April 4, 2017

Mr. Steven Stucker
Senior Environmental Engineer
National Grid
Environmental Department C-1
300 Erie Boulevard West
Syracuse, New York 13202

RE: Former Fulton MGP Site – Residential Cleanup Criteria Feasibility Letter Report
FILE: 1118/44581

Dear Mr. Stucker:

O'Brien & Gere (OBG) has prepared this letter report discussing the feasibility of cleanup of the Former Fulton Manufactured Gas Plant (MGP) Site to Residential Cleanup Objectives presented in 6 NYCRR Part 375 as contrasted to cleanup to the levels specified in the March 2009 Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC).

INTRODUCTION

The Former Fulton MGP Site occupies approximately 1.04 acres in a residential section of the City of Fulton, Oswego County, New York (Figure 1). The Site operated as an MGP Site producing manufactured gas from 1903 to 1932. Three parcels comprise the Site. Area 1 of the Site is a single parcel (253-05-08) north of South First Street that is zoned residential (R1A). Area 2 of the Site is south of South First Street and includes two parcels, one of which (253.33-02-01) is zoned residential (R1A) and the other of which (253.33-02-02) is zoned commercial (C-2). All three parcels are owned and deed restricted by National Grid.

The manufacturing process involved heating coal and petroleum products to produce combustible gas. The gas was cooled, purified and then piped to the end users. The former MGP facility included a gas holder, gas tank, oil tank, oil house, coke shed, tar well, and concentrator house. In general, Area 2 of the Fulton Site contained the gas production facilities and Area 1 contained facilities for storing and distributing the gas. As the gas was cooled and purified prior to distribution, a dark oily liquid known as coal tar condensed and accumulated in various gas plant structures. Tar leaking from the holders and other structures impacted soil and groundwater in the vicinity of the former MGP.

As presented in the ROD issued by the NYSDEC in March 2009, the remediation goals for the Site are to prevent, eliminate or reduce to the extent practicable:

- Ingestion/direct contact with contaminated soil;
- Inhalation of contaminants volatilizing from contaminated soil;
- Eliminate through removal, treatment and/or containment source areas in soil;
- Migration of contaminants into the adjacent surface water;
- Eliminate through removal, treatment and/or containment, the impact of soil to groundwater;
- Potential infiltration of chemicals of concern (COCs) into the storm sewer adjacent to Area 2 of the Site.

To meet these goals, the ROD presents the NYSDEC-selected remedy that includes, among other things, the following elements:

- Excavation and removal to their full depth of all former MGP related structures and foundations in Areas 1 and 2 that contain MGP-related contaminated materials. Impacted soil in the immediate vicinity of the structures will be removed to the extent practicable.
- Excavation of approximately 2,822 cubic yards of soil grossly contaminated with MGP wastes. Materials will be excavated to depths of up to 7 feet below ground surface (bgs) or to the extent practicable due to dewatering limitations. The material to be excavated will include soil containing visible coal tar or separate phase materials. The actual depth of removal will be based on visual observations in the field with the concurrence of the NYSDEC. A visible demarcation barrier will be installed at the bottom of the excavation to mark the extent of soil removal prior to backfilling.
- Excavation areas will be backfilled with clean soil from off-site locations that meet NYSDEC's backfill criteria for intended site use. Excavated soil may be used to backfill the lower portions of the excavation if they meet NYSDEC criteria.
- Installation and maintenance of a soil cover over Areas 1 and 2. The soil cover will consist of a minimum of 2 feet of clean material meeting NYSDEC's backfill criteria. National Grid may propose to use other cover materials such as asphalt or other paving material to meet the next intended use of the property subject to NYSDEC approval. The type and nature of soil cover to be installed will be determined pursuant to 6 NYCRR Part 375.

In February 2011, on behalf of National Grid, OBG transmitted the Final Design Report for the Former Manufactured Gas Plant Site in Fulton, New York to the NYSDEC, which incorporated responses to comments on the draft 100% Final Design presented in an August 20, 2010 letter to the Department and approved by the Department's December 20, 2010 letter to O'Brien & Gere.

Subsequent to submission of the Final Design Report, the NYSDEC requested that National Grid either obtain a zoning change for the two parcels zoned as residential (253.25-05-08 and 253.33-02-01) or clean these two parcels to the Residential Cleanup Objectives presented in 6 NYCRR Part 375. Cleaning these parcels to Residential Cleanup Objectives would entail an increase in the vertical limits of the excavations. This increase would lead to an increase in the volume of excavated soils of approximately 4,550 cubic yards. This increase in vertical limits would also require excavation support (*e.g.,* steel sheeting) and an on-site water pre-treatment system.

As requested by National Grid, OBG has prepared this letter report to evaluate the feasibility of cleanup of these two parcels to the Residential Cleanup Standards and contrast cleanup of these two parcels to the Residential Cleanup Standards and cleanup of the third parcel to the ROD standards to remediation of all three parcels as described in the ROD. The two remedial alternatives were evaluated relative to the following criteria:

- Overall protection of Human Health and the Environment
- Compliance with Standards, Criteria and Guidance (SGCs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

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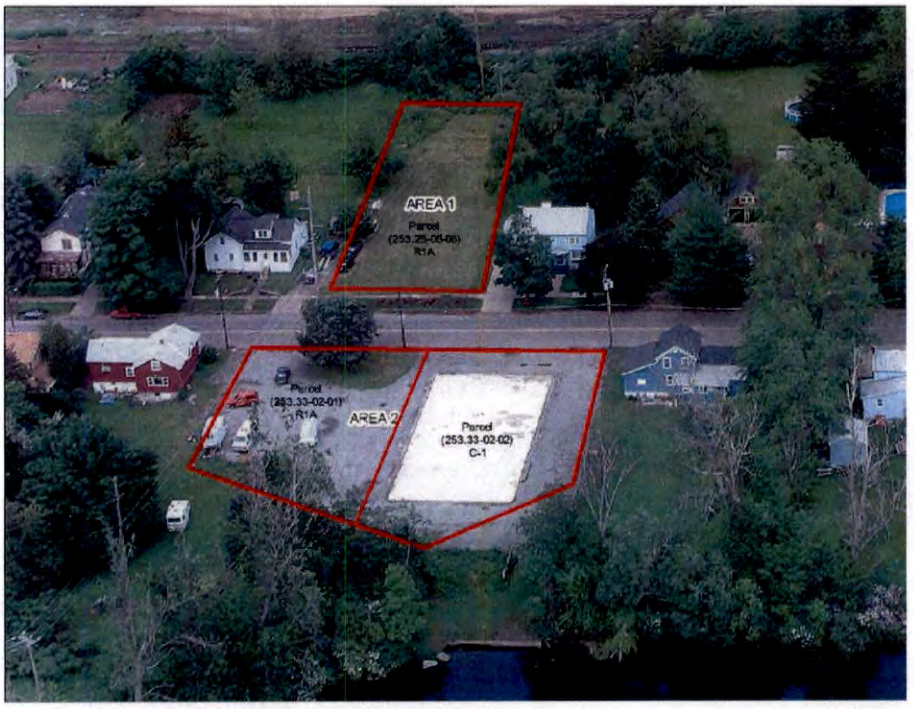
PHYSICAL LIMITATIONS TO REMEDIATION

Site conditions present challenges to remediation at both Areas 1 and 2. Specifically, the small size, the residential surroundings and the shallow ground water are physical characteristics that complicate remediation and need to be considered during development and evaluation of alternatives for the Site.

Figure 1



The small size of the site and presence of overhead utilities makes it difficult to implement staging of construction equipment or materials and on-site treatment of remediation wastes as well as execution of excavation and shoring activities. Overhead power lines owned by National Grid transit Area 1 (Parcel 253.25-05-08) and the northern most parcel of Area 2 (Parcel 253.33-02-01).

The lack of room makes extensive excavation very difficult, because there is limited room for staging of excavation materials or trucks awaiting loading. The lack of space between impacted soil and the neighboring properties does not allow for excavation benching to access material to be excavated at depth, requiring shoring to be used for excavations below the water table. The size of the Site also limits the ability to stage shoring equipment and materials (including backfill material), thus limiting productivity and extending mobilization phases. The presence of overhead utilities presents limitations on excavation, loading and installation of sheeting for Areas 1 and 2. Underground utilities associated with natural gas distribution are also known to exist on the southern end of Area 1.

The logistical constraints presented by the small size of the Site are compounded by the presence of residences around the Site. Odors and vapor emissions related to open excavations are a significant consideration for residents. Given the low anticipated excavation rates due to the limitations described above, odors and vapors could be emitted for extended durations. In addition to potentially subjecting residents to odors and vapor emissions for the duration of excavation, the noise and vibration due to shoring installation and truck traffic could be considerable for extensive excavations. Installation of sheeting along the perimeter of Area 2 could also

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affect the integrity of nearby residential foundations. In addition, installation of sheeting could result in potential basement flooding due to potential ground water mounding caused by the presence of sheet piles.

The residential nature of the area make the anticipated truck traffic related to excavation and disposal yet another significant consideration for this project. Roadways in the vicinity of the site may be damaged by the traffic and heavy loads associated with extensive excavation at the Site. In addition, the heavy traffic and associated inconvenience to residents would be considerable for extensive excavations.

In addition to the considerable nuisance and inconvenience posed to residents and the logistical constraints presented by the location and small size of the Site, the presence of shallow groundwater and deep contamination present constructability limitations as well. The presence of groundwater at 1.5 to 8 ft below ground surface will result in significant dewatering needs and the need for shoring for deep excavations. To remove certain areas of contamination, excavations would need to extend to depths of up to 28 ft below ground surface. Collected groundwater resulting from construction dewatering may require transportation off-site further contributing to the traffic problems associated with remedies including extensive excavation. In addition to dewatering needs, it is anticipated that excavation shoring systems will require the use of bracing and anchoring systems, due to the nature of the till present in the subsurface which would not allow the use of conventionally driven sheet piles, adding considerable complication and cost to shoring designs for deep excavation at the Site.

In addition to the physical constraints of the Site, it should be noted that excavation of MGP-impacted material results in generation of greenhouse gases associated with excavation activities and off-site transportation of material, and related importation of fill. The relative quantity of greenhouse gases generated is proportional to the quantity of material excavated. Thus, full-scale removal of MGP-impacted material down to a depth of 28 ft could result in significant greenhouse gas generation when compared to equally protective options.

EVALUATION OF ALTERNATIVES

The following section presents the evaluation of cleanup to Residential Cleanup Standards on the two parcels zoned residential (and cleanup on the third parcel to the ROD-specified standards) and cleanup of Area 1 and Area 2 to the ROD-specified standards.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

With respect to protection of human health, cleanup to either standard would provide equal protectiveness from exposure to groundwater and soil. With respect to protection of the environment, off-site impacts to the environment (off-site ground water) have not been observed. Cleanup to either standard would provide protection to human health and the environment.

COMPLIANCE WITH STANDARDS, CRITERIA AND GUIDANCE (SGCS)

As summarized in the Feasibility Study for the Site, chemical-specific SCGs were identified for ground water and soil. The selected remedy for the Site would address ground water and soil SCGs, through institutional controls, the combination of limited excavation, soil cover, sewer rehabilitation, and enhanced natural attenuation. Cleanup to the Residential Standards would also address the SCGs through removal of soil exhibiting concentrations to meet NYS Residential Use SCOs.

No location-specific SCGs were identified for the Site. Action-specific SCGs related to OSHA requirements during construction activities were identified for the remedy and would be met during construction to either cleanup standard. Also, action-specific SCGs related to air emissions and waste management were identified for the remedy and would be met during remedy implementation of either cleanup approach.

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LONG-TERM EFFECTIVENESS AND PERMANENCE

Cleanup to either standard would provide long-term effectiveness and permanence through adequate and reliable mitigation of exposures to soil and ground water. Although cleanup to NYS Residential Use SCOs would provide added long-term effectiveness and permanence through the removal of soil exceeding NYS Residential Use SCOs, the combination of limited excavation, soil cover, sewer rehabilitation, and enhanced natural attenuation for cleanup to the ROD specified standards would provide similar long-term effectiveness and permanence through reduction in the potential for migration of MGP-related COCs off-site.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Regardless of which soil cleanup standard is utilized, installation of a soil cover would provide equal reduction in potential mobility of MGP-related COCs. Limited excavation of soil as required to meet the cleanup standards as presented in the ROD would provide only a minor reduction in volume of MGP-related material present at the Site (compared to NYS Residential Use SCOs), however, the majority of MGP-related material would remain under this approach (due to the extensive depth to the material). Removal of soil exceeding NYS Residential Use SCOs would provide a larger reduction in volume of MGP-related material when compared to the ROD cleanup objectives. However, since current site conditions indicate that impacted ground water is not migrating off-site (except potentially though the sewer) and NAPL was not observed to be mobile, either cleanup approach would achieve similar reduction in potential mobility through either sewer rehabilitation and enhanced natural attenuation.

SHORT-TERM EFFECTIVENESS

Engineering controls would be implemented during construction of the alternatives that would be adequately protective of the community and the environment.

Excavation activities related to either cleanup approach may present odor, dust and vapor exposures to nearby residents. The extensive excavation included to achieve NYS Residential Use SCOs may result in significantly increased impacts to the community and site workers related to these exposures due to the longer duration of construction. The higher level of traffic associated with off-site disposal and excavation backfill required for this cleanup approach would present a significant increase in impacts to the local community.

Environmental impacts such as air emissions, including greenhouse gases would be lower for the cleanup approach presented in the ROD and more significant for the approach meeting NYS Residential Use SCOs. These increased emissions are most influenced by the anticipated duration of activities involving excavation, the increased quantity of excavated materials requiring transportation off-site, and the increased quantity of backfill required.

The cleanup approach required by the ROD, which meets the RAOs and provides equal protectiveness as the alternate approach being evaluated, can be constructed with significantly less short-term impacts to the local community and the environment.

IMPLEMENTABILITY

While cleanup to either the ROD specified standards or to NYS Residential Use SCOs are each implementable, cleanup to Residential Use SCOs is significantly more difficult due to the following considerations:

- Increase in duration of project (greater disturbance to neighbors, more truck traffic, higher probability of damage to streets)
- Increased duration of dust, odor, and vapor control required
- Increase in Health and Safety measures required (duration and quantity)

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- Increase in duration of vibration monitoring
- Increase in duration of monitoring to adjacent residential properties (masonry, drywall, etc.)
- Increase in noise monitoring and mitigation
- Increase in volume of construction and/or groundwater to manage and/or treat/dispose of and likely the need for an on-site water pre- treatment facility
- Increase in volume of material for treatment/disposal
- Steel sheeting will require additional tiebacks/internal bracing due to increased excavation depths
- Increase in volume of backfill material
- Increased greenhouse gas emissions

COST

The estimated cost (in 2017 dollars) of cleanup to the ROD selected remedy is approximately $3,370,000 while the estimated cost (in 2017 dollars) of cleanup to the NYS Residential Use SCOs is approximately $8,450,000. A detailed cost estimate for each cleanup approach is attached.

SUMMARY

Cleanup of the former Fulton MGP Site to either the ROD specified cleanup standards or the NYS Residential Use SCOs would achieve the remediation goals for the site identified in the ROD. Either approach is protective of human health and the environment, would comply with identified SCGs, and exhibit long term effectiveness and permanence. While either cleanup option would reduce mobility, cleanup to the Residential Use SCO would remove a greater volume of waste from the site. This may be offset by the risks associated with the increased duration of construction and traffic associated with cleanup to the Residential standard. Similarly, cleanup to the Residential Use SCOs will result in greater short term impacts. Cleanup the Residential Use SCOs is significantly more difficult to implement due to the presence of overhead utilities, greater depth of excavation required, relatively shallow depth of groundwater and small area available for construction activities. The cost of cleanup to the Residential Cleanup SCOs is estimated to be approximately 2.5 times as costly ($8,450,000 vs. $3,370,000) as cleanup to the ROD specified standards.

We appreciate the opportunity to provide continuing services to National Grid in connection with this challenging project. If you have any questions or require additional information, please contact me.

Very truly yours,
O'BRIEN & GERE ENGINEERS, INC.

Stephen W. Anagnost, P.E.
Senior Managing Engineer

Attachments

cc: Brian Stearns, P.E. – National Grid
Marvin Hull - OBG
William Monette, P.E. – OBG
Dehorah Wright, CPG – OBG

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National Grid- Former Fulton MGP Site
Oswego County, New York
Cleanup to ROD Standards
Construction Cost Estimate

Item No.	Payment Item	Unit	Estimated Quantity	Unit Price	Total
	Section 1 - Fixed Maximum Lump Sum				
1.1	Mobilization	lump sum	1	$ 138,000.00	$ 138,000
1.2	Demobilization	lump sum	1	$ 69,000.00	$ 69,000
1.3a	Performance Bond	lump sum	1	$ 7,000.00	$ 7,000
1.3b	Payment Bond	lump sum	1	$ 7,000.00	$ 7,000
	Section 2 - Lump Sum Items				
2.1	Health and Safety Plan	lump sum	1	$ 15,000.00	$ 15,000
2.1a	CAMP Plan	lump sum	1	$ 8,000.00	$ 8,000
2.2	HASP and CAMP Implementation	lump sum	1	$ 72,000.00	$ 72,000
2.3	Construction Work Plans	lump sum	1	$ 35,000.00	$ 35,000
2.4	SWPPP	lump sum	1	$ 15,000.00	$ 15,000
2.5	Surveys and Record Drawings	lump sum	1	$ 25,000.00	$ 25,000
2.6	Construction Water Management	lump sum	1	$ 50,000.00	$ 50,000
2.7a	Cleaning and Inspection of Storm Sewer	lump sum	1	$ 11,000.00	$ 11,000
2.7b	In-Situ Relining of Storm Sewer	lump sum	1	$ 100,500.00	$ 100,500
2.7c	Post-Construction Inspection of Storm Sewer	lump sum	1	$ 6,200.00	$ 6,200
2.8	Work Zone Delineation	lump sum	1	$ 50,000.00	$ 50,000
2.9	Excavation Support Plan	lump sum	1	$ 5,000.00	$ 5,000
	Section 3 - Unit Price Items				
3.1a	Groundwater Monitoring Well Decommissioning (MW-6 and PZ-1)	LF	53	$ 100.00	$ 5,300
3.1b	Groundwater Monitoring Well Construction (MW-14)	LF	30	$ 100.00	$ 3,000
3.2a	Odor Suppression Controls	week	20	$ 1,000.00	$ 20,000
3.2b	Bio solve® Solution	drum	3	$ 2,157.00	$ 6,471
3.2c	RUSMAR Odor Suppression Foam	drum	12	$ 575.00	$ 6,900
3.3	Excavation and Removal of Asphalt Pavement	Tons	489	$ 25.00	$ 12,225
3.4	Excavation and Removal of Former MGP Structures	Tons	2800	$ 200.00	$ 560,000
3.5	Excavation, Stockpiling and handling of Soil to depth of 2 ft bgs	CY	2150	$ 18.00	$ 38,700
3.6	Excavation, Stockpiling and handling of Soil below a depth of 2 ft bgs	CY	2650	$ 40.00	$ 106,000
3.7a	Transportation and Disposal of MGP Impacted Soils - "Non Hazardous" Characteristic Soil	Tons	1431	$ 75.00	$ 107,325
3.7b	Transportation and Disposal of MGP Impacted Soils - MGP Tar or NAPL Containing Waste to ESMI for LTTD	Tons	1431	$ 150.00	$ 214,650
3.7c	Transportation and Disposal of MGP Impacted Soils - "Hazardous" Characteristic Soil	Tons	1431	$ 300.00	$ 429,300
3.8	Asphalt Recycing	Tons	489	$ 19.00	$ 9,291
3.9	Transportation and Disposal of C&D Waste - MGP Structures	Tons	2800	$ 55.00	$ 154,000
3.10a	Soil Sampling, Volatile Organic Compounds	EA	10	$ 82.50	$ 825
3.10b	Soil Sampling, Semi-Volatile Organic Compounds	EA	10	$ 171.60	$ 1,716
3.10c	Soil Sampling, Metals and Cyanide	EA	10	$ 125.40	$ 1,254
3.11a	Demarcation Layer (Geotextile Filter Fabric)	SF	24000	$ 0.50	$ 12,000
3.11b	Stabilization Fabric	SF	1000	$ 0.50	$ 500
3.12	Placement of Suitable Excavated Material as Backfill	CY	1938	$ 15.00	$ 29,070
3.13	Backfill, Grading and Compaction of Excavations with common fill	CY	4100	$ 36.00	$ 147,600
3.14	Select Fill - Type "F"	CY	50	$ 30.00	$ 1,500
3.15	Topsoil	CY	900	$ 38.00	$ 34,200
3.16	Seeding, Fertilizer and Mulch	SF	45800	$ 0.50	$ 22,900
3.17	ORC Advanced®	LB	4000	$ 6.00	$ 24,000
3.18	Storm Sewer Jet Grouted Water Stop	CF	400	$ 125.00	$ 50,000
	Section 4 - Indirect Capital Costs				
4.1	Contingency (25% Direct Capital Costs)	lump sum	1	$ 344,000	$ 344,000
4.2	Engineering (15% Direct Capital Costs)	lump sum	1	$ 207,000	$ 207,000
4.3	Construction Management (10% Direct Capital Costs)	lump sum	1	$ 138,000	$ 138,000
4.4	Legal Fees (5% Direct Capital Costs)	lump sum	1	$ 69,000	$ 69,000
				Grand Total	$ 3,370,427

Assumptions:

1 Excavations will extend to the groundwater table if encountered but will not extend past 7 ft BGS.
2 1938 CY of soil removed from top 2 ft to be used as bakfill for excavations greater than 2 ft
3 Transportation and Disposal of MGP Impacted Soils assumes 33.3% will be clasified Non-Hazardous, 33.3% will be clasified as MGP Tar or Napl Containing Waste to ESMI for LTTD and 33.3% will be clasified Hazardous.
4 Abandon 2 Monitoring Wells and install 1
5 Estimated Project Duration is 24 Weeks
6 Jet Grouting does not include mobilization and demobilization
7 Conversion from CY to Tons is assumed to be 1 CY = 1.5 TON
8 Estimate reflects 2017 Dollars
9 Concrete slabs and foundations are approx. 2 ft thick. 1 CY of concrete assumed to weigh 4000 lbs.
10 Item 3.6 includes money for excavation support

National Grid - Former Fulton MGP Site
Oswego County, New York
Remediation of Area 1 to Residential and Area 2 West to Residential/Area 2 East to ROD Specified Soil Cleanup Objectives
Construction Cost Estimate

Item No.	Payment Item	Unit	Estimated Quantity	Unit Price	Total
	Section 1 - Fixed Maximum Lump Sum				
1.1	Mobilization	lump sum	1	$ 345,000.00	$ 345,000
1.2	Demobilization	lump sum	1	$ 173,000.00	$ 173,000
1.3a	Performance Bond	lump sum	1	$ 18,000.00	$ 18,000
1.3b	Payment Bond	lump sum	1	$ 18,000.00	$ 18,000
	Section 2 - Lump Sum Items				
2.1	Health and Safety Plan	lump sum	1	$ 15,000.00	$ 15,000
2.1a	CAMP Plan	lump sum	1	$ 8,000.00	$ 8,000
2.2	HASP and CAMP Implementation	lump sum	1	$ 120,000.00	$ 120,000
2.3	Construction Work Plans	lump sum	1	$ 35,000.00	$ 35,000
2.4	SWPPP	lump sum	1	$ 15,000.00	$ 15,000
2.5	Surveys and Record Drawings	lump sum	1	$ 25,000.00	$ 25,000
2.6a	Construction Water Pretreatment - Mobilization of CWTP	lump sum	1	$ 75,000.00	$ 75,000
2.6b	Construction Water Pretreatment - Operation and Maintenance of CWTP	lump sum	1	$ 375,000.00	$ 375,000
2.6c	Construction Water Pretreatment - Demobilization	lump sum	1	$ 50,000.00	$ 50,000
2.7	Off-Site Transportation and Disposal of Construction Water (Stipulated Lump Sum)	Stipulated	1	$ 196,000.00	$ 196,000
2.8a	Cleaning and Inspection of Storm Sewer	lump sum	1	$ 11,000.00	$ 11,000
2.8b	In-Situ Relining of Storm Sewer	lump sum	1	$ 100,500.00	$ 100,500
2.8c	Post-Construction Inspection of Storm Sewer	lump sum	1	$ 6,200.00	$ 6,200
2.9	Work Zone Delineation	lump sum	1	$ 50,000.00	$ 50,000
2.10	Excavation Support Plan	lump sum	1	$ 10,000.00	$ 10,000
	Section 3 - Unit Price Items				
3.1a	Groundwater Monitoring Well Decommissioning (MW-6 and PZ-1)	LF	53	$ 100.00	$ 5,300
3.1b	Groundwater Monitoring Well Construction (MW-14)	LF	30	$ 100.00	$ 3,000
3.2a	Odor Suppression Controls	week	36	$ 1,000.00	$ 36,000
3.2b	Bio solve® Solution	drum	5	$ 2,157.00	$ 10,785
3.2c	RUSMAR Odor Suppression Foam	drum	24	$ 575.00	$ 13,800
3.3	Excavation and Removal of Asphalt Pavement	Tons	489	$ 25.00	$ 12,225
3.4	Excavation and Removal of Former MGP Structures Area 1 & 2	Tons	2800	$ 200.00	$ 560,000
3.5a	Excavation, Stockpiling and handling of Soil to depth of 2 ft bgs Area 1	CY	1350	$ 18.00	$ 24,300
3.5b	Excavation, Stockpiling and handling of Soil below a depth of 2 ft bgs Area 1	CY	3100	$ 20.00	$ 62,000
3.6a	Perimeter Sheet Piling (290'x28') Area 1	VSF	8120	$ 50.00	$ 406,000
3.6b	Installation of Soldier Pile & Lagging Under Overhead Utilities (80'x12') Area 1	VSF	960	$ 123.00	$ 118,080
3.7a	Excavation, Stockpiling and handling of Soil to depth of 2 ft bgs Area 2	CY	1100	$ 18.00	$ 19,800
3.7b	Excavation, Stockpiling and handling of Soil below a depth of 2 ft bgs Area 2	CY	3800	$ 20.00	$ 76,000
3.8	Perimeter Sheet Piling (475'x28') Area 1	VSF	13300	$ 75.00	$ 997,500
3.9a	Transportation and Disposal of MGP Impacted Soils - "Non Hazardous" Characteristic Soil	Tons	3734	$ 75.00	$ 280,050
3.9b	Transportation and Disposal of MGP Impacted Soils - MGP Tar or NAPL Containing Waste to ESMI for LTTD	Tons	3734	$ 150.00	$ 560,100
3.9c	Transportation and Disposal of MGP Impacted Soils - "Hazardous" Characteristic Soil	Tons	3734	$ 300.00	$ 1,120,200
3.10	Asphalt Recycing	Tons	489	$ 19.00	$ 9,291
3.11	Transportation and disposal of Concrete Structures and Pavement Area 1 & 2	Tons	2800	$ 55.00	$ 154,000
3.12a	Soil Sampling, Volatile Organic Compounds	EA	20	$ 82.50	$ 1,650
3.12b	Soil Sampling, Semi-Volatile Organic Compounds	EA	20	$ 171.60	$ 3,432
3.12c	Soil Sampling, Metals and Cyanide	EA	20	$ 125.40	$ 2,508
3.13a	Demarcation Layer (Geotextile Filter Fabric)	SF	24000	$ 0.50	$ 12,000
3.13b	Stabilization Fabric	SF	1000	$ 0.50	$ 500
3.14	Placement of Suitable Excavated Material as Backfill	CY	1938	$ 15.00	$ 29,070
3.15	Backfill, Grading and Compaction of Excavations with common fill	CY	8500	$ 30.00	$ 255,000
3.16	Select Fill - Type "F"	CY	50	$ 30.00	$ 1,500
3.17	Topsoil	CY	900	$ 38.00	$ 34,200
3.18	Seeding, Fertilizer and Mulch	SF	45800	$ 0.50	$ 22,900
3.19	ORC Advanced®	LB	4000	$ 6.00	$ 24,000
3.20	Storm Sewer Jet Grouted Water Stop	CF	400	$ 125.00	$ 50,000
	Section 4 - Indirect Capital Costs				
4.1	Contingency (25% Direct Capital Costs)	lump sum	1	$ 863,000	$ 863,000
4.2	Engineering (15% Direct Capital Costs)	lump sum	1	$ 518,000	$ 518,000
4.3	Construction Management (10% Direct Capital Costs)	lump sum	1	$ 345,000	$ 345,000
4.4	Legal Fees (5% Direct Capital Costs)	lump sum	1	$ 173,000	$ 173,000
				Grand Total	$ 8,449,891

Assumptions:

1 Estimated Construction Water Mangement duration is 28 weeks
2 Soldier Piles and Lagging will be used instead of Steel Sheeting under Over Head Power Lines
3 Transportation and Disposal of MGP Impacted Soils assumes 33.3% will be clasified Non-Hazardous, 33.3% will be clasified as MGP Tar or Napl Containing Waste to ESMI for LTTD and 33.3% will be clasified Hazardous.
4 Abandon 2 Monitoring Wells and Install 1
5 Estimated Project Duration is 40 Weeks
6 Estimate reflects 2017 Dollars
7 Jet Grouting does not include mobilization and demobilization
8 Conversion from CY to Tons is assumed to be 1 CY = 1.5 TON
9 Concrete slabs and foundations are approx. 2 ft thick. 1 CY of concrete assumed to weigh 4000 lbs.
10 VSF cost associated with Area 2 requires additional tie-backs and walers