufacturing. This is consistent with the types of plant facilities indicated on the 1890 Sanborn® Map

As shown on Figure 2-2, the plant consisted of a main building with a number of attached rooms and a gas holder to the west, which had a diameter of approximately 40 feet. The area surrounding the plant was primarily industrialized. The 1890 Sanborn® Map shows the Hunter Arms Company factory was situated on the southern portion of the 0 Ontario property and the properties located south of the Site. In addition, the eastern portion of the current 0 Ontario Street property and North Second Street overlie what was, during MGP operations, part of the Oswego Canal.

By 1896, the Hunter Arms Company had also occupied the northern portion of the 0 Ontario Street property as shown by the 1896 Sanborn® Map. The gas holder was apparently dismantled prior to this date as the structure was not shown on the 1896 Sanborn® Map. A new building had been built in the same location. In addition, the former MGP building was used for coal storage.

Based on a review of the available Sanborn® Maps, the MGP building was demolished sometime between 1911 and 1924. In addition, the Oswego Canal was filled in during this same time period. Although the Sanborn® Maps do not show any structures on the Site since the Hunter Arms Company factory was demolished (sometime before 1960), sewer construction drawings dated October 1973 that were obtained from the City Department of Public Works (DPW) show a structure identified as Carrol’s Restaurant on the Site.

2.3 Summary of Previous Site Investigations

Several phases of investigation activities have previously been conducted at the Site; the results of which are documented in the following submittals:

- Site Characterization Data Summary Report (BC, August 2005);
- Data Summary Report, Supplemental Site Characterization (BC, February 2008);
- Data Summary Report, Remedial Investigation (BC, May 2013);

- Data Summary Report, Supplemental Remedial Investigation (BC, June 2016); and
- Data Summary Report, 2018 Supplemental Remedial Investigation Activities (BC, April 2019).

The findings associated with the above-listed phases of investigation are summarized in the subsections below.

2.3.1 Historical Document Research

Research of the off-site area (Parcel C Area) west of the Site was conducted in an effort to further evaluate whether a structure formerly existed there in light of the demolition debris (concrete, brick, etc.) encountered in the subsurface at boring B-106 during the SC and by a review of a historical map (1867 Topographical Atlas of Oswego County, New York) that indicated a circular structure was present in the area of B-106 during the period of MGP operations. This research included obtaining and reviewing available resources such as:

- Maps and Other Cartographic Sources – Sanborn® Fire Insurance maps for areas surrounding the former MGP, historic City plans and atlases, historic survey drawings for the Oswego Canal.
- Aerial photographs.
- Historical topographic maps.

From the available materials reviewed during the research efforts, no indications of a potential structure were identified on any historical imagery or historic drawings. However, other useful information was obtained during the research, as discussed below.

A segment of the historic Oswego Canal was once located directly adjacent to the eastern side of the on-site property. The canal was subsequently filled and is now buried under the area of existing State Highway NYS-481. Research into the alignment of the historic Oswego Canal in the area of the Site and potential drainage features (e.g., drainage pipes, weirs, ditches, etc.) associated with the canal at or adjacent to the Site was conducted to assess if such features may affect subsurface conditions at the Site. This research included obtaining and reviewing available resources as listed above. The dates which imagery and maps were acquired included the following:

- Sanborn® Fire Insurance Maps: 1890, 1896, 1901, 1906, 1911, 1924, and 1960.
- Aerial Photography: 1955, 1965, 1975, 1978, 1985 and 1994.
- Topographic Maps: 1900 and 1956.

In addition, the New York State (NYS) Archives located in Albany was visited to review historic drawings of the City of Fulton and other drawings, including survey maps of the segment of the Oswego Canal formerly located adjacent to the eastern side of the on-site property. The drawings reviewed at the NYS Archives included the following:

- Hutchinson, Holmes. Oswego Canal Survey, Vol. 1, Volney. 1834.
- Scheck, P. Map of the Village of Fulton. 1855.
- Barge Canal Section Maps. Map 5 – Oswego Canal, Volney to Granby; and Map 6 – Oswego Canal, Fulton, Volney, Granby. ca 1896.
- Taylor, B. Maps Plans and Estimates of Enlarged Locks on the Oswego Canal. 1863.
- Bien, J. R. Atlas of the State of New York. 1895.
- Department of Public Works, Division of Canals and Waterways. Maps of Canal Lands Owned by the State of New York (“Blue Line Maps”). Maps 41 through 44 – Town of Volney, City of Fulton. 1930.
- Schillner Maps. Various maps depicting the Oswego Canal in area of site. ca 1896.

The imagery, maps, and drawings compiled during the research efforts are provided on the DVD included in Appendix A of the Data Summary Report. Several of these historic maps/drawings depict a west-east oriented feature bisecting the off-site property west of the Site that presumably is a narrow waterway that connected to the Oswego River. The western end of this feature connected to the eastern shore of the Oswego River. This feature extended approximately 410 feet eastward from the river onto the Site, and turned abruptly south for approximately 80 feet, extending to the position of the former Hunter Arms Co. gun factory building that was once located near the southern portion of the on-site property. Refer to the following drawings contained on the DVD in Appendix A of the SRI Data Summary Report, which depict the feature discussed above:

- Scheck, P. Map of the Village of Fulton. 1855.
- Barge Canal Section Maps. Map 5 – Oswego Canal, Volney to Granby; and Map 6 – Oswego Canal, Fulton, Volney, Granby. ca 1896.
- Schillner Maps. Various maps depicting the Oswego Canal in area of Site. ca 1896.
- 1890 Sanborn® Fire Insurance Map.

The approximate location of this feature is shown on Figure 2-2 and is based on the 1855 map referenced above.

2.3.2 Surface Geophysical Survey

A non-intrusive surface geophysical survey was performed on August 25, 2016 on a portion of the off-site property in the vicinity of the Parcel C Area. The primary objective of the survey was to identify potential subsurface structures, or remnants thereof, that may exist in this area based on demolition debris (concrete, brick, etc.) encountered in boring B-106. As discussed above, review of a historical map (1867 Topographical Atlas of Oswego County) indicated a circular structure was present in this area during the period of MGP operations. The surface geophysical survey instruments used included a magnetometer, ground-penetrating radar (GPR) and electromagnetics (EM). Geophysical anomalies identified during the survey were plotted on the Site plan (see Figure 2-2). Naeva Geophysics, Inc. (Naeva) of Congers, New York performed the surface geophysical survey. Anomalies potentially indicating remnants of a subsurface structure were not identified during the survey; however, linear EM anomalies interpreted to be suspected utilities and also local metal detector anomalies were identified and were incorporated into the Site plan (see Figure 2-2).

2.3.3 Subsurface Deposits and Stratigraphy

The subsurface materials encountered on the Site generally consist in ascending order of sandstone bedrock, glacial till, and anthropogenic fill (see cross-section A-A’ presented as Figure 2-3).

The overburden at the Site generally consists of several feet of fill material overlying glacial till deposits. The fill varies in thickness, but is typically 11-feet thick on-site and approximately 5-feet thick in the off-site area west of the Site (i.e., across Hubbard Street from the parcel that comprises the former MGP). In the area of the former gas holder, the fill extends to a depth of over 20 feet below ground surface (bgs). The fill is also locally thicker under Hubbard and Ontario Streets where native deposits were apparently excavated for installation of sewers, and subsequently filled (see Figures 4 and 5, geologic cross-sections B-B’ and C-C’). In general, the fill is composed of various materials including sand, gravel, coal, and demolition debris (e.g., brick and concrete). Finer-grained material (silt and clay), where present in the fill, is typically not the predominant component. Soil descriptions indicate the glacial till is composed of poorly sorted sand with varying amounts of silt and gravel and is moderately dense. The glacial till deposits are, in general, reddish brown in color.

The bedrock beneath the Site can generally be described as a red-brown, thin to medium bedded, fine to medium-grained sandstone, with occasional thin finer-grained layers of shale, mudstone or siltstone, and thin zones of conglomeratic sandstone in which relatively large clasts of mudstone are abundant (e.g., “rip-up clasts” or “clay galls”). This is consistent with regional information, which indicates that the bedrock formation directly underlying the Site is the Queenston Formation. The sediment that now comprises the Queenston Formation was deposited during the Late Ordovician Period (approximately 450 million years ago). Based on available bedrock geologic mapping including the “Geologic Map of New York, Finger Lakes Sheet” (Rickard, L.V. and Fisher, D.V., 1970), the area of the Site is shown to be within the area mapped as the “Undifferentiated Medina Group and Queenston Formation”. The Medina Group and the Queenston Formation are commonly mapped together because they are difficult to differentiate without substantial outcrop exposure. In the vicinity of the Site, the Medina Group is represented by the Lower Silurian Grimsby Formation. Both the Grimsby Formation and the Queenston Formation contain red shale, siltstone, and sandstone, and both were deposited in shallow lagoons or bordering tidal flats (Patchen, 1966). The red color of the Queenston and Grimsby sediments are likely the result of exposure to an aerobic environment during and after deposition, which allowed iron within the sedimentary unit to oxidize. Based on the above, the bedrock underlying the Site could be identified as either the Grimsby Formation or Queenston Formation; however, upon further review of available geologic literature associated these formations, it was determined that the bedrock underlying the Site is that of the Queenston Formation. The following documents were reviewed prior to arriving at this conclusion.

- Patchen, D.G., 1966, Petrology of the Oswego, Queenston, and Grimsby Formations, Oswego County, New York: unpubl. Master’s thesis, SUNY Binghamton, 191 p.
- Lumsden, D.N. and Pelletier, B.R., 1969, Petrology of the Grimsby Sandstone (Lower Silurian) of Ontario and New York: Journal of Sedimentary Petrology, v. 39, no. 2, p. 521-530.

During the field work completed as part of a master’s thesis prepared by Douglas G. Patchen at the State University of New York (SUNY) Binghamton, the top of Grimsby Formation of the Medina Group, which lies unconformably below the Oneida Conglomerate of the Clinton Group (Rickard, L.V. and Fisher, D.V., 1970), was mapped at a location along the Oswego River south of the Site. This outcrop was examined during the SRI activities and the lithologic contact identified by Patchen was observed at an elevation of approximately 358 feet NGVD. Review of additional literature indicated that the Grimsby Formation in Fulton is relatively thin (7 feet 4 inches) (Lumsden, D.M. and Pelletier, B.R., 1969). Based on the above, it can be inferred that the base of the Grimsby Formation in Fulton would be positioned at an elevation of approximately 350 feet NGVD in the vicinity of the outcrop. Bedrock surface elevations across the Site range from approximately 309 feet NGVD in the southern portion of the on-site property to a low of 296 feet NGVD on the property immediately north of the Site. Given that outcrop observations and regional mapping indicate that the bedding of the rock units in this area have a generally horizontal to sub-horizontal dip, the top of rock surface beneath the Site is at a stratigraphic position approximately 40 feet below the base of the Grimsby Formation.

Moreover, as indicated in the reviewed literature, the Queenston Formation is devoid of fossils in New York State, whereas although the Grimsby Formation is relatively barren of fossils, it does contain *Arthrophycus alleghaniensis* (a worm burrow) throughout the formation (Patchen, 1966). *Arthrophycus alleghaniensis* was not identified in rock core samples or nearby outcrops, thereby providing further support that the bedrock directly underlying the Site is part of the Queenston Formation.

In summary, based on the review of available geologic literature related to the Grimsby and Queenston Formations, inspection of outcrops located in the vicinity of the Site, and examination of core samples collected during the RI field activities, the sandstones and siltstones encountered beneath the Site are part of the Queenston Formation.

The relative ease of drilling and observations from split-spoon samples indicate the upper few inches of the bedrock surface is weathered to some degree. Samples of the uppermost part of the sandstone that were recovered in split-spoons were capable of being disaggregated by hand (i.e., friable), thus indicating that the cement matrix (e.g., clays, calcite, silica, etc.), which binds the sand grains together was previously weathered and degraded.

The surface of the top of bedrock underlying the Site is somewhat undulatory. The elevation of the bedrock surface varies from approximately 309 to 288 feet NGVD across the Site (see Figure 7 from the 2018 SRI DSR).

2.3.4 Underground Utility Evaluation

The City of Fulton's DPW was visited to obtain records for information related to subsurface utilities surrounding the Site to support the understanding of subsurface conditions and assess features that may impact groundwater flow. For instance, based on the results on continuous water level monitoring (as discussed below), the operation of the sewer lift station located near the intersection of Hubbard and Ontario Streets locally affects groundwater levels and likely impacts groundwater flow to some degree. Additionally, the associated sewers feeding the lift station along these streets also have the potential to impact groundwater flow because the sewer inverts are below the water table in this area. Available drawings depicting the dimensions and configuration of the sewers (storm and sanitary) and nearby sewer lift station were obtained from the DPW and features depicted on drawings (e.g., utility alignments) were incorporated into the Site Plan (see Figure 2-2). In addition, operational data related to the sewer pump station that is located near the intersection of Hubbard and Ontario Streets was reviewed as well.

2.3.5 Hydrogeology

On-site, the water table is generally encountered within the till, at approximately 9 to 13 feet bgs. In the areas immediately to the west and north of the Site where the ground surface is at a lower elevation, the water table is encountered at shallower depths (approximately 5 to 7 feet bgs).

As mentioned in Section 1 and as recommended in the cover letter that accompanied the 2018 SRI DSR, continuous water level monitoring activities were conducted during the period November 19, 2019 through December 4, 2019 to further evaluate Site groundwater flow conditions. The results and findings associated with these activities are incorporated herein and were used to assist with the selection of drilling locations proposed per this work plan. Water table elevation contours for December 5, 2019 (see Figure 2-4) indicate that shallow overburden groundwater at the Site flows generally from southeast to the west and northwest across the Site and the off-site area to the west and discharges to the Oswego River, as confirmed with data from recent continuous water level monitoring activities in site monitoring wells and a surface water elevation control point established in the backwater area of the Oswego River located adjacent to the off-site property.

The vertical hydraulic gradients from locations with both shallow and deep overburden wells have been observed to be variable in direction, i.e., both upward and downward. Based on continuous water level monitoring, this is likely due to influence of nearby utilities (e.g., sewer lift station located near the intersection of Hubbard and Ontario Streets). The groundwater elevations measured in wells with screened intervals positioned in the deep overburden deposits indicate a similar flow direction to the flow direction in the shallow overburden. In general, water level data from locations with both a deep overburden monitoring well and a shallow bedrock monitoring well indicate an upward vertical hydraulic gradient, and thus a component of upward component of groundwater flow from the bedrock to the deep overburden deposits.

As described in the section above in Section 2.3.3, the bedrock formation underlying the vicinity of the Site, the Queenston Formation, is composed of red-brown thin to medium bedded, fine to medium-grained sandstone, with occasional intervals containing grey and red-brown mudstone clasts (flat pebble conglomerate) throughout. Examination of nearby outcrops, rock cores, along with review of regional mapping conducted by others (Patchen, D.G., 1966), indicate the bedding is oriented with either a nearly horizontal or very shallow dip. Outcrop and core examinations also indicate that open bedding plane parallel fractures do occur, often where there is a contact between variations in lithology within the formation. The bedding plane parallel fractures were observed to be the most continuous fractures on an outcrop scale. It is likely that open, generally continuous bedding plane parallel fractures impart a large degree of influence on lateral groundwater flow in the bedrock at the Site. This is based on our understanding of the Queenston Formation, adjacent bedrock strata from regional information, and other sites in the Erie-Ontario Lowlands of New York where groundwater flow in shallow to horizontal dipping sedimentary bedrock units has been examined, as well as on the examination of nearby rock outcrops, on-site rock cores and borehole geophysical logs. A stratigraphic horizon (aka, a “marker bed”) was identified and correlated across the site using natural gamma logging during the 2018 SRI field work; this marker bed coincides with the position of a bedding plane parallel water-bearing fracture zone that was found to be continuous across the study area. As described below, hydraulic responses observed in nearby wells during drilling indicate a high degree of hydraulic connectivity between wells that are screened across this zone. Groundwater elevation data from the well locations screened across the identified marker bed indicate that groundwater within this water-bearing fracture zone generally flows eastward towards the Oswego River (see elevation data plotted on Figure 2-4), as the groundwater elevation in the closest shallow bedrock well to the river (MW-122R) is consistently lower than the elevations measured in the bedrock wells to the east (based on manual water level measurement data). However, due to some uncertainties regarding more localized bedrock groundwater flow patterns, continuous water level monitoring activities were conducted from November 19, 2019 through December 4, 2019, per recommendations in the cover letter that accompanied the 2018 SRI DSR. Specifically, water elevations in other shallow bedrock wells (e.g., MW-124R) were observed to be less than elevations in MW-122R, periodically, throughout the monitoring period. MW-124R is located approximately 170 feet further east of the Oswego River than MW-122R, yet the continuous water level data indicate that the direction of shallow bedrock groundwater flow may shift in a northeastern direction from time to time, potentially depending on local surface water flow conditions in the Oswego River. Accordingly, additional data is required to further evaluate flow direction in shallow bedrock groundwater. The screened intervals for the bedrock wells installed prior to the 2018 SRI activities (MW-109R, MW-111R, MW-117R, and BRB-1) are positioned within the shallow bedrock, but at shallower stratigraphic intervals than the above-described marker bed. Groundwater elevations in these wells are consistently higher than the elevations in the wells screened across the marker bed, indicating a component of downward groundwater flow from the shallower bedrock toward the water-bearing fracture associated with the marker bed. Based on the groundwater elevation data collected at the one location (MW-122 cluster) where both a shallow and deep bedrock well were installed (MW-122R and MW-122RD), there is a downward vertical gradient from the shallow bedrock water-bearing zone to the water-bearing fracture encountered in the deeper bedrock at MW-122RD.

During the 2018 SRI activities, the upper portion of the bedrock (i.e., upper ±30 feet below the top of rock), was evaluated at six locations (MW-120R, MW-121R, MW-122R, MW-123R, MW-124R, MW-125) using several assessment techniques including rock coring, packer pressure testing and borehole geophysical logging. In addition, during the bedrock drilling activities at MW-124R and MW-122RD (i.e., bedrock coring and packer pressure testing), continuous monitoring of water level changes was conducted in nearby, available, bedrock wells (BRB-1, MW-111R, MW-121R, and MW-125R), using pressure transducers with automatic data loggers (i.e., In-Situ Level TROLLS®); these data support the assessment of hydraulic connectivity of water-bearing fractures in the upper bedrock. Data loggers were installed in the bedrock wells mentioned above to monitor changes in water level during drilling and packer pressure testing of bedrock at locations MW-124R and MW-122RD. During bedrock coring and packer pressure testing performed at MW-124R and during drilling/packer pressure testing of the shallow bedrock at MW-122RD, increases in water levels were observed in BRB-1, MW-111R, MW-121R, and MW-125 during both drilling and packer testing. This evaluation supports the conclusion that the shallow bedrock interval evaluated during the RI activities completed to-date contains interconnected water-bearing fractures where lateral groundwater flow likely predominates; the water-bearing fractures encountered during the SRI appear to be part of a water-bearing zone in the shallow bedrock.

Additionally, during the 2018 SRI activities, a deeper portion of the bedrock was evaluated at MW-122RD. An isolation casing was installed at MW-122RD at 55 feet bgs (approximately 34 feet below top of rock surface). Rock coring, packer pressure testing, and borehole geophysical logging continued from below the casing to 100 feet bgs (approximately 79 feet below top of rock surface). Using the above assessment techniques, a deep water-bearing fracture was encountered at approximately 86 to 96 feet bgs (approximately 65 to 75 feet below top of rock surface), separated from the shallow water-bearing zone by approximately 25 to 30 feet of lower permeability bedrock. The continuous water level monitoring in nearby wells during drilling does not indicate hydraulic communication between the shallow bedrock water-bearing zone and the deep bedrock water-bearing fracture.

The estimated horizontal hydraulic conductivity (K_h) values from slug tests conducted on monitoring wells installed during the 2018 SRI activities and previous investigations are summarized as follows:

- **Shallow overburden:** The estimated geometric mean Kh of the shallow overburden deposits (saturated portion of upper ±15 feet of overburden deposits comprised primarily of glacial till and locally by fill) based on slug tests 7.6 x 10^{-4} centimeters per second (cm/sec); the estimated values range from 5.3 x 10^{-3} cm/sec to 1.2 x 10^{-4} cm/sec.
- **Deep overburden:** The estimated geometric mean K_h of the deep overburden deposits comprised of glacial till (approximately 15 feet bgs to approximately 28 feet bgs) based on slug tests is 2.1 x 10^{-3} cm/sec, with a range from 1.5 x 10^{-2} cm/sec, to as low as 2.1 x 10^{-5} cm/sec.
- **Shallow bedrock:** Slug tests were conducted on the wells that are screened in the bedrock to estimate K_h. K_h values from slug tests on these wells are representative of the bedrock intersected by water-bearing fractures, not the bedrock matrix itself, which has much lower hydraulic conductivity based on its physical characteristics. The estimated geometric mean K_h of the shallow bedrock (upper ±20 to ±30 feet of rock) based on slug tests is 1.8 x 10^{-3} cm/sec. Estimated K_h values in the shallow bedrock range from 2.9 x 10^{-5} cm/sec to 1.6 x 10^{-2} cm/sec.
- **Deep bedrock:** A slug test was conducted on MW-122RD, which is screened in the deep bedrock, to estimate K_h. As described for shallow bedrock, the K_h value from this slug test is representative of the bedrock intersected by water-bearing fractures, not the bedrock matrix itself, which has much lower hydraulic conductivity based on its physical characteristics. The estimate K_h of the deep bedrock (approximately 65 to 75 feet below top of rock surface) based on this slug test is 1.2 x 10^{-3} cm/sec.

2.3.6 Visual/Olfactory Indications of Impact

Overburden

Figure 2-5 provides a plan view of locations where visual/olfactory observations indicative of potential impacts including NAPL and indications of potential purifier waste material have been observed in overburden soil through the course of the SC and RI field activities.

In general, the NAPL encountered occurs as a viscous, tacky tar-like material or as a semi-solid material that may have initially been a NAPL (observed at TP-103 and B-129). In the subsurface, the viscous NAPL/tar is observed as: partially to fully saturating the soils, as a coating on coarser-grained material, or as a seam within the soil matrix. Viscous NAPL/tar was observed within area of the former gas holder at depths ranging from approximately 22 to 27 feet bgs, and outside the area of the former holder at shallower depths (8 feet bgs). In the area of the former gas holder, NAPL/tar was observed on top of the bedrock surface. Most of the NAPL/tar observations exhibited tar-like odors and thus, NAPL/tar at these locations is likely associated with former MGP operations. However, based on observations and odor noted at B-119, B-121, B-123B, MW-103D, MW-111D, MW-112D, and MW-124R, some of the impacts encountered appeared to be petroleum-based and are not likely associated with former MGP operations. At locations B-119, B-123B, MW-103D, and MW-111D, visual/olfactory observations indicate potential petroleum and MGP impacts at the same location. Environmental forensic results from samples of NAPL-impacted soils with olfactory observations indicative of MGP-related impacts (e.g., tar-like odors) collected from on-site location B-117 and off-site location MW-111D during the 2012 RI field work indicate that the NAPL was likely derived from the coal carbonization MGP process, which did not require petroleum as a feedstock.

NAPL/tar was identified in soil within and near the off-site Parcel C Area at several locations and at various depths (see Figure 12). Typically, the NAPL/tar occurs as a thin seam or blotches of viscous, tacky tar-like material and is encountered immediately above the top of rock surface. These observations were documented at locations B-127, MW-111D, MW-111R, and MW-113D ranging in depth from approximately 19.5 5 to 20.6 feet bgs. However, NAPL has also been observed at shallower depths on the off-site property (at a depth of 10.5 feet bgs in boring B-106 and from approximately 9 to 18.8 feet bgs at B-127). The NAPL encountered at B-127 was described as having an oil-like consistency and heavily coating/saturating the sand and gravel deposits. Additionally, the impacted soils from this interval exhibited tar-like odors and thus, are likely, at least in part, MGP-related.

NAPL has not been observed in overburden monitoring wells during NAPL gauging events conducted during the RI activities. However, as a screening process to further assess the potential presence of NAPL at the Site, the concentrations of constituents in groundwater were compared to aqueous solubility of those constituents. A concentration that is above one percent of the solubility limit is considered an indicator that the constituent is potentially present in NAPL form in the vicinity of the well. Concentrations of naphthalene in groundwater samples from well MW-111D during the 2018 sampling events (950 µg/L in September and 1,100 µg/L in November) were above one percent of the aqueous solubility limit for naphthalene (310 µg/L). NAPL/tar was identified the soil adjacent to the well screen at MW-111D.

In summary, NAPL/tar was encountered in the overburden deposits on-site within the area of former MGP operations, primarily in the area of the former gas holder. This NAPL/tar is in close proximity to the bedrock surface and is generally described as being viscous in nature. NAPL was also identified in the overburden at several locations within and near the off-site Parcel C Area. The NAPL/tar observed at these locations was described as either being viscous in nature and positioned on top of rock surface or at shallower intervals with the NAPL having an oil-like consistency and heavily coating/saturating the sand and gravel deposits.

Indications of potential purifier waste material (i.e., degraded wood material with burnt/sulfur-like odor) were observed in the interval from approximately 14 to 23 feet bgs at soil boring locations B-117, B-118, and MW-117R, which are in the area of the former gas holder. Potential purifier waste material (i.e., wood chips with slight burnt-like odor) was also encountered at approximately 9 feet bgs at soil boring B-129. Analysis of soil samples collected from B-118 and B-117 (adjacent to MW-117R) from similar depth intervals did not indicate significant concentrations of cyanide (i.e., concentrations less than Part 375 Unrestricted Use Soil Cleanup Objective [SCO]), which is sometimes associated with purifier waste.

Bedrock

Figure 2-6 provides a plan view of locations where NAPL/tar has been observed in bedrock core samples and/or within bedrock monitoring wells throughout the course of the RI field activities completed to-date.

NAPL/tar was observed in rock core samples at bedrock well locations MW-117R and BRB-1 during the 2015/2016 SRI activities. Both of these locations are in the area of the former gas holder. At MW-117R, NAPL/tar was observed discontinuously across the depth interval from 26.8 to 29.2 feet bgs. The NAPL/tar at MW-117R was generally observed as black tacky, viscous NAPL/tar coatings along near-horizontal fracture surfaces with a tar-like odor. At BRB-1, black viscous, tacky NAPL/tar with a tar-like odor was observed coating a bedding plane parting surface on a core at a depth of approximately 43.6 feet bgs, which is positioned approximately 17.6 feet below the top of rock at this location. During the 2018 SRI activities, black viscous blebs of NAPL/tar were observed at MW-121R on a horizontal fracture surface in a rock core at a depth of approximately 40.3 feet bgs, which is positioned approximately 18.3 feet below the top of rock at this location.

Observations that were indicative of NAPL in bedrock were also made during the 2015/2016 SRI activities at MW-109R and MW-111R and during the 2018 SRI activities at MW-121R. For instance, upon removal of geophysical tools from the corehole at MW-109R, blotches of NAPL/tar were sporadically observed on the tools. Similarly, spots of NAPL/tar were observed sporadically on the geophysical tools and partially coating ends of the tools following removal of the tools from the corehole at MW-111R and MW-121R.

In summary, NAPL/tar has been identified in bedrock at locations within the area encompassing the former gas holder (MW-117R and BRB-1), the western property boundary (MW-109R), and the eastern portion of the off-site property including the Parcel C Area (MW-111R and MW-121R). Bedrock monitoring wells were installed at each of these locations; NAPL/tar has only been identified in wells MW-117R and MW-109R. Stratigraphically, the deepest elevation of NAPL/tar observed in bedrock based on core sample observations is approximately 280.7 feet NGVD (approximately 40.3 feet bgs) at location MW-121R. No NAPL/tar was observed in the deeper bedrock evaluated at MW-122RD (approximately 30 to 80 feet below the top of rock [approximately 50 to 100 feet bgs]), and, although this well was completed approximately 125 feet to 175 feet west of the area of where indications of NAPL were observed in bedrock (MW-125R and MW-111R), the low to non-detect concentrations of BTEX compounds and naphthalene in groundwater samples from this well (see Figure 2-9) are not indicative of NAPL being present in this deeper zone.

The concentrations of naphthalene in wells BRB-1, MW-111R, MW-121R, MW-122R, MW-124R, and MW-125R were above one percent of the aqueous solubility limit, a threshold that is used as an indicator of the potential presence of NAPL to be present in the vicinity of a well. These wells are within or proximal to the area where NAPL was identified.

NAPL/tar has been found within bedrock monitoring well MW-117R each time the well was gauged following installation. The NAPL/tar was encountered at the base of the well, below the water column, indicating that the NAPL is denser than water and thus is considered a dense NAPL, or DNAPL. Following identification of NAPL/tar in the well MW-117R in 2016, a periodic NAPL gauging and removal program was initiated. Throughout the RI activities completed to-date, 37 gauging and 30 removal events have been performed and over the course of the NAPL removal events, approximately 4.55 gallons of highly viscous NAPL/tar have been removed from this well location. Initially, weekly gauging and removal events were conducted; however, based on a significant reduction in NAPL/tar accumulation in the well over time, the gauging/removal frequency was subsequently decreased to monthly and then to a quarterly basis in May 2017. Additional reduction of NAPL/tar accumulation in MW-117R has been observed since and a recommendation to further decrease the NAPL/tar removal frequency to annually was approved by the NYSDEC in April 2019. Approximately 0.10 feet of NAPL/tar was also measured at the base of the bedrock monitoring well MW-109R during the November 2018 NAPL gauging and groundwater monitoring activities. Gauging of this location during the previous RI activities yielded similar approximate NAPL thickness measurements from this location. NAPL/tar has not been encountered in any of the other bedrock monitoring wells.

Based on available data, the lateral extent of NAPL/tar in bedrock is delineated with the exception of south of MW-121R. Data and observations from deep bedrock well MW-122RD also provide supporting evidence for adequately delineating the vertical extent of NAPL/tar in bedrock.

2.3.7 Surface Soil Analytical Results

0- to 2-inch bgs Interval

For the purposes of evaluating the concentrations and areal distribution of potentially MGP-related constituents in surface soil, surface soil samples from the 0- to 2-inch bgs depth interval were collected from eight locations throughout the Site during RI activities performed in 2012. Surface soil samples from this depth interval were also collected from areas selected to be representative of background conditions (BG-SS-1 through BG-SS-5) and analyzed for comparison to concentrations in on-site surface soils. The sample locations are shown on Figure 2 of the RI Data Summary Report (BC, May 2013). The surface soil samples were analyzed for Target Compound List (TCL) semi-volatile organic compounds (SVOCs) and total cyanide.

The results of the 0- to 2-inch surface soil evaluation indicated the following:

- Based on comparison to background conditions, there are no impacts from the former MGP operations to the 0- to 2-inch bgs surface soils on the Site; and
- There are no exceedances of applicable 6 NYCRR Subpart 375-6 Soil Cleanup Objectives (SCOs) in the 0- to 2-inch bgs surface soils on the Site. The applicable SCOs include Protection on Public Health (commercial zoning) and Protection of Groundwater.

0- to 6-inch bgs Interval

For the purposes of providing data for an ecological assessment (i.e., Steps 1 through 2B of a Fish and Wildlife Resources Impact Analysis [FWRIA]), surface soil samples from the 0- to 6-inch bgs depth interval were collected from eight locations throughout the Site during the 2012 RI activities. Surface soil samples from this depth interval were also collected from potential background areas and analyzed for comparison to concentrations in on-site samples. The 0- to 6-inch surface soil samples were analyzed for TCL SVOCs and total cyanide.

The results of the 0- to 6-inch surface soil evaluation indicated the following:

- Based on comparison to background conditions, there are no impacts from the former MGP operations to the 0- to 6-inch bgs surface soils on the Site; and
- There are no exceedances of USEPA's Ecological Soil Screening Levels or Protection of Ecological Resources SCOs for polycyclic aromatic hydrocarbons (PAHs) in the 0- to 6-inch bgs surface soils on the Site. Additionally, soil sample concentrations were below the SCOs for Protection of Public Health (commercial zoning) and Protection of Groundwater.

2.3.8 Subsurface Soil Analytical Results

Throughout the course of the SC and RI field activities to-date, a total of 82 subsurface soil samples from 42 locations were collected and submitted for analysis of benzene, toluene, ethylbenzene and isomers of xylene (BTEX), PAHs, and total cyanide. The subsurface soil data collected throughout the SC and RI activities were compared to the following criteria:

- Subsurface soil cleanup guidance level for total PAHs of 500 mg/kg from Section H from NYSDEC's Draft Soil Cleanup Guidance (October 21, 2010); and
- 6 NYCRR Subpart 375-6 SCOs for Protection of Public Health (commercial or industrial, depending on zoning at location), Protection of Ecological Resources, and/or Protection of Groundwater.

Total PAH concentrations in the subsurface soil samples are above 500 mg/kg at seven locations (see Figure 2-7). These locations generally fall within areas and depth intervals impacted by NAPL/tar. From the seven locations, a total of 12 samples were submitted for laboratory analyses. Out of the 12 samples, total PAH concentrations were above 500 mg/kg in eight samples; these total PAH concentrations ranged from a low of 593 in the 19 to 21-foot sample interval from B-127 to a high of 4,895 in the 24 to 26-foot sample interval from B-117.

The distribution of total BTEX, total PAHs and cyanide in subsurface soils is depicted on Figure 2-7. At a location, if a concentration of one or more constituents exceeded any one of the above noted SCOs, it is depicted with a red symbol. Locations where no exceedances were observed are depicted with a green symbol. During the SC and RI activities performed to-date, subsurface soil samples from 17 locations contained concentrations of one or more constituents in the BTEX and/or PAH constituent groups above one or more of the applicable SCOs (see Figure 2-7). The locations with exceedances of the SCOs for BTEX compounds and PAHs generally fall within areas impacted by NAPL/tar, primarily in and near the area of the former gas holder and on the off-site property west of the on-site parcel.

Total cyanide was not detected at concentrations above applicable SCOs in any of the SC and RI subsurface soil samples (see Figure 2-7).

Based on the findings from the RI activities, the lateral and vertical extents of MGP-related impacts to soils have been adequately characterized for the purposes of the RI.

2.3.9 Groundwater Analytical Results

Two comprehensive rounds of groundwater sampling were conducted during the 2018 SRI activities (September and November 2018). In accordance with the March 2018 work plan, no groundwater samples were collected from MW-109R and MW-117R during either sampling round because NAPL was detected in these monitoring wells during NAPL gauging performed prior to sampling. The groundwater samples were analyzed for BTEX compounds, PAHs, and total cyanide. Results of the analyses were compared to the 6 NYCRR Part 703 groundwater standards for Class GA water (groundwater) or, where no such standard exists, the corresponding guidance value from Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1; collectively, these are referred to herein as the Class GA criteria. Table 7 presents the groundwater quality data from samples collected in September and November 2018, including a comparison to the Class GA criteria.

As requested by the NYSDEC and in accordance with the Emerging Contaminant Groundwater Sampling Work Plan dated July 27, 2018, groundwater samples were also collected from four monitoring wells (MW-101, MW-103, MW-108, and MW-109S) in April 2019 for analysis of emerging contaminants (1,4-dioxane and per- and polyfluoroalkyl substances [PFAS]). The results of the emerging contaminant sampling are briefly discussed below in the subsection below entitled "Overburden Groundwater Quality".

Overburden Groundwater Quality

Concentrations of BTEX, naphthalene and total cyanide in overburden groundwater for the sampling rounds conducted to-date are posted on Figure 2-8. Concentrations that are above the Class GA criteria are shown in bold type.

NAPL/tar in the overburden is the source of MGP-related dissolved-phase organic compounds in the overburden groundwater. The most prevalent constituents detected in overburden groundwater at concentrations above the Class GA criteria were BTEX compounds and naphthalene. These constituents are often associated with MGP-related residuals but can also be related to non-MGP sources. These constituents are used as indicators for evaluating dissolved-phase impacts in overburden groundwater at the Site. During the sampling rounds completed as part of the 2018 SRI activities, both naphthalene and one or more BTEX compounds were detected at concentrations above the Class GA criteria in samples collected from deep overburden wells MW-109D, MW-110D, MW-111D, MW-113D, and MW-114D. The base of the screens for these wells is positioned immediately above or slightly below the top of bedrock surface. In the shallow overburden groundwater (at or near position of water table), one or more BTEX compounds were also detected at concentrations above the Class GA criteria in shallow overburden wells MW-108 and MW-111S. Of note, at MW-108, benzene concentrations only exceeded the Class GA criterion during one of these sampling events (November 2018); in September 2018 benzene was detected but at a concentration below the criterion. Moreover, benzene is the only compound that has been detected at concentrations above Class GA criteria at this location and exceedances were only observed 2 out of the 7 sampling events performed between 2007 and 2018.

PAHs that are somewhat lower in solubility than naphthalene were also detected in samples from the deep overburden wells listed above. At MW-111D, the concentrations of acenaphthene, fluorene, and phenanthrene exceeded the Class GA criteria. Acenaphthene was also reported above the Class GA criteria in samples collected from deep overburden wells MW-109D, MW-110D, MW-113D, and MW-114D and in samples collected from MW-111S, which is screened across the water table. Other PAH compounds including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene were detected above the Class GA criteria in samples collected from MW-103D and MW-111D. However, elevated levels of these other PAH compounds, which have very low solubilities compared to naphthalene, acenaphthene, fluorene, and phenanthrene, may be related to suspended particulates or turbidity entrained in the sample.

At deep overburden well MW-121D, only the benzene concentration was slightly above the Class GA criterion during the November 2018 sampling event, however, benzene was not detected in the September 2018 samples collected from this location.

Total Cyanide was not detected above its applicable Class GA criterion at any location.

In summary, exceedances of Class GA criteria are most prevalent in the deep overburden wells located in the vicinity of the off-site Parcel C Area. In the deep overburden groundwater, the highest concentrations are at MW-111D within the Parcel C Area; the shallow overburden well at same location (MW-111S) has much lower concentrations and only exceeds for benzene. At deep overburden wells MW-114D and MW-113D, located downgradient and sidegradient, respectively, concentrations decrease but are still above Class GA criteria. At deep overburden wells further sidegradient (MW-121D) and downgradient (MW-122D), concentrations decrease to below Class GA criteria. The only other Class GA criteria exceedances identified during the 2018 SRI activities were for benzene at deep overburden well MW-103D and shallow overburden well MW-108, located south and west of the former gas holder, respectively. At MW-103D, the benzene concentrations ranged from 12 to 17 µg/L. At MW-108, benzene concentrations ranged from 0.9 J (below class GA criterion) to 3 µg/L.

The extents of dissolved-phase BTEX and PAH concentrations above the Class GA criteria in overburden groundwater have been adequately characterized for the purposes of the RI.

With regards to the results associated with the April 2019 emerging contaminant sampling, groundwater concentrations of 1-4, dioxane and PFAS in the four wells sampled were below the NYSDEC's initial screening levels specified in the August 20, 2018 letter to National Grid (i.e., 0.35 for 1,4-dioxane µg/L and 70 ng/L for PFAS). This information was requested by the NYSDEC for their records and for incorporation into their database as part of their initiative to collect information regarding the presence/absence of emerging contaminants in groundwater at remediation sites.

Bedrock Groundwater Quality

Concentrations of BTEX compounds, naphthalene and total cyanide in bedrock groundwater are posted on Figure 2-9. Concentrations that are above the Class GA criteria are shown in bold type. NAPL/tar in the overburden and in bedrock is the source of MGP-related dissolved-phase organic compounds in the bedrock groundwater. As described above, NAPL/tar has been detected in bedrock monitoring wells MW-109R and MW-117R during NAPL gauging performed prior to sampling.

BTEX and naphthalene were detected above Class GA criteria within shallow bedrock groundwater in 8 of the 10 shallow bedrock wells; these constituents were either not detected or were detected at concentrations below the Class GA Criteria in shallow bedrock wells MW-120R and MW-123R, located to the east and south of the former MGP structures. Acenaphthene, which has a somewhat lower solubility than naphthalene, was also detected above its Class GA criterion in samples from several shallow bedrock wells (BRB-1, MW-111R, MW-122R, MW-124R, and MW-125R). At BRB-1 and MW-111R were exceedances of other lower solubility PAHs (e.g., benzo(a)anthracene, chrysene and indeno(1,2,3-c,d)pyrene). However, elevated levels of these other PAH compounds, which have very low solubilities compared to naphthalene and acenaphthene, may be related to suspended particulates or turbidity entrained in the sample.

As part of the 2018 SRI activities, groundwater quality conditions in the deeper bedrock was evaluated at MW-122RD. This well is completed in the first potential water-bearing zone below the section of lower permeability rock (potential aquitard) beneath the shallow bedrock zone, as indicated by activities conducted during drilling at MW-122RD (e.g., coring, packer testing, continuous water level monitoring in adjacent wells, and vertical gradient). it is positioned between the area of known MGP impacts and the Oswego River, at a location presumed to be downgradient from the greatest degree of MGP-related impacts. Dissolved-phase MGP-related constituents were either not detected or detected at concentrations below Class GA criteria in samples collected from MW-122RD, indicating that groundwater impacts in the bedrock appear to be limited to the shallow bedrock interval.

Total Cyanide was not detected above its applicable Class GA in samples collected from any of the bedrock monitoring wells sampled during the 2018 SRI activities.

Based on the results of the 2018 SRI groundwater sampling activities, the eastern and southern extents of dissolved-phase BTEX and naphthalene concentrations in shallow on-site bedrock groundwater have been adequately delineated for the purposes of the RI. However, further evaluation of the extent of dissolved-phase MGP-related constituents on the off-site properties is required.

Section 3

Scope of Work

The proposed SRI activities are described below. Specific methods and procedures associated with these SRI activities will be conducted in accordance with the following plans:

- Generic Field Sampling Plan for Site Investigations at Non-Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "FSP").
- Generic Quality Assurance Project Plan for Site Investigations at Non-Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "QAPP").
- Generic Health & Safety Plan for Site Investigations at Non-Owned Former MGP Sites (Foster Wheeler, November 2002).
- Health and Safety Plan for Remedial Investigation Activities, Fulton (Ontario St.) Former MGP Site (Brown and Caldwell, March 2019) (referred to as "Health and Safety Plan"). This plan was developed consistent with the Generic Health & Safety Plan for Site Investigations at Non-Owned Former MGP Sites (Foster Wheeler, November 2002).
- DER-10/Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010).

The scope of work for the SRI activities is described in the subsections below.

3.1 Preliminary Activities

3.1.1 Property Access Activities

In 2004, during the SC, the owner of the property that occupies the former MGP Site (currently owned by Mirabito Holdings, Inc. of Binghamton, New York and formerly owned by Drake Petroleum Company, Inc., successor by merger to Mid-Valley Oil Company, Inc.) was contacted and an access agreement was established allowing National Grid to conduct investigation activities on the property. Subsequently, in 2007, an access agreement was established with the owner of the property located west of Hubbard Street (currently owned by Spirit Master Funding X, LLC and previously owned by Davis-Standard LLC, formerly Black Clawson Converting Machinery, Inc.) prior to the implementation of supplemental SC activities. Also, an agreement was established in 2016 with the owner of the property located north of the former MGP Site (Universal Properties of New York, LLC) during the SRI field work to provide access to a monitoring well installed on this property (MW-115D). The access agreements previously obtained with each property owner are currently valid; however, these agreements will need to be updated to reflect the activities proposed in this scope of work upon approval of this work plan by the NYSDEC.

As described below, SRI activities are proposed on the property located west of Hubbard Street and south of Ontario Street (owned by Spirit Master Funding X, LLC), the property west of Hubbard Street and north of Ontario Streets (owned by Yager Real Property, LLC), and within the City roadways and City right-of-ways (Ontario Street and North 1st Street). These activities will include the advancement of boreholes intended for installation of monitoring wells, and groundwater sampling from monitoring wells. Upon approval of this Work Plan, Yager Real Property, LLC will be contacted to initiate property access agreement negotiations and the City of Fulton will be contacted to obtain permission to conduct investigation activities within the City roadways and City right-of-ways and to coordinate temporary road closures (if necessary) to facilitate the field activities.

Prior to initiating proposed SRI field activities, the owners of the above-mentioned properties will be contacted to brief them on the planned activities.

3.2 Field Activities

3.2.1 Utility Mark Outs and Clearance

Prior to conducting the intrusive activities described below, the planned bedrock monitoring well locations will be marked in the field. Dig Safely New York will be contacted to clear subscribed underground utilities, and the City of Fulton will be contacted to clear utilities that they maintain (e.g., sewer and water).

Some of the proposed drilling locations may be adjusted to provide for adequate clearance from underground and aboveground utilities. The final locations for the bedrock monitoring wells will be determined in the field following the mark-out of underground utilities.

At each drilling location, clearance of subsurface utilities will be confirmed by physical means (e.g., vacuum soil extraction, hand tools, etc.). Physical clearance will be used to remove the soil at each drilling location to a depth of approximately 5 feet bgs.

3.2.2 Bedrock Evaluation and Bedrock Monitoring Well Installation

For this phase of RI activities, up to five (5) bedrock monitoring wells (shallow bedrock wells MW-126R through MW-130R) are proposed at the approximate locations shown on Figure 3-1. The selected locations are intended to: 1) further evaluate the extent of NAPL/tar in bedrock; and 2) further evaluate the extent of dissolved-phase, MGP-related constituents in bedrock groundwater on the off-site property west of the Site. The boring for each monitoring well will also provide information to further evaluate the stratigraphic characteristics of the overburden and to evaluate the characteristics of the bedrock. A summary of the technical rationale and target depths for the proposed monitoring wells is presented on Table 3-1.

The procedures for evaluating the bedrock and installing bedrock monitoring wells are described below.

3.2.2.1 Shallow Bedrock Monitoring Wells

Initially, a six-inch diameter pilot borehole will be drilled using 3 ¼-inch inside diameter (I.D.) hollow-stem augers. Continuous sampling of the soil will be conducted using a two-foot long, two-inch O.D. split-spoon sampler from ground surface to refusal on bedrock. The samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with a system after Burmister (1959) and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts, or other impacts based on appearance, odors or organic vapor concentrations measured using a photoionization detector (PID). Head-space screening will be conducted using the PID by immediately transferring a representative subsample of the soil to a clean glass jar and sealing its lid with aluminum foil or to a sealable polyethylene plastic bag (e.g., Ziploc®). To allow the sample to equilibrate, it will remain sealed for a period of time (approximately 15 minutes) and then the tip of the PID will be inserted through the foil, or though the plastic bag, and the maximum instrument reading will be recorded.

An eight-inch diameter borehole will then be drilled through the overburden and approximately one to two feet into competent bedrock using conventional rotary methods. Depending on the subsurface conditions, a temporary well casing may be installed to keep the borehole from collapsing and facilitate drilling.

A four-inch diameter steel casing will then be placed in the borehole, extending from the bottom of the borehole (seated one to two feet into competent bedrock) to the ground surface. The casing will then be grouted in place by filling the annular space between the casing and the borehole, from the bottom of the borehole to a few feet bgs, with a cement/bentonite grout using the tremie method or pressure grouting. The cement/bentonite grout in the annular space will be allowed to set for a minimum period of 12 hours before resuming drilling activities at the borehole location.

Prior to commencement of bedrock drilling activities, pressure transducers equipped with automatic data loggers (e.g., In-Situ Level TROLLS®) will be installed in existing shallow bedrock wells nearby the proposed well locations including MW-121R, MW-122R, MW-122RD, MW-124R and MW-125R. Continuous monitoring of water levels will be conducted during coring and packer pressure testing to monitor changes in water level at these locations that may result from the drilling of bedrock at the proposed bedrock drilling locations. The automatic data loggers will be set to record water levels from the pressure transducers every minute for the duration of drilling activities.

Bedrock drilling will resume by means of conventional or wire-line coring techniques using a nominal four-inch O.D. core barrel. Cores will be collected in 5-foot intervals, to a depth of approximately 20 to 30 feet below the top of bedrock surface (approximately 47 to 57 feet bgs); the ultimate depth of the borehole will be determined in the field based on information collected during drilling, in particular the results of the packer pressure testing described below. Core samples will be described in the field to characterize: rock type; bedding thicknesses; texture; fracture type, orientation and spacing; structural features in addition to fractures; and other descriptors used to identify the composition of the bedrock. Rock Quality Designation (RQD) will be measured in accordance with American Society for Testing and Materials (ASTM) Standard D6032-08 and recorded for each five-foot interval as an indicator of bedrock competency. The cores will be field screened for indications of MGP-related impacts, or other impacts, based on appearance, odor and organic vapor concentrations as indicated by a PID. Additionally, drilling return water will be observed and screened with a PID for indications that NAPL or other impacts that may be encountered during the drilling process (e.g., sheens, globules of NAPL, etc.).

Packer pressure testing will be conducted at five-foot intervals following each core run to evaluate changes in hydraulic conductivity versus depth and identify potential water-bearing zones. Packer pressure testing will be conducted in accordance with the procedures specified in the FSP. During packer pressure testing, in the event that the volume of water injected into the tested interval exceeds approximately five gallons over a period of five minutes, the test may be terminated as to limit the volume of water introduced into the formation.

Coring and packer will continue to the approximate depth identified in Table 3-1 based on the estimated depth of the water-bearing zone associated with the stratigraphic marker bed identified during previous RI activities (see Section 2.3.5). If a potential water-bearing zone is encountered at this approximate depth, coring and packer testing will continue in five-foot intervals for another 5 to 10 feet in an attempt to evaluate the thickness of the zone, and to confirm the presence of a relatively lower permeability interval directly below the water-bearing zone, as was encountered elsewhere.

Following completion of coring and packer testing, borehole geophysical logging will be conducted in the core hole. Specific geophysical parameters that will be recorded during the logging will include natural gamma, fluid temperature, fluid resistivity, spontaneous potential, single point resistance, and caliper. The geophysical data will be used to further evaluate the bedrock conditions and the vertical position of the water-bearing zone. Results of the natural gamma logging will be used to confirm the presence and position of the stratigraphic marker bed and the position of the water-bearing zone will likely be determined using results from the caliper, fluid temperature and fluid resistivity logs.

A two-inch diameter screen and riser casing will be installed inside the four-inch steel casing and nominal four-inch borehole. The wells will be constructed of two-inch diameter, Schedule 40 PVC casing with 0.020-inch slot PVC screens with an appropriately-sized filter pack. At well locations where NAPL is encountered, if any, a one to two-foot long sump will be installed below the screen, if appropriate, as described in the FSP. In instances where sumps are installed, the annular space between the sump and formation will be filled with bentonite, cement/bentonite grout, or other suitable, relatively low permeability material. After a minimum period of 12 hours have passed following well installation to allow for the cement/bentonite grout to set, the wells will be developed. Well development will be conducted in accordance with procedures in the FSP.

3.2.3 Slug Tests

In-situ hydraulic conductivity tests (i.e., slug tests) will be performed on each monitoring well installed pursuant to this work plan to evaluate the horizontal hydraulic conductivity of the adjacent formation. Rising and/or falling head slug tests will be conducted in accordance with the procedures described in the FSP and the data generated will be input into AQTESOLV® software for hydraulic conductivity calculations using analytical solutions appropriate for the hydrogeologic conditions.

3.2.4 Groundwater Monitoring and NAPL Gauging

Two (2) rounds of groundwater sampling will be conducted as part of this phase of RI field activities. For each round, groundwater samples will be collected from the monitoring wells proposed herein and the existing monitoring wells. The first round of groundwater sampling will be initiated after at least one week has passed since completion of well development and after water levels in the wells have stabilized. The second round will be conducted approximately three months (one quarter) after the first round, preferably in a time period where the groundwater elevation conditions differ seasonally from the first round. For example, if the first round is conducted during a period when the water table is relatively high, then it is preferable to schedule the second round for a period when the water table is relatively low.

Prior to groundwater sampling, depth to water measurements and NAPL gauging will be conducted on each well planned for sampling and all on-site and off-site wells. In the event that NAPL is detected in a monitoring well, a groundwater sample will not be collected from that well. Groundwater samples will be collected according to the USEPA low flow sampling protocol and in accordance with procedures outlined in the FSP.

The groundwater samples will be submitted for analysis of BTEX, PAHs, and total cyanide. The groundwater samples will also be analyzed in the field for pH, specific conductivity, temperature, turbidity, and dissolved oxygen.

Analysis of groundwater samples will be conducted by a laboratory certified under the NIOSH Environmental Laboratory Approval Program (ELAP) to provide Analytical Services Protocol (ASP)/Contract Laboratory Program (CLP) deliverables. The analytical results will be provided to the NYSDEC as an Electronic Data Deliverable (EDD) formatted to the NYSDEC's data submission requirements that are detailed on the NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). This will include: 1) populating the NYSDEC EDD with the analytical data; 2) validating the EDD using the database software application EQuIS™ from EarthSoft®, Inc.; and 3) submitting the validated EDD to the NYSDEC.

3.2.5 Continuous Water Level Monitoring and Optional Pumping Test

As recommended in the cover letter that accompanied the 2018 SRI DSR, continuous water level monitoring activities were conducted during the period November 19, 2019 through December 4, 2019 to further evaluate Site groundwater flow conditions. Based on evaluation of the data, it is evident that surface water flow conditions in the Oswego River temporally influence water levels in the existing shallow bedrock well network. Although the results and findings associated with these activities were used to assist with the selection of drilling locations proposed per this work plan, further assessment of bedrock groundwater flow directions and groundwater discharge areas is needed to adequately assess contaminant distribution and migration pathways in bedrock groundwater. Accordingly, following review of results of the proposed water level monitoring during drilling (see Section 3.2.2.1) and following receipt of results from the first round of groundwater sampling, continuous monitoring of water levels in existing bedrock wells, bedrocks wells installed per this work plan, and in a staff gauge installed in the Oswego River will be conducted over an extended period (± 2 to 4 weeks). The continuous monitoring will be conducted with pressure transducers equipped with automatic data loggers (e.g., In-Situ Level TROLLS®). The automatic data loggers will be set to record water levels from the pressure transduces every minute for the monitoring period. A manual water level meter will also be used to measure water levels in the monitoring wells at the beginning and end of the continuous monitoring period. Hourly barometric pressure data and precipitation data for the monitoring period will be obtained from the National Oceanic and Atmospheric Administration (NOAA) meteorological measurement station located closest to the Site. Additionally, barometric pressure will be measured at the Site using a pressure transducer and automatic data logger configured to measure and record barometric pressure (e.g., In-Situ BaroTROLL®).

Depending on the continuous water level results, findings obtained during the drilling processes and the results of the first round of groundwater sampling activities, a constant rate pumping test may be proposed as part of the SRI activities to further evaluate the continuity of the shallow bedrock water-bearing zone and interaction, if any, with the overlying overburden deposits. The following subsections describe the components of the pumping test program, if conducted.

3.2.5.1 Antecedent Period Monitoring

Approximately one week before the pumping test, the antecedent (i.e., pre-pumping) monitoring period will be initiated wherein continuous monitoring of water levels within selected monitoring wells and the proposed pumping well will be conducted using pressure transducers equipped with automatic data loggers (e.g., In-Situ Level TROLLS®). The automatic data loggers will be set to record water levels from the pressure transducers every 15 minutes for the antecedent monitoring period (approximately one week). A manual water level meter will also be used to measure water levels in these selected monitoring wells, and in other monitoring wells, at the beginning and end of this antecedent period. Hourly barometric pressure data and precipitation data for the antecedent period, and during the pumping test, will be obtained from the National Oceanic and Atmospheric Administration (NOAA) meteorological measurement station located at Oswego County Airport. This station is located less than two miles from the Site, and thus, the data should be generally representative of Site conditions. Additionally, barometric pressure will be measured on-Site every 15 minutes using a pressure transducer and automatic data logger configured to measure and record barometric pressure (e.g., an In-Situ BaroTROLL®). The antecedent water level, barometric and precipitation data will be used to facilitate the evaluation of the degree to which changes in groundwater levels are induced by groundwater withdrawal from the pumping well during the pumping test versus other potential influences. Accordingly, the pumping test will be conducted directly following the antecedent data collection period.

3.2.5.2 Pumping Test

A constant-rate pumping test will be performed by withdrawing groundwater from the pumping well at a constant rate and monitoring water levels in the pumping well and surrounding monitoring wells. The pumping test is expected to be approximately six to eight hours in duration. The test will be followed by a recovery period of the same duration as the pumping period. Groundwater will be extracted for the duration of the pumping test at a rate determined in the field. Water produced during the test will be containerized on-site pending characterization and appropriate off-site disposal. During the test, water levels will be measured using pressure transducers with automatic data loggers in the pumping well and select monitoring wells. The selected locations will be the same as those that that will be equipped with transducers during the antecedent monitoring period described in Section 3.2.5.1. Prior to the beginning of the pumping test, the automatic data loggers will be reset to record water levels on a more frequent schedule at the start of pumping to provide for more frequent measurements at the beginning of the test when the water level changes occur most rapidly. Water levels will also be measured manually in these wells and in other Site monitoring wells (see Table 3-4) just prior to the initiation of pumping and periodically throughout the test. The pumping rate will be measured using a flow meter. In addition, if the flow rate is low enough, it will be measured periodically by recording the time required to fill a container of known volume (i.e., the "bucket and stop watch" method).

Measurement of water levels, both manual and automatic, will continue during the post-pumping recovery period. The duration of the recovery monitoring period will be, at a minimum, as long as the duration of the pumping period.

Hourly barometric pressure data and precipitation data for the pumping and recovery periods, and for the period one week prior to the pumping test (as described in Section 3.2.5.1) will be obtained from the NOAA meteorological measurement station located closest to the site (Oswego County Airport). Additionally, barometric pressure will be measured on-site every 15 minutes using a pressure transducer and automatic data logger configured to measure and record barometric pressure (e.g., an In-Situ BaroTROLL®). These data will allow an evaluation of the degree to which water level changes measured in the wells were associated with the pumping of water from the test well versus other potential influences.

3.2.6 Survey

Each of the monitoring well locations completed as part of the SRI activities will be surveyed. The survey will include location coordinates, ground surface elevation, and in the case of the wells, top of casing elevation data. Coordinates will be referenced to the State Plane coordinate system for New York using the North American Datum of 1983 (NAD 1983) in units of feet. Elevations will be referenced to the National Geodetic Vertical Datum (NGVD) of 1929 in units of feet. The survey will be performed by a New York licensed surveyor.

3.2.7 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the SRI activities will include soil and rock cuttings, drilling water, development water, equipment decontamination water, purge water, disposable sampling equipment, and personal protective equipment (PPE). The waste will be containerized in DOT-approved, 55-gallon drums and polyethylene totes, which will be labeled to identify their contents. The appropriate treatment/disposal will be arranged based on the characterization of the waste streams. Treatment/disposal of the IDW will be managed by a licensed, permitted transportation and disposal contractor on National Grid's approved vendor list.

3.3 Data Evaluation and Reporting

An SRI Data Summary Report will be provided to the NYSDEC. The Data Summary Report will include the following:

- Soil boring logs and well construction diagrams;
- DUSR and tabular and graphic summaries of the analytical results;
- Updated site plan depicting SRI sampling locations and previous investigation locations;
- Figures presenting the continuous monitoring data;
- Maps of groundwater elevations and interpreted flow directions;
- Hydrogeologic cross-sections depicting subsurface conditions; and
- Other information pertinent to the SRI activities.

Accompanying the addendum will be conclusions related to the objectives of this phase of RI field work, and an assessment of whether or not the data collected to-date are sufficient to meet the RI objectives for the Site. Also included will be either a recommendation that a RI Report be prepared (if the data collected to-date are sufficient), or recommendations for addressing additional data needs to complete the RI, including human and ecological exposure assessments.

In the event that preparation of a RI Report is recommended and the NYSDEC concurs with this recommendation, a RI Report will be prepared to address the following:

- The identity and characteristics of the source(s) of MGP-related impacts;
- The amount, concentration, phase, location, environmental fate and transport, and other significant characteristics of any MGP-related constituents present;
- Hydrogeologic characteristics, including grain size, hydraulic conductivity of saturated formations monitored, depth to saturated zone, nature of bedrock, hydraulic gradients, proximity to potential groundwater discharge areas (e.g., surface water, floodplains, or wetlands, etc.);
- Assessment of routes of exposure and potential human receptors via a qualitative human health exposure assessment in accordance with Section 3.1(C)17 and Appendix 3B of the May 2010 DER-10 Technical Guidance for Site Investigation and Remediation; and
- A determination as to whether or not a Fish and Wildlife Resource Impact Analysis (FWRIA) are required based on Appendix 3C of the May 2010 DER 10 Technical Guidance for Site Investigation and Remediation (DER-10) and, if so required, Part 1 of the FWRIA, as described in Section 3.10.1 of DER-10, will be conducted and documented in the RI Report.

The RI Report will include the following:

- Pertinent information obtained throughout the implementation of this work plan and previous investigations;
- Descriptions of the work completed under this work plan and previous investigations and the results of that completed work;
- Deviations from this work plan and previous investigations that result from unexpected conditions encountered during the investigation;
- Summary of the overall nature and extent of contamination referencing any exceedances of applicable State standards, criteria, and guidance;
- Summary of any ecological assessments conducted;
- Summary tables of analytical data collected;
- Soil boring logs and well construction diagrams, which will include well development data and field instrument (e.g., PID) readings;
- Groundwater elevation contour maps with flow directions specified;
- Hydrogeologic cross-sections of the Site;
- Figure depicting the elevation contours of the top of bedrock surface;
- Figures illustrating the distribution of constituent concentrations in soils and groundwater, including sample depths;
- The results and summary of the qualitative human health exposure assessment and FWRIA part 1; and
- Conclusions which summarize the areas of concern, identify any potentially completed exposure pathways, and recommendations for future work (e.g., none, additional investigation, or an evaluation of remedial alternatives).

Section 4

Schedule

Following NYSDEC/NYSDOH review and approval of the proposed locations and SRI Work Plan addendum, efforts will commence to update the existing property access agreements and establish any new agreements necessary for implementing this work plan. Field activities will be initiated approximately two weeks following execution of the property access agreement(s) and notification of the property owners of the planned SRI activities.

It is anticipated that approximately two months will be required to conduct the field activities described in this work plan through completion of: bedrock evaluation and monitoring well installations; well development; slug testing; and the first round of groundwater sampling. As noted in Section 3.2.4, the second round of groundwater sampling will be conducted approximately three months following the first round, preferably in an interval of hydrologic conditions that differs seasonally from the first round. Within approximately six to eight weeks of completion of the second round of groundwater sampling, the laboratory analyses and the DUSR are expected to be complete.

The addendum to the SRI Data Summary Report will be submitted approximately two months after the DUSR for the groundwater samples for the second sampling round is received from the data validator. If following the NYSDEC's review of the Data Summary Report (see Section 3.3), it is determined that the RI is complete, then National Grid will develop a schedule for preparing and submitting a RI Report will and propose this schedule to NYSDEC.

Section 5

References

Brown and Caldwell Associates, March 2019. Health and Safety Plan for Remedial Investigation Activities, Fulton (North Ontario St.) Former MGP Site, Fulton, New York.

Brown and Caldwell Associates, April 2019. Data Summary Report, 2018 Supplemental Remedial Investigation Activities, Fulton (Ontario St.) Former MGP Site, NYSDEC Site #738050, Fulton, Oswego County, New York.

Brown and Caldwell Associates, June 2016. Data Summary Report, Supplemental Remedial Investigation, Fulton (Ontario St.) Former MGP Site, NYSDEC Site #V00484, Fulton, Oswego County, New York.

Brown and Caldwell Associates, April 2015. Supplemental Remedial Investigation Work Plan, Fulton (North Ontario St.) Former MGP Site, Fulton, New York.

Brown and Caldwell Associates, May 2013. Data Summary Report, Remedial Investigation, Fulton (North Ontario St.) Former MGP Site, Fulton, New York

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Brown and Caldwell Associates, August 2005. Site Characterization Data Summary Report, Fulton (North Ontario St.) Former MGP, Fulton, New York.

EECS, Inc., January 2004. Site Characterization/Interim Remedial Measures Work Plan for Site Investigations at the Fulton Non-Owned Former MGP Site.

Foster Wheeler, November 2002. Generic Field Sampling Plan for Site Investigations at Non-Owned Former MGP Sites.

Foster Wheeler, November 2002. Generic Quality Assurance Project Plan for Site Investigations at Non-Owned Former MGP Sites.

Foster Wheeler, November 2002. Generic Health & Safety Plan for Site Investigations at Non-Owned Former MGP Sites.

Lumsden, D.N. and Pelletier, B.R., 1969. Petrology of the Grimsby Sandstone (Lower Silurian) of Ontario and New York: Journal of Sedimentary Petrology, v. 39, no. 2, p. 521-530.

NYSDEC, 2010. DER-10 / Technical Guidance for Site Investigation and Remediation. DEC Program Policy. May 3, 2010.

Patchen, D.G., 1966. Petrology of the Oswego, Queenston, and Grimsby Formations, Oswego County, New York: unpubl. masters thesis, SUNY Binghamton, 191 p.

Rickard, L.V. and Fisher, D.V., 1970. Geologic Map of New York, Finger Lakes Sheet.

Tables

TABLE 3-1
RATIONALE FOR SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS
FULTON (ONTARIO ST.) FORMER MGP SITE
FULTON, NEW YORK

Location ID	Objective(s)	Target Depth[1]
BEDROCK EVALUATION/BEDROCK MONITORING WELL LOCATIONS		
MW-126R	1) Further evaluate extent of NAPL within bedrock on the off-site property west of the site and south of off-site Parcel C Area; 2) Further evaluate the lateral extent of dissolved-phase, MGP-related constituents in shallow bedrock groundwater on the off-site property west of the site; and 3) Further evaluate groundwater flow direction in shallow bedrock groundwater.	Pending findings from coring, packer pressure tests and geophysical logging, complete a well with screen that straddles the water-bearing zone in bedrock coinciding with the stratigraphic marker bed. Total depth of borehole is anticipated to be approximately 30 feet below the top of bedrock surface (estimated 52 feet bgs).
MW-127R	1) Further evaluate the lateral extent of dissolved-phase, MGP-related constituents in shallow bedrock groundwater on the off-site property west of the site; and 2) Further evaluate groundwater flow direction in shallow bedrock groundwater.	Pending findings from coring, packer pressure tests and geophysical logging, complete a well with screen that straddles the water-bearing zone in bedrock coinciding with the stratigraphic marker bed. Total depth of borehole is anticipated to be approximately 30 feet below the top of bedrock surface (estimated 52 feet bgs).
MW-128R	1) Further evaluate the lateral extent of dissolved-phase, MGP-related constituents in shallow bedrock groundwater on the off-site property west of the site; and 2) Further evaluate groundwater flow direction in shallow bedrock groundwater.	Pending findings from coring, packer pressure tests and geophysical logging, complete a well with screen that straddles the water-bearing zone in bedrock coinciding with the stratigraphic marker bed. Total depth of borehole is anticipated to be approximately 30 feet below the top of bedrock surface (estimated 50 feet bgs).
MW-129R	1) Further evaluate the lateral extent of dissolved-phase, MGP-related constituents in shallow bedrock groundwater on the off-site property west of the site; and 2) Further evaluate groundwater flow direction in shallow bedrock groundwater.	Pending findings from coring, packer pressure tests and geophysical logging, complete a well with screen that straddles the water-bearing zone in bedrock coinciding with the stratigraphic marker bed. Total depth of borehole is anticipated to be approximately 30 feet below the top of bedrock surface (estimated 62 feet bgs).
MW-130R	1) Further evaluate the lateral extent of dissolved-phase, MGP-related constituents in shallow bedrock groundwater on the off-site property west of the site; and 2) Further evaluate groundwater flow direction in shallow bedrock groundwater.	Pending findings from coring, packer pressure tests and geophysical logging, complete a well with screen that straddles the water-bearing zone in bedrock coinciding with the stratigraphic marker bed. Total depth of borehole is anticipated to be approximately 30 feet below the top of bedrock surface (estimated 54 feet bgs).

Notes:
(1) - Target depths are estimated based on data from surrounding borings. Adjustments may be required based on field observations.
MGP - Manufactured Gas Plant
NAPL - non-aqueous phase liquid
bgs - below ground surface

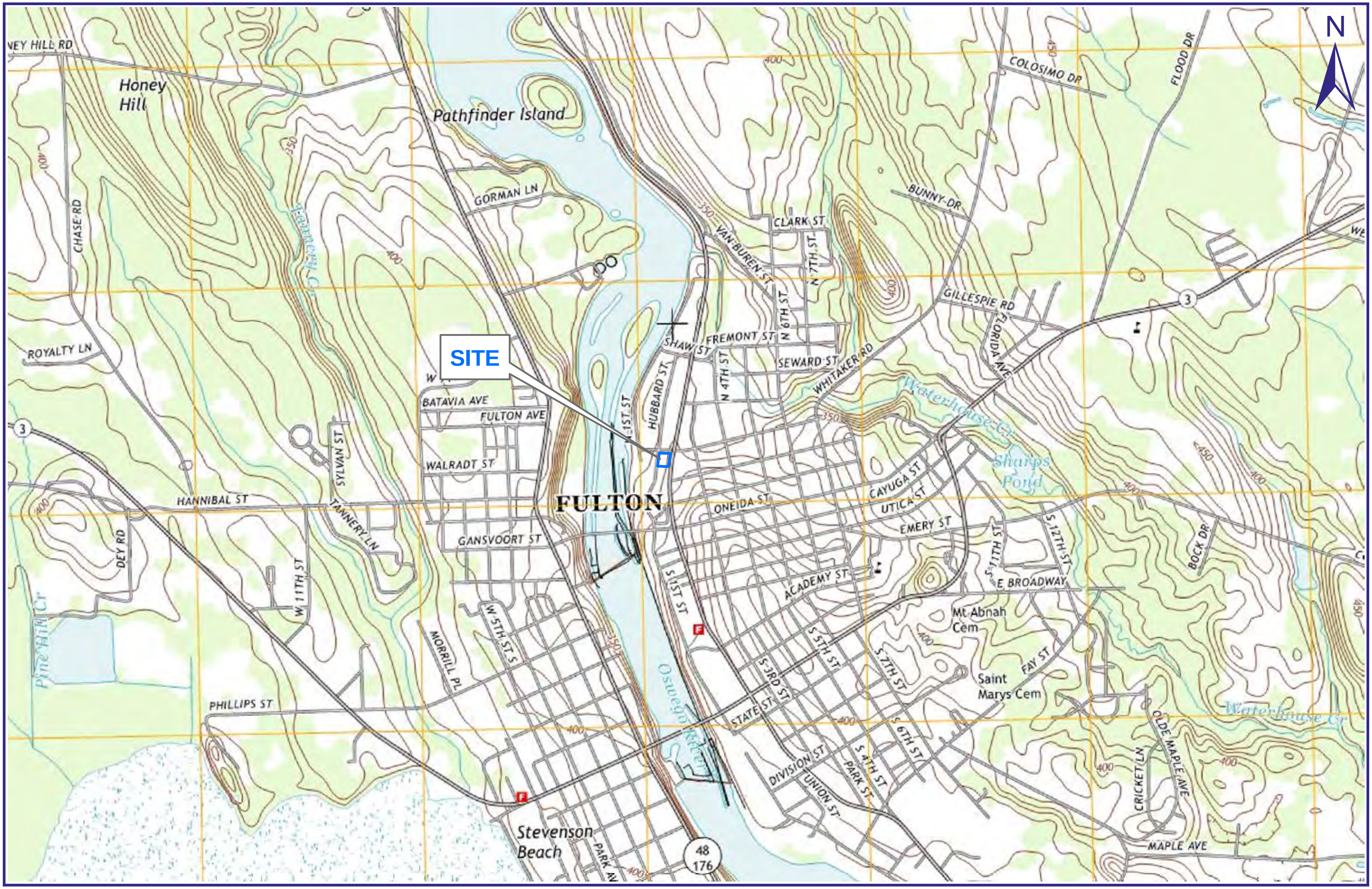
TABLE 3-2
SUMMARY OF LABORATORY ANALYSES
FULTON (ONTARIO ST.) FORMER MGP SITE
FULTON, NEW YORK

Media and Sample Type	BTEX Method 8260	PAHs Method 8270	Total Cyanide Method 9012
Groundwater (38 wells, 2 events)(1)	76	76	76
Duplicate(2)	4	4	4
MS/MSD(2)	4	4	4
Trip Blank(3)	±10	--	--
Equipment Blank(2)	4	4	4

Notes:
(1) - If NAPL is identified in a well, groundwater samples from that well will not be collected and subsequently analyzed.
(2) - Per the QAPP, one duplicate sample, one MS/MSD pair, and one equipment blank will be submitted and analyzed for every Sample Deliver y Group (SDG). Maximum of 20 samples per SDG.
(3) - Per the QAPP, one trip blank will be included in every shipment of water samples to be analyzed for volatile organic compounds.

Figures

12/17/2019



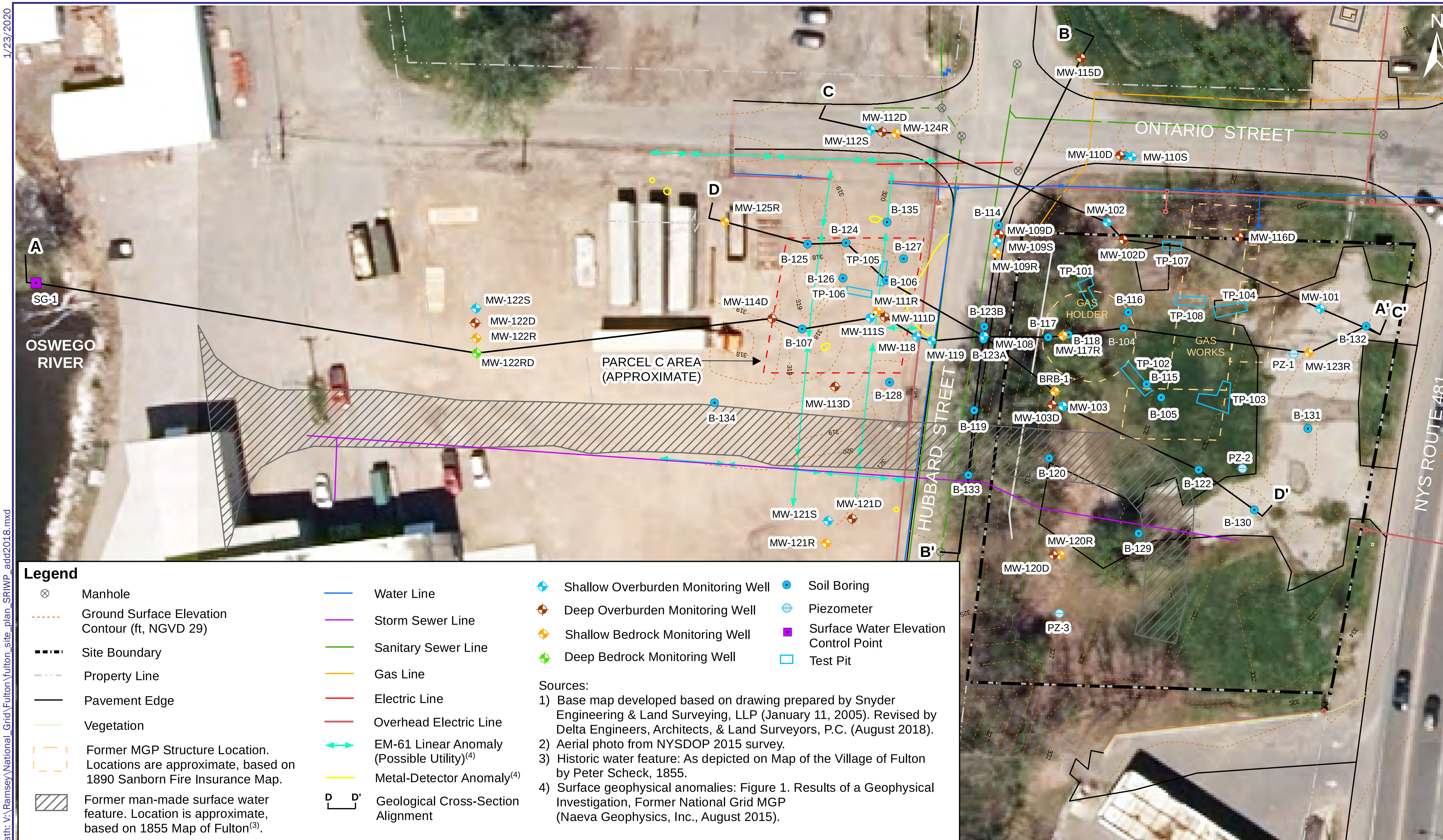
Author: Rhojnacki Path: V:\Ramsey\National_Grid\Fulton\Fulton_Site_Location.mxd

Brown AND Caldwell

FIGURE 2-1
SITE LOCATION
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

Source: USGS 7.5 Minute Topographic Map
Fulton Quadrangle (2013)

0 1,000 2,000
Feet



Legend

- Manhole
- Ground Surface Elevation Contour (ft, NGVD 29)
- Site Boundary
- Property Line
- Pavement Edge
- Vegetation
- Former MGP Structure Location. Locations are approximate, based on 1890 Sanborn Fire Insurance Map.
- Former man-made surface water feature. Location is approximate, based on 1855 Map of Fulton(3).
- Water Line
- Storm Sewer Line
- Sanitary Sewer Line
- Gas Line
- Electric Line
- Overhead Electric Line
- EM-61 Linear Anomaly (Possible Utility)(4)
- Metal-Detector Anomaly(4)
- D D' Geological Cross-Section Alignment
- Shallow Overburden Monitoring Well
- Deep Overburden Monitoring Well
- Shallow Bedrock Monitoring Well
- Deep Bedrock Monitoring Well
- Soil Boring
- Piezometer
- Surface Water Elevation Control Point
- Test Pit

Sources:
1) Base map developed based on drawing prepared by Snyder Engineering & Land Surveying, LLP (January 11, 2005). Revised by Delta Engineers, Architects, & Land Surveyors, P.C. (August 2018).
2) Aerial photo from NYSDOP 2015 survey.
3) Historic water feature: As depicted on Map of the Village of Fulton by Peter Scheck, 1855.
4) Surface geophysical anomalies: Figure 1. Results of a Geophysical Investigation, Former National Grid MGP (Naeva Geophysics, Inc., August 2015).

1/23/2020

Author: JMarolda Path: V:\Ramsey\National_Grid\Fulton\fulton_site_plan_SRIWP_add2018.mxd

Brown AND Caldwell

FIGURE 2-2
SITE PLAN
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

LEGEND:

TP-104 — MONITORING WELL/SOIL BORING TEST PIT IDENTIFICATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

277/4895 — TOTAL BTEX/TOTAL PAH(mg/kg) CONCENTRATION WITHIN SAMPLE INTERVAL. BOLD VALUE INDICATES ONE OR MORE CONSTITUENT CONCENTRATIONS ABOVE NYS PART 375 SOIL CLEANUP OBJECTIVES (PROTECTION OF PUBLIC HEALTH-COMMERCIAL OR INDUSTRIAL ZONING [DEPENDING ON LOCATION] PROTECTION OF ECOLOGICAL RESOURCES, AND/OR PROTECTION OF GROUNDWATER)

WELL SCREEN INTERVAL

PVC SUMP

TOTAL DEPTH OF BOREHOLE

NON-AQUEOUS PHASE LIQUID (NAPL) OBSERVED WITHIN WELL DURING GAUGING EVENTS

WATER TABLE, SEPTEMBER 17, 2018

(313.07) — GROUNDWATER ELEVATION, SEPTEMBER 17, 2018

FILL

GLACIAL TILL

BEDROCK

VISUAL/OLFACTORY INDICATIONS OF IMPACTS (SEE NOTE 1):

- TAR SATURATED
- COATED MATERIAL, LENSES
- BLEBS, GLOBS, SHEEN
- STAINING, ODOR
- PETROLEUM IMPACTS STAINING & ODORS
- PURIFIER WASTE AND ODOR
- NO OBSERVED IMPACTS

ABBREVIATIONS:

BTEX	BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE ISOMERS
PAHS	TOTAL POLYCYCLIC AROMATIC HYDROCARBONS
CN	TOTAL CYANIDE
ND	NOT DETECTED
J	ESTIMATED CONCENTRATION
R	RESULT REJECTED AS DETERMINED BY DATA VALIDATOR
NS	NOT SAMPLED. NAPL IN WELL

GEOPHYSICAL ANOMALIES ASSOCIATED WITH MARKER BED

TEMP.	FLUID TEMPERATURE
F-RES.	FLUID RESISTIVITY
CAL.	CALIPER

Gamma 0 cps 150 — NATURAL GAMMA OUTPUT

MW-111S	Dec-12	Mar-13
BTEX	ND	ND
PAHs	**0.9 J**	ND
CN	ND	ND

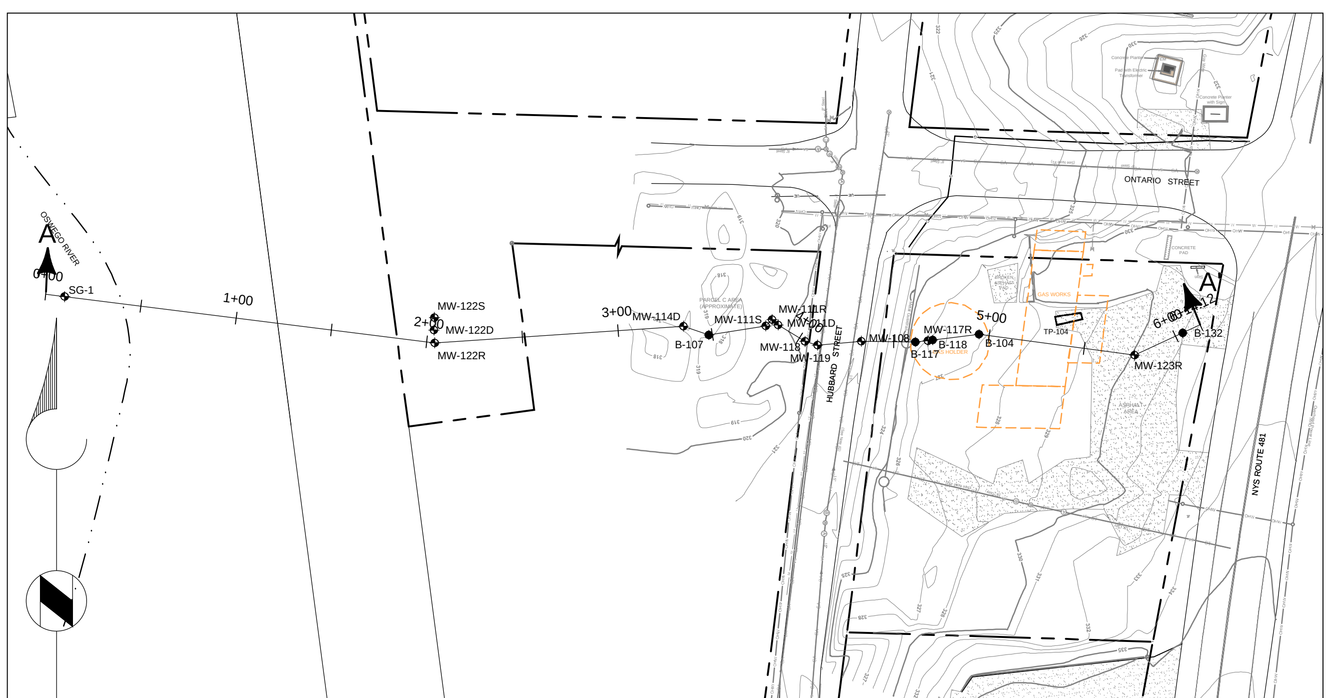
GROUNDWATER QUALITY DATA. VALUES REPORTED IN MICROGRAMS PER LITER (µg/L) BOLD VALUE INDICATES ONE OR MORE CONSTITUENTS ARE ABOVE CLASS GA CRITERIA

* HIGHEST CONCENTRATION FROM ORIGINAL GROUNDWATER AND DUPLICATE GROUNDWATER SAMPLE IS POSTED.

** DUPLICATE SAMPLE COLLECTED

NOTE:

1. NYSDEC'S STANDARD COLORS AND ASSOCIATED DESCRIPTORS FOR REPORTING MGP IMPACTS WERE USED TO DEPICT INTERVALS WHERE IMPACTS WERE OBSERVED IN SOIL SAMPLES, BEDROCK CORE SAMPLES, OR DURING DRILLING PROCESSES INCLUDING PACKER PRESSURE TESTING AND BOREHOLE GEOPHYSICS.

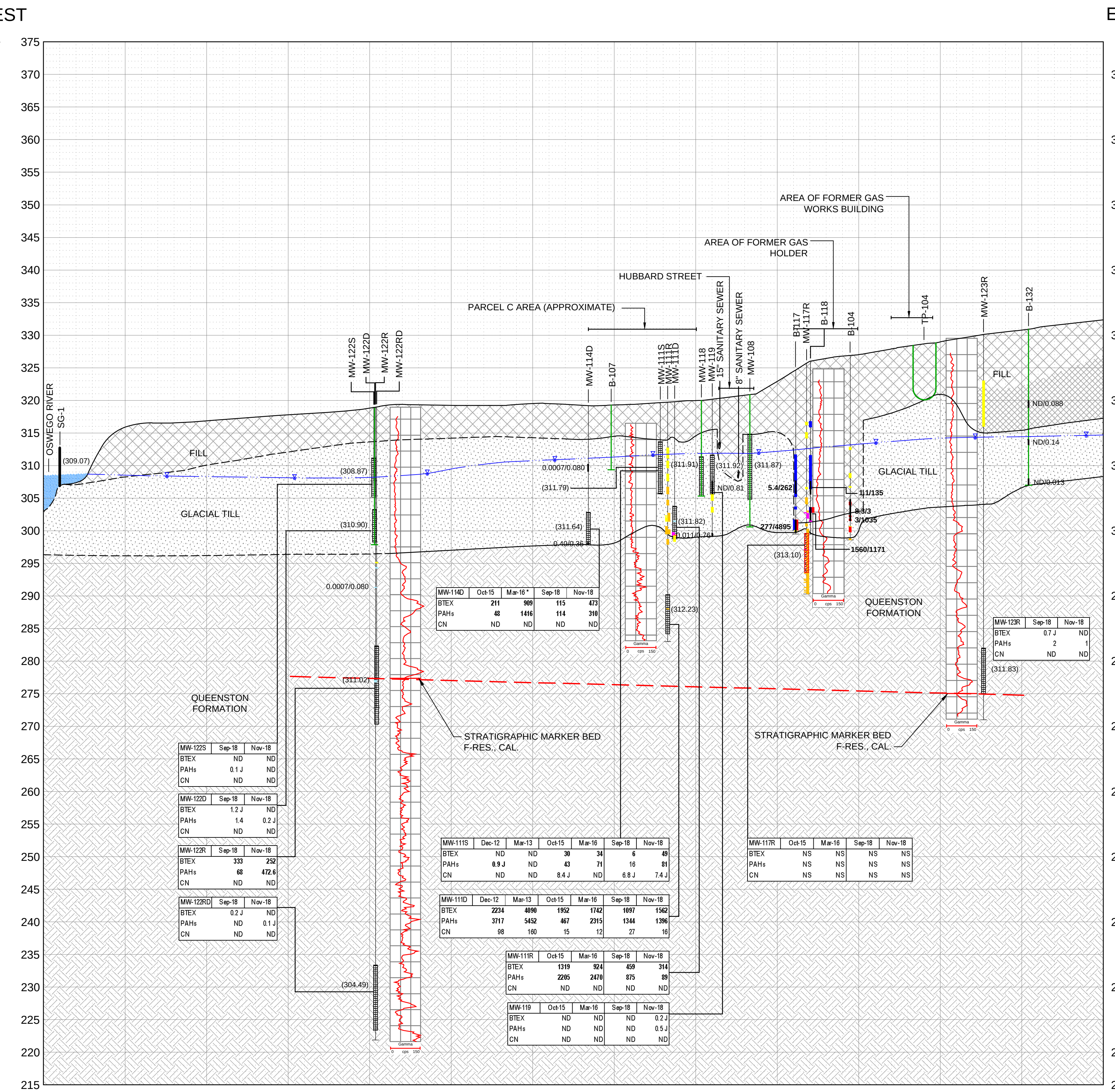


PARTIAL PLAN

SCALE: 1" = 100'

0 100 200

SCALE IN FEET



MW-122S	Sep-18	Nov-18
BTEX	ND	ND
PAHs	0.1 J	ND
CN	ND	ND

MW-122D	Sep-18	Nov-18
BTEX	1.2 J	ND
PAHs	1.4	0.2 J
CN	ND	ND

MW-122R	Sep-18	Nov-18
BTEX	**333**	**252**
PAHs	**68**	**472.6**
CN	ND	ND

MW-122RD	Sep-18	Nov-18
BTEX	0.2 J	ND
PAHs	ND	0.1 J
CN	ND	ND

MW-114D	Oct-15	Mar-16 *	Sep-18	Nov-18
BTEX	**211**	**909**	**115**	**473**
PAHs	**48**	**1416**	**114**	**310**
CN	ND	ND	ND	ND

MW-111S	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
BTEX	ND	ND	**30**	**34**	**6**	**49**
PAHs	**0.9 J**	ND	**43**	**71**	16	**81**
CN	ND	ND	8.4 J	ND	6.8 J	7.4 J

MW-111D	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
BTEX	**2234**	**4090**	**1952**	**1742**	**1097**	**1562**
PAHs	**3717**	**5452**	**467**	**2315**	**1344**	**1396**
CN	98	160	15	12	27	16

MW-111R	Oct-15	Mar-16	Sep-18	Nov-18
BTEX	**1319**	**924**	**459**	**314**
PAHs	**2205**	**2470**	**875**	**89**
CN	ND	ND	ND	ND

MW-119	Oct-15	Mar-16	Sep-18	Nov-18
BTEX	ND	ND	ND	0.2 J
PAHs	ND	ND	ND	0.5 J
CN	ND	ND	ND	ND

MW-117R	Oct-15	Mar-16	Sep-18	Nov-18
BTEX	NS	NS	NS	NS
PAHs	NS	NS	NS	NS
CN	NS	NS	NS	NS

MW-123R	Sep-18	Nov-18
BTEX	0.7 J	ND
PAHs	2	1
CN	ND	ND

PROFILE

SCALE H: 1" = 80'

V: 1" = 20'

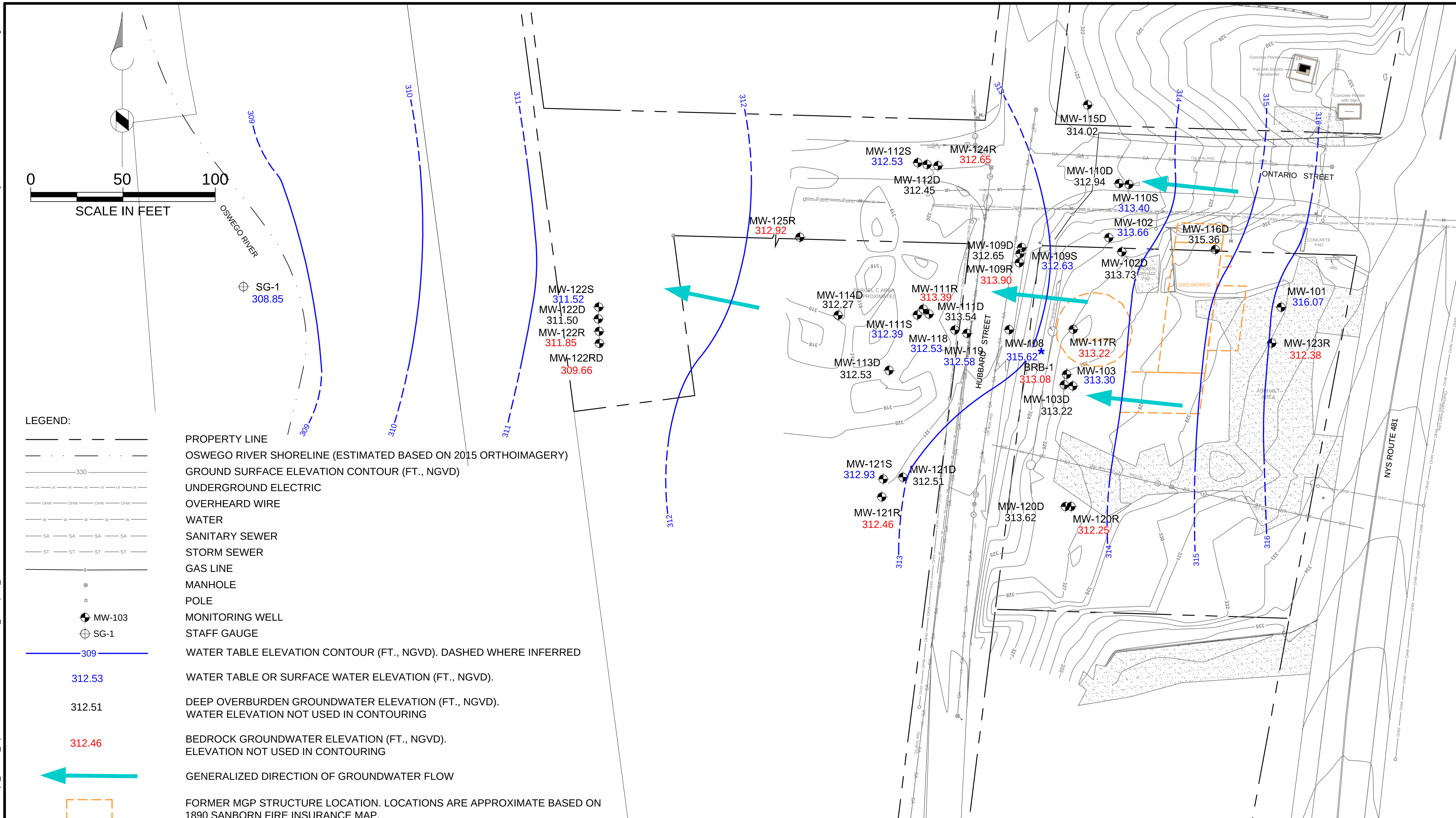
Brown AND Caldwell

DATE: December 17, 2019

NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE
FULTON, NEW YORK

GEOLOGICAL CROSS SECTION A-A'

FIGURE 2-3



LEGEND:

	PROPERTY LINE
	OSWEGO RIVER SHORELINE (ESTIMATED BASED ON 2015 ORTHOIMAGERY)
330	GROUND SURFACE ELEVATION CONTOUR (FT., NGVD)
UE	UNDERGROUND ELECTRIC
OHW	OVERHEARD WIRE
W	WATER
SA	SANITARY SEWER
ST	STORM SEWER
	GAS LINE
	MANHOLE
	POLE
MW-103	MONITORING WELL
SG-1	STAFF GAUGE
309	WATER TABLE ELEVATION CONTOUR (FT., NGVD). DASHED WHERE INFERRED
312.53	WATER TABLE OR SURFACE WATER ELEVATION (FT., NGVD).
312.51	DEEP OVERBURDEN GROUNDWATER ELEVATION (FT., NGVD). WATER ELEVATION NOT USED IN CONTOURING
312.46	BEDROCK GROUNDWATER ELEVATION (FT., NGVD). ELEVATION NOT USED IN CONTOURING
	GENERALIZED DIRECTION OF GROUNDWATER FLOW
	FORMER MGP STRUCTURE LOCATION. LOCATIONS ARE APPROXIMATE BASED ON 1890 SANBORN FIRE INSURANCE MAP.

SOURCE:
BASEMAP DEVELOPED BASED ON DRAWING PREPARED BY SNYDER ENGINEERING AND LAND SURVEYING, LLP (JANUARY 11, 2005), REVISED BY DELTA ENGINEERS, ARCHITECTS, AND LAND SURVEYORS, P.C. (AUGUST 2018).

NOTE:
* VALUE NOT USED IN DEVELOPING CONTOURS, AS FLUSH-MOUNTED WELL CASING FLOODED (FROM SURFACE RUNOFF) DURING STORM WATER EVENT.

Brown AND Caldwell

SCALE: 1" = 50'

DATE: December 30, 2019

NATIONAL GRID
FULTON (ONTARIO ST.)
FORMER MGP SITE
FULTON, NEW YORK

WATER TABLE CONTOUR MAP
DECEMBER 5, 2019

FIGURE
2-4

Path: \\bcusfp01\projects\National_Grid\Fulton(N_Ontario_St)\152206 - Fulton SRI Addendum _RI Report_CAD\2-SHEETS\B-GEOTECHNICAL File Name: WATER TABLE CONTOUR MAP 12-5-19 Plot Date: January 2, 2020 8:24 AM Cadd User: Alan Santiago

1/24/2020

Author: JMarolda Path: V:\Ramsey\National_Grid\Fulton\fulton_visual_olf_impacts_SRI_OB_2018.mxd

Brown AND Caldwell

FIGURE 2-5
VISUAL/OLFACTORY OBSERVATIONS: OVERBURDEN
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

Legend

- Manhole
- Ground Surface Elevation Contour (ft, NGVD 29)
- Site Boundary
- Property Line
- Pavement Edge
- Vegetation
- Water Line
- Storm Sewer Line
- Sanitary Sewer Line
- Gas Line
- Electric Line
- Overhead Electric Line
- Former MGP Structure Location. Locations are approximate, based on 1890 Sanborn Fire Insurance Map.

Visual/Olfactory Indications of Impact (See Notes):

- NAPL/Tar observed in bedrock monitoring well during gauging events
- Tar Saturated
- Coated Material, Lenses
- Blebs, Globs, Sheen
- Staining, Odor
- Petroleum Impacts: Staining & Odors
- No Observed Impacts

Note:
1) Refer to Table 4 for descriptions and depth intervals of visual/olfactory observations.
2) NYSDEC's standard colors and associated descriptors for reporting MGP impacts were used to depict locations where impacts were observed.

Sources:
1) Base map developed based on drawing prepared by Snyder Engineering & Land Surveying, LLP (January 11, 2005). Revised by Delta Engineers, Architects, & Land Surveyors, P.C. (August 2018).

2) Aerial photo from NYSDOP 2015 survey.

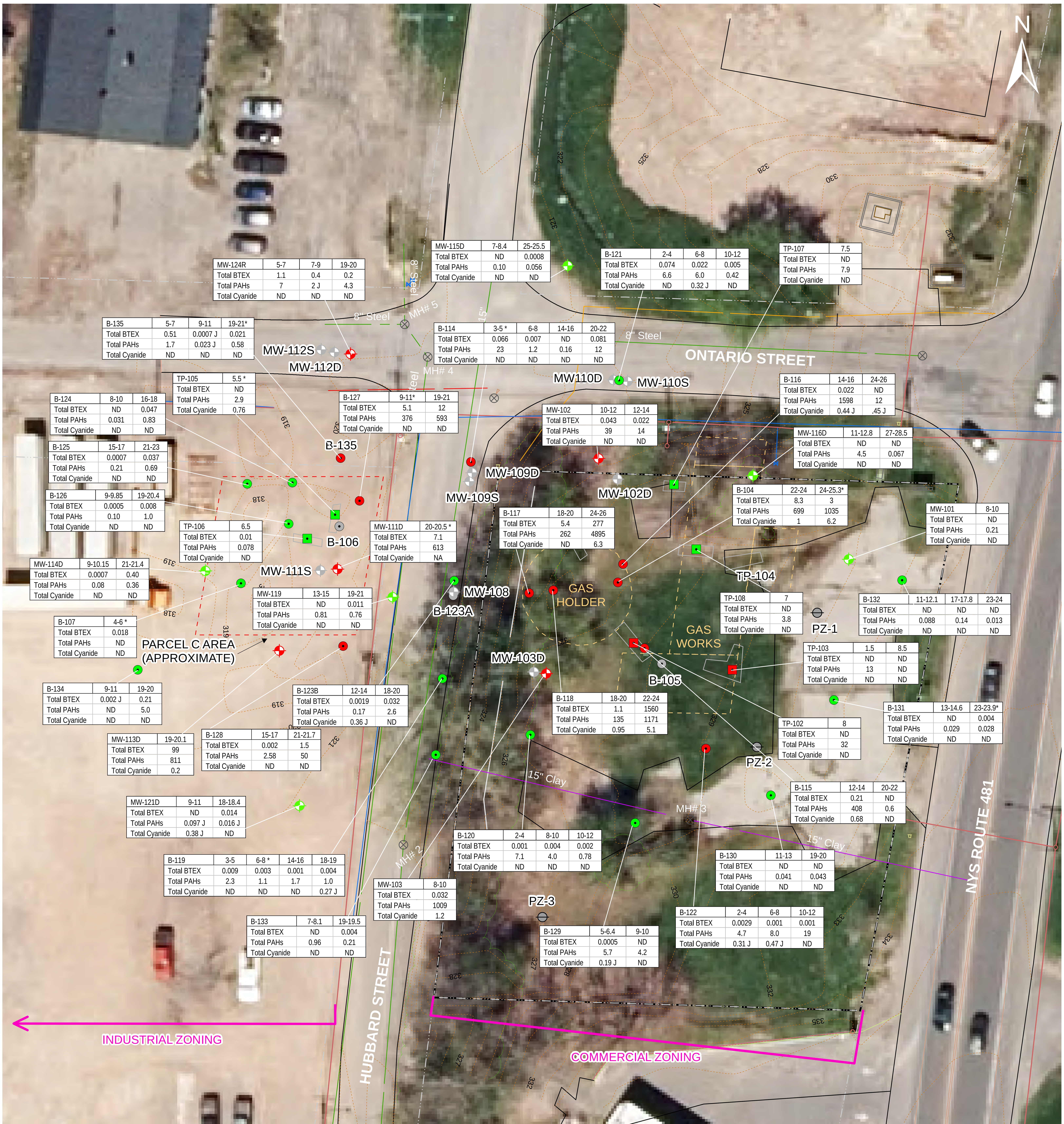
Author: JMarolda Path: V:\Ramsey\National_Grid\Fulton\fulton_visual_olf_impacts_SRI_BR_2018.mxd

Brown AND Caldwell

FIGURE 2-6
VISUAL/OLFACTORY OBSERVATIONS: BEDROCK
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

3/12/2019



Legend

Monitoring Well: green symbol indicates no exccedance of New York State Part 375 Soil Cleanup Objectives (SCOs); red symbol indicates one or more constituents exceed SCO(s)

Soil Boring: green symbol indicates no exccedance of SCOs; red symbol indicates one or more constituents exceed SCO(s)

Test Pit Sample: green symbol indicates no exccedance of SCOs; red symbol indicates one or more constituents exceed SCO(s)

Soil Boring

Monitoring Well

Piezometer

Test Pit

Manhole

Ground Surface Elevation Contour (ft, NGVD 29)

Site Boundary

Property Line

Pavement Edge

Water Line

Vegetation

Sanitary Sewer Line

Storm Sewer Line

Overhead Electric Line

Electric Line

Gas Line

Former MGP Structure Location. Locations are approximate, based on 1890 Sanborn Fire Insurance Map.

Explanation of terms and abbreviations:

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes
PAHs - Polycyclic Aromatic Hydrocarbons
J - Estimated Concentration
ND - Not Detected
NA - Not Analyzed

Bold Value - Indicates conentration of one or more constituents in a constituent group are above NYS Part 375 SCOs (Protection of Public Health for Commercially or Industrially Zoned Properties [depending on sample location]; Protection of Ecological Resources; and/or Protection of Groundwater)

Results reported in milligrams per kilogram (mg/kg)

* - Table lists the highest concentration from original and duplicate sample

Sources:
1) Base map developed based on drawing prepared by Snyder Engineering & Land Surveying, LLP (January 11, 2005); Revised by Delta Engineers, Architects, & Land Surveyors, P.C. (August 2018).

2) Aerial photo from NYSDOP 2015 survey

Author: BFTaylor Path: P:\GIS\National_Grid\Fulton\fulton_subsurface_soil_quality_SRI_2x3.mxd

Brown AND Caldwell

FIGURE 2-7
BTEX, PAHS AND CYANIDE IN SUBSURFACE SOIL
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

MW-112S	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	2	ND	ND	ND
Cyanide, total	ND	ND	ND	ND	ND	ND
MW-112D	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	2	ND	ND	ND
Cyanide, total	ND	ND	ND	ND	ND	ND

MW-110S	Sep-07	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND
Cyanide, total	ND	ND	ND	ND	ND	ND	ND
MW-110D	Sep-07	Dec-12	Mar-13 *	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	0.3 J	0.4 J
Toluene	ND	1 J	1 J	ND	1	2	2
Ethylbenzene	ND	4 J	4 J	ND	5	10	9
Xylenes, total	ND	15	13	0.7 J	16	27	25
Naphthalene	3.1	75	75	9	76	130	98
Cyanide, total	ND	ND	ND	ND	ND	ND	ND

MW-109S	Sep-07	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND
Cyanide, total	ND	ND	ND	ND	ND	ND	ND
MW-109D	Sep-07	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18*	Nov-18
Benzene	6.6	2 J	9	ND	ND	1	0.4 J
Toluene	ND	ND	2 J	ND	ND	0.5 J	0.5 J
Ethylbenzene	18	6	29	ND	ND	7	3
Xylenes, total	34	6	33	ND	ND	7	4
Naphthalene	150 JD	28	150	5	3	20	10
Cyanide, total	ND	ND	ND	ND	7.1 J	7.9 J	ND

MW-115D	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND
Naphthalene	ND	ND	ND	0.1 J
Cyanide, total	ND	ND	ND	ND

MW-116D	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND
Naphthalene	2	ND	ND	ND
Cyanide, total	ND	ND	5.5 J	ND

MW-122S	Sep-18	Nov-18
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
Xylenes, total	ND	ND
Naphthalene	0.1 J	ND
Cyanide, total	ND	ND

MW-122D	Sep-18	Nov-18
Benzene	0.6 J	ND
Toluene	ND	ND
Ethylbenzene	0.6 J	ND
Xylenes, total	ND	ND
Naphthalene	0.3 J	ND
Cyanide, total	ND	ND

MW-111S	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	25	15	6	29
Toluene	ND	ND	ND	ND	ND	1
Ethylbenzene	ND	ND	4	14	ND	9
Xylenes, total	ND	ND	0.5 J	5	ND	10
Naphthalene	ND	ND	0.6	8	ND	5
Cyanide, total	ND	ND	8.4 J	ND	6.8 J	7.4 J
MW-111D	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	44	110	72	42	67	52
Toluene	320	780	220	200	120	180
Ethylbenzene	470	600	360	300	200	330
Xylenes, total	1400	2600	1300	1200	710	1000
Naphthalene	2800	4300	7	2000	950	1100
Cyanide, total	98	160	15	12	27	16

MW-101	Dec-04 *	Sep-07	Dec-12 **	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide, total	2.2 J	ND	ND	ND	ND	ND	ND	ND

MW-102	Dec-04	Sep-07	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	2.2 J	ND	ND	ND	ND	ND	0.4 J	ND
Toluene	1.3 J	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.6 J	ND	ND	ND	ND	ND	0.5 J	ND
Xylenes, total	5.1 J	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	0.8	0.2 J	ND	0.4 J	0.3 J	1
Cyanide, total	13.7	23	54	22	15	ND	23	24

MW-102D	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18 *	Nov-18
Benzene	0.6 J	0.5 J	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND
Naphthalene	5	5	0.1 J	2	1	0.9
Cyanide, total	8.2 J	5.2 J	ND	ND	ND	ND

PZ-1	Dec-04	Sep-07	Dec-12	Mar-13	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	NS	NS
Toluene	ND	ND	ND	ND	NS	NS
Ethylbenzene	ND	ND	ND	ND	NS	NS
Xylenes, total	ND	ND	ND	ND	NS	NS
Naphthalene	ND	ND	12	ND	NS	NS
Cyanide, total	ND	ND	ND	ND	NS	NS

MW-114D	Oct-15	Mar-16 *	Sep-18	Nov-18
Benzene	13	30	12	26
Toluene	27	59	17	77
Ethylbenzene	51	280	29	120
Xylenes, total	120	540	57	250
Naphthalene	7	1200	51	200
Cyanide, total	ND	ND	ND	ND

MW-113D	Oct-15	Mar16 *	Sep-18	Nov-18
Benzene	44	23	12	22
Toluene	3	2	ND	4
Ethylbenzene	64	60	2	25
Xylenes, total	24	15	ND	15
Naphthalene	42	10	0.3 J	3
Cyanide, total	ND	7.7 J	17	5.7 J

MW-119	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	0.2 J
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Cyanide, total	ND	ND	ND	ND

MW-103	Dec-04	Sep-07 *	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	0.2 J	ND	ND	ND	ND	ND
Cyanide, total	11	16	14	15	19	26	19	19

MW-103D	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18 *
Benzene	ND	ND	8	9	12	17
Toluene	ND	ND	2	ND	0.3 J	2
Ethylbenzene	3 J	ND	3	2	2	2
Xylenes, total	8	ND	7	3	3 J	4 J
Naphthalene	70 J	6	25	2	4	3
Cyanide, total	15	17	20	23	23	18

MW-120D	Sep-18	Nov-18
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
Xylenes, total	ND	ND
Naphthalene	ND	ND
Cyanide, total	ND	ND

PZ-2	Dec-04	Sep-07	Dec-12	Mar-13	Sep-18	Nov-18
Benzene	ND	ND	ND	ND	NS	NS
Toluene	ND	ND	ND	ND	NS	NS
Ethylbenzene	ND	ND	ND	ND	NS	NS
Xylenes, total	ND	ND	ND	ND	NS	NS
Naphthalene	ND	ND	ND	0.2 J	NS	NS
Cyanide, total	ND	ND	ND	ND	NS	NS

MW-121S	Sep-18	Nov-18
Benzene	ND	ND
Toluene	ND	ND
Ethylbenzene	ND	ND
Xylenes, total	ND	ND
Naphthalene	ND	ND
Cyanide, total	ND	ND

MW-121D	Sep-18	Nov-18
Benzene	ND	3
Toluene	ND	ND
Ethylbenzene	ND	ND
Xylenes, total	ND	ND
Naphthalene	ND	0.2 J
Cyanide, total	ND	ND

MW-108	Sep-07	Dec-12	Mar-13	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	26	ND	31	ND	ND	0.9 J	3
Toluene	ND	ND	ND	ND	ND	ND	0.5 J
Ethylbenzene	7.3	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	ND
Naphthalene	4.1 J	ND	0.2 J	ND	ND	ND	ND
Cyanide, total	56	20	13	ND	ND	16	8.5 J

PZ-3	Dec-04	Nov-06 *	Dec-12	Sep-18	Nov-18
Benzene	ND	ND	ND	NS	NS
Toluene	8.8 J	4.2 J	2 J	NS	NS
Ethylbenzene	ND	ND	ND	NS	NS
Xylenes, total	ND	ND	ND	NS	NS
Naphthalene	NA	NA	0.1 J	NS	NS
Cyanide, total	NA	NA	ND	NS	NS

Legend

- Shallow Overburden Monitoring Well
- Deep Overburden Monitoring Well
- Piezometer
- Manhole
- Ground Surface Elevation Contour (ft, NGVD 29)
- Site Boundary
- Property Line
- Pavement Edge
- Vegetation
- Water Line
- Storm Sewer Line
- Sanitary Sewer Line
- Gas Line
- Electric Line
- Overhead Electric Line
- Former MGP Structure Location. Locations are approximate, based on 1890 Sanborn Fire Insurance Map.

Sources:
1) Base map developed based on drawing prepared by Snyder Engineering & Land Surveying, LLP (January 11, 2005); Revised by Delta Engineers, Architects, & Land Surveyors, P.C.(August 2018).
2) Aerial photo from NYSDOP 2015 survey

Explanation of terms and abbreviations:
ND - Not detected
NA - Not analyzed
J - Estimated concentration
D - Reported result is representative of a diluted sample analysis.

Bold Value - Indicates constituent concentration above Class GA Criterion.

Results reported in micrograms per liter (µg/L)

* - Table lists the highest concentration from original and duplicate sample
** - Duplicate sample collected

1/24/2020

Author: JMarolda Path: V:\Ramsey\National_Grid\Fulton\fulton_overburden_groundwater_quality_2X3_Landscape_SRI_DSR.mxd

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FIGURE 2-8
BTEX, NAPHTHALENE AND CYANIDE IN OVERBURDEN GROUNDWATER
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

1/24/2020

MW-124R	Sep-18	Nov-18
Benzene	4	8
Toluene	18	26
Ethylbenzene	33	77
Xylenes, total	80	160
Naphthalene	230	410
Cyanide, total	ND	ND

MW-125R	Sep-18	Nov-18 *
Benzene	11	5 J+
Toluene	75	38 J+
Ethylbenzene	100	63 J+
Xylenes, total	350	180 J+
Naphthalene	810	210 J
Cyanide, total	ND	ND

MW-109R	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	7	NS	NS	NS
Toluene	100 J	NS	NS	NS
Ethylbenzene	39	NS	NS	NS
Xylenes, total	320	NS	NS	NS
Naphthalene	760	NS	NS	NS
Cyanide, total	ND	NS	NS	NS

MW-122R	Sep-18	Nov-18
Benzene	12	15 J+
Toluene	9	18 J+
Ethylbenzene	32	49 J+
Xylenes, total	190	170
Naphthalene	0.8	400
Cyanide, total	ND	ND

MW-122RD	Sep-18	Nov-18
Benzene	ND	ND
Toluene	0.2 J	ND
Ethylbenzene	ND	ND
Xylenes, total	ND	ND
Naphthalene	ND	0.1 J
Cyanide, total	ND	ND

MW-111R	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	29	14	11	5
Toluene	180	110	66	43
Ethylbenzene	250	170	92	66
Xylenes, total	860	630	290	200
Naphthalene	1900	1800	700	17
Cyanide, total	ND	ND	ND	ND

MW-117R	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	NS	NS	NS	NS
Toluene	NS	NS	NS	NS
Ethylbenzene	NS	NS	NS	NS
Xylenes, total	NS	NS	NS	NS
Naphthalene	NS	NS	NS	NS
Cyanide, total	NS	NS	NS	NS

MW-123R	Sep-18	Nov-18
Benzene	ND	ND
Toluene	0.2 J	ND
Ethylbenzene	0.5 J	ND
Xylenes, total	ND	ND
Naphthalene	2	0.9
Cyanide, total	ND	ND

BRB-1	Oct-15	Mar-16	Sep-18	Nov-18
Benzene	13	3	13	2
Toluene	77	19	85	20
Ethylbenzene	120	36	93	34
Xylenes, total	410	140	340	120
Naphthalene	1400	710	650	42
Cyanide, total	ND	ND	ND	ND

MW-121R	Sep-18	Nov-18
Benzene	4	2
Toluene	21	3
Ethylbenzene	50	14
Xylenes, total	150	24
Naphthalene	380	43
Cyanide, total	ND	ND

MW-120R	Sep-18	Nov-18
Benzene	1	ND
Toluene	0.7 J	ND
Ethylbenzene	2	ND
Xylenes, total	3 J	ND
Naphthalene	4	0.4 J
Cyanide, total	ND	ND

Legend

- Bedrock Monitoring Well
- Manhole
- Ground Surface Elevation Contour (ft, NGVD 29)
- Site Boundary
- Property Line
- Pavement Edge
- Vegetation
- Water Line
- Storm Sewer Line
- Sanitary Sewer Line
- Gas Line
- Electric Line
- Overhead Electric Line
- Former MGP Structure Location. Locations are approximate, based on 1890 Sanborn Fire Insurance Map.

Explanation of terms and abbreviations:

ND - Not detected
NA - Not analyzed
J - Estimated concentration
J+ - Estimate concentration.Result is estimated high.

Bold Value - Indicates constituent concentration above Class GA Criterion.

Results reported in micrograms per liter (µg/L)

* - Table lists the highest concentration from original and duplicate sample
** - Duplicate sample collected

Sources:
1) Base map developed based on drawing prepared by Snyder Engineering & Land Surveying, LLP (January 11, 2005); Revised by Delta Engineers, Architects, & Land Surveyors, P.C.(August 2018).

2) Aerial photo from NYSDOP 2015 survey

Author: JMarolda Path: V:\Ramsey\National_Grid\Fulton\fulton_bedrock_groundwater_quality_2X3_Landscape_SRI_2018.mxd

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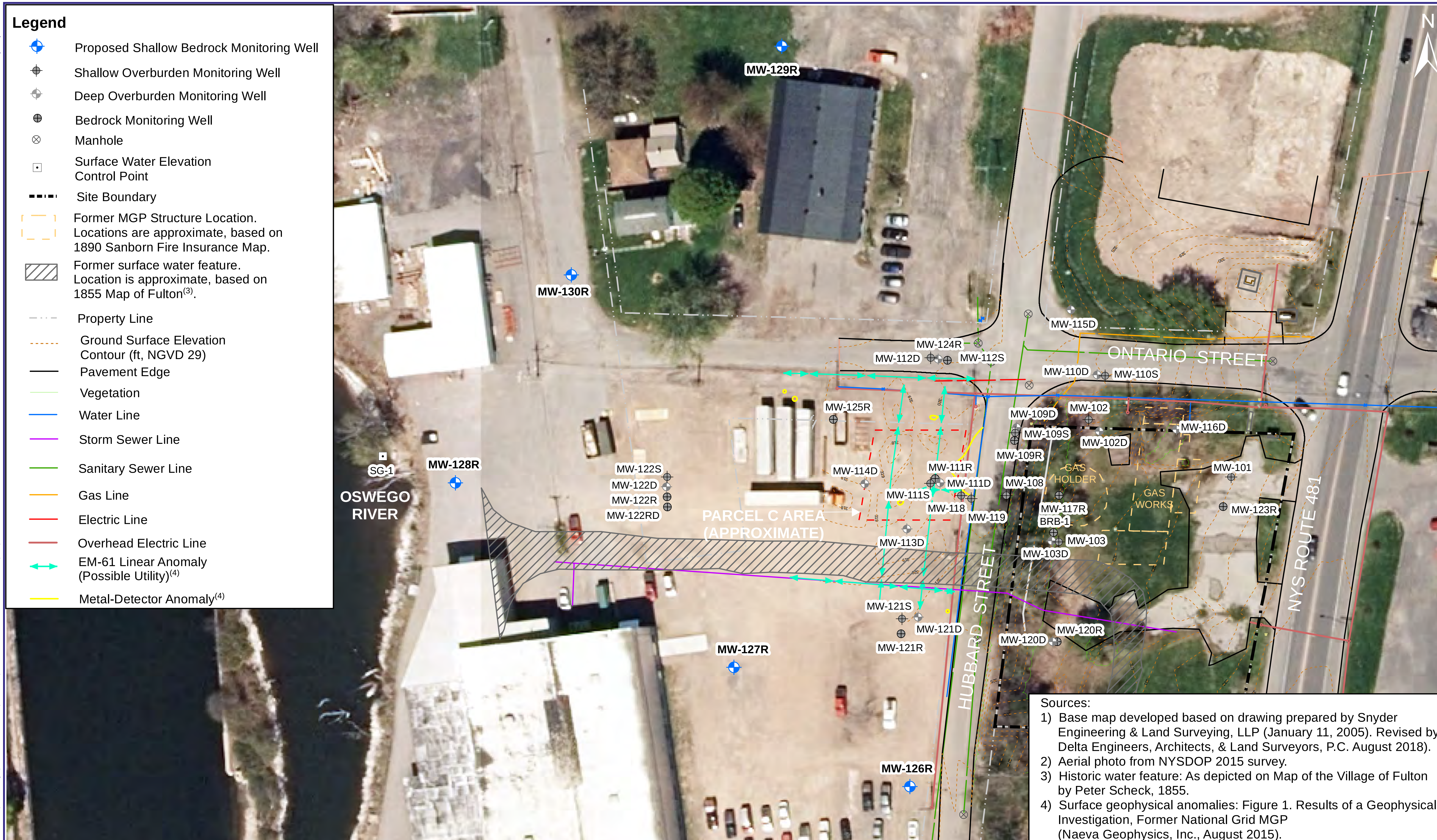
FIGURE 2-9
BTEX, NAPHTHALENE AND CYANIDE IN BEDROCK GROUNDWATER
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 20 40
Feet

2/14/2020



Author: Rhojnacki Path: V:\Ramsey\National_Grid\Fulton\fulton_SRIWP_addendum_proposed_locs_2020.mxd

Brown AND Caldwell

FIGURE 3-1
PROPOSED SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS
NATIONAL GRID
FULTON (ONTARIO ST.) FORMER MGP SITE, FULTON, NEW YORK

0 30 60
Feet