NYSEG

Focused Feasibility Study Report

Binghamton Court Street Former MGP Site

Operable Unit #2

Binghamton, New York

Site No. 7-04-031

June 2021

Focused Feasibility Study – OU2

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Site Operable Unit #2
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Site No. 7-04-031

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Certification

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______________________________ 6/30/21

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Acronyms and Abbreviations

bss	below sediment surface
CAMP	Community Air Monitoring Plan
cfs	cubic feet per second
COC	constituent of concern
cy	cubic yard
DER	Division of Environmental Remediation
ECL	Environmental Conservation Law
FFS	Focused Feasibility Study
FWRIA	Fish and Wildlife Resource Impact Assessment
GPS	global positioning system
GRA	general response action
HASP	Health and Safety Plan
HDPE	high-density polyethylene
HHEA	human health exposure assessment
IRM	interim remedial measure
LTTD	low-temperature thermal desorption
MGP	manufactured gas plant
mg/kg	milligram per kilogram
MNR	monitored natural recovery
NAPL	non-aqueous phase liquid
NWP38	Nationwide Permit No. 38
NYCRR	New York Codes, Rules, and Regulations
NYSEG	New York State Electric & Gas Corporation, Inc.
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
OU	operable unit

PAH	polycyclic aromatic hydrocarbon
PDI	pre-design investigation
PPE	personal protective equipment
RAO	remedial action objective
RI	remedial investigation
RTK	real time kinematic
SCG	standards, criteria, and guidance
SGV	Sediment Guidance Value
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
USACE	United States Army Corps of Engineers
USEPA	Environmental Protection Agency
USGS	United States Geological Survey
USDOT	United States Department of Transportation
WQC	water quality certification

Executive Summary

Introduction

This Focused Feasibility Study Report (FFS Report) presents an evaluation of remedial alternatives to address environmental impacts identified at Operable Unit No. 2 (OU-2) of the Binghamton Court Street Former Manufactured Gas Plant (MGP) Site (the Site) located in Binghamton, New York (Site No. 7-04-031). This FFS Report has been prepared by Arcadis of New York, Inc. (Arcadis), on behalf of the New York State Electric & Gas Corporation (NYSEG) in accordance with the site-specific Order on Consent (D7-001-96-03) between the New York State Department of Environmental Conservation (NYSDEC) and NYSEG (NYSDEC 1996).

The purpose of the FFS Report is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions
- Protective of public health and the environment
- Consistent with relevant sections of NYSDEC guidance

The overall objective of this FFS Report is to recommend a remedy that achieves the site-specific remedial action objectives (RAOs) and the best balance of the NYSDEC evaluation criteria.

Background

The former MGP Site is located in the City of Binghamton, New York and consists of multiple OUs.

- OU-1 consists of the landside portion of the former MGP Site.
- OU-2 consists of impacted sediments within the Susquehanna River.

OU-1 formerly housed an MGP that manufactured gas from approximately 1888 to 1939. Various structures were located within OU-1, including four gas holders, seven oil tanks, a tar-separating well, a machine shop, and a governor house. By about 1969, all aboveground structures associated with the MGP had been dismantled. Two buildings are currently present on OU-1: a small gas regulator station and a building used for storage.

The OU-1 portion of the Site is owned by NYSEG and is located in an industrial section of the City of Binghamton, in Broome County, New York. OU-1 occupies lots identified as 271-291 and 293 Court Street, as well as a portion of Court Street immediately adjacent to these lots. The 293 Court Street property was formerly used as a natural gas service center by Columbia Gas Transmission Corporation. OU-1 is bordered to the north by a major Norfolk Southern rail line and yard, an asphalt works plant, and a scrap yard; to the south by the Susquehanna River (separated by a floodwall); to the east by the 295 Court Street property, which contains a warehouse owned by a third party; and to the west by Brandywine Avenue.

OU-2 includes impacted sediments within the Susquehanna River and is located immediately south of OU-1. OU-2 is bordered to the north by Court Street (separated by a floodwall) and a City of Binghamton-owned parcel, and to the west by the Tompkins Street Bridge.

Nature and Extent of Impacts

Following completion of interim remedial measure (IRM) activities at OU-1, NYSEG completed sediment IRM activities at OU-2 in 2019. As part of the OU-2 IRM, sediment excavation activities were completed at two removal areas to address the most accessible and contiguous shallow sediments containing MGP-related visual impacts and total polycyclic aromatic hydrocarbons (PAHs) concentrations that exceed Class A sediment guidance value of 4 milligrams per kilogram (mg/kg) (per Table 5 of the NYSDEC Screening and Assessment of Contaminated Sediment guidance document [NYSDEC 2014]). Remaining residual impacts may include sediment with PAH concentrations greater than 4 mg/kg (at depths greater than 1 foot below sediment surface [bss]), trace sheens, or NAPL-coated material isolated below existing sediment with PAH concentrations less than 4 mg/kg or imported clean backfill, at depths up to more than 25 feet below sediment surface.

Remedial Action Objectives

RAOs were developed on a media-specific basis (i.e., sediment) with consideration of MGP-related waste materials (i.e., coal tar NAPL) and associated COCs identified in OU-2, as well as the potential exposure pathways and receptors, and with consideration of the current and foreseeable future anticipated uses of OU-2. The RAOs developed for the OU-2 are consistent with the generic RAOs for sediment provided on NYSDEC's website (NYSDEC 2020a) and consist of the following:

1. Prevent direct contact with contaminated sediment.
2. Prevent surface water contamination which may result in fish advisories.
3. Prevent releases of contaminants from sediment that would result in surface water levels in excess of ambient water quality criteria.
4. Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
5. Restore sediments to pre-release/background conditions to the extent feasible.

While DER-10 requires the development of general response actions (GRAs) and screening of technology types and process options as part of remedial alternative development and evaluation, DER-10 also allows for the preference of presumptive remedies. Based on the collective knowledge and experience, and regulatory acceptance of previous alternatives analyses performed on MGP sites with similar impacts, this FFS Report focuses on remedial technologies with documented success in achieving similar RAOs for OU-2. The remedial alternatives evaluated for this FFS consist of the following:

- Alternative 1 – A "No Action" alternative
- Alternative 2 – No Further Action with Monitoring
- Alternative 3 – Removal to Pre-Release Conditions

Detailed Evaluation of Alternatives

Following the development of the remedial alternatives, a detailed description of each alternative was prepared, and each alternative was evaluated with respect to the following criteria presented in DER-10:

- Short-Term Impacts and Effectiveness
- Long-Term Effectiveness and Permanence
- Land Use
- Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment
- Implementability
- Compliance with SCGs
- Overall Protectiveness of the Public Health and the Environment
- Cost Effectiveness

Comparative Analysis of Alternatives

Following the detailed evaluation of each alternative, a comparative analysis of the alternatives was completed using the evaluation criteria. The comparative analysis identified the advantages and disadvantages of each alternative relative to each other and with respect to the evaluation criteria. The results of the comparative analysis were used as a basis for recommending the preferred remedy for achieving the RAOs.

Preferred Remedial Alternative

The results of the comparative analysis were used as the basis for recommending Alternative 2 as the preferred remedy. The primary components of the preferred remedial alternative consist of the following:

- Completing post-construction vegetation monitoring for an assumed 5 years.
- Completing post-construction visual sediment monitoring for an assumed 30 years.

1 Introduction

This Focused Feasibility Study Report (FFS Report) presents an evaluation of remedial alternatives to address environmental impacts identified at Operable Unit No. 2 (OU-2) of the Binghamton Court Street Former Manufactured Gas Plant (MGP) Site (the Site) located in Binghamton, New York (Site No. 7-04-031). This FFS Report has been prepared by Arcadis of New York, Inc. (Arcadis), on behalf of the New York State Electric & Gas Corporation (NYSEG) in accordance with the site-specific Order on Consent (D7-001-96-03) between the New York State Department of Environmental Conservation (NYSDEC) and NYSEG (NYSDEC 1996).

1.1 Regulatory Framework

This FFS Report has been prepared to evaluate remedial alternatives to address environmental impacts at the Site in a manner consistent with the Order on Consent and the following:

- NYSDEC Division of Environmental Remediation (DER), Technical Guidance for Site Investigation and Remediation (DER-10) (NYSDEC 2010).
- Applicable provisions of the New York State Environmental Conservation Law (ECL) and associated regulations, including Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375-6 (6 NYCRR Part 375-6).

1.2 Purpose

The purpose of this FFS Report is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions.
- Protective of public health and the environment.
- Consistent with relevant sections of NYSDEC guidance.

The overall objective of this FFS Report is to recommend a remedy that achieves the site-specific remedial action objectives (RAOs) and the best balance of the NYSDEC evaluation criteria.

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 1, Introduction – provides background information relevant to the development of potential remedial alternatives.
- Section 2, Nature and Extent of OU-2 Impacts – provides a summary of the completed investigations, completed interim remedial measures (IRMs), and extent of remaining impacts.
- Section 3, Identification of Standards, Criteria, and Guidance – identifies the standards, criteria, and guidance (SCGs) that govern the development and selection of remedial alternatives.

- Section 4, Development of Remedial Action Objectives – provides a summary of the completed human health exposure assessment (HHEA) and fish and wildlife resource impact analysis (FWRIA) and identifies site-specific RAOs that are protective of public health and the environment.
- Section 5, Detailed Evaluation of Remedial Alternatives – presents a detailed description and analysis of each potential remedial alternative using the evaluation criteria presented in DER-10.
- Section 6, Comparative Analysis of Alternatives – presents a comparative analysis of each remedial alternative using the evaluation criteria and identifies the preferred remedial alternative.
- Section 7, References – presents the literature cited within this document.

1.4 Background Information

This section summarizes site background information relevant to the development and evaluation of remedial alternatives, including site location, physical setting, and site history and operation.

1.4.1 Site Location and Physical Setting

The Former MGP Site is located in the City of Binghamton, New York (Figure 1) and consists of multiple OUs.

- OU-1 consists of the landside portion of the former MGP site.
- OU-2 consists of impacted sediments within the Susquehanna River.

The OU-1 portion of the Site is owned by NYSEG and is located in an industrial section of the City of Binghamton, in Broome County, New York. OU-1 occupies lots identified as 271-291 and 293 Court Street, as well as a portion of Court Street immediately adjacent to these lots. The 293 Court Street property was formerly used as a natural gas service center by Columbia Gas Transmission Corporation. OU-1 is bordered to the north by a major rail line and freight yard, an asphalt works plant, and a scrap yard; to the south by the Susquehanna River (separated by a floodwall); to the east by the 295 Court Street property, which contains a warehouse owned by a third party; and to the west by Brandywine Avenue.

OU-2 includes impacted sediments within the Susquehanna River and is located immediately south of OU-1. OU-2 is bordered to the north by Court Street (separated by a floodwall) and a City of Binghamton-owned parcel (located at the southeast corner of the intersection of Tompkins Street and Court Street and extending east immediately south of the floodwall), and to the west by the Tompkins Street Bridge (constructed at its current location in the 1960s; formerly located approximately 120 feet upstream of its current location).

1.4.2 Site History and Operation

OU-1 formerly housed an MGP that manufactured gas from approximately 1888 to 1939, during which time operations gradually expanded westward from the eastern portion of OU-1, and eventually covered the entire OU-1 area. Various structures were located within OU-1, including four gas holders, seven oil tanks, a tar-separating well, a machine shop, and a governor house. By about 1969, all aboveground structures associated with the MGP had been dismantled. Two buildings are present on OU-1: a small gas regulator station; and a building used for storage. The remainder of OU-1 consists of a gravel lot currently used by NYSEG for equipment/material storage and parking.

The findings of previous investigations, documented in the Final Remedial Investigation Report ([RI Report] BBL 2002) indicated that non-aqueous phase liquid (NAPL), primarily coal tar dense NAPL, was observed in unsaturated and saturated subsurface soils in OU-1. In the late 1990s and early 2000s, the remaining subsurface portions of numerous former MGP structures (which served as a source for NAPL) were removed. Additionally, as discussed in Section 2.2, several IRMs were completed to address the mobility of any remaining impacts at OU-1.

1.4.3 Geology, Hydrogeology, and Hydrology

This subsection provides an overview of the geology, hydrogeology, and hydrology of the Site.

1.4.3.1 Geology

Investigation activities completed to date have identified five principal geologic units within OU-1 and/or OU-2 (in descending order):

- Fill (in OU-1 only) – Silt, sand, gravel, ash, cinders, and slag with demolition debris, foundation remnants, and buried utilities (approximately 5 to 10 feet thick).
- Alluvial silt and clay (in OU-1 only) – Massive silt and clay, with a blocky texture and little or no organic matter. This unit forms a discontinuous lens approximately 5 to 15 feet below grade and 5 to 10 feet thick on average (up to 13 feet thick in some places). This layer pinches out to the east, west, and south.
- Outwash sand and gravel – Fine to coarse sand and fine to coarse gravel, with occasional lenses of fine sand and silt (averaging 30 feet thick). The OU-2 subsurface consists primarily of outwash sands and gravels from the sediment surface to the top of till that ranges from loose to very dense.
- Till – Dense silt and clay matrix containing embedded sand and gravel, rounded to angular, multiple rock types. The till is approximately 45 to 50 feet below grade and approximately 50 feet thick in OU-1. The till is approximately 30 to 35 feet below the sediment surface in OU-2.
- Bedrock – Dark gray shale, slightly weathered, horizontal bedding. The bedrock layer is approximately 100 feet below grade in OU-1 and approximately 70 to 80 feet below the sediment surface in OU-2.

Geologic cross-sections were previously presented as Figures 6, 7, and 8 in the RI Report and are included in Attachment 1 to this FFS Report.

The Susquehanna River (where it passes the Site and through the City of Binghamton) forms a drainage basin, extending to the north and east. The outwash sand and gravel unit fills much of the Susquehanna River valley (as it runs east to west across central New York) and forms the Clinton Street-Ballpark Valley Sole Source Aquifer (USEPA 2020). The fill and alluvial silt and clay units are not present below the Susquehanna River.

1.4.3.2 Hydrogeology

In OU-1, the water table is generally located 8 to 10 feet below grade. The majority of shallow groundwater in OU-1 moves radially away from the center of a groundwater mound located near the center of OU-1 where the silt unit is present. A water table contour map was provided as Figure 11 in the RI Report and is included in Attachment 1 to this FFS Report.

Where the silt unit is absent, shallow groundwater can preferentially drain down into the sand and gravel unit. Within the sand and gravel, and from the bedrock through the till, the gradient is generally upward, suggesting that groundwater in OU-1 discharges to the Susquehanna River.

1.4.3.3 Hydrology

Water depths within the Susquehanna River in OU-2 have ranged from approximately 1 foot to 11 feet, based on soundings or borings completed during previous investigation activities. The United States Geological Survey (USGS) River Gauge 015030000 at Conklin, New York is the closest upstream river gauge, approximately 8.4 miles from OU-2. Discharge, stage, temperature, and specific discharge data are available for this gauge station. The maximum discharge measured at this station was 76,800 cubic feet per second (cfs) and the maximum gauge height was 25.02 feet on June 28, 2006 during a 100+-year flood. The minimum discharge measured at this station was 85 cfs, on October 14, 1964, and the minimum gauge height was 1.30 feet.

2 Nature and Extent of Impacts

This section provides an overview of the nature and extent of impacts in OU-2. Further details, including analytical summary tables, are presented in the RI Report (BBL 2002), Sediment Assessment Report (Arcadis 2013), and the Pre-Design Investigation Letter Report ([PDI Letter Report] (Arcadis 2015).

2.1 Summary of Investigations

This subsection presents an overview of previous investigations that have been completed to evaluate conditions at OU-2.

2.1.1 Remedial Investigation

As indicated in Section 1, Remedial Investigation activities were conducted between 1997 and 2002 and are documented in the RI Report. As discussed in the RI Report, potential pathways for NAPL migration to OU-2 included subsurface migration in the fill and sand and gravel units, and potential preferential pathways for NAPL migration in the former 66-inch storm sewer (in the southwest corner of OU-1) and the 24-inch pipe and the two other outfall pipes in the Court Street floodwall. However, the RI Report concluded that the 24-inch and other two outfall pipes were not significant pathways because these pipes were plugged with sediment and/or discharge was not observed. The potential for NAPL migration to the Susquehanna River has been addressed through the IRMs discussed in Section 2.2.

2.1.2 Sediment Assessment

Following completion of the OU-1 IRM activities to address MGP source material and potentially mobile NAPL (discussed in Section 2.2), an OU-2 sediment assessment was conducted in 2013. The sediment assessment activities included probing and reconnaissance, and sediment sampling for polycyclic aromatic hydrocarbons (PAHs). Probing and reconnaissance were conducted from 100 feet upstream of the 24-inch outfall pipe to 150 feet downstream of the Tompkins Street Bridge. A total of 12 sediment samples were collected from locations identified during the probing and reconnaissance activities. The findings of the 2013 assessment indicated that the distribution of impacts observed in surficial sediments varied from the distribution of impacts documented in the RI Report (which was developed based in findings from the late 1990s and early 2000s). Of the six general areas assessed in 2013, observations and analytical sampling indicated that only two areas (Areas B and D) required further evaluation.

The August 2013 Sediment Assessment Report (Arcadis 2013) was previously provided to NYSDEC and was included as attachment to the May 2015 Pre-Design Investigation Report Letter (Arcadis 2015), which is included herein as Attachment 2.

2.1.3 Pre-Design Investigation

A PDI was completed in 2014 to: further evaluate the distribution of impacts in deeper sediments in the previously identified Areas B and D; assess the concentrations and extent of MGP-related PAHs in sediments; and obtain geotechnical data to support a remedial design. For the PDI, Area B and Area D were re-designated as Area 1 and Area 2, respectively. A total of 24 sediment borings were advanced during the PDI. Recovered sediment samples were visually characterized for color, composition, and presence/absence of potential MGP-related impacts (i.e., NAPL, blebs, coating, sheens, and staining). A total of 73 sediment samples were submitted for laboratory analysis for PAHs. The results of the PDI were presented in the May 2015 Pre-Design Investigation Report Letter (Arcadis 2015) and used to prepare a design for the excavation of impacted sediment, as discussed in Section 2.2.3. MGP-related impacted sediments identified during the 2013 and 2014 investigations are shown on Figure 2.

2.2 Summary of Interim Remedial Measures

As discussed in the RI Report, potential pathways for NAPL migration previously included subsurface migration in the fill and sand and gravel units, and potential preferential pathways for NAPL migration (beyond the limits of OU-1) in the former 66-inch storm sewer (in the southwest corner of OU-1). As mentioned in Section 1, remaining subsurface portions of numerous former MGP structures (which served as a source for NAPL) were removed in the late 1990s/early 2000s and IRM activities were completed from 2006 to 2013 to address remaining impacts and/or NAPL migration potential.

As indicated above, subsequent sediment assessment and PDI activities at OU-2 identified two areas of MGP-impacted sediments in the Susquehanna River. IRM activities at OU-2 were completed in 2019. Select completed IRMs for OU-1, as well was the IRM for OU-2, are summarized in the following subsections.

2.2.1 NAPL Barrier Wall IRM

To address the remaining potentially mobile NAPL in the subsurface fill and sand and gravel units at OU-1, NYSEG constructed a passive NAPL barrier wall along the western and southern property boundaries of 271-291 and 293 Court Street. In general, the passive barrier wall does not prevent groundwater flow, but serves as mechanism to prevent further migration (as well as collect) potentially mobile LNAPL and DNAPL that may remain in OU-1. A summary of the activities associated with this IRM are presented in the NAPL Barrier Wall Interim Remedial Measure Engineering Certification Report (Arcadis 2008).

2.2.2 66-inch Storm Sewer IRM

A former 66-inch storm sewer that collected runoff from a large portion of the City of Binghamton traversed the Site (OU-1) from north to south and discharged to the Susquehanna River (OU-2). Site investigations previously identified that potentially impacted groundwater and/or NAPL was infiltrating into the storm sewer and entering the Susquehanna River at the outfall immediately adjacent to the OU-1 portion of the Site. Although NYSEG installed a polyvinyl chloride (PVC) liner within the sewer to address the infiltrating impacts in 2003, leakage was observed during 2008 and 2009 liner inspections. Ultimately, NYSEG abandoned the existing 66-inch storm sewer in-place and installed a new water- and NAPL-tight 63-inch high-density polyethylene (HDPE) storm sewer pipe across the OU-1 portion of the Site in 2011/2012, to prevent infiltration of potentially impacted groundwater and NAPL. A summary of the activities associated with this IRM are documented in the 66-Inch Storm Sewer Replacement Construction Completion Report (Arcadis 2012).

2.2.3 OU-2 IRM

Following completion of the OU-1 IRMs to address the potential for NAPL migration to OU-2 and the subsequent OU-2 assessment/PDI activities, Arcadis prepared an IRM Design Report for Operable Unit 2 (OU-2 IRM Design Report, Arcadis 2017) to address the most accessible and contiguous shallow sediment containing MGP-related visual impacts and PAHs exceeding the Class A sediment guidance value of 4 milligrams per kilogram (mg/kg) (NYSDEC 2014). Sediment removal limits were delineated based on investigation data obtained during the 2013 and 2014 investigation activities, given the age of the RI data and potential changes to the sediment conditions since (e.g., due to flooding, ice scour, etc.). The OU-2 IRM Design Report was approved by the NYSDEC on May 3, 2017. The NYSDEC-approved IRM for OU-2 consisted of the following remedial components:

- Sediment removal from and backfilling of Area 1, which is located in the Susquehanna River, across Court Street from the southwest corner of OU-1, adjacent to the Court Street floodwall and the City of Binghamton-owned parcel, bounded by Court Street and Tompkins Street. The vertical extent of removal in Area 1 ranged from 1 to 5 feet.
- Sediment removal from and backfilling of Area 2, which is located in the Susquehanna River, across Court Street from the southeast corner of OU-1, adjacent to the Court Street floodwall. The vertical extent of removal in Area 2 was 1 foot.

Sediment removal, backfilling, and restoration activities were performed by DA Collins, Inc. in 2019 and documented in the December 2019 Draft Final Engineering Report (Draft FER) prepared by GEI, Inc (GEI 2019b). Excavation/backfill limits associated with the OU-2 IRM are shown on Figure 3. Following removal of shallow sediment, clean backfill meeting NYSDEC Class A Sediment Guidance Values (NYSDEC 2014) was placed to restore the excavation areas, which provides a physical barrier above sediments with deeper minor/residual impacts. The final backfill elevation is consistent with pre-construction elevations. Note that while the OU-2 IRM Design Report identified approximately 1,200 cubic yards (cy) of sediment removal, only approximately 750 cy of sediment was reportedly removed during the OU-2 IRM. The volume difference was attributed to the presence of the former Tompkins Street bridge abutment in Area 1 (which was not anticipated in the OU-2 IRM Design Report) and less sediment sloping/sloughing than anticipated in the sediment volumes indicated in OU-2 IRM Design Report.

2.3 Extent of Remaining Impacts

Contiguous shallow impacts identified during previous investigations were addressed by the OU-2 IRM. As indicated above, the impacts addressed as part of the OU-2 IRM were based on the recent (i.e., 2013 and 2014) investigation data. When considering the recent investigation data, only residual/minor impacts may remain at isolated, non-contiguous locations. South of the Area 1, isolated locations contain total PAHs at concentrations ranging from 6 to 170 mg/kg at depths from 1 to 5 feet below sediment surface (bss). Within the Area 2 horizontal removal limits, NAPL-coated sand and gravel is present at 28 to 29 feet bss (i.e., immediately above the till).

In Area 1, locations of shallow sediment containing minor impacts are isolated from areas containing more contiguous impacts and therefore, were not targeted for removal during the OU-2 IRM. In Area 2, deep intervals with NAPL-coated material lie more than 25 feet below the base of the river. Based on the depths of these impacts, these locations are not contiguous to the shallow sediment impacts and were not included in the completed OU-2 IRM activities.

Overall, the extent of impacts that remain following the completion of the OU-2 IRM are minor/residual in nature and do not represent a significant threat to potential receptors, especially considering that removal areas were backfilled with clean imported fill materials or remaining residual impacts are located below existing sediment with PAH concentrations less than 4 mg/kg, which provides a physical barrier between potential receptors and the remaining minor/residual impacts.

3 Identification of Standards, Criteria, and Guidance

This section presents potentially applicable SCGs related to the implementation of remedial alternatives at OU-2. Potentially applicable SCGs were identified as set forth in DER-10. SCGs are used to identify RAOs and evaluate potential remedial alternatives, but do not dictate a particular alternative and do not set remedial cleanup levels.

3.1 Definition of SCGs

Definitions of the SCGs are presented below:

- Standards and Criteria – are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations that are generally applicable, consistently applied, and officially promulgated under federal or state law that are either directly applicable or relevant and appropriate to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances.
- Guidance – are non-promulgated criteria that are not legal requirements and do not have the same status as "standards and criteria," however, remedial programs should be designed with consideration given to guidance that, based on professional judgment, are determined to be applicable to the project.

3.2 Types of SCGs

The SCGs considered for the potential remedial alternatives identified in this FFS Report were categorized into the following classifications:

- Chemical-Specific SCGs – These SCGs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values for each constituent of concern (COC). These values establish the acceptable amount or concentration of chemical constituents that may be found in, or discharged to, the ambient environment.
- Action-Specific SCGs – These SCGs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste management and remediation of the site.
- Location-Specific SCGs – These SCGs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in specific locations.

3.3 SCGs

The SCGs identified for the evaluation of remedial alternatives are presented below.

3.3.1 Chemical-Specific SCGs

Chemical-specific SCGs that potentially apply to waste materials generated during remedial activities include Federal and State regulations regarding the identification and listing, testing procedures, and establishment of screening levels to identify hazardous wastes and specific disposal requirements. Potentially applicable chemical-specific SCGs are summarized in Table 1.

3.3.2 Action-Specific SCGs

Action-specific SCGs include general health and safety requirements and general requirements regarding handling and disposing of hazardous waste (including transportation and disposal, permitting, manifesting for disposal and treatment facilities). Potentially applicable action-specific SCGs are summarized in Table 2.

3.3.3 Location-Specific SCGs

Location-specific SCGs include regulations and federal acts concerning activities conducted in floodplains, wetlands, and historical areas, and activities affecting navigable waters and endangered/threatened or rare species. Potentially applicable location-specific SCGs are summarized in Table 3.

4 Development of Remedial Action Objectives

This section presents the RAOs that have been identified for OU-2. These site-specific RAOs, developed in accordance with DER-10, represent medium-specific goals that are protective of human health and the environment. These RAOs are in general, developed by considering the results of the completed investigations and potential SCGs identified for a site. RAOs are developed to specify the COCs for a site and to assist in developing quantitative goals for COCs in each media that may require remediation.

4.1 Risk Evaluation Summary

Risk evaluations are used to determine the need for, and extent of, potential remedial actions for a site. As part of the RI for the Site, risk evaluations were completed and consisted of a qualitative evaluation of human health exposure to site-related COCs (i.e., an HHEA) and an assessment of the impacts of site-related COCs on fish and wildlife (i.e., a FWRIA). The HHEA and FWRIA identified potential risks to human health and the environment from exposure to COCs in site media. Remedial alternatives developed as part of this FFS are evaluated based on their ability to reduce risks to human health and the environment, as identified by the risk evaluations.

Note that the risk evaluations were completed 20 years ago (as part of the RI). As discussed in Section 2, the OU-2 IRM addressed the most accessible and contiguous shallow sediment containing MGP-related impacts through sediment removal (and backfilling with clean imported fill). As noted in the following subsections, the evaluations completed as part of RI identified little to no risk to human health or fish/ wildlife, and those risks have been further reduced through completion of the OU-2 IRM.

4.1.1 Human Health Exposure Assessment

The HHEA presented in the RI Report considered two direct contact scenarios: exposures to City personnel performing storm sewer maintenance; and exposures to persons conducting recreational activities along the Susquehanna River.

Although sediment contains MGP-related impacts at select locations, the potential for human exposure to the impacted sediment is limited, based on the following:

- Worker exposure from performing maintenance on the storm sewer would be limited by standard health and safety practices.
- Although the river is used for recreational activities, exposure would be limited by physical conditions (i.e., the nature of the sediment bed and depth of water).

4.1.2 Fish and Wildlife Resource Impact Assessment

The ecological assessment presented in the RI Report identified two areas where the potential exists for adverse impacts to wildlife; both are isolated areas of the Susquehanna River's bed. One area is located near and downstream of the 66-inch sewer outfall; the other is near and downstream of the 24-inch outfall. In these two areas, concentrations of several COCs, notably PAHs, exceed the NYSDEC sediment screening levels for the protection of benthic aquatic life (i.e., invertebrates) (NYSDEC 1993). Exceeding these screening levels does not identify actual risks to benthic species, but only indicates that the potential for adverse effects cannot be dismissed based on the available data.

The FWRIA concluded that the presence of MGP-impacted sediments in these locations has not adversely affected the quality of the Susquehanna River water.

4.2 Remedial Action Objectives

RAOs are media-specific goals that, if met, would be comprehensive in protecting human health and the environment from the MGP-related impacts identified at OU-2. As presented in Section 5, potential remedial alternatives are evaluated based on their ability to meet the RAOs and be protective of human health and the environment.

RAOs were developed on a media-specific basis (i.e., sediment), with consideration of MGP-related waste materials (i.e., coal tar NAPL) and associated COCs identified in OU-2, as well as the potential exposure pathways and receptors evaluated as part of the HHEA and FWRIA, and with consideration of the current and foreseeable future anticipated uses of OU-2. The RAOs developed for OU-2 are consistent with the generic RAOs for sediment provided on NYSDEC’s website (NYSDEC 2020a). The RAOs for MGP-related impacts in sediment in OU-2 consist of the following:

1. Prevent direct contact with contaminated sediment.
2. Prevent surface water contamination which may result in fish advisories.
3. Prevent releases of contaminants from sediment that would result in surface water levels in excess of ambient water quality criteria.
4. Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
5. Restore sediments to pre-release/background conditions to the extent feasible.

5 Detailed Evaluation of Remedial Alternatives

This section presents detailed descriptions of the remedial alternatives developed to address MGP-related impacts identified in OU-2. Each of the remedial alternatives is evaluated using the criteria presented in DER-10. The results of the detailed evaluation of the remedial alternatives are used as a basis to recommend a remedial alternative for addressing impacted media.

5.1 Description of Evaluation Criteria

In accordance with DER-10, the detailed evaluation presented in this section consists of an evaluation of each remedial alternative against the following criteria:

- Short-Term Impacts and Effectiveness
- Long-Term Effectiveness and Permanence
- Land Use
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Implementability
- Compliance with SCGs
- Overall Protection of Public Health and the Environment
- Cost Effectiveness

Descriptions of the evaluation criteria are presented in the following subsections. Additional criteria, including community acceptance, will be addressed following submittal of this FFS.

Per DER-10, sustainability and green remediation will also be considered in the evaluation, with the goal of improving the sustainability of the selected remedy. The evaluation considers the alternative's ability to minimize energy use; reduce greenhouse gas and other emissions; maximize reuse of land and recycling of materials; and preserve, enhance, or create natural habitats, etc. Sustainability and green remediation are discussed under the short-term impacts and effectiveness criterion.

5.1.1 Short-Term Impacts and Effectiveness

The short-term effectiveness of the remedial alternative is evaluated relative to its potential effect on public health and the environment during implementation of the alternative. The evaluation of each alternative with respect to its short-term effectiveness will consider the following:

- Potential short-term adverse impacts and nuisances to which the public and environment may be exposed during implementation of the alternative.
- Potential impacts to workers during implementation of the remedial actions and the effectiveness and reliability of protective measures.
- The sustainability and use of green remediation practices utilized during implementation of the remedy.

- Amount of time required until protection of public health and the environment is achieved.

5.1.2 Long-Term Effectiveness and Permanence

The evaluation of each remedial alternative relative to its long-term effectiveness and permanence is made by considering the risks that may remain following completion of the remedial alternative. The following factors will be assessed in the evaluation of the alternative's long-term effectiveness and permanence:

- Potential impacts to public health and the environment from untreated waste or treatment residuals remaining at the completion of the remedial alternative.
- The adequacy and reliability of controls (if any) that will be used to manage treatment residuals or remaining untreated impacted media.

5.1.3 Land Use

This criterion evaluates the current and intended future land use of OU-2 relative to the cleanup objectives of the remedial alternative when Class A Sediment Guidance Values (SGVs) would not be achieved. This evaluation considers local zoning laws, proximity to residential property, accessibility to infrastructure, and proximity to natural resources including groundwater drinking supplies.

5.1.4 Reduction of Toxicity, Mobility, and Volume of Contamination

This evaluation criterion addresses the degree to which the remedial alternative would permanently and significantly reduce the toxicity, mobility, or volume of the constituents present in the site media. The evaluation will consider the following factors:

- The treatment process and the amount of materials to be treated.
- The anticipated ability of the treatment process to reduce the toxicity, mobility, or volume of site impacts.
- The nature and quantity of treatment residuals that will remain after treatment.
- The degree to which the treatment is irreversible.

5.1.5 Implementability

This criterion addresses the technical and administrative feasibility of implementing the remedial alternative, including the availability of the various services and materials required for implementation. The following factors will be considered during the implementability evaluation:

- Technical Feasibility – This factor refers to the relative ease of implementing or completing the remedial alternative based on site-specific constraints. In addition, the remedial alternative's constructability and operational reliability are also considered, as well as the ability to monitor the effectiveness of the remedial alternative.

- Administrative Feasibility – This factor refers to the availability of necessary personnel and material, along with potential difficulties in obtaining approvals for long-term operation of treatment systems, access agreements for construction, and acquiring necessary approvals and permits for remedial construction.

5.1.6 Compliance with Standards, Criteria, and Guidance

This criterion evaluates the remedial alternative's ability to comply with SCGs. Compliance with the following items is considered during evaluation of the remedial alternative:

- Chemical-specific SCGs
- Action-specific SCGs
- Location-specific SCGs

Potentially applicable chemical-, action-, and location-specific SCGs are presented in Tables 1, 2, and 3, respectively.

5.1.7 Overall Protection of Public Health and the Environment

This criterion evaluates whether the remedial alternative provides adequate protection of public health and the environment. This evaluation assesses how exposure pathways are eliminated, reduced, or controlled through removal, treatment, engineering controls, or institutional controls. This evaluation also considers the ability of the remedial alternative to meet the RAOs.

5.1.8 Cost Effectiveness

This criterion evaluates the overall cost of the alternative relative to the effectiveness of the alternative. The estimated total cost to implement the remedial alternative is based on an analysis of the sum of the direct capital costs (e.g., materials, equipment, and labor), indirect capital costs (e.g., engineering, licenses/permits, and contingency allowances), and a present worth analysis of operation and maintenance (O&M) costs. O&M costs may include operating labor, energy, chemicals, and sampling and analysis. These costs will be estimated with an anticipated accuracy between -30% to +50%. A 25% contingency factor is included to cover unforeseen costs incurred during implementation of the remedial alternative. A 5% discount (i.e., interest) rate is used to determine the present-worth factor.

5.2 Identification of Remedial Alternatives

Although each former MGP site offers its own unique site characteristics, the evaluation of remedial technologies that are applicable to MGP-related impacts, or have been successfully implemented at other MGP sites, is well documented. This collective knowledge and experience, and regulatory acceptance of previous alternatives analyses performed on MGP sites with similar impacts, were used to identify technologies with documented success in achieving similar RAOs for OU-2.

While DER-10 requires the development of general response actions (GRAs) and screening of technology types and process options as part of remedial alternative development and evaluation, DER-10 also allows for the preference of presumptive remedies. Therefore, this FFS Report focuses on remedial technologies that can be successfully implemented at OU-2 and have the potential to achieve the RAOs identified in Section 4.

MGP-related impacts in the Susquehanna River sediment have been addressed through the excavation and off-site treatment/disposal of targeted impacted sediments, completed as an IRM in 2019 (as discussed in Section 2). Therefore, to satisfy the requirements of DER-10, the remedial alternatives evaluated for this FFS consist of the following:

- A “No Action” alternative.
- No Further Action with Monitoring – Following the OU-2 IRM, vegetation monitoring would be conducted for an assumed 5 years and visual sediment monitoring would be conducted for an assumed 30 years.
- Removal to Pre-Release Conditions – Removal of all potentially impacted material, located at depths up to 30 feet bss in the vicinity of the floodwall. The alternative is anticipated to include extensive excavation support adjacent to existing structures (i.e., floodwall) to facilitate removal of impacted sediment.

The detailed evaluation of these remedial alternatives is discussed in the following subsections.

5.3 Detailed Evaluation of Alternatives

As indicated in Section 5.2, in accordance with DER-10, the following remedial alternatives have been identified for evaluation as part of the FFS:

- Alternative 1 – No Action
- Alternative 2 – No Further Action with Monitoring
- Alternative 3 – Removal to Pre-Release Conditions

The technical description and detailed analysis of each of these remedial alternatives, with respect to the NYSDEC evaluation criteria described in the previous subsection, are presented in the following subsections.

5.3.1 Alternative 1 – No Action

The “No Action” alternative was retained for evaluation as required by DER-10. The “No Action” alternative serves as the baseline for comparison of the overall effectiveness of the other remedial alternatives.

As indicated in Section 2, remedial construction activities have been completed in OU-1 to address the source of impacted sediments in OU-2 and the OU-2 IRM has addressed the most accessible and contiguous shallow sediment containing MGP-related impacts; only minor/residual impacts remain in sediment. Under Alternative 1, no additional remedial actions would be conducted to address the remaining impacted sediments (i.e., the sediment would be allowed to remain in its current condition and no post-construction monitoring activities would be completed). The HHEA and FWRIA (discussed in Section 4) concluded that OU-2 conditions prior to the OU-2 IRM did not present a significant risk to human exposure or ecological receptors.

Natural biological, chemical, and physical processes would likely reduce remaining MGP-related impacts in the sediments over time. However, this alternative does not include monitoring to confirm the effectiveness of the OU-2 IRM.

5.3.1.1 Short-Term Impacts and Effectiveness – Alternative 1

No additional remedial actions would be implemented to address remaining minor/residually impacted sediments. Therefore, there would be no short-term environmental impacts and no risks associated with remedial activities would be posed to the community.

5.3.1.2 Long-Term Effectiveness and Permanence – Alternative 1

Under the "No Action" alternative, no additional remedial activities would be implemented to address remaining impacted sediments. As discussed in Section 2, the OU-2 IRM removal areas were backfilled with clean imported fill materials or remaining residual impacts are located below existing sediment with PAH concentrations less than 4 mg/kg and therefore, the potential for human exposure to the remaining minor/residually impacted sediment is minimal. Although Alternative 1 does not include a monitoring component, this alternative could potentially be effective on a long-term basis.

5.3.1.3 Land Use – Alternative 1

The OU-2 portion of the Susquehanna River is a Class A water body (NYSDEC 2020b). The best usages of Class A waters are as a source of water supply for drinking and culinary or food processing purposes, for primary and secondary contact recreation, and for fishing. Class A waters are suitable for fish, shellfish and wildlife propagation and survival. The current and anticipated future use of OU-2 is not anticipated to change. As discussed in Section 4, prior to the OU-2 IRM, human or environmental exposure to impacted sediment was expected to be limited given the depth of the impacts, and water depths. No additional remedial actions would be completed under Alternative 1 and OU-2 would remain in its current condition. Therefore, the "No Action" alternative would not alter the anticipated future intended use of OU-2.

5.3.1.4 Reduction of Toxicity, Mobility or Volume through Treatment – Alternative 1

Under the "No Action" alternative, no additional remedial activities would be implemented to address remaining impacted sediments. Although not an active treatment process, placement of clean imported backfill material as part of the OU-2 IRM (and the presence of existing sediment with PAH concentrations less than 4 mg/kg over deeper residual impacts) further reduces the potential mobility of the minor/residually impacted sediments remaining isolated at depths. Environmental media would not be treated (other than by natural processes), recycled, or destroyed. Therefore, the toxicity, mobility, and volume of remaining MGP-related impacts in sediment would only be reduced to the extent that these reductions occur through natural recovery/degradation processes.

5.3.1.5 Implementability – Alternative 1

The "No Action" alternative does not require implementation of any additional remedial activities, and therefore is technically and administratively implementable.

5.3.1.6 Compliance with SCGs – Alternative 1

- Chemical-Specific SCGs: Potentially applicable chemical-specific SCGs include sediment-guidance values established in the NYSDEC document Technical Guidance for Screening Contaminated Sediments (NYSDEC 1999). Following completion of the OU-2 IRM, at minimum, the top 1 foot of sediment meets the sediment guidance values. However, because additional removal or treatment is not included as part of this alternative, the chemical-specific SCGs for minor/residual MGP-related impacts remaining in deeper sediments would not be met by this alternative (other than by natural processes).
- Action-Specific SCGs: This alternative does not involve implementation of any remedial activities; therefore, the action-specific SCGs are not applicable.
- Location-Specific SCGs: Because no remedial activities would be conducted under this alternative, the location-specific SCGs are not applicable.

5.3.1.7 Overall Protection of Public Health and the Environment – Alternative 1

Following completion of the OU-2 IRM, the “No Action” alternative could be an effective means for achieving the RAOs. As indicated above, Alternative 1 would not include implementation of any additional remedial activities or any other controls to address remaining minor/residually MGP-related impacts. The “No Action” alternative could achieve the chemical-specific SCGs (in the top 1 foot of sediment). Alternative 1 would not result in short-term impacts to the community and could be potentially effective in the long-term.

Current (i.e., post-IRM) conditions do not present a significant threat to human health and the environment, and to the extent such conditions remain in the future, aspects of the RAOs would be achieved. Specifically, direct contact with sediment containing MGP-related impacts (RAO #1), surface water contamination that results in fish advisories (RAO #2), and the release of MGP-related impacts from sediment that would cause surface water concentrations above ambient water quality criteria (RAO #3), currently do not occur and are reasonably not expected to occur in the future. Impacts to benthic species have not been observed and current conditions reduce the potential for impacts biota through ingestion/ direct contact (RAO#4). Shallow sediments have been restored to pre-release/background conditions (RAO #5). However, achievement of RAO #5 for deeper sediments containing minor/residual MGP-related impacts would only occur through natural recovery/degradation processes.

5.3.1.8 Cost Effectiveness – Alternative 1

The “No Action” alternative does not involve implementation of any additional active remedial activities or the monitoring of site conditions. Therefore, there are no costs associated with this alternative.

5.3.2 Alternative 2 – No Further Action with Monitoring

As discussed previously, only minor/residual impacts remain following the completion of the OU-2 IRM. Similar to Alternative 1, under Alternative 2, no further remedial actions would be conducted to address remaining impacted sediments within OU-2 (i.e., the sediment would be allowed to remain in its current condition).

This alternative would include vegetation monitoring to assess and document post-construction conditions at the temporary “transloading area” constructed on private property (approximately 1,300 feet upstream of the removal areas) to facilitate access to the Susquehanna River during the OU-2 IRM. As part of the OU-2 IRM, the transloading area was restored with vegetated topsoil and trees. Post-construction vegetation monitoring would include assessing the total amount of vegetative cover, cover type, bank stability, species and counts, and overall vegetation health. Vegetation maintenance (e.g., planting additional trees, overseeding, etc.) would be completed, as need to achieve NYSDEC restoration criteria. Vegetation monitoring (and any completed maintenance) would be documented in an annual report submitted to NYSDEC. Vegetation monitoring would be conducted for an assumed five years.

Additionally, because minor/residually impacted sediment remains, Alternative 2 would also include periodic visual monitoring to assess the presence/absence of sheens potentially generated from sediment remaining in the OU-2 removal areas. Visual monitoring is assumed to be completed on a quarterly basis for up to 30 years. The requirement for visual sediment monitoring, including reducing the monitoring frequency or ceasing monitoring altogether, would be incorporated into the October 2019 Draft Site Management Plan (Draft SMP) (GEI 2019a). Observations and corrective actions, if any, will be documented in an annual monitoring report submitted to NYSDEC.

5.3.2.1 Short-Term Impacts and Effectiveness – Alternative 2

No additional remedial actions would be implemented to address remaining impacted sediments; only periodic site monitoring activities would be completed (up to an assumed 30-year period). Accordingly, there would be no risks to the community or short-term environmental impacts associated with monitoring activities. Any worker safety concerns related to working on/near the water for monitoring activities would be minimized by using engineering controls and appropriate health and safety practices, as would be specified in a site-specific health and safety plan (HASP).

Alternative 2 would have a minimal carbon footprint mainly from travel to/from the Site to conduct vegetation and visual monitoring activities.

5.3.2.2 Long-Term Effectiveness and Permanence – Alternative 2

Under this alternative, no additional remedial activities would be implemented to address minor/residual MGP-related impacts remaining in deeper sediments. The OU-2 IRM has addressed impacted sediments with the greatest potential for human or ecological exposure through targeted removal. As discussed in Section 2, OU-2 IRM removal areas were backfilled with clean imported fill materials or remaining residual impacts are located below existing sediment with PAH concentrations less than 4 mg/kg and therefore, the potential for human exposure to the remaining impacted sediment is minimal. However, Alternative 2 would include long-term monitoring to document the effectiveness and permanence of the OU-2 IRM.

5.3.2.3 Land Use – Alternative 2

The current and anticipated future use of OU-2 is not anticipated to change. As discussed in Section 4, prior to the OU-2 IRM, human or ecological exposure to impacted sediment was expected to be limited given the depth of the impacts, and water depths. No additional remedial actions would be completed under Alternative 2 and OU-2 would remain in its current condition. Monitoring activities conducted under Alternative 2 would not alter the anticipated future intended use of OU-2.

5.3.2.4 Reduction of Toxicity, Mobility or Volume through Treatment – Alternative 2

No further remedial action would be completed under Alternative 2. Although not an active treatment process, placement of clean imported backfill material as part of the OU-2 IRM (and the presence of existing sediment with PAH concentrations less than 4 mg/kg over deeper residual impacts) further reduces the potential mobility of the impacted sediments remaining isolated at depths. The toxicity and volume of the remaining minor/residual MGP-related impacts in deeper sediment would likely be reduced through natural recovery/degradation processes.

5.3.2.5 Implementability – Alternative 2

The monitoring activities to be completed under Alternative 2 would be both technically and administratively implementable. There are no challenges with implementing potential maintenance activities associated with this alternative. Administratively, monitoring activities would have to be coordinated with the City of Binghamton and/or private property owners to establish access on properties not owned by NYSEG.

5.3.2.6 Compliance with SCGs – Alternative 2

- Chemical-Specific SCGs: Potentially applicable chemical-specific SCGs include sediment-guidance values established in the NYSDEC document Technical Guidance for Screening Contaminated Sediments (NYSDEC 1999). At minimum, the top 1 foot of sediment throughout OU-2 would meet the sediment guidance values. However, because removal or treatment is not included as part of this alternative, the chemical-specific SCGs for minor/residual MGP-related impacts remaining in deeper sediments would not be met by this alternative (other than by natural processes).
- Action-Specific SCGs: This alternative does not involve implementation of any additional remedial activities; however, vegetation maintenance and monitoring and visual inspection of the riverbed sediments will occur. Monitoring and maintenance activities would be conducted in accordance with Occupational Safety and Health Administration (OSHA) requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.
- Location-Specific SCGs: Because no additional remedial activities would be conducted under this alternative, the location-specific SCGs are not applicable. However, long term access agreements would be needed with the City of Binghamton and/or private property owners to establish access on properties not owned by NYSEG to complete monitoring activities.

5.3.2.7 Overall Protection of Public Health and the Environment – Alternative 2

As indicated above, Alternative 2 would not include implementation of additional remedial activities or any other controls to address sediment containing remaining minor/residual MGP-related impacts. Alternative 2 would not result in short-term impacts to the community and could potentially be effective in the long-term.

As discussed under Alternative 1, following the OU-2 IRM, sediment containing minor/residual impacts would remain isolated at depth. However, current conditions do not present a significant threat to human health and the environment. Therefore, Alternative 2 would achieve RAOs #1 through #4. Similarly, shallow sediments have been restored to pre-release/background conditions (RAO #5) and achievement of RAO #5 for deeper sediment containing MGP-related impacts would only occur through natural recovery/degradation processes. However, Alternative 2 would include long-term monitoring to document the effectiveness and permanence of the OU-2 IRM.

5.3.2.8 Cost Effectiveness – Alternative 2

The estimated costs associated with Alternative 2 are presented in Table 4. The estimated present worth cost of O&M activities (i.e., monitoring, reporting, and maintenance) associated with this alternative is approximately $310,000.

5.3.3 Alternative 3 – Removal to Pre-Release Conditions

This remedial alternative would address all currently remaining minor/residual MGP-related impacts within OU-2, regardless of depth or potential risks to human health or the environment (or the lack thereof). Sediment removal and backfilling would occur at two targeted removal areas (i.e., expanding on OU-2 IRM Area 1 and Area 2) and encompass approximately 0.4 acres. An estimated 1,700 and 4,500 cy of sediment would be removed, with sediment excavation depths up to 5 and 30 feet bss, at Areas 1 and 2, respectively. The total estimated removal volume would be approximately 6,200 cy and includes any material that may be removed to support the constructability of the remediation (i.e., overlying native/ previously imported backfill and material assumed to slough into the dredge area from outside the removal boundary). The excavation/backfill limits associated with this alternative are shown on Figure 4.

A temporary containment/excavation support system would be installed at each removal area and sediment removal activities would be conducted “in the wet”. The temporary containment system would consist of a temporary sheet pile barrier and turbidity curtain installed around each of the sediment removal areas to isolate the area and to control turbidity generated from sediment excavation activities. Additionally, Alternative 3 would also require a temporary sheet pile barrier support system installed to an assumed depth of 60 feet bss to facilitate removal of deep sediments/material up to 30 feet bss at Area 2. Internal structural support/bracing (i.e., whalers, struts) would likely also be required as part the excavation support system. Note that NYSDEC Division of Water (Flood Protection and Dam Safety) may require that deep sheet pile installed immediately adjacent to existing infrastructure remain in place following remedial activities. A detailed evaluation of the temporary sheet pile barrier/excavation support system would be completed during the remedial design of this alternative.

Geotechnical monitoring would be conducted during the installation and removal of the temporary containment system and sediment excavation/backfilling. Geotechnical monitoring would generally consist of optical survey and vibration monitoring at multiple locations on existing infrastructure (i.e., floodwall, storm sewer pump house, former Tompkins Street bridge abutment) adjacent to the sediment removal areas. Additionally, geotechnical monitoring using inclinometers would be conducted in the upland area to monitor for soil settlement behind the flood wall (i.e., in Court Street). Structural surveys of the nearby infrastructure would be completed prior to and following the remedial activities to document the conditions of the structures.

Sediment would be removed using conventional equipment (e.g., barge-mounted crane and/or excavator fitted with an environmental bucket). Excavation equipment could be fitted with a real-time kinematic global positioning system (RTK GPS) to allow for accurate control of the elevation of the bucket/crane from the bottom of the dredge prism to minimize over-dredge and ensure accurate coverage. Removed sediment would be loaded into a barge/scow and transported to a material transloading area constructed upstream of the removal areas (i.e., assumed to be constructed at the same location as the OU-2 IRM, at the private property approximately 1,300 feet upstream of the removal areas).

Free water inside the barge/scow, with no visible sheen present, may be discharged within the temporary containment system prior to travelling to the transloading area. Sediment would be allowed to gravity drain within the barge during transport and decant water would be collected at the transloading area. Decant water and water generated from equipment/personnel decontamination would be collected and treated at an on-site temporary water treatment system. Treated water would be discharged to the Susquehanna River under a NYSDEC State Pollutant Discharge Elimination System (SPDES) Permit Equivalent. Alternatively, water could be collected and transported for treatment/disposal at an off-site facility. It is anticipated that excavated material would be subject to preliminary stabilization (i.e., achievement of United States Environmental Protection Agency's [USEPA's] "Paint Filter Test") within the barge or at the transloading area prior to transportation on public roads. The loaded/stabilized material would be transported back to OU-1 (i.e., via dump trucks with sealed gates) for further processing, screening, and stabilization to meet the requirements of the off-site treatment/disposal facilities. Once the material is suitable for over-the-road transport (i.e., passes paint filter test and other moisture requirements of the treatment/disposal facilities), the material would be loaded to trucks for off-site transport to an approved waste management facility (i.e., for low-temperature thermal desorption [LTTD] treatment) as conditionally exempt non-hazardous solid waste or to a local landfill as a non-hazardous solid waste.

Following removal of shallow and deep sediments, clean imported backfill meeting NYSDEC Class A Sediment Guidance Values (NYSDEC 2014) would be placed to restore the sediment removal areas. The final backfill elevation would be consistent with pre-construction elevations. Following completion of all in-river activities, the transloading area would be restored to match pre-construction conditions. Restoration is assumed to consist of the installation/placement of biodegradable erosion control fabric, trees, and vegetated topsoil. Additional restoration would include the replacement of the asphalt pavement at the private property used for access to the transloading area. Post-remediation vegetation monitoring of the transloading area would be completed for an assumed five years.

5.3.3.1 Short-Term Impacts and Effectiveness – Alternative 3

Implementation of this alternative could result in short-term exposure of remedial construction workers and the surrounding community during sediment excavation, material handling, off-site transportation, and backfill placement activities. The potential short-term exposures could be via: ingestion and dermal contact with NAPL, impacted sediment, and/or surface water; and inhalation of volatile organic vapors or dust containing COCs during remedial construction.

Potential exposure of remedial workers would be minimized through the use of appropriately trained field personnel and personal protective equipment (PPE), as specified in a site-specific HASP. Community access to the OU-2 work area is limited by the floodwall, the steep banks of the Susquehanna River, and potential access locations restricted by temporary security fencing. A site-specific community air monitoring plan (CAMP) would be prepared during the remedial design and implemented during remedial construction activities. The CAMP would be used to confirm that dust and volatilized organic vapors are within acceptable levels, and potential nuisance odors are minimized during sediment removal activities. Additional engineering controls (e.g., use of water sprays to suppress dust, use of sprays or long-lasting foams to suppress vapors and/or odors, modification of the rate of remedial construction activities, etc.) would be implemented, as necessary during remedial activities, in accordance with the CAMP and the design.

Additional worker safety concerns include working on the water, working with and around large construction equipment, noise generated from operating construction equipment, and increased vehicle traffic associated with transportation of excavated materials and delivery of backfill materials. These concerns would be minimized by using engineering controls and appropriate health and safety practices.

Based on the proximity to existing infrastructure (i.e., floodwall, storm sewer pump house, former bridge abutment), structural surveys and would be required to document pre- and post-construction conditions of these features. Geotechnical monitoring (i.e., optical and vibration) would be completed to monitor the potential for impacts to the existing infrastructure (e.g., due to vibrations). Additionally, geotechnical monitoring using inclinometers (i.e., the assumed to be installed within Court Street) would require altered traffic patterns/lane closures for the duration of the project. The remedial design that would be prepared for this alternative would include geotechnical monitoring warning/action levels to mitigate the potential for damaging infrastructure.

During remedial construction, turbidity monitoring would be conducted both upstream and downstream of the active work areas. The release of solids (i.e., turbid water) from the targeted removal areas is not anticipated due to the use of the temporary containment system. During installation and removal of the temporary containment system, appropriate controls (e.g., turbidity curtains) would be installed immediately downstream of the work areas to mitigate solids releases.

Because of the lack of river access from OU-2 to OU-1, a material transloading area would be constructed upstream of OU-2. General handling and management operations include the following: removal of sediment from the targeted removal areas; decanting of free water within the temporary containment area; transport via barge to the material transloading area; collection of free water within the barge for treatment; preliminary sediment stabilization; and loading for transport to a temporary staging area established at OU-1 for further processing, followed by off-site transport to a NYSEG-approved waste management facility. Off-site transportation of excavated material and importation of backfill materials would result in approximately 660 tractor trailer truck round trips (assuming 35 tons per truck). Transportation activities would be managed to minimize risks to the community.

Based on the location and extent/depth of removal areas and in-river work restrictions (i.e., typically July through November, based on permit windows and river flows), remedial activities would require approximately 10 months to complete, with 7 months of in-river work. Therefore, Alternative 3 is assumed to be completed over two construction seasons.

Green remediation practices for Alternative 3 could include the potential reuse of non-visually impacted material (i.e., large rock or riprap). However, this alternative has been developed assuming no reuse (as a conservative measure). Additional green remediation practices could potentially include use of low-sulfur diesel fuel in remedial construction equipment and limiting the use of cement-based products (i.e., for sediment stabilization). The greatest contribution to greenhouse gases would occur as a result of equipment operation during excavation, backfilling, and transportation activities, as well as off-site thermal treatment of excavated sediment.

5.3.3.2 Long-Term Effectiveness and Permanence – Alternative 3

Alternative 3 would include the excavation of all sediment containing potentially MGP-related impacts, to an estimated depth of 5 feet bss in expanded Area 1 and 30 feet bss in expanded Area 2. Therefore, the potential for future long-term exposures to sediment containing MGP-related impacts (although highly unlikely) is significantly reduced, if not eliminated.

Sediment excavation areas would be backfilled to match pre-removal elevations with clean imported backfill materials. The gradation of the imported fill material would match the existing sediment gradation (to the extent practicable). Sediment excavation and backfilling would have minimal or no adverse effects on river flows and velocities.

5.3.3.3 Land Use – Alternative 3

The current and anticipated future use of OU-2 is not anticipated to change. Excavation of all impacted sediments would eliminate human or ecological exposure to impacted sediment. The sediment removal and backfilling activities would result in restoring the riverbed to pre-release conditions, which eliminates the potential for future exposures. Therefore, Alternative 3 would not alter the anticipated future intended use of OU-2.

5.3.3.4 Reduction of Toxicity, Mobility or Volume through Treatment – Alternative 3

Alternative 3 would include the removal of approximately 6,200 cy of river sediments to address remaining impacted sediments to an estimated depth of 5 feet bss in expanded Area 1 and 30 feet bss in expanded Area 2. Impacted sediments are not continuous and generally occur at isolated locations below imported backfill placed during the OU-2 IRM or native material with PAH concentrations less than 4 mg/kg. Consequently, an estimated 4,600 cy of clean overlying sediments would be removed to address all impacted sediments. Excavated sediment would be transported off-site for thermal treatment or disposal as a non-hazardous waste in a solid waste landfill. Following excavation, removal areas would be backfilled with clean imported material to match pre-removal sediment elevations. Removal of all impacted sediments would eliminate the potential toxicity, mobility, and volume of impacted sediments.

5.3.3.5 Implementability – Alternative 3

While Alternative 3 would be administratively implementable, implementation of Alternative 3 would have a number of technical challenges. Removal and off-site treatment/disposal of excavated sediment is technically feasible and remedial contractors capable of performing the excavation and backfilling activities, as well as deep sheet pile installation, are available.

Potential technical implementation challenges associated with this alternative include the following:

- Access to the remedial areas – Access to the remedial areas of OU-2 is limited by the steep banks of the Susquehanna River, the flood wall, and private properties located along the top of the Susquehanna River banks. OU-2 remedial areas would likely be accessed from private property located on the left bank and upstream of the removal areas.
- Working near structures – Area 2 is located adjacent to a floodwall. Excavation would occur up to the existing structure utilizing the temporary containment/excavation support system. The excavation support system

would consist of custom made 70-foot-long steel sheet pile (assumed to be procured from outside of the United States) with internal bracing/supports to allow excavation of sediments up to 30 feet bss. Additionally, due to the depth of impacts and the location of the required excavation support system, extensive geotechnical monitoring would be required, including Court Street lane restrictions or closure during construction activities. Assuming the alternative is feasible, a remedial design would be required to detail the necessary installation and monitoring requirements. As indicated above, based on the proximity to the floodwall, deep sheet pile may need to remain in place following excavation and backfilling activities.

- Dewatering – Sediment would be excavated "in the wet" and would require dewatering/stabilization prior to transportation off-site for treatment/disposal. Gravity dewatering would be completed in the containment barge and water removed via pumping for collection/treatment. If additional dewatering/ stabilization is required material would be transported to OU-1 for further dewatering prior to off-site transport. Additionally, this alternative would require the excavation and subsequent dewatering of clean sediments to address the deep MGP-impacted sediments.
- Storm Sewer Outfalls – For Alternative 3, storm sewer flows from outfalls located within the removal areas would have to be bypassed (i.e., via gravity or pumping) around the excavation area and into the Susquehanna River for a longer duration.

Administratively, remedial construction activities would have to be coordinated with the City of Binghamton, the New York State Department of Transportation (NYSDOT), and private property owners to establish access/support areas on properties not owned by NYSEG. Based on the required removal depths in close proximity to the floodwall, implementation of Alternative 3 would require extensive consultation/permitting efforts with NYSDEC Division of Water (Flood Protection and Dam Safety) to address the administrative (and potentially technical) feasibility of implementing this alternative.

5.3.3.6 Compliance with SCGs – Alternative 3

- Chemical-Specific SCGs: Potentially applicable chemical-specific SCGs include sediment-guidance values established in the NYSDEC document Technical Guidance for Screening Contaminated Sediments (NYSDEC 1999). Under Alternative 3, sediment excavation and backfilling activities would remove shallow and deep sediments containing MGP-related impacts, as well as sediments with PAH concentrations less than 4 mg/kg between impacted intervals. Excavated sediment would be replaced with clean imported backfill material, resulting in achievement of the sediment guidance values in the removal areas.
- Action-Specific SCGs: Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Work activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP. Permitting requirements include: a Nationwide Permit # 38 – Cleanup of Hazardous and Toxic Waste (NWP38) issued by the United States Army Corp of Engineers (USACE) and water quality certification (WQC) under Section 401 of the Clean Water Act issued by the NYSDEC (i.e., via a Joint Application Permit). These permits would be required for conducting remedial construction activities within a navigable waterway of New York State. Excavated materials would be subject to United States Department of Transportation (USDOT) requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a

NYSDEC-approved work plan and using licensed waste transporters and permitted disposal facilities. Per DER-4 (NYSDEC 2002), excavated material from a former MGP site that is characteristically hazardous for benzene only is conditionally exempt from hazardous waste management requirements when destined for thermal treatment (e.g., low-temperature thermal desorption).

- Location-Specific SCGs: Potentially applicable location-specific SCGs are associated with floodplain management, discharge of dredge or fill materials, modification of waterways, and obstruction/ alteration of navigable waters. Compliance with these SCGs would be achieved by meeting the substantive requirements of any required permits and by implementing designs that would minimize disturbance and/or alteration of the Susquehanna River. The use of river access locations on regulated flood control lands would require Article 16 permit for Flood Control Land Use issued by the NYSDEC Division of Flood Protection and Dam Safety. Additionally, location-specific SCGs related to local permitting (e.g., Building, Floodplain Development, etc.) would be met via securing the proper permits prior to implementing remedial construction activities. As noted above, permitting efforts with NYSDEC (for an Article 16 Permit) may be extensive, given the proximity/extent of excavation near the floodwall.

5.3.3.7 Overall Protection of Public Health and the Environment – Alternative 3

Under Alternative 3, sediment containing MGP-related impacts would be addressed through the excavation of impacted (and clean) sediment, up to an estimated depth of 30 feet bss, and placement of clean imported backfill. Under this alternative, future exposures to impacted sediment would be eliminated and all RAOs would be achieved. However, given that following the OU-2 IRM, sediment containing minor/residual impacts is currently isolated at depth below existing sediments with PAH concentrations less than 4 mg/kg, Alternative 3 is eliminating/mitigating an exposure that is highly unlikely.

5.3.3.8 Cost Effectiveness – Alternative 3

The estimated costs associated with Alternative 3 are presented in Table 5. The total estimated present worth cost for this alternative is approximately $12.3M, which includes the estimated capital costs for conducting sediment removal and backfilling activities. The estimated present worth cost of O&M activities (e.g., monitoring, reporting, and maintenance) associated with this alternative is approximately $150,000.

6 Comparative Analysis of Alternatives

This section presents the comparative analysis of the remedial alternatives using the evaluation criteria identified in Section 5. The comparative analysis identifies the advantages and disadvantages of each alternative relative to each other and with respect to the evaluation criteria.

6.1 Comparative Analysis

The alternatives evaluated in Section 5 consist of the following:

- Alternative 1 – No Action
- Alternative 2 – No Further Action with Monitoring
- Alternative 3 – Removal to Pre-Release Conditions

The comparative analysis of these alternatives is presented in the following subsections.

6.1.1 Short-Term Impacts and Effectiveness

Alternatives 1 and 2 would not include any additional remedial activities and subsequently would present no or very limited potential short-term impacts to remedial workers, the public, and/or the environment. Alternative 3 includes intrusive activities to address remaining sediment containing minor/residual MGP-related impacts and would pose potential short-term risks to remedial workers and the public from potential exposure to impacted sediment (and potential surface water and decontamination water) during sediment excavation and the off-site transportation of removed material. Additionally, the excavation activities conducted under Alternative 3 would pose short-term risks to the surrounding community from the operation of construction equipment, generation of noise and dust, and an increase in local truck traffic from off-site transportation of excavated materials and importation of clean fill. Potential exposures during implementation of Alternative 3 would be mitigated, to the extent practicable, by using appropriate PPE, air and work space monitoring, implementation of dust, vapor and odor controls and noise mitigation measures (as appropriate and if necessary based on monitoring results), and proper planning and training of remedial workers.

Estimated duration of remedial construction activities for each of the alternatives and number of truck trips required for each alternative are presented below.

- Alternative 1 – no time required and no truck trips
- Alternative 2 – no time required and no truck trips
- Alternative 3 – 10 months total, 7 months in-river (two construction seasons), and 660 truck trips

Compared to Alternatives 1 and 2, Alternative 3 would be significantly more disruptive, based on the following:

- The duration of remedial construction activities (i.e., operation of construction equipment, generation of noise, dust, etc.) for Alternative 3 would cover two construction seasons due to the extent of sediment excavation/backfilling and installation of the temporary containment/excavation support systems.

- A risk of exposure to remedial workers and the public from impacted sediment (and potential surface water and decontamination water) during sediment excavation and the off-site transportation of removed material.
- A considerable amount of truck traffic due to sediment removal/backfill volumes.
- The need for extensive geotechnical monitoring of the surrounding infrastructure, including installation of inclinometers in Court Street, which would likely require lane closures for the duration of construction activities.

Alternative 1 would have no carbon footprint. Alternative 2 would have a minor carbon footprint from monitoring and maintenance activities. Compared to Alternatives 1 and 2, Alternative 3 would result in a significant increase in greenhouse gas emissions from the operation of construction equipment and thermal treatment of excavated material.

6.1.2 Long-Term Effectiveness and Performance

Currently, routine site activities conducted within OU-2 do not include intrusive activities that could result in exposure to sediment containing MGP-related impacts. As discussed in Section 4, prior to the OU-2 IRM, the potential for exposure to the impacted sediment was limited by physical conditions (i.e., the nature of the sediment bed and depth of water). Therefore, following the excavation and backfilling activities completed as part of the OU-2 IRM, both Alternatives 1 and 2 could potentially be effective on a long-term basis. However, Alternative 2 does include visual sediment monitoring to confirm that post-IRM construction conditions continue to be protective of human health and the environment and that remaining minor/residual impacts in deep sediments are sufficiently contained.

Alternative 3 would include the excavation of all sediment containing MGP-related impacts, regardless of depth. Under Alternative 3, sediment excavation areas would be backfilled to match existing elevations with appropriately sized materials. Sediment excavation and backfilling would have minimal or no adverse effects on river flows and velocities.

Under Alternative 3, through excavation alone, the potential for future long-term exposures to sediment containing MGP-related impacts (although highly unlikely) is significantly reduced, if not eliminated. Therefore, Alternative 3 could be considered more effective in the long-term. However, given the residual/ minor nature and depth of remaining impacts, the potential for future exposures under Alternatives 1 and 2 is unlikely. Because Alternative 2 includes a post-construction monitoring component, Alternative 2 is equally effective compared to Alternative 3.

6.1.3 Land Use

No additional remedial actions would be completed under Alternatives 1 or 2. Alternative 3 would include the removal of impacted sediment and backfilling of excavation areas with clean imported material. As such, the current and anticipated future use of OU-2 is not anticipated to change under any of the alternatives.

6.1.4 Reduction of Toxicity, Mobility, and Volume through Treatment

Alternatives 1 and 2 would not actively treat, remove, recycle, or destroy remaining impacted media (other than by natural processes).

Alternative 3 would include the removal of approximately 6,200 cy of river sediments to address impacted sediments. An assumed 1,600 cy of sediment containing MGP-related impacts would be transported off-site for thermal treatment and an assumed 4,600 cy of sediment (overlying material with PAH concentrations less than 4 mg/kg) would be transported to a landfill for disposal. Alternative 3 would address (through removal) all sediment containing MGP-related impacts.

Based on the residual/minor nature of remaining impacts, Alternative 3 would only be marginally more effective at reducing the toxicity, mobility, and volume of impacted materials, compared to Alternatives 1 and 2.

6.1.5 Implementability

Alternatives 1 and 2 do not include the implementation of any additional remedial activities, and therefore are both are technically and administratively implementable.

Alternative 3 includes excavating sediment and backfilling removal areas within the limits of the Susquehanna River. Remedial contractors capable of performing the excavation, sheet pile installation, and backfilling activities are available. In addition to the general implementation challenges (including site access, sediment dewatering, and storm sewer outfall bypass operations), Alternative 3 would be significantly more technically challenging to implement due to the extensive excavation support system required to remove deep sediments immediately adjacent to existing infrastructure (i.e., the floodwall). Alternative 3 would require a robust excavation support system that would be developed as part the remedial design and extensive geotechnical monitoring that would be required to mitigate the potential to damage existing structures.

Administratively, implementation of Alternative 3 would be coordinated with the City of Binghamton and private property owners to establish access/support areas on properties not owned by NYSEG. Furthermore, Alternative 3 would be more difficult to implement from an administrative perspective, given that this alternative would also require coordination with NYSDOT to implement the long-term Court Street lane closures and would require extensive consultation with NYSDEC Division of Water (Flood Protection and Dam Safety) to install sheet pile and conduct excavation/backfilling activities in close proximity to the floodwall.

Overall, Alternatives 1 and 2 are the most technically and administratively implementable. While Alternative 3 is implementable, the alternative represents significantly more technical and administrative challenges due to the location and depth of impacts.

6.1.6 Compliance with SCGs

- Chemical-Specific SCGs: Under current conditions (i.e., Alternatives 1 and 2), at a minimum, the top 1 foot of sediment throughout OU-2 meets the sediment guidance values. Remaining sediment containing minor/residual impacts is isolated below clean imported fill or is covered with existing sediment with PAH concentrations less than 4 mg/kg. Under Alternative 3, excavation activities would address all sediments containing MGP-related impacts, thereby achieving the sediment guidance values Therefore, Alternative 3 is more effective at achieving potentially applicable chemical-specific SCGs.
- Action-Specific SCGs: Alternative 2 monitoring and maintenance activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be

accomplished by following a site-specific HASP. Alternative 3 would follow similar OSHA requirements, but also include Federal and State permitting requirements for conducting remedial activities within a navigable waterway (i.e., NWP and WQC). Compliance with these requirements would be achieved by following a NYSDEC-approved work plan and using licensed waste transporters and permitted disposal facilities. Therefore, by following all health and safety regulations (Alternatives 2 and 3), and meeting the substantive requirements of any required Federal, State, or local permits and transportation and disposal regulations (Alternative 3 only), all Alternatives would be equally effective at achieving potentially applicable action-specific SCGs.

- Location-Specific SCGs: Applicable Federal, State, and Local permits would be required for Alternative 3. The use of river access locations located on regulated flood control lands would require an Article 16 permit for Flood Control Land Use issued by the NYSDEC. Additionally, Alternative 3 will require additional permitting from NYSDEC Division of Water (Flood Protection and Dam Safety) to implement remedial activities (i.e., deep excavation) in proximity to the floodwall. Therefore, by meeting the substantive requirements of any required Federal, State, or local permits (required for Alternative 3 only) all alternatives would be equally effective at achieving potentially applicable location-specific SCGs.

6.1.7 Overall Protection of Public Health and the Environment

The potential for exposure to impacted sediments was previously limited by physical conditions (i.e., the nature of the sediment bed and depth of water). Furthermore, the OU-2 IRM addressed the most accessible and contiguous shallow sediment containing MGP-related impacts and further reduced the potential for exposure. While Alternatives 1 and 2 would not include implementation of additional remedial activities, current conditions do not present a significant threat to human health and the environment, and to the extent such conditions remain in the future, both Alternatives 1 and 2 could achieve most RAOs. Additionally, Alternative 2 would include visual sediment monitoring to confirm and document the effectiveness and permanence of the OU-2 IRM.

Under Alternative 3, remaining sediment containing minor/residual MGP-related impacts would be addressed through the excavation of sediment, up to an estimated depth of 30 feet bss. Under this alternative, future exposures to impacted sediment would be eliminated and all RAOs would be achieved.

The following table summarizes each alternative's ability to achieve the RAOs.

Tables

Table 1
Chemical-Specific SCGs
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
RCRA-Regulated Levels for Toxicity Characteristic Leaching Procedure (TCLP) Constituents	40 CFR Part 261.24	S	These regulations specify the TCLP constituent levels for identification of hazardous wastes that exhibit the characteristic of toxicity.	Excavated materials may be sampled and analyzed for TCLP constituents prior to disposal to determine if the materials are hazardous based on the characteristic of toxicity.
Universal Treatment Standards/Land Disposal Restrictions (UTS/LDRs)	40 CFR Part 268.48	S	Identifies hazardous wastes for which land disposal is restricted and provides a set of numerical constituent concentration criteria at which hazardous waste is restricted from land disposal (without treatment).	Applicable if waste is determined to be hazardous and off-site land disposal is contemplated.
Clean Water Act (CWA) - Ambient Water Quality Criteria	40 CFR Part 131; USEPA 440/5-86/001 "Quality Criteria for Water - 1986," superseded by "National Recommended Water Quality Criteria: 2009"	S	Criteria for protection of aquatic life and/or human health depending on designated water use.	Potentially applicable to the evaluation of potential impacts to the Susquehanna River from site-related constituents.
CWA Section 404	33 USC Chapter 26 Subchapter 4 Section 1341-1346	S	Regulates discharges to surface waters, indirect discharges of water to POTWs, and discharge of dredged or fill material into waters of the U.S. (including wetlands).	Applicable for remedial activities that include dredging or capping and/or the treatment of water generated during excavation and dewatering activities.
CWA Section 136	40 CFR 136	G	Identifies guidelines for test procedures for the analysis of pollutants.	Applicable to the evaluation of potential impacts to the Susquehanna River from site-related constituents.
New York State				
Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	S	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 371, 373, and 376.	Applicable for determining if materials generated during implementation of remedial activities are hazardous wastes.
New York State Surface Water and Groundwater Quality Standards	6 NYCRR Parts 700-705	S	Establishes quality standards for surface water and groundwater.	Potentially applicable for assessing water quality at the site during remedial activities.
Technical Guidance for Screening Contaminated Sediments	Division of Fish, Wildlife, and Marine Resources (January 1999), superseded by "Screening and Assessment of Contaminated Sediment (June 2014)"	G	Describes the methodology for establishing numeric sediment cleanup standards. It also provides guidance when evaluating risk management options for contaminated sediment and when determining final contaminant concentrations that will be achieved through remedial efforts.	Consistent with this guidance, Site-specific bioavailability and toxicity assessments were used in determining the sediment remediation area.
NYSDEC Ambient Water Quality Standards and Guidance Values	Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (6/98, addended 4/00 and 6/04)	G	Provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in the NYSDEC programs.	To be considered in evaluating surface water quality.

Table 2
Action-Specific SCGs
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

ARCADIS

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
Clean Water Act (CWA) - Discharge to Waters of the U.S., General Pretreatment Regulations for Existing and new Sources of Pollution and Guidelines for Specification of Disposal Sites for Dredged or Fill Material	40 CFR Parts 403, and 230 Section 404 (b) (1); 33 USC 1341-1346	S	Establishes site-specific pollutant limitations and performance standards which are designed to protect surface water quality. Types of discharges regulated under CWA include: indirect discharge to a POTW, and discharge of dredged or fill material into U.S. waters.	Applicable to remedial activities within and/or adjacent to the Susquehanna River.
CWA Section 401	33 USC 1341	S	Requires that 401 Water Quality Certification permit be provided to federal permitting agency (USACE) for any activity including, but not limited to, the construction or operation of facilities which may result in any discharge into jurisdictional waters of the U.S..	Applicable to remedial activities within and/or adjacent to the Susquehanna River.
United States Department of Transportation (USDOT) Rules for Transportation of Hazardous Materials	49 CFR Parts 107 and 171 - 177	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous materials.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the Site.
Nationwide Permit Program, NWP 38, Cleanup of Hazardous and Toxic Waste	33 USC 1344, 1413, 401, 33 CFR 330	S	Regulates activities required to contain, stabilize, or remove hazardous toxic waste materials performed, ordered, or sponsored by a government agency.	Applicable to the remedial activities at the Site.
Occupational Safety and Health Administration (OSHA) - General Industry Standards	29 CFR Part 1910	S	These regulations consist of occupational safety and health standards which have been found to be national consensus standards or established Federal standards; including worker exposure limits (e.g., 8-hour time-weighted average and ceiling concentrations) for various compounds, and associated training requirements for workers at hazardous waste operations.	Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below required concentrations. Appropriate training requirements will be met for remedial workers.
OSHA - Safety and Health Standards	29 CFR Part 1926	S	These regulations provide general construction safety and health standards. These regulations specify the type of safety equipment to be utilized and procedures to be followed during site remediation.	Appropriate safety equipment will be on-site and appropriate procedures will be followed during remedial activities.
OSHA - Record-keeping, Reporting and Related Regulations	29 CFR Part 1904	S	These regulations outline record-keeping and reporting requirements for an employer under OSHA.	These regulations apply to the company(s) contracted to install, operate and maintain remedial actions at hazardous waste sites.
RCRA - Preparedness and Prevention	40 CFR Part 264.30 - 264.37	S	These regulations outline requirements for safety equipment and spill control when treating, handling and/or storing hazardous wastes.	Safety and communication equipment will be installed at the Site as necessary. Local authorities will be familiarized with the Site.
RCRA - Contingency Plan and Emergency Procedures	40 CFR Part 264.50 - 264.56	S	Provides requirements for outlining emergency procedures to be used following explosions, fires, etc. when storing hazardous wastes.	Emergency and contingency plans will be developed during remedial design. Copies of the plan will be kept on-site.
RCRA - Closure Performance Standard	40 CFR Part 264.111	S	This regulation establishes performance standards required for closing hazardous waste facilities, including: minimizing the need for further maintenance; controlling, minimizing or eliminating post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products; and decontaminating or disposing of contaminated equipment, structures and soils.	Decontamination actions and facilities will be constructed for remedial activities and disassembled after completion.
RCRA Subtitle C	42 U.S.C. Section 6901 et seq.; 40 CFR Part 268	S	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes UTSs to which hazardous wastes must be treated prior to land disposal.	Potentially applicable to remedial activities that include the dredging and disposal or capping of waste material from the Site.
90 Day Accumulation Rule for Hazardous Waste	40 CFR Part 262.34	S	Allows generators of hazardous waste to store hazardous waste at the generation site for up to 90 days in tanks, containers and containment buildings without having to obtain a RCRA hazardous waste permit.	Potentially applicable to remedial alternatives that involve the storing of hazardous materials on-site.
Standards Applicable to Transporters of Hazardous Waste - RCRA Sections 3002 and 3003	40 CFR Parts 170 - 179, 262 and 263	S	Establishes the responsibility of off-site transporters of hazardous waste in the handling, transportation and management of the waste. Requires manifesting, recordkeeping and immediate action in the event of a discharge.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the Site.
USEPA-Administered Permit Program: The Hazardous Waste Permit Program	RCRA Section 3005; 40 CFR Part 270 and 124	S	Covers the basic permitting, application, monitoring and reporting requirements for off-site hazardous waste management facilities.	Any off-site facility accepting hazardous waste from the Site must be properly permitted. Implementation of the Site remedy will include consideration of these requirements.
Clean Air Act-National Ambient Air Quality Standards	40 CFR Part 50	S	Establishes ambient air quality standards for protection of public health.	Remedial operations will be performed in a manner that minimizes the production of certain air emissions.

Table 2
Action-Specific SCGs
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

ARCADIS

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
CERCLA-National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	42 U.S.C. Section 9605; 33 U.S.C. 1321 (d); 40 CFR Part 300	S	Provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.	Potentially applicable to remedial activities that include (but are not limited to) the dredging and disposal or capping of waste material from the Site.
New York State				
Air Resources - Prevention and Control of Air Contamination and Air Pollution, Air Quality Classifications and Standards	6 NYCRR Parts 200, 201, 256, 257, and 262	S	Provides methods to prevent and control air contamination and establishes air quality standards, general classifications, and air quality classifications specific to Broome County.	These regulations may be applicable for remedial alternatives that result in certain air emissions.
New York State Pollution Discharge Elimination System (SPDES), administered under National Pollutant Discharge Elimination System (NPDES) Program Requirements	40 CFR Parts 122 Subpart B and 125; CWA Sections 301, 303, and 307 (Administered under 6 NYCRR 750)	S	Establishes permitting requirements for point source discharges; regulates discharge of water into navigable waters including the quantity and quality of discharge.	Removal activities may involve treatment/disposal of water. If so, water generated at the site will be managed in accordance with NYSDEC SPDES permit requirements.
Discharges to Public Waters	New York State Environmental Conservation Law, Section 71-3503	S	Provides that a person who deposits gas tar, or the refuse of a gas house or gas factory, or offal, refuse, or any other noxious, offensive, or poisonous substances into any public waters, or into any sewer or stream running or entering into such public waters, is guilty of a misdemeanor.	During the remedial activities, MGP-impacted materials will not be deposited into public waters or sewers.
New York Regulations for Transportation of Hazardous Waste	6 NYCRR Part 372.3 a-d	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous waste.	These requirements will be applicable to any company(s) contracted to transport hazardous waste from the site.
Waste Transporter Permits	6 NYCRR Part 364	S	Governs the collection, transport and delivery of regulated waste within New York State.	Properly permitted haulers will be used for any waste materials transported off-site.
New York Hazardous Waste Management System - General	6 NYCRR Part 370	S	Provides definitions of terms and general instructions for the Part 370 series of hazardous waste management.	Hazardous waste is to be managed according to this regulation.
Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	6 NYCRR Part 372	S	Provides guidelines relating to the use of the manifest system and its recordkeeping requirements. It applies to generators, transporters and treatment, storage or disposal facilities in New York State.	This regulation will be applicable to any company(s) contracted to transport or manage hazardous material generated at the Site.
New York Regulations for Hazardous Waste Management Facilities	6 NYCRR Part 373.1.1 - 373.1.8	S	Provides requirements and procedures for obtaining a permit to operate a hazardous waste treatment, storage and disposal facility. Also lists contents and conditions of permits.	Any off-site facility accepting waste from the site must be properly permitted.
Land Disposal Restrictions	6 NYCRR Part 376	S	Restricts land disposal of hazardous wastes that exceed specific criteria.	New York defers to USEPA for UTS/LDR regulations.
Remedial Program	6 NYCRR Part 375.1.8	S	Provides general actions to be considered during the remedial process.	This guidance is applicable for various stages of the remediation process (e.g., remedy selection, remedial design, remedial action).
Use and Protection of Waters Program	6 NYCRR Part 608	S	Protection of waters permit program regulates: 1) any disturbance of the bed or banks of a protected stream or water course; 2) construction and maintenance of dams; and 3) excavation or fill in navigable waters of the State.	A permit will be required for the excavation and placement of fill associated with the remediation of impacted sediment in the Susquehanna River.
Guidelines for the Control of Toxic Ambient Air Contaminants	Division of Air Resources (DAR)-1 (Air Guide 1) [6 NYCRR Part 212]	G	Provides guidance for the control of toxic ambient air contaminants in New York State and outlines the procedures for evaluating sources of air pollution.	This guidance may be applicable for remedial alternatives that result in certain air emissions.
NYSDEC Technical Guidance for Site Investigation and Remediation	Division of Environmental Remediation (DER)-10 (2010)	G	Outlines the minimum technical activities DEC accepts for remedial projects administered under DER.	This guidance is applicable for various stages of the remediation process (e.g., remedy selection, remedial design, remedial action).
NYSDEC Guidance on the Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants	TAGM 4061 (2002) (DER-4)	G	Outlines the criteria for conditionally excluding coal tar waste and impacted soils/sediment from former MGPs which exhibit the hazardous characteristic of toxicity for benzene (D018) from the hazardous waste requirements of 6 NYCRR Parts 370 - 374 and 376 when destined for thermal treatment.	This guidance will be considered, as appropriate, in the management of MGP-impacted sediment and coal tar waste generated during the remedial activities.
Citizen Participation Handbook for Remedial Programs	DER-23 Citizen Participation Handbook (January 2010) - supersedes June 1998 Guidebook	G	Identifies community participation requirements managed by DER and according to 6 NYCRR Part 375.	This guidance may be applicable for various stages of the remediation process (e.g. remedy selection, remedial design, remedial action).

Table 3
Location-Specific SCGs
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
Protection of Navigable Waters and of Harbor and River Improvements	33 USC 408	S	Regulates activities taking place within federally authorized Civil Works projects, evaluates compatibility of new infrastructure with existing Civil Works projects, prevents unintended alterations or negative impacts to the public.	To be considered if remedial activities may potentially affect existing Civil Works projects.
Floodplains Management and Wetlands Protection	40 CFR 6 Appendix A	S	Activities taking place within floodplains and/or wetlands must be conducted to avoid adverse impacts and preserve beneficial value. Procedures for floodplain management and wetlands protection provided.	To be considered if remedial activities are conducted within the floodplain.
Endangered Species Act	16 USC 1531 et seq.; 50 CFR Part 200; 50 CFR Part 402	S	Requires federal agencies to confirm that the continued existence of any endangered or threatened species and their habitat will not be jeopardized by a site action.	The Northern Long-Eared Bat (endangered) is on the USFWS list of Threatened, Endangered, Sensitive Species and may be located in Broome County.
Fish and Wildlife Coordination Act	16 USC 661	S	Actions must be taken to protect fish or wildlife when diverting, channeling, or otherwise modifying a stream or river.	Potentially applicable to remedial activities within and/or adjacent to the Susquehanna River.
Historical and Archaeological Data Preservation Act	16 USC 469a-1	S	Provides for the preservation of historical and archaeological data that might otherwise be lost as a result of alteration of the terrain.	The National Register of Historic Places website would be consulted to determine if historical sites are located nearby.
National Historic Preservation Act	16 USC 470; 36 CFR Part 65; 36 CFR Part 800	S	Requirements for the preservation of historic properties.	The National Register of Historic Places website would be consulted to determine if historical sites are located nearby.
Rivers and Harbors Act, Sections 9 & 10	33 USC 401 and 403; 33 CFR Parts 320- 330	S	Prohibits unauthorized obstruction or alteration of navigable waters of the U.S. (dredging, fill, cofferdams, piers, etc.). Requirements for permits affecting navigable waters of the U.S.	Potentially applicable to remedial activities within and/or adjacent to the Susquehanna River.
National Environmental Policy Act, Executive Orders 11988 and 11990	40 CFR 6.302	S	Requires federal agencies, where possible, to avoid or minimize adverse impact of federal actions upon wetlands/floodplains and enhance natural values of such. Establishes the “no-net-loss” of waters/wetland area and/or function policy.	To be considered if remedial activities are conducted within the floodplain.
Clean Water Act, Section 470	33 USC 1344, Section 404; 33 CFR Parts 320-330; 40 CFR Part 230	S	Discharge of dredge or fill materials into waters of the U.S., including wetlands, are regulated by the U.S. Army Corps of Engineers.	Potentially applicable to remedial activities within and/or adjacent to the Susquehanna River.
Hazardous Waste Facility Located on a Floodplain	40 CFR Part 264.18(b)	S	Requirements for a TSD facility built within a 100-year floodplain.	Hazardous waste TSD activities (if any) will be designed to comply with applicable requirements cited in this regulation.
New York State				
New York State Floodplain Management Development Permits	6 NYCRR Part 500	S	Provides conditions necessitating New York State Department of Environmental Conservation permits and provides definitions and procedures for activities conducted within floodplains.	Potentially applicable to remedial activities within and/or adjacent to the Susquehanna River.
New York State Parks, Recreation, and Historic Preservation Law	New York Historic Preservation Act, Section 14.09	S	States the requirements for the preservation of historic properties.	The National Register of Historic Places website indicated no records present for historical sites in the immediate vicinity of the Site.
NYSDEC Flood Control Land Use Permit (Article 16)	New York State Environmental Conservation Law, Article 16, Section 0107.13	S	Prohibits any activity that impairs the ability of a flood control project to function.	Potentially applicable to remedial activities within the Binghamton Flood Damage Reduction Project.
Floodplain Management Criteria for State Projects	6 NYCRR Part 502	S	Establishes floodplain management practices for projects involving state-owned and state-financed facilities.	The area to be remediated is located within the 100-year floodplain. Therefore activities conducted at the site would be performed in accordance with this regulation.
Local				
Local Building Permits	Not applicable.	S	Local authorities may require a building permit for any permanent or semi-permanent structure, such as an on-site water treatment system building or a retaining wall.	Substantive provisions are potentially applicable to remedial activities that require construction of permanent or semi-permanent structures.
City of Binghamton Building and Zoning Department	Chapter 240 of the City of Binghamton Charter and Code of Ordinances	S	Local authorities require a Floodplain Development Permit for construction within the 100-year floodplain.	City of Binghamton requires a Floodplain Development Permit if construction occurs within the 100-year floodplain of the Susquehanna River.

Table 4
Cost Estimate for Alternative 2 - No Further Action with Monitoring
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Operation and Maintenance (O&M) Costs					
1.	Vegetation Monitoring and Reporting	1	LS	$30,000	$30,000
2.	Vegetation Maintenance	1	LS	$5,000	$5,000
				Total Present Worth O&M Cost (5 years @ 5%):	**$151,500**
3.	Sediment Monitoring and Reporting	1	LS	$10,000	$10,000
				Total Present Worth O&M Cost (30 years @ 5%):	**$153,700**
				Total Estimated Cost for Alternative No. 2:	**$305,200**
				Total Estimated Cost for Alternative No. 2 (Rounded):	**$310,000**

General Notes:

1. Cost estimate is based on Arcadis of New York's (Arcadis') past experience and vendor estimates using 2021 dollars.
2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. Arcadis is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.

Assumptions:

1. Vegetation monitoring and reporting cost estimate includes labor, equipment, and materials necessary to complete two inspection events per year and preparation of an annual report to be submitted to NYSDEC.
2. Vegetation maintenance cost estimate includes labor, equipment, and materials necessary to complete reseeding or replanting of trees based on annual vegetation monitoring.
3. Sediment monitoring cost estimate includes labor, equipment, and materials necessary to complete quarterly visual inspections of the sediment surface and preparation of an annual report to be submitted to NYSDEC.

Table 5
Cost Estimate for Alternative 3 - Removal to Pre-Release Conditions
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Capital Costs					
1.	Permitting and Access Agreements	1	LS	$50,000	$50,000
2.	Mobilization / Demobilization	1	LS	$450,000	$450,000
3.	Pre- and Post-Construction Structural Surveys	1	LS	$20,000	$20,000
4.	Geotechnical Monitoring	1	LS	$290,000	$290,000
5.	Odor Controls	70	Gallons	$70	$4,900
6.	Turbidity Controls	650	LF	$75	$48,800
7.	Site Preparation - Staging/Access	160,000	SF	$0.40	$64,000
8.	Material Staging Area	11,000	SF	$6	$66,000
9.	Court Street Closure/Traffic Controls	25	Week	$5,000	$125,000
10.	Temporary Water Treatment System	5	Months	$150,000	$750,000
11.	Outfall Diversion	1	LS	$10,000	$10,000
12.	Temporary Containment System - Shallow	12,000	SF	$80	$960,000
13.	Temporary Containment System - Deep	19,600	SF	$165	$3,234,000
14.	Internal Bracing and Support	1	LS	$300,000	$300,000
15.	Sediment Removal and Handling	6,200	CY	$150	$930,000
16.	Stabilization Agent	500	TON	$250	$125,000
17.	Liquid Waste Characterization	30	Sample	$400	$12,000
18.	Solid Waste Characterization	25	Sample	$600	$15,000
19.	Solid Waste Transportation and Disposal - LTTD	2,900	TON	$90	$261,000
20.	Solid Waste Transportation and Disposal - Non-Hazardous	8,500	TON	$75	$637,500
21.	Armor Stone	200	CY	$120	$24,000
22.	River Backfill	6,000	CY	$80	$480,000
23.	Asphalt Restoration	22,000	SF	$6	$132,000
24.	Bank Restoration	1	Acre	$10,000	$10,000
				Subtotal Capital Cost:	**$8,999,200**
25.				Administration and Engineering (5%):	$450,000
				Construction Management (5%):	$450,000
				Contingency (25%):	$2,249,800
				Total Capital Costs:	**$12,149,000**
Operation and Maintenance (O&M) Costs					
26.	Vegetation Monitoring and Reporting	1	LS	$30,000	$30,000
27.	Vegetation Maintenance	1	LS	$5,000	$5,000
				Total Present Worth O&M Cost (5 years @ 5%):	**$151,500**
				Total Estimated Cost for Alternative No. 3:	**$12,300,500**
				Total Estimated Cost for Alternative No. 3 (Rounded):	**$12,300,000**

General Notes:

1. Cost estimate is based on Arcadis of New York's (Arcadis') past experience and vendor estimates using 2021 dollars.
2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. Arcadis is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.
3. All costs assume construction field work to be conducted by non-unionized labor.

Table 5
Cost Estimate for Alternative 3 - Removal to Pre-Release Conditions
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

Assumptions:

1. Permitting and access agreement cost estimate includes preparation of permit applications associated with completion of this remedial alternative, including but not limited to: USACE's Nationwide Permit Number 38; NYSDEC's Water Quality Certification (under Section 401 of the Clean Water Act); NYSDEC Article 16 Permit for Flood Control Land Use; and a City of Binghamton Floodplain Development permit. Estimate also includes securing access agreements with City-owned or third party-owned properties to facilitate access to the Susquehanna River.
2. Mobilization/demobilization cost estimate includes mobilization and demobilization of labor, equipment, and materials necessary to conduct the remedial construction activities associated with this alternative. Cost estimate includes equipment mobilization/demobilization (e.g., office trailer set-up, large crane, large barge, excavator, dump trucks) and restoration of disturbed surfaces during demobilization. Estimate assumes remedial construction activities would be completed over two construction season. Estimate based on an assumed 5% of the subtotal capital cost.
3. Structural survey cost estimate includes labor and equipment necessary to conduct pre- and post-construction structural surveys. Structural survey activities may include, but are not limited to, completion of a structural survey assessment of the existing floodwall, historic bridge abutment, and pumphouse and spillway adjacent to sediment removal areas.
4. Geotechnical monitoring cost estimate includes installation and removal of five optical survey points, five vibration monitoring locations, and 6 inclinometer well casings, as well as maintenance and monitoring activities for the duration of intrusive activities (assumed 30 weeks).
5. Odor control cost estimate includes providing and maintaining materials and equipment on-site to control odors and vapor during material excavation. Material cost assumes 100 gallons of odor/vapor suppression agent per 1,000 cy of excavated material. Equipment cost assumes one foam application machine and one pressure washer.
6. Turbidity controls cost estimate includes labor, equipment, and material necessary install, maintain, and remove a turbidity curtain around the temporary containment system (i.e., sheet pile) to control suspended solids migration during removal and backfill activities. Estimate assumes a curtain length of 350 feet for Removal Area 1 and a curtain length of 275 feet for Removal Area 2.
7. Site preparation/access cost estimate includes materials necessary to install a 3" layer of gravel at the OU-1 and transload support areas and placement of gravel and geotextile fabric for temporary access roads.
8. Material staging cost estimate includes labor, equipment, and materials necessary to construct impacted material staging and decontamination area at OU-1. Assumes material staging and decontamination area constructed with two layers of geotextile and one layer of geomembrane with minimum 18" berm around perimeter.
9. Court street closure/traffic controls cost estimate includes labor, equipment, and materials necessary to close the southern eastbound lane of Court Street for the duration of removal activates. Traffic controls assumed to be in place during intrusive activities (i.e., installation of sheet pile, excavation).
10. Temporary water treatment system (TWTS) cost estimate includes rental, set-up, and operation of a portable waste water treatment system at OU-1 capable of operating at 150 gallons-per-minute for treatment of construction generated water. Cost estimate includes pumps and piping to required transport water from barge to tank truck (at transload area) and material staging and decontamination area to TWTS. Estimate assumes TWTS includes pumps, influent piping and hoses, skimmer tanks, influent equalization/settling tank, weir/separator tanks, bag filters, organoclay filters, granular activated carbon vessels, zeolite resin vessels, ion exchange vessels, effluent/backwash storage/pH adjustment tanks, effluent/backwash pumps, discharge piping and hoses, and flow meter/totalizer.
11. Diversion of outfalls cost estimate includes provisions for managing storm water from two outfall pipes currently discharging into the removal areas.
12. Shallow temporary containment system cost estimate includes labor, equipment, and materials necessary to install and remove the temporary containment system to facilitate sediment removal. Estimate assumes that the containment system includes a maximum of 40 foot long steel sheet pile (NYSEG-owned) installed to a maximum depth of 30 feet below sediment surface around the removal areas.
13. Deep temporary containment system cost estimate includes labor, equipment, and materials necessary to install and remove the temporary containment system to facilitate sediment removal. Estimate assumes that the containment system includes a maximum of 70 foot long steel sheet pile installed to a maximum depth of 60 feet below sediment surface around select removal areas. Assumes 70 foot steel sheet pile is custom ordered, purchased, and imported from overseas manufacturer.

Table 5
Cost Estimate for Alternative 3 - Removal to Pre-Release Conditions
NYSEG
Binghamton Court Street Former MGP Site
Binghamton, New York

14. Internal bracing and support cost estimate includes labor, equipment, and materials necessary to construct and install internal bracing on the deep temporary containment system to facilitate sediment removal to a maximum depth of 30 feet below sediment surface. Assumes achievement of required embedment depths, additional bracing required if minimum embedment depths are not achieved.

15. Sediment removal and handling cost estimate includes equipment and materials necessary to remove sediment from each removal area. Estimate assumes that up to 5 feet (Area 1) and 30 feet (Area 2) of existing river sediment would be removed using conventional mechanical techniques in the wet (e.g., barge mounted crane with environmental clamshell bucket). Estimate includes costs associated with material removal (including reduced production for deeper excavation areas), direct loading to a transport scow/barge, water-tight trucks, and transporting excavated material to the NYSEG property at OU-1 for processing. Cost estimate includes survey verification.

16. Stabilization agent cost estimate includes the purchase and importation of stabilizing agents to amend excavated material. Cost estimate assumes stabilization admixture (e.g., Portland cement, CKD) will be added at ratio of 5% of the volume of material to be stabilized.

17. Liquid waste characterization cost estimate includes the analysis of liquid waste characterization samples in accordance with applicable permits (including, but not limited to, VOCs, SVOCs, and RCRA Metals, pH, and Oil and Grease). Cost estimate assumes four samples collected and analyzed during system startup and one sample collected each week of treatment/discharge.

18. Solid waste characterization cost estimate includes the analysis of solid waste characterization samples (including, but not limited to, PCBs, VOCs, SVOCs, RCRA Metals, percent sulfur, and heat of combustion). Cost estimate assumes one solid waste characterization sample per 500 tons of material transported to waste disposal facility.

19. Solid waste transportation and disposal - LTTD cost estimate includes labor, equipment, and materials necessary to transport and treat excavated sediment at a thermal treatment facility. Quantity assumes 25% of removal volume will be treated/disposed of via LTTD at an estimated density of 1.75 tons per cubic-yard. Cost estimate includes treatment fee, transportation fuel surcharge, and spotting fees. Cost estimate assumes thermally treated soil does not require subsequent treatment or disposal.

20. Solid waste transportation and disposal - non-hazardous cost estimate includes labor, equipment, and materials necessary to transport and dispose of excavated soil at a non-hazardous solid waste landfill. Quantity assumes 75% of removal volume will be disposed as non-hazardous material (assumed direct-bury) at an estimated density of 1.75 tons per cubic-yard. Cost assumes disposal of miscellaneous materials (e.g., used silt curtain, personal protective equipment, excess material, debris) at an appropriately licensed facility.

21. Armor stone cost estimate includes labor, equipment, and materials necessary to import, place, and grade 6" of shoreline armor stone to serve as the armor layer in the remediation areas.

22. River backfill material cost estimate includes labor, equipment, and materials necessary to import, place, and grade river backfill as necessary to restore removal areas to pre-removal elevations and grades.

23. Asphalt restoration cost estimate includes labor, equipment, and materials necessary to remove and replace the asphalt surface at adjoining private property used for river access.

24. Bank restoration cost estimate includes labor, equipment, and materials necessary to restore affected riverbank areas to pre-construction conditions. Quantity assumes installation of seed, erosion control materials, and trees.

25. Administration and engineering and construction management costs are based on an assumed 5% of the total capital costs, including material disposal costs.

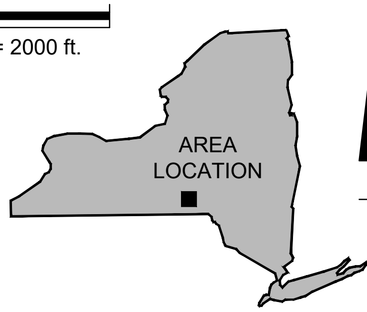
26. Vegetation monitoring and reporting cost estimate includes labor, equipment, and materials necessary to complete two inspection events per year and preparation of an annual report to be submitted to NYSDEC.

27. Vegetation maintenance cost estimate includes labor, equipment, and materials necessary to complete reseeding or replanting of trees based on annual vegetation monitoring.

Figures

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



NYSEG
COURT STREET FORMER MGP SITE
BINGHAMTON, NEW YORK
OU-2 FOCUSED FEASIBILITY STUDY

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

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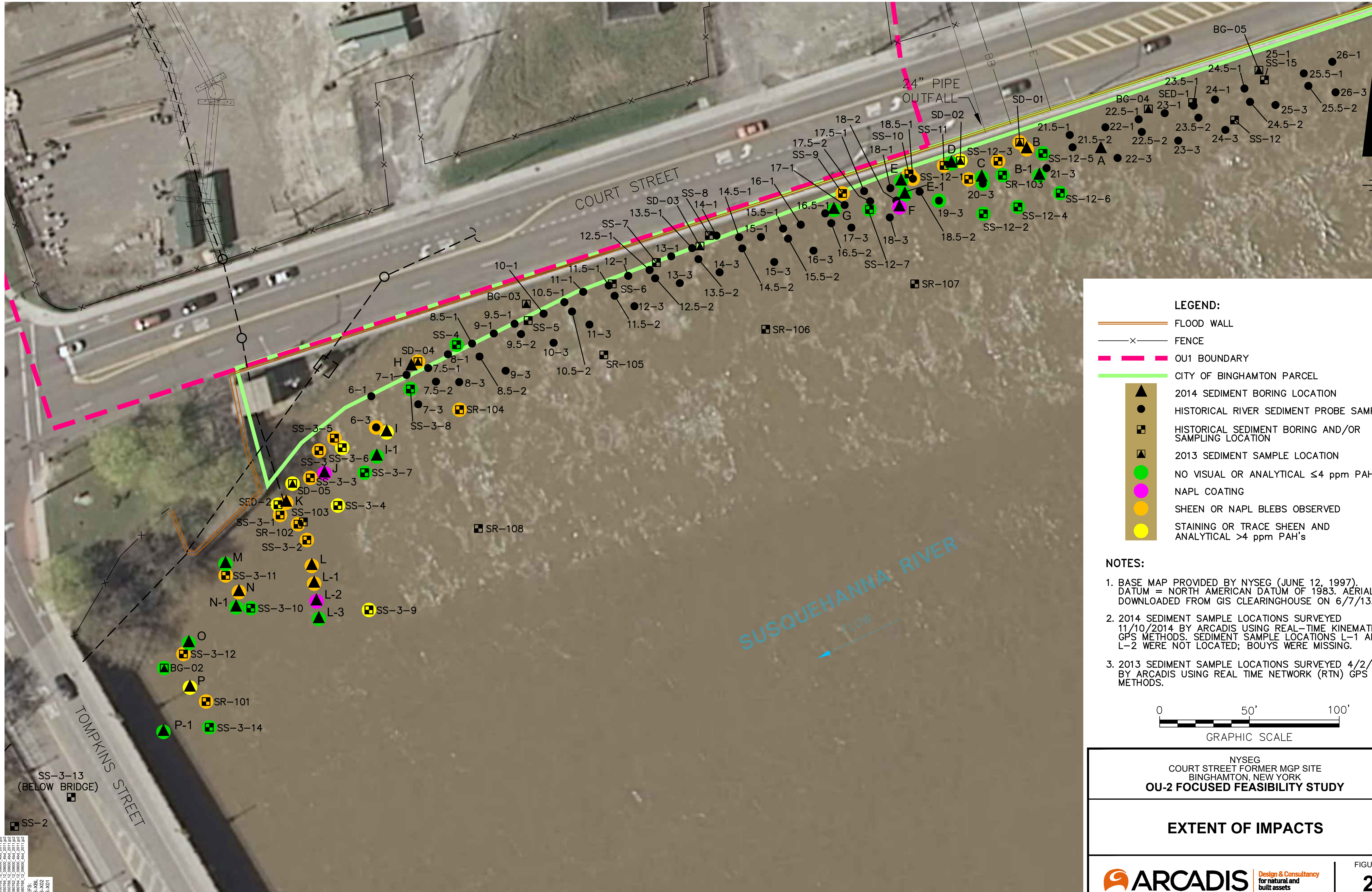


LEGEND:

- FLOOD WALL
- FENCE
- OU1 BOUNDARY
- CITY OF BINGHAMTON PARCEL
- 2014 SEDIMENT BORING LOCATION
- HISTORICAL RIVER SEDIMENT PROBE SAMPLE
- HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION
- 2013 SEDIMENT SAMPLE LOCATION
- NO VISUAL OR ANALYTICAL ≤4 ppm PAH's
- NAPL COATING
- SHEEN OR NAPL BLEBS OBSERVED
- STAINING OR TRACE SHEEN AND ANALYTICAL >4 ppm PAH's

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.
2. 2014 SEDIMENT SAMPLE LOCATIONS SURVEYED 11/10/2014 BY ARCADIS USING REAL-TIME KINEMATIC GPS METHODS. SEDIMENT SAMPLE LOCATIONS L-1 AND L-2 WERE NOT LOCATED; BOUYS WERE MISSING.
3. 2013 SEDIMENT SAMPLE LOCATIONS SURVEYED 4/2/13 BY ARCADIS USING REAL TIME NETWORK (RTN) GPS METHODS.

0 50' 100'

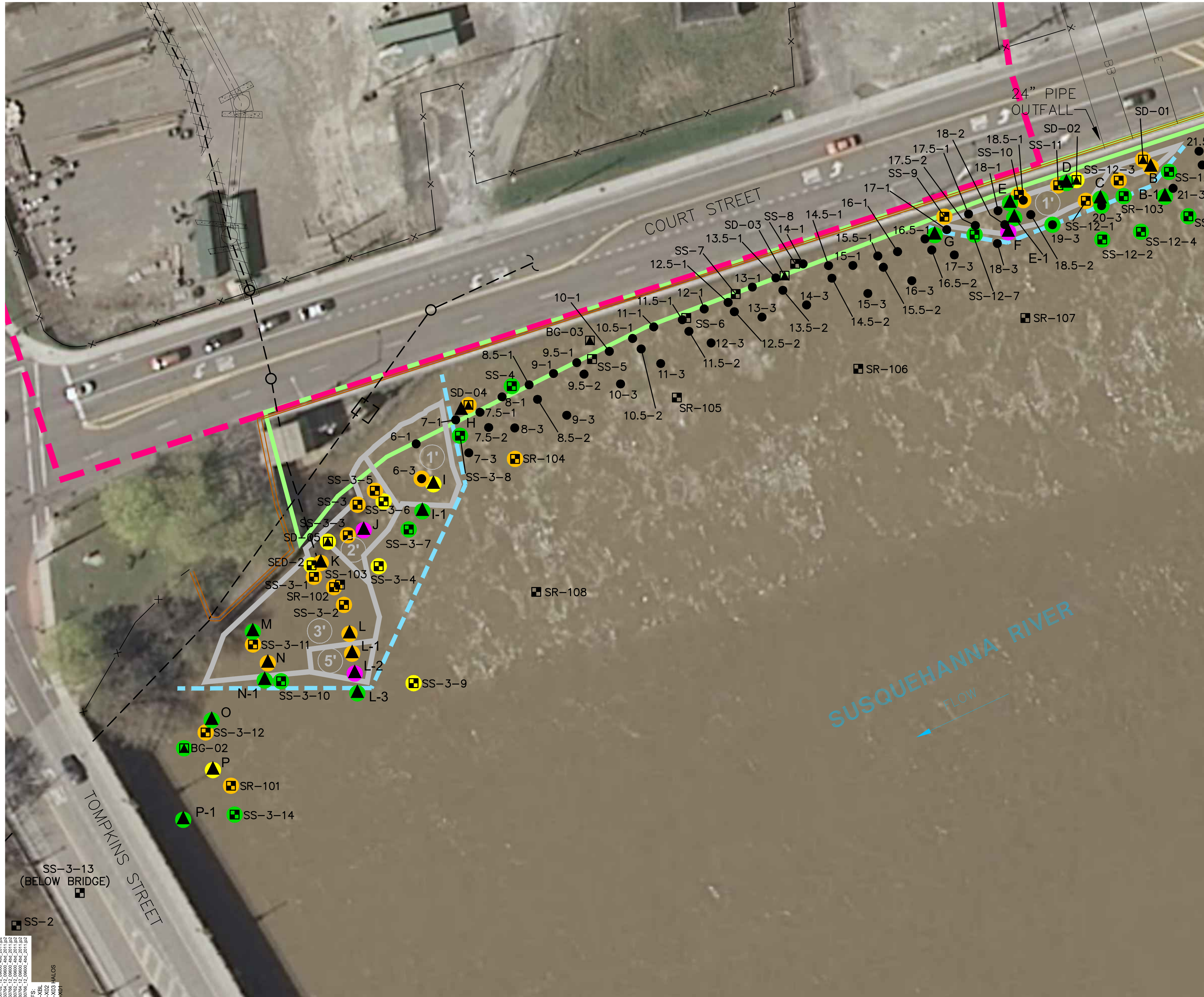
GRAPHIC SCALE

NYSEG
COURT STREET FORMER MGP SITE
BINGHAMTON, NEW YORK
OU-2 FOCUSED FEASIBILITY STUDY

EXTENT OF IMPACTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2



LEGEND:

- FLOOD WALL
- FENCE
- APPROXIMATE OU-2 TARGETED REMOVAL LIMITS
- 2' SEDIMENT REMOVAL DEPTH
- LIMITS OF TEMPORARY CONTAINMENT SYSTEM SHEET PILE (APPROXIMATE)
- OU1 BOUNDARY
- CITY OF BINGHAMTON PARCEL
- 2014 SEDIMENT BORING LOCATION
- HISTORICAL RIVER SEDIMENT PROBE SAMPLE
- HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION
- 2013 SEDIMENT SAMPLE LOCATION
- NO VISUAL OR ANALYTICAL ≤4 ppm PAH's
- NAPL COATING
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0 50' 100'

GRAPHIC SCALE

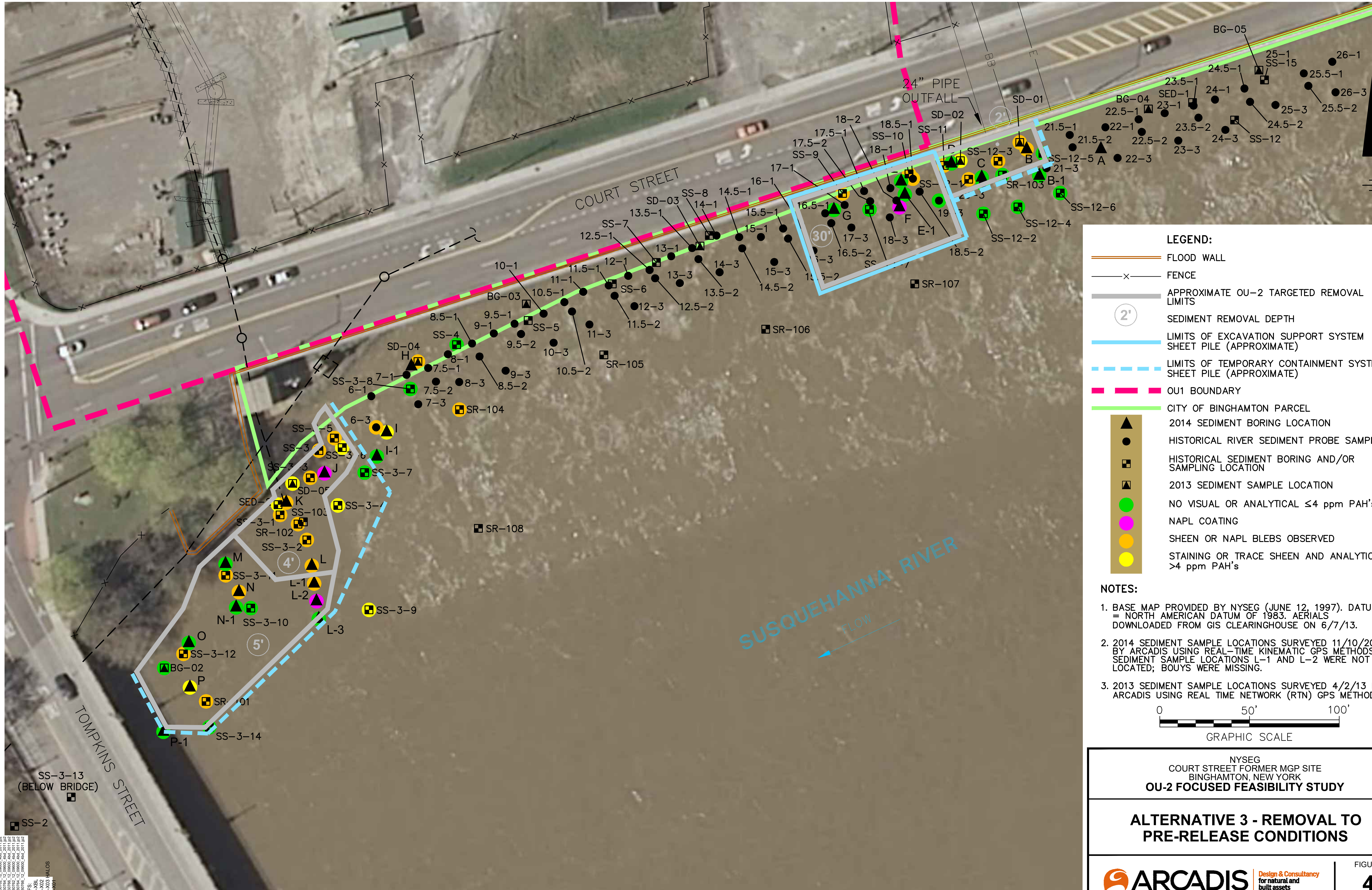
NYSEG
COURT STREET FORMER MGP SITE
BINGHAMTON, NEW YORK

OU-2 FOCUSED FEASIBILITY STUDY

2019 IRM

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



LEGEND:

- FLOOD WALL
- FENCE
- APPROXIMATE OU–2 TARGETED REMOVAL LIMITS
- 2' SEDIMENT REMOVAL DEPTH
- LIMITS OF EXCAVATION SUPPORT SYSTEM SHEET PILE (APPROXIMATE)
- LIMITS OF TEMPORARY CONTAINMENT SYSTEM SHEET PILE (APPROXIMATE)
- OU1 BOUNDARY
- CITY OF BINGHAMTON PARCEL
- 2014 SEDIMENT BORING LOCATION
- HISTORICAL RIVER SEDIMENT PROBE SAMPLE
- HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION
- 2013 SEDIMENT SAMPLE LOCATION
- NO VISUAL OR ANALYTICAL ≤4 ppm PAH's
- NAPL COATING
- SHEEN OR NAPL BLEBS OBSERVED
- STAINING OR TRACE SHEEN AND ANALYTICAL >4 ppm PAH's

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.
2. 2014 SEDIMENT SAMPLE LOCATIONS SURVEYED 11/10/2014 BY ARCADIS USING REAL–TIME KINEMATIC GPS METHODS. SEDIMENT SAMPLE LOCATIONS L–1 AND L–2 WERE NOT LOCATED; BOUYS WERE MISSING.
3. 2013 SEDIMENT SAMPLE LOCATIONS SURVEYED 4/2/13 BY ARCADIS USING REAL TIME NETWORK (RTN) GPS METHODS.

0 50' 100'

GRAPHIC SCALE

NYSEG
COURT STREET FORMER MGP SITE
BINGHAMTON, NEW YORK
OU-2 FOCUSED FEASIBILITY STUDY

ALTERNATIVE 3 - REMOVAL TO PRE-RELEASE CONDITIONS

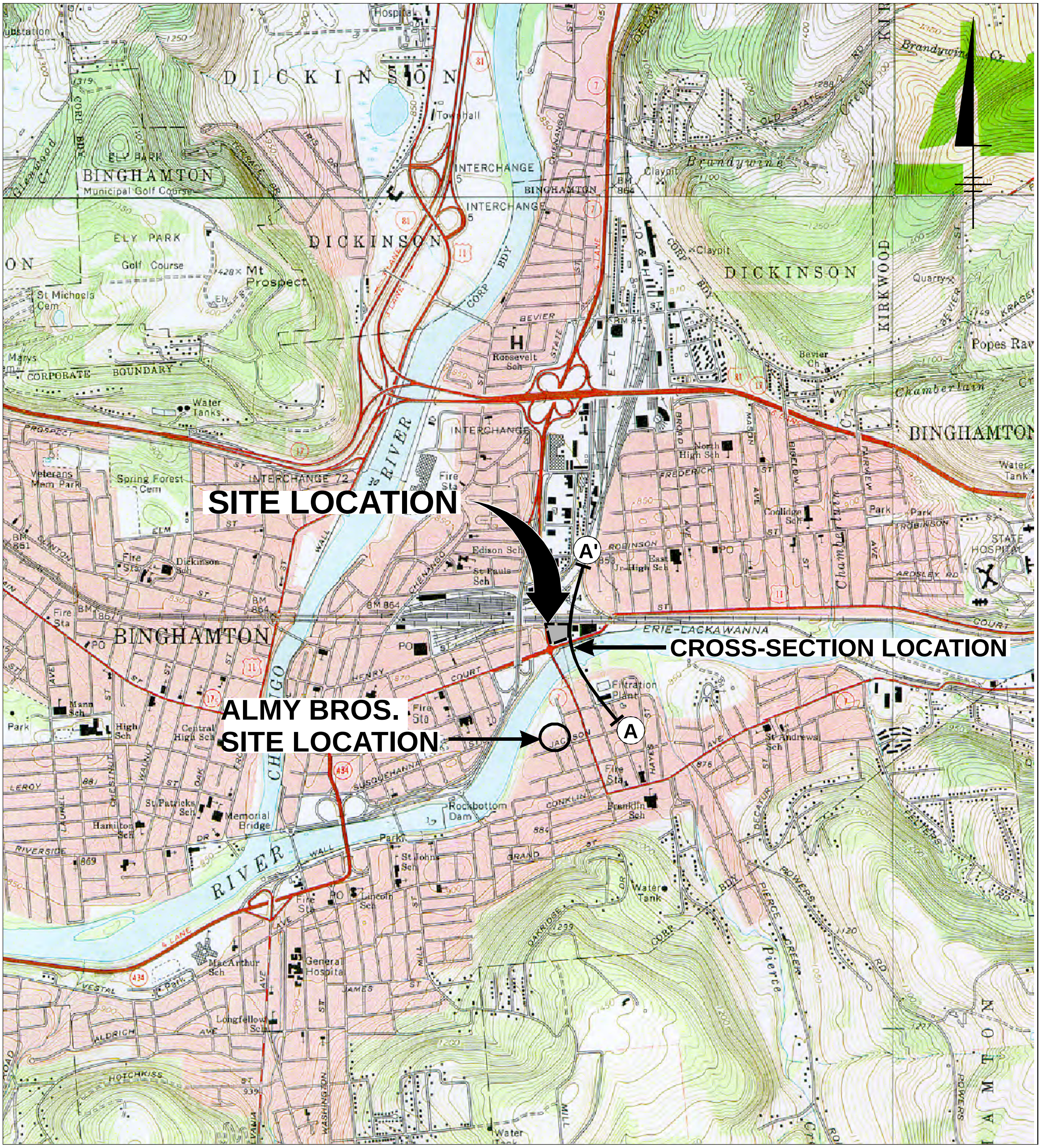
ARCADIS Design & Consultancy for natural and built assets

FIGURE 4

C:\Users\Ksartori\BIM 360\Arcadis\ANA - IBERDROLA USA\Project Files\NYSEG - BINGHAMTON COURT ST - RD\2020\30056344\01-DWG\FFS-Fig4-Alt 3.dwg SAVED: 10/28/2020 8:59 AM BY: SARTORI, KATHERINE

Attachment 1

Select RI Figures



REFERENCE: Base map source: USGS 7.5 Min. Topo. Quad., Binghamton East, NY., Binghamton West, NY., Castle Creek, NY., Chenango Forks, NY. (1968, Photorevised 1976).

2,000 ft 0 2,000 ft

GRAPHIC SCALE

QUADRANGLE LOCATION

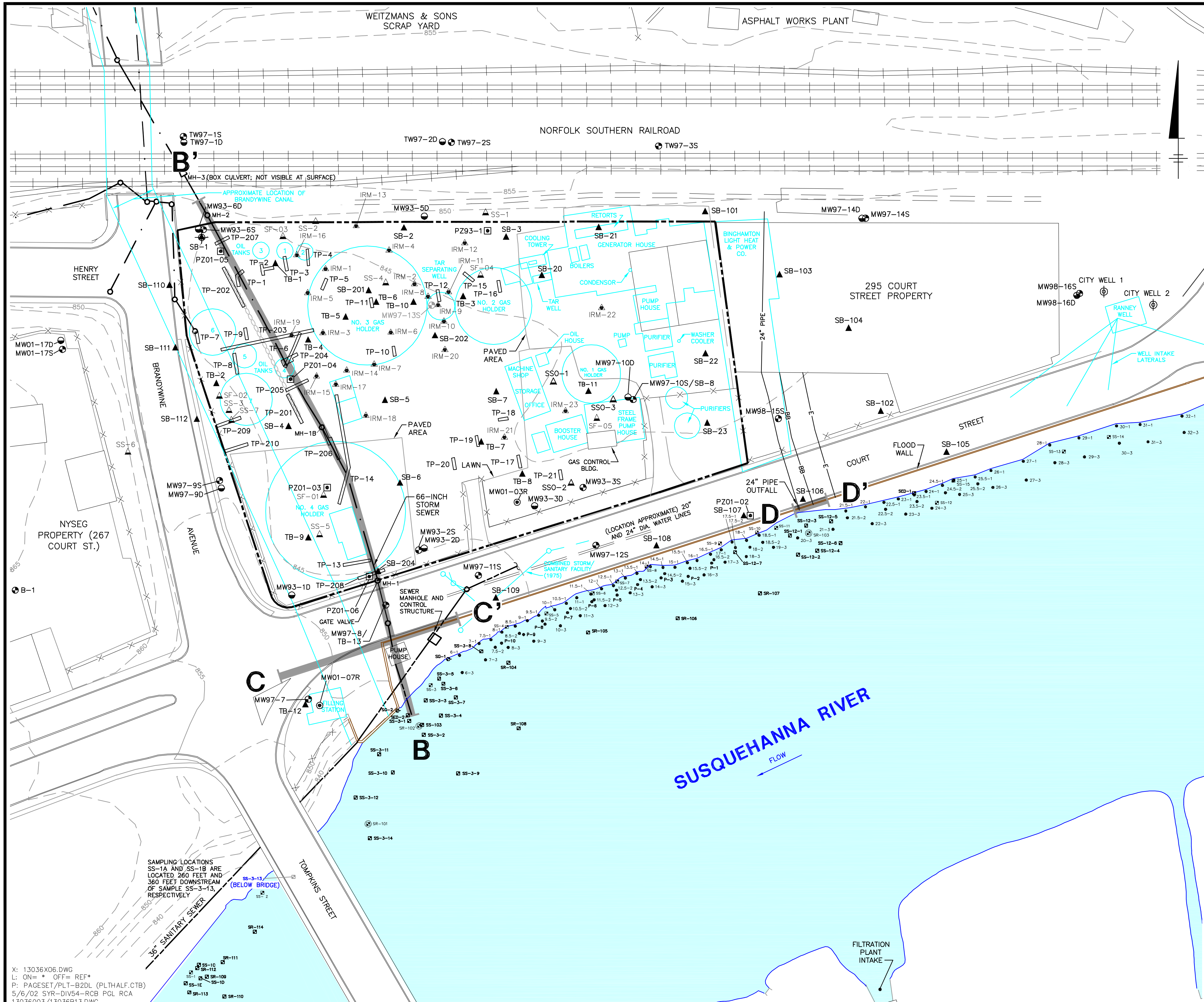
NEW YORK STATE ELECTRIC & GAS CORP.
BINGHAMTON, NEW YORK
COURT STREET SITE
PHASE II SUPPLEMENTAL REMEDIAL INVESTIGATION

SITE LOCATION AND SELECTED FEATURES

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE 1

04/30/02 SYR-D54-DJH
13036003/13036n02.CDR



LEGEND

- FLOOD WALL
- RAILROAD TRACK
- FENCE
- SITE PROPERTY LINES (APPROXIMATE)
- SEWER LINE (APPROXIMATE)
- GROUND SURFACE ELEVATION CONTOUR (FT. AMSL)
- HISTORICAL FEATURE
- BURIED CONCRETE WALL
- MONITORING WELL (SHALLOW)
- MONITORING WELL (DEEP)
- MONITORING WELL (BEDROCK)
- PIEZOMETER
- CITY MONITORING WELL
- SURFACE SOIL SAMPLE
- TEST PIT
- SOIL BORING
- STAFF GAUGE
- SEDIMENT PROBING POINT
- SEDIMENT BORING AND/OR SAMPLING LOCATION
- DEEP RIVERBED BORING LOCATION
- IRM CONFIRMATORY SAMPLE LOCATION
- DECOMMISSIONED MONITORING WELL
- B — B' LINE OF CROSS-SECTION

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997).
2. SURFACE ELEVATIONS DIGITIZED FROM CITY OF BINGHAMTON MAP, SHEET 303, FLOWN DECEMBER 2, 1973 AND MAPPED APRIL 1, 1974.
3. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING NATIONAL GEODETIC VERTICAL DATUM OF 1929, HORIZONTAL DATUM: NAD 83 NEW YORK STATE CENTRAL 3102.
4. ALL INVESTIGATION LOCATIONS SURVEYED BY HAWK ENGINEERING, P.C. BINGHAMTON, N.Y. EXCEPT THE FOLLOWING SEDIMENT PROBING AND SAMPLING LOCATIONS:
   - LOCATIONS WITH AN "SS" OR "SF" PREFIX;
   - LOCATIONS WITH A "-2" SUFFIX; AND
   - SEDIMENT SAMPLING LOCATIONS SED-1 AND SED-2.
5. LOCATIONS OF CONFIRMATORY SAMPLING POINTS IRM-1 THROUGH IRM-23 FROM FIGURE 6 OF THE JANUARY 2002 "INTERIM REMEDIAL MEASURES, FINAL ENGINEERING REPORT" PREPARED BY NYSEG LICENSING AND ENVIRONMENTAL OPERATIONS DEPARTMENT.
6. STORM SEWER LOCATION DIGITIZED FROM CITY OF BINGHAMTON MAP, SHEET 303, ENTITLED: PRELIMINARY REPORT, COMPREHENSIVE STORM DRAINAGE, EXISTING FACILITIES. PREPARED BY VERNON O. SHUMAKER, CONSULTING ENGINEER, VESTAL, NEW YORK, DATE NOT PROVIDED.

0 100' 200'

GRAPHIC SCALE

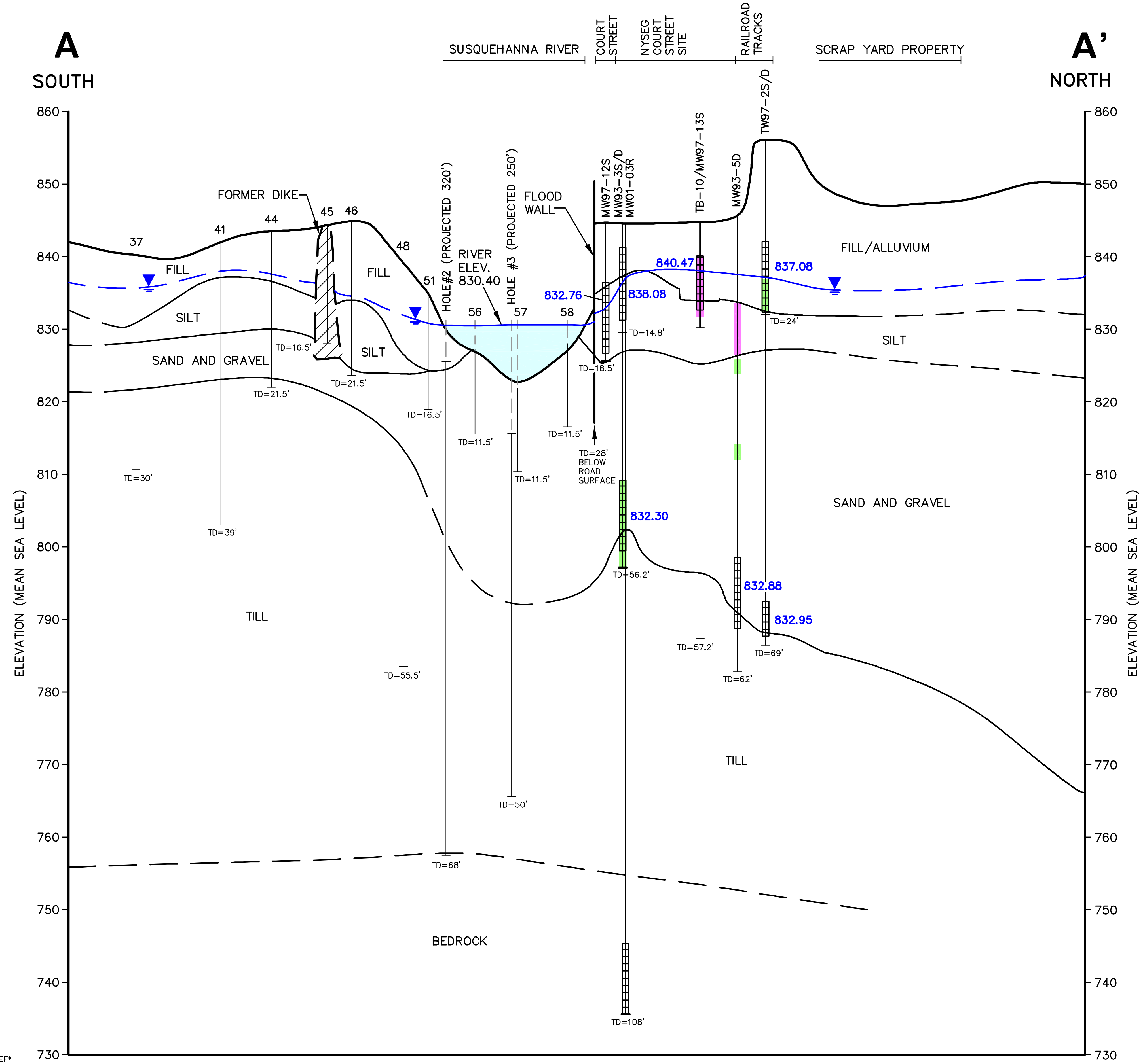
NEW YORK STATE ELECTRIC & GAS CORP.
BINGHAMTON, NEW YORK
COURT STREET SITE
PHASE II SRI

INVESTIGATION LOCATIONS

BBL® BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 3

X: 13036X06.DWG
L: ON= * OFF= REF*
P: PAGESET/PLT-B2DL (PLTHALF.CTB)
5/6/02 SYR-DIV54-RCB PGL RCA
13036003/13036B13.DWG



LEGEND

- 37 — WELL/WELL CLUSTER IDENTIFICATION
- WATER TABLE
- SHEEN
- 837.08 — WATER LEVEL ELEVATION (10/2/01)
- WELL SCREEN
- NAPL
- TD=30' — TOTAL DEPTH OF BORING

NOTES:

1. GROUND SURFACE ELEVATIONS BASED ON CITY OF BINGHAMTON MAP, SHEET 303, 1974 AND USGS 7.5 MINUTE TOPOGRAPHIC MAP, BINGHAMTON WEST QUADRANGLE, 1968. ALL ELEVATIONS ABOVE MEAN SEA LEVEL, 1929 NATIONAL GEODETIC VERTICAL DATUM.
2. POSTED RIVER STAGE AND WATER TABLE ELEVATIONS MEASURED OCTOBER, 2001.
3. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING NATIONAL GEODETIC VERTICAL DATUM OF 1929, HORIZONTAL DATUM: NAD 83 NEW YORK STATE CENTRAL 3102.
4. STRATIGRAPHIC CONTACTS INFERRED FROM AVAILABLE SUBSURFACE LOGS AND CONTOUR MAPS GENERATED TO APPROXIMATE TILL AND SILT SURFACES.
5. WELLS WITH PREFIXES MW, TB, AND TW INSTALLED BY BBL IN 1993 AND 1997. WELLS DESIGNATED BY NUMBER ONLY WERE CONSTRUCTED FOR THE CITY OF BINGHAMTON WATER FILTRATION PROJECT, 1957. WELLS DESIGNATED "HOLE" WERE CONSTRUCTED BY THE STATE OF NEW YORK, DEPARTMENT OF PUBLIC WORKS, FOR THE CONSTRUCTION OF THE TOMPKINS STREET BRIDGE, 1960.
6. DASHED LINES ARE INFERRED.

0 300' 600'
HORIZONTAL SCALE (FEET)

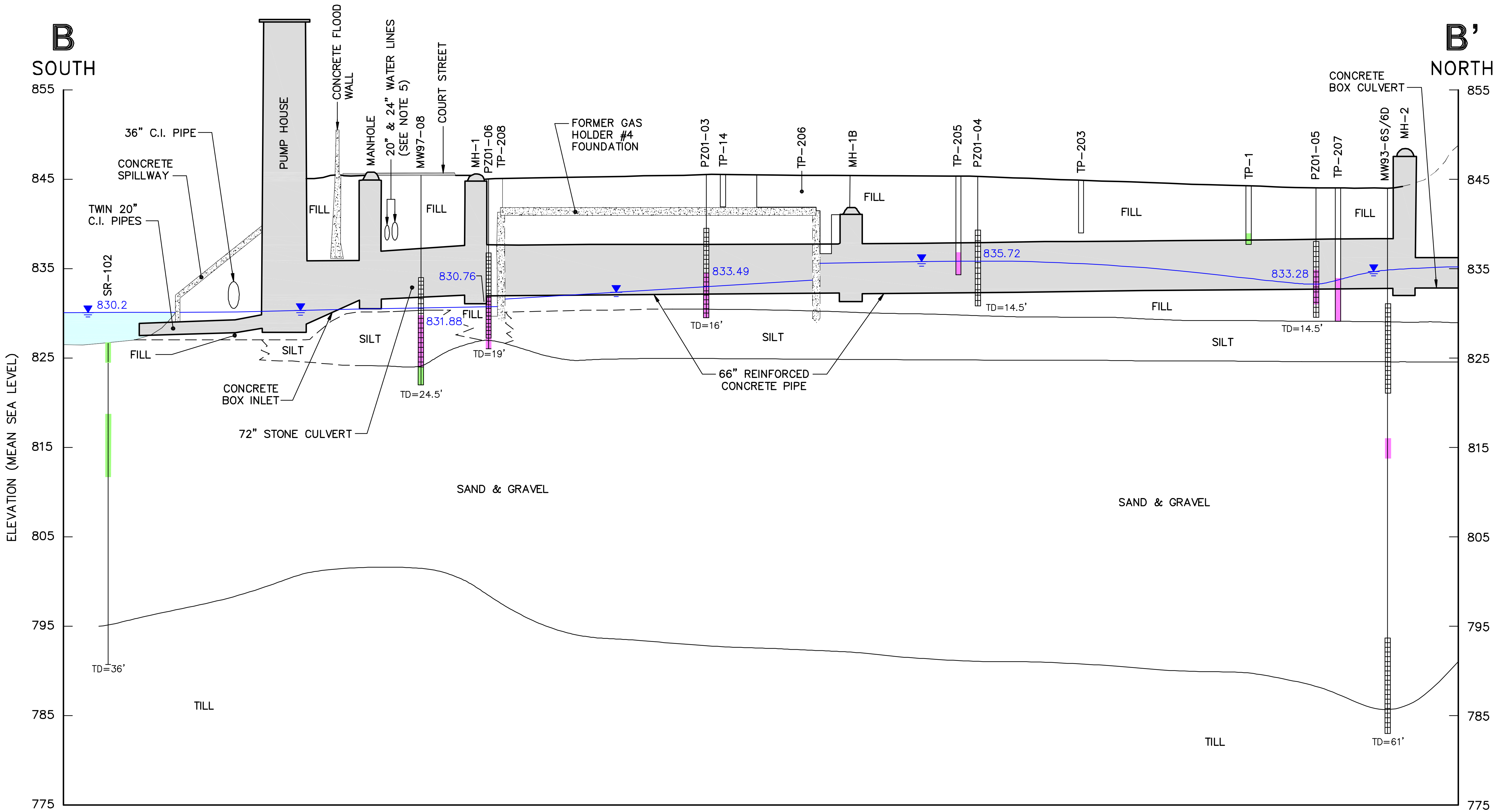
NEW YORK STATE ELECTRIC & GAS CORP.
COURT STREET SITE
BINGHAMTON, NEW YORK
PHASE II SRI

GEOLOGIC CROSS-SECTION A-A'

BBL BLASLAND, BOUCK & LEE, INC. *engineers & scientists*

FIGURE **6**

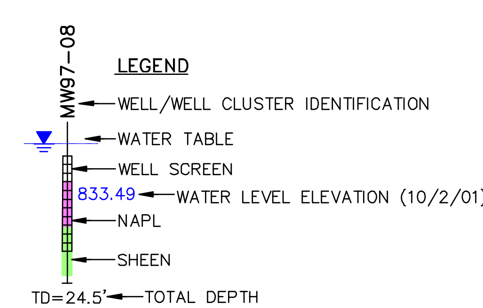
L: ON= * OFF= REF*
P: PAGESET/PLT-BL
5/2/02 SYR-54-PGL SDL RCA
13036003/13036V13.DWG



NOTES:

1. GROUND SURFACE ELEVATIONS BASED ON CITY OF BINGHAMTON MAP, SHEET 303, 1974 AND USGS 7.5 MINUTE TOPOGRAPHIC MAP, BINGHAMTON WEST QUADRANGLE, 1968. ALL ELEVATIONS ABOVE MEAN SEA LEVEL, 1929 NATIONAL GEODETIC VERTICAL DATUM.
2. RIVER STAGE AND WATER TABLE ELEVATIONS MEASURED OCTOBER, 2001.
3. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
4. DASHED LINES ARE INFERRED.
5. THE LOCATIONS OF THESE WATER LINES ARE APPROXIMATE. IT IS POSSIBLE THAT THEIR RESPECTIVE LOCATIONS MAY BE REVERSED.

LEGEND

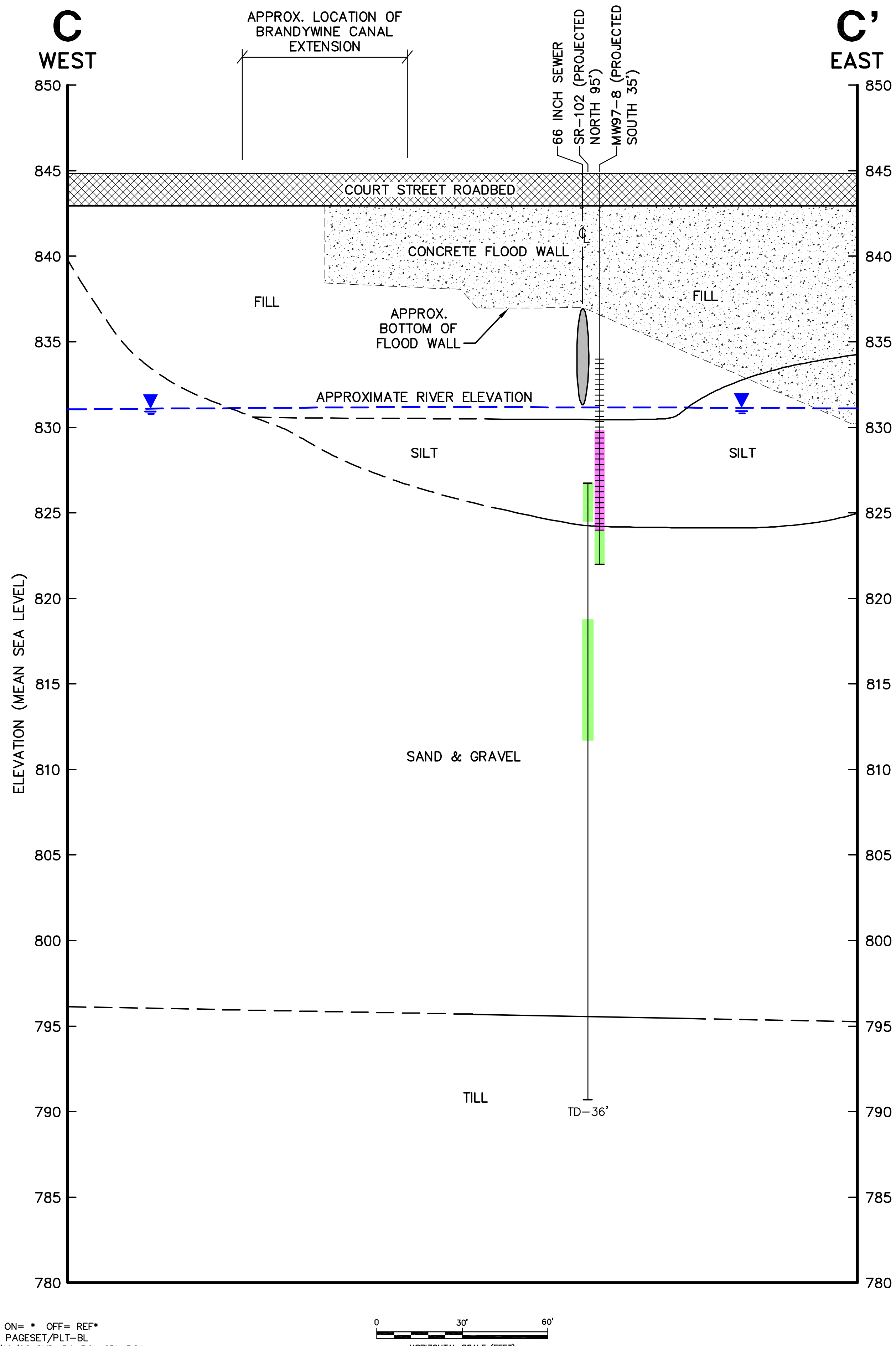


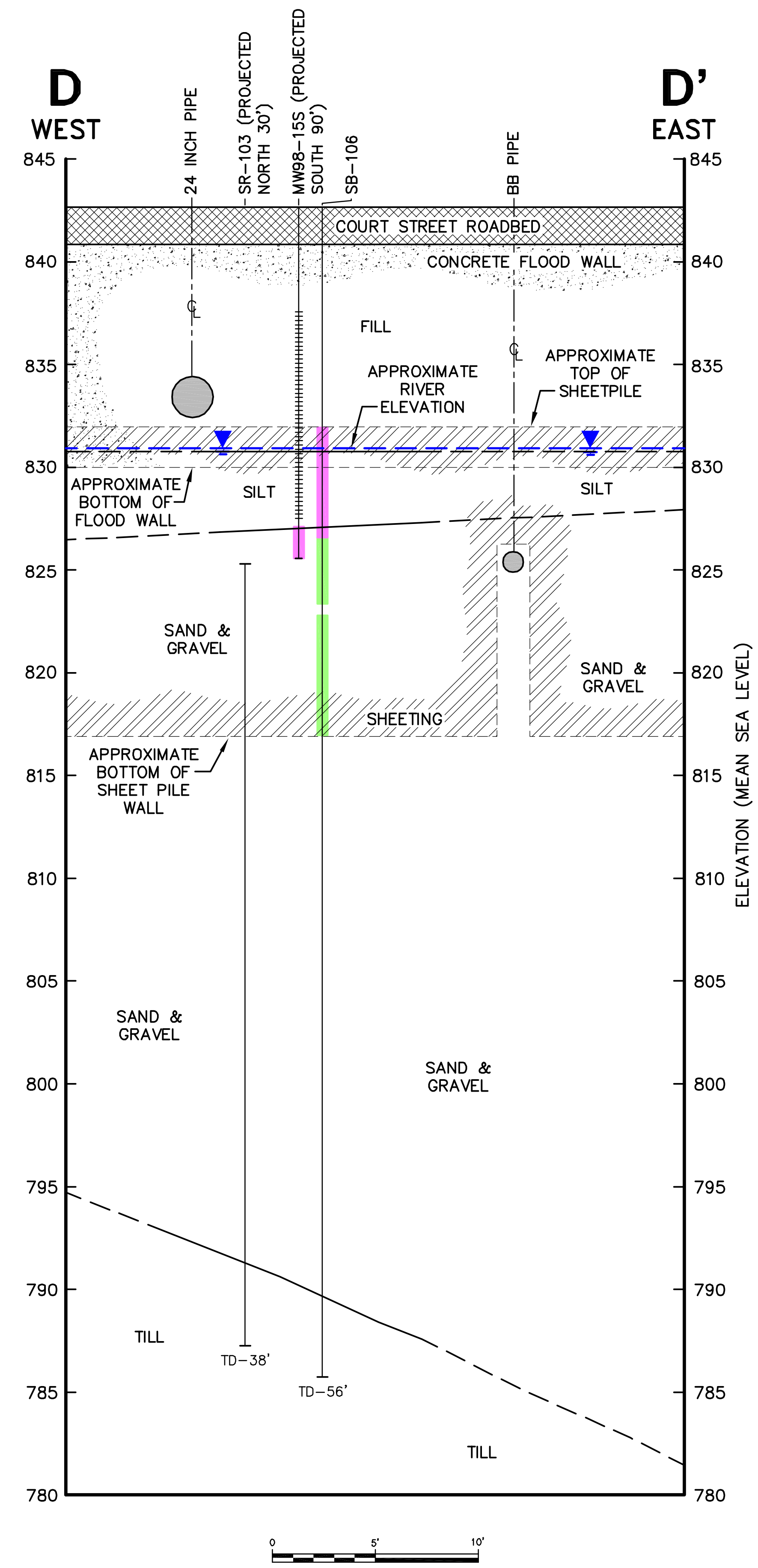
NEW YORK STATE ELECTRIC & GAS CORP.
COURT STREET SITE
BINGHAMTON, NEW YORK
PHASE II SRI

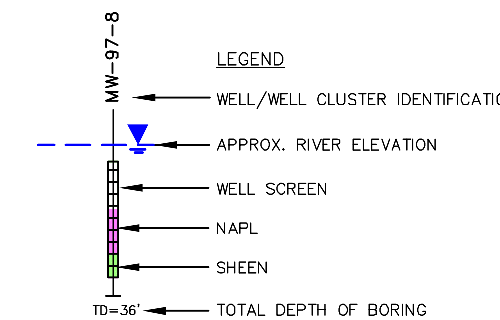
GEOLOGIC CROSS-SECTION B-B'

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 7







NOTES:

1. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING NATIONAL GEODETIC VERTICAL DATUM OF 1929.
2. DASHED LINES ARE INFERRED.

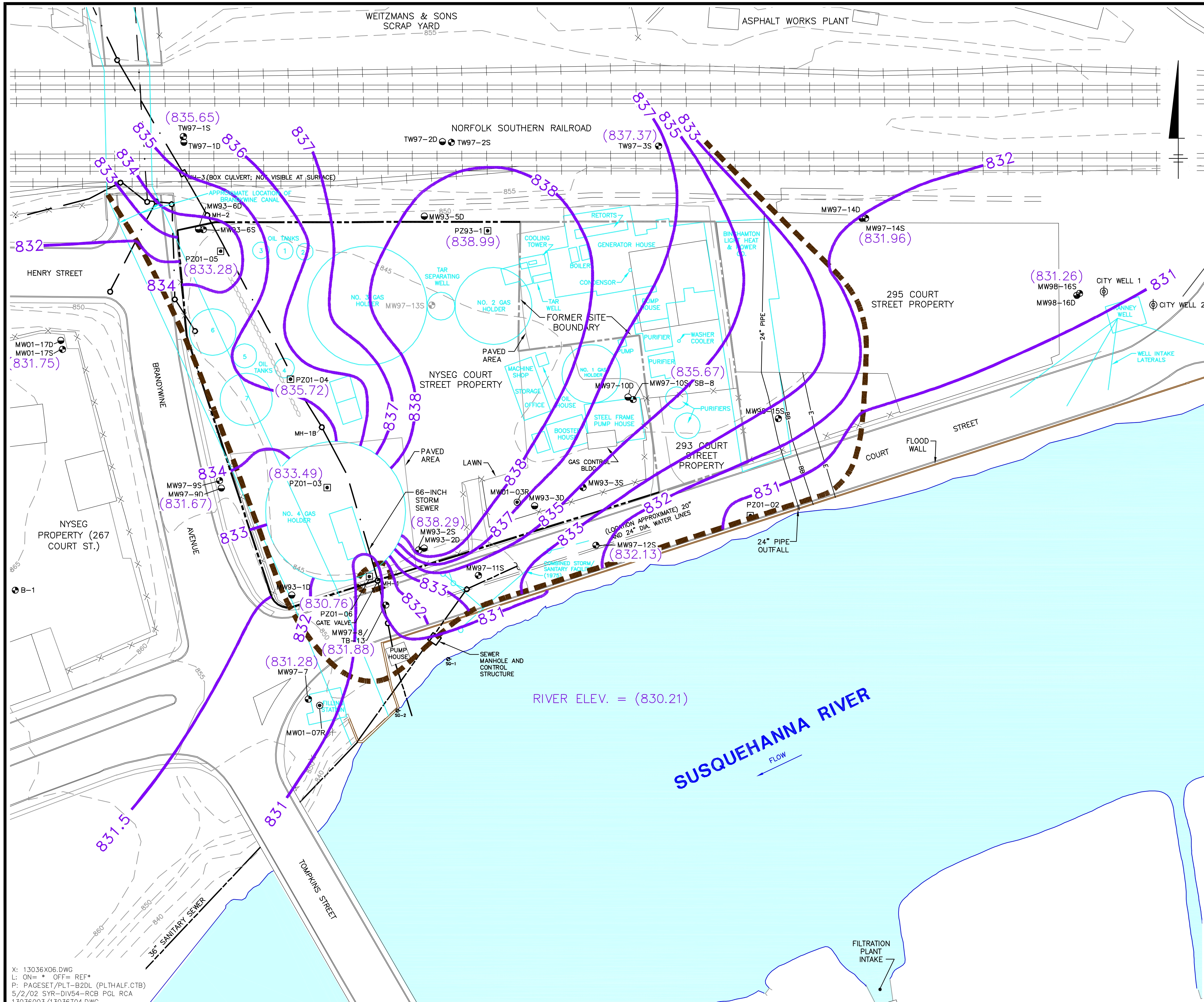
L: ON= * OFF= REF*
P: PAGESET/PLT-BL
5/16/02 SYR-54-PGL SDL RCA
13036003/13036V15.DWG

NEW YORK STATE ELECTRIC & GAS CORP.
COURT STREET SITE
BINGHAMTON, NEW YORK
PHASE II SRI

GEOLOGIC CROSS-SECTIONS C-C' AND D-D'

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
8



LEGEND

- FLOOD WALL
- RAILROAD TRACK
- FENCE
- SITE PROPERTY LINES (APPROXIMATE)
- SEWER LINE (APPROXIMATE)
- 840 GROUND SURFACE ELEVATION CONTOUR (FT. AMSL)
- HISTORICAL FEATURE
- BURIED CONCRETE WALL
- MONITORING WELL (SHALLOW)
- MONITORING WELL (DEEP)
- MONITORING WELL (BEDROCK)
- PIEZOMETER
- CITY MONITORING WELL
- STAFF GAUGE
- DECOMMISSIONED MONITORING WELL
- (831.26) WATER TABLE ELEVATION (FT. AMSL)
- 832 WATER TABLE ELEVATION CONTOUR (FT. AMSL) DASHED WHERE INFERRED
- EDGE OF SILT

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997).
2. SURFACE ELEVATIONS DIGITIZED FROM CITY OF BINGHAMTON MAP, SHEET 303, FLOWN DECEMBER 2, 1973 AND MAPPED APRIL 1, 1974.
3. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING NATIONAL GEODETIC VERTICAL DATUM OF 1929, HORIZONTAL DATUM: NAD 83 NEW YORK STATE CENTRAL 3102.
4. STORM SEWER LOCATION DIGITIZED FROM CITY OF BINGHAMTON MAP, SHEET 303, ENTITLED: PRELIMINARY REPORT, COMPREHENSIVE STORM DRAINAGE, EXISTING FACILITIES. PREPARED BY VERNON O. SHUMAKER, CONSULTING ENGINEER, VESTAL, NEW YORK, DATE NOT PROVIDED.
5. ALL SURFACE SOIL SAMPLING, SOIL BORING, TEST BORING, MONITORING WELL, CITY WELL, AND TEMPORARY MONITORING WELL LOCATIONS SURVEYED BY HAWK ENGINEERING, P.C., BINGHAMTON, N.Y.

0 100' 200'

GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS CORP.
BINGHAMTON, NEW YORK
COURT STREET SITE
PHASE II SRI

WATER TABLE ELEVATION CONTOUR MAP - OCTOBER 2, 2001

BBL® BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 11

Attachment 2

May 14, 2015 PDI Letter Report

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Tel 315.446.9120
Fax 315.446.8053
www.arcadis-us.com

Mr. Anthony Karwiel
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7014

ENVIRONMENT

Subject:
Binghamton Court Street Former MGP Site
Susquehanna River Sediments
Pre-Design Investigation Letter Report

Date:
May 14, 2015

Contact:
David A. Cornell, P.G.

Phone:
315.671.9379

Email:
David.Cornell@arcadis-us.com

Our ref:
B0013082.0012.00001

Dear Mr. Karwiel:

This letter presents the results of the Pre-Design Investigation (PDI) completed in connection with the Binghamton Court Street former manufactured gas plant (MGP) site (the “site”) located in Binghamton, New York. The PDI was conducted by ARCADIS, on behalf of New York State Electric & Gas (NYSEG), between October 20 and November 6, 2014. The fieldwork was performed in accordance with the following correspondence:

- Pre-Design Work Plan (PDI Work Plan) dated June 6, 2014
- New York State Department of Environmental Conservation’s (NYSDEC) approval letter to NYSEG dated July 28, 2014

The PDI objectives and background are provided below, followed by a discussion of the completed fieldwork and results of the PDI.

Objectives and Background

Prior to conducting the PDI, ARCADIS conducted a reconnaissance and sediment assessment at the site between March 11 and May 21, 2013 to determine whether regions of affected sediments documented in the 2002 Remedial Investigation (RI) still existed. The need for this assessment was precipitated by the occurrence of two major flood events that occurred after the RI. The assessment involved probing and sampling sediments along the same stretch of the Susquehanna River that was investigated during the RI, as well as investigating sediment depositional areas near the first downstream dam located approximately 3,300 feet downstream from the site. The results of the assessment were detailed in the Susquehanna River Sediment Assessment Report submitted to NYSDEC on August 19, 2013 (**Attachment A**).

The findings of the 2013 assessment indicated that the distribution of visual impacts observed in surficial sediments adjacent to and downstream from the site varied from the distribution of visual impacts documented in the RI.

As set forth in the June 2014 PDI Work Plan two areas in the Susquehanna River adjacent to the site, Area 1 and Area 2, were identified for remedial consideration and further evaluation in the PDI. The specific objectives of the PDI were to:

- evaluate the distribution of visual impacts (i.e., sheens, non-aqueous phase liquid [NAPL]) in deeper sediments in comparison to the impacts observed during previous investigations;
- assess the concentration and extent of MGP-related polycyclic aromatic hydrocarbons (PAHs) in sediments; and
- obtain the necessary geotechnical data to support a remedial design.

This letter report describes the PDI activities, provides the PDI sampling results from Area 1 and Area 2 adjacent to the site, and provides the revised horizontal and vertical extents of Area 1 and Area 2.

Pre-Design Sediment Drilling and Sampling

A total of 24 sediment borings were advanced during the PDI as shown on **Figure 1**. Sixteen (16) planned borings (PDI-SED-A to PDI-SED-P) and eight (8) contingency borings (PDI-SED-B-1, PDI-SED-E-1, PDI-SED-I-1, PDI-SED-L-1 through PDI-SED-L-3, PDI-SED-N-1, and PDI-SED-P-1) were installed. Boring logs are provided in **Attachment B**. The contingency borings were installed to further refine the extent where visual field observations were noted. Two planned borings (PDI-SED-H and PDI-SED-A) in Area 1 and two planned borings in Area 2 (PDI-SED-A and PDI-SED-M) were advanced to greater depths (20 to 30 feet below sediment surface [bss]) in order to gather additional subsurface geotechnical information (**Figure 1**).

Prior to initiating the sediment drilling activities, a utility clearance was performed.

Due to the heavily armored bottom of the Susquehanna River, borings were advanced by a barge-mounted Acker Ace drill rig using drive and wash methods. A rotary bit was also used to advance borings through obstructions. In order to minimize impacts to surface water during drilling, an oil absorbent boom was placed around the barge and a temporary casing was set into sediments prior to the advancement of all borings. Sediment samples were obtained continuously using a 3-inch diameter by 2-foot long split spoon sampler driven by a 300-pound hammer. With the exception of the geotechnical locations, most borings were advanced to depths between 4 and10 feet bss. Water depths, blow-counts, sample recoveries, and/or any observed impacts produced by the drilling were also noted on the boring logs during the PDI.

Equipment used during the drilling program was decontaminated prior to, in between, and after all intrusive activities using an Alconox wash or by steam cleaning. Decontamination water, sediment cuttings and all investigation-derived waste (IDW) were containerized in 55-gallon drums for subsequent off-site disposal by NYSEG. Sediment borings were backfilled using a bentonite grout mixture or naturally by sediment collapse. The location and sediment surface elevations of each boring were surveyed by ARCADIS using a global positioning system (GPS) relative to North American Datum of 1983 (NAD 83) and North American Vertical Datum of 1988 (NAVD 88), respectively.

Recovered sediment samples were visually characterized for color, composition, and presence/absence of potential MGP-related impacts (i.e., NAPL, blebs, coating, sheens, staining, or odors) and headspace screened for volatile organic compounds using a photoionization detector (PID). A total of 73 sediment samples were submitted for laboratory analysis from the 24 borings advanced during the PDI. Sediment sampling intervals were selected for laboratory analysis based on predetermined depths described in the PDI Work Plan. When sediment samples exhibited field observations of potential impacts at the pre-determined termination depth, additional deeper intervals were sampled until at least 2 feet of visually clean sediment was encountered. Sediment samples were submitted to Accutest Laboratories for analysis of National Oceanic and Atmospheric Administration (NOAA) 34 PAHs using United States Environmental Protection Agency (USEPA) SW-846 Method 8270 and total organic carbon (TOC) using the Lloyd Kahn method.

ARCADIS validated the laboratory analytical data and prepared a data usability summary report (DUSR) for each individual sample delivery group (SDG) using the most-recent versions of the USEPA's Functional Guidelines (USEPA, 1999; 2002) and USEPA Region II standard operating procedures (SOPs) for data validation. The DUSRs include an assessment of data accuracy, precision, and completeness; significant quality assurance problems, solutions, corrections, and potential consequences; and analytical data validation reports. The results of the data validation have been incorporated into the analytical data presented in **Table 1**.

Pre-Design Investigation Results

The following discussion of the PDI results is divided into subsections based on the areas that were investigated, specifically Area 1 and Area 2 as defined in the PDI Work Plan. **Figure 1** provides the PDI boring locations, and **Table 1** provides the analytical data from the PDI.

Area 1

The sediments of Area 1 are primarily described as fine to coarse sands and fine to coarse gravels (PDI-SED-H through PDI-SED-P-1). There were also some notable silt lenses within the upper 2 to 3 feet at PDI-SED-I and PDI-SED-J. Field observations of potential impacts were noted at 8 of the 12 boring locations within or near Area 1. Field observations of potential impacts included NAPL blebs to trace blebs, light NAPL coating, staining, and sheens. In addition, trace sheens and MGP-like odors were observed. No saturated NAPL conditions were encountered. Total priority pollutant PAH (PrPAH) concentrations measured from sediment in this area ranged from 0.14 milligrams per kilogram (mg/kg) (PDI-SED-H) to 850 mg/kg (PDI-SED-J). A more comprehensive list of field observations and associated PrPAH concentrations for Area 1 are provided below.

Location	Field Observations (ft bss)	PrPAH mg/kg (feet bss)
PDI-SED-H	Faint MGP-like odor (24.0 to 27.4)	3.02 (0.0 to 0.5) 0.70 (0.5 to 1) 0.81 (1 to 2) 0.77 (2 to 3) 0.14 (3 to 4)
PDI-SED-I	Faint MGP-like odor (0 to 0.4) and (2.9 to 3.1)	51.4 (0 to 0.5) 381 (0.5 to 1) 1.5 (1 to 2) 1.4/ 0.75 (2 to 3) 0.48 (3 to 4)
PDI-SED-I-1	No obvious impacts	0.17 (0 to 2)
PDI-SED-J	Light NAPL coating, sheen, NAPL blebs, MGP-like odor (0 to 0.6) Faint MGP-like odor (2.6 to 6.9)	753/ 850 (1 to 2) 4.71 (2 to 3) 4.61 (3 to 4)
PDI-SED-K	Trace NAPL blebs, trace sheen, MGP-like odor (0.5 to 0.8) Trace NAPL blebs , sheen, MGP-like odor (2.0 to 2.9)	694 (1 to 2) 10.1 (2 to 3) 7.65 (3 to 4)
PDI-SED-L	Black staining, trace sheen (0.4 to 0.7) Trace sheen, faint MGP-like odor (2 to 2.7)	18.3 (0 to 0.5) 453 (0.5 to 1) 526 (1 to 2) 101 (2 to 3) 10.1 (3 to 4)
PDI-SED-L-1	Trace sheen (2 to 2.8) Trace sheen, trace NAPL blebs (4.3 to 4.8)	1.48 (5 to 6)
PDI-SED-L-2	Black staining, light NAPL coating, trace sheen, MGP-like odor (2.7 to 2.9) Faint MGP-like odor (4.2-4.5)	1.89 (0 to 2) 3.15 (2 to 3) 689 (3 to 4) 391 (4 to 6)

Location	Field Observations (ft bss)	PrPAH mg/kg (feet bss)
PDI-SED-L-3	No obvious impacts	1.49 (2 to 4)
PDI-SED-M	No obvious impacts	1.22 (2 to 3) 1.24 (3 to 4) 0.31 (4 to 5)
PDI-SED-N	NAPL blebs, MGP-like odor, trace sheen (0.2 to 2.7) Trace NAPL blebs, faint MGP-like odor (4 to 4.6)	226 (0 to 0.5) 72.0 (0.5 to 1) 79.5 (1 to 2) 4.62 (2 to 3) 0.54 (3 to 4) 0.71 (4 to 5) 0.27 (6 to 8)
PDI-SED-N-1	No obvious impacts	0.61 (0 to 2)
PDI-SED-O	No obvious impacts	1.24 (2 to 3) 0.23 (3 to 4) 0.52 (4 to 5)
PDI-SED-P	Black staining, faint MGP-like odor (0.4 to 0.7) Trace sheen (2 to 3)	0.89 (0 to 0.5) 1.52 (0.5 to 1) 4.66 (1 to 2) 5.83/ 4.03 (2 to 3) 14.2 (3 to 4) 12.5 (4 to 5)
PDI-SED-P-1	No obvious impacts	3.65 (0 to 2) 3.77 (2 to 4)

<u>Area 2</u>

The sediments of Area 2 are primarily described as fine to coarse sands and fine to coarse gravels (PDI-SED-A through PDI-SED-G). Borings PDI-SED-A, B and G contained MGP-like odors. PrPAH concentrations measured from sediment in this area ranged from 0.01 mg/kg (PDI-SED-A) to 2.38 mg/kg (PDI-SED-G). A more comprehensive list of field observations and associated Total PrPAH concentrations for Area 2 are detailed in the table below.

Location	Field Observations (ft bss)	Total PrPAH mg/kg (feet bss)
PDI-SED-A	Faint MGP-like odor (20 to 22)	0.02 (0 to 0.5) 0.01 (1 to 2) 0.01 (2-3) 0.01 (3-4)
PDI-SED-B	Faint MGP-like odor (2.0 to 2.4)	0.23 (1 to 2) 0.10 (2 to 3) 0.05 (3 to 4)
PDI-SED-B-1	No obvious impacts	NA
PDI-SED-C	No obvious impacts	0.14 (0 to 0.5) 0.15 (1 to 2) 0.27 (2 to 3) 0.18 (3 to 4)

Location	Field Observations (ft bss)	Total PrPAH mg/kg (feet bss)
PDI-SED-D	Trace sheen, faint MGP-like odor (0 to 3.1) Faint MGP-like odor (4.0 to 4.4)	0.18 (1 to 2) 0.31 (2 to 3) 0.38 (3 to 4)
PDI-SED-E	No obvious impacts	1.34 (0 to 4)
PDI-SED-E-1	No obvious impacts	NA
PDI-SED-F	Light to moderate NAPL coating, sheen, faint to strong MGP-like odor (28.4 to 29.5)	0.21 (0 to 0.5) 0.16 (1 to 2) 0.31 (2 to 3) 0.27 (3 to 4)
PDI-SED-G	No obvious impacts	2.36 (0 to 0.5) 0.44 (1 to 2) 2.38 (2 to 3) 1.09 (3 to 4)

In addition to the shallow impacts (<5 feet bss), three borings installed during the 2014 PDI also encountered deeper impacts in the sands and gravel well below the river bed. As detailed in the tables above and on the attached borings logs, locations PDI-SED-A (Area-2) and PDI-SED-H (Area-1) encountered faint MGP-like odors from 20 to 22 feet bss and from 24 to 27.4 feet bss, respectively. Additionally, an interval of NAPL coated sand and gravel was observed from 28.4 to 29.5 feet bss at boring location PDI-SED-F (Area-2), which corresponds to the interval immediately above the till. Due to the depth of these impacts, they are not contiguous to the shallow sediment impacts that resulted from historic storm water discharges. The interval with NAPL coating lies over 25 feet below the base of the river, and the faint MGP like odors were observed approximately 15 feet below the base of the river. Therefore, these deep impacts will not be included in the areas for remedial consideration.

Areas 1 and 2 Remedial Extents

The proposed areas for remedial consideration set forth in the PDI Work Plan were revised based on the PDI results, the 2013 assessment results, as well as previous investigation results. Specifically the following were included in the remedial extent:, field observations of NAPL blebs, coating, staining, and sheen (except for trace or slight sheen) ; TPAH16 concentrations greater than 4 mg/kg (i.e. Class B and C sediments per Table 5 of the NYSDEC Screening and Assessment of Contaminated Sediment (2014); and the presence of sheens during the 2013 assessment. **Figure 2** depicts the 2014 boring locations, the 2013 sediment probing and sample locations, historical sampling locations, and the newly defined areas for remedial consideration based on this PDI. The rationale for the remedial extents of Areas 1 and 2 is provided below.

Area 1

The horizontal extent of Area 1 is based on the field observations of no NAPL blebs, coating, staining, and sheens, and PrPAH concentrations at or less than 4 mg/kg at the following locations:

- SS-4, SS-3-8, SR-104, SD-04, H, I-1, SS-3-7, SS-3-4, L-3, SS-3-9, M, N-1, SS-3-10, O, P, P-1, BG-02, SR-101, and SS-3-14

The vertical extent of Area 1 is based on the field observations of no NAPL blebs, coating, staining, and sheens and PrPAH concentrations at or less than 4 mg/kg below field observations of potential impacts and PrPAH concentrations greater than 4 mg/kg at the following locations:

Location	Vertical Extent
I	1 foot
J	2 feet
SS-3-3	2 feet
K	3 feet
SS-3-1	3 feet
L	3 feet
L-1	5 feet
N	2 feet

Area 1 is depicted on **Figure 2,** and **Table 2** provides a detailed tabulation of the horizontal and vertical delineation of Area 1.

As shown on **Figure 2** and detailed in **Table 3**, two boring location (SS-3-12 and PDI-SED-P) where sheens were observed within the sediment were not included in Area 1 because the data from SS-3-12 collect in 1997 is superseded by 2014 boring location PDI-SED-O (no impacts and TPAH less than 4 mg/kg) leaving only boring location PDI-SED-P (trace sheen and TPAHs lower than 4 mg/kg in the upper 1 foot and 4.66 mg/kg in the 1 to 2 foot interval) surrounded by borings with no visible impacts and TPAHs lower than 4 mg/kg (PDI-SED-N1, SS-3-10, PDI-SED-L-3, PDI-SED-O, BG-02, SR-101, SS-3-14 and PDI-SED-P1).

Area 2

The horizontal extent of Area 2 is based on the field observations of no NAPL blebs, coating, staining, and sheens and PrPAH concentrations at or less than 4 mg/kg at the following locations:

- SS-12-5, A, B, B-1, SS-12-6, SR-103, SS-12-4, D, C, SS-12-2, E, E-1, SS-12-7, SS-9, G, and F

The vertical extent of Area 2 is assumed to be 1 foot based on the field observations and PrPAH concentrations from the previous investigations as none of the 2014 encountered potential impacts or contained PrPAH concentrations greater than 4 mg/kg. In two borings, SS-12-3 and SS-12-1, sheens were observed to 2 feet; however the PrPAH concentrations from the 1 to 2 foot interval were 2 and 2.3 mg/kg, respectively.

Area 2 is depicted on **Figure 2,** and **Table 3** provides a detailed tabulation of the horizontal and vertical delineation of Area 2.

Summary

Based on the results of the most recent investigations, NYSEG believes that sediments impacted with site related constituents have been adequately delineated. Therefore, with NYSDEC concurrence, NYSEG plans to move forward with a remedial design based on the vertical and horizontal removal of shallow sediments as described in this report and as depicted by Areas 1 and 2 detailed on **Figure 2**.

Please feel free to contact Tracy Blazicek (NYSEG) or me if you have any questions or comments.

Sincerely,

ARCADIS of New York, Inc.

David A. Cornell, P.G.
Senior Geologist

Attachments

Copies:
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Nancy Gensky, P.G., ARCADIS
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Tables

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID:	NYSDEC	NYSDEC		PDI-SED-A	PDI-SED-A	PDI-SED-A	PDI-SED-A	PDI-SED-B	PDI-SED-B	PDI-SED-B	PDI-SED-C	PDI-SED-C
Sample Depth(Feet):	Sed	Sed		0 - 0.5	1 - 2	2 - 3	3 - 4	1 - 2	2 - 3	3 - 4	0 - 0.5	1 - 2
Date Collected:	Class A	Class C	Units	10/31/14	10/31/14	10/31/14	10/31/14	10/23/14	10/23/14	10/23/14	10/23/14	10/23/14
CPAHs												
Acenaphthene	- -	- -	ug/kg	5.88	4.40 U	4.10 U	3.14 J	19.0 U	9.20	12.6	61.3	63.3 [86.4]
Acenaphthylene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	2.70 J	2.00 J	2.80 J	2.30 J [2.70 J]
Anthracene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	2.40 J	4.10 U	8.20	17.3 [18.5]
Benzo(a)anthracene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	13.2 J	4.10 J	4.10 U	4.20 J	4.40 U [3.90 U]
Benzo(a)pyrene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	16.8 J	5.70	4.10 U	5.40	4.40 U [3.90 U]
Benzo(b)fluoranthene	- -	- -	ug/kg	4.60 UJ	4.40 UJ	4.10 UJ	3.80 U	20.1	6.60	4.10 U	5.90	4.40 U [3.90 U]
Benzo(e)pyrene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	15.9 J	5.70	4.10 U	5.70	4.40 U [3.90 U]
Benzo(ghi)perylene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	12.0 J	4.40	4.10 U	4.90	4.40 U [3.90 U]
Benzo(k)fluoranthene	- -	- -	ug/kg	4.60 UJ	4.40 UJ	4.10 UJ	3.80 U	15.8 J	4.90	4.10 U	5.40	4.40 U [3.90 U]
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.60 U	2.32 J	4.10 U	3.80 U	19.0 U	3.10 J	4.10 U	2.40 J	4.40 U [3.90 U]
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	3.44 J	2.77 J	2.35 J	3.80 U	16.9 J	6.00	2.20 J	5.20	4.40 U [3.90 U]
C1-Fluorenes	- -	- -	ug/kg	5.78	3.46 J	4.10 U	3.80 U	19.0 U	4.00 J	6.00	6.70	10.5 [11.2]
C1-Naphthalenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	2.66 J	19.0 U	3.40 J	14.7	9.10	32.2 [38.8]
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	2.56 J	3.93 J	2.90 J	3.80 U	22.5	6.00	3.90 J	3.80 J	4.40 [5.50]
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
C2-Fluorenes	- -	- -	ug/kg	4.31 J	3.97 J	4.10 U	3.80 U	19.0 U	2.80 J	4.10 U	3.20 J	3.60 J [3.90 U]
C2-Naphthalenes	- -	- -	ug/kg	4.05 J	4.13 J	2.83 J	3.63 J	13.0 J	5.40	12.2	17.6	41.3 [48.1]
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	3.40 J	2.90 J	5.50	2.40 J [2.80 J]
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
C3-Fluorenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
C3-Naphthalenes	- -	- -	ug/kg	2.96 J	2.59 J	2.68 J	2.60 J	19.0 UBJ	4.30 UB	5.60 UB	11.1 UB	20.5 [21.6]
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.60 U	2.80 J	4.10 U	3.80 U	9.90 J	2.80 J	4.10 U	2.70 J	4.40 U [3.90 U]
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
C4-Naphthalenes	- -	- -	ug/kg	3.70 J	3.08 J	3.50 J	2.25 J	19.0 U	4.30 U	4.10 U	5.00	6.80 [7.20]
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
Chrysene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	14.4 J	6.10	4.10 U	4.40	4.40 U [3.90 U]
Dibenzo(a,h)anthracene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	4.40 U	4.40 U [3.90 U]
Fluoranthene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	40.9 J	14.4	4.10 U	11.5	4.40 U [3.90 U]
Fluorene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	19.0 U	4.30 U	4.10 U	2.40 J	4.80 [5.60]
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	4.60 U	4.40 U	4.10 U	3.80 U	11.2 J	3.80 J	4.10 U	3.50 J	4.40 U [3.90 U]
Naphthalene	- -	- -	ug/kg	4.60 U	4.90	4.10 U	4.30	19.3 J	11.7	24.3	4.50	8.80 [11.3]
Perylene	- -	- -	ug/kg	4.60 U	109	4.10 U	3.80 U	16.7 J	6.40	4.10 U	3.70 J	4.40 U [3.90 U]
Phenanthrene	- -	- -	ug/kg	4.60 U	4.02 J	3.47 J	3.80 U	20.0 J	7.20	3.30 J	8.00	49.7 [41.5]
Pyrene	- -	- -	ug/kg	8.99	4.40 U	3.34 J	2.00 J	43.4 J	20.9	5.00	10.6	4.40 U [3.90 U]
Total PrPAHs	4,000	35,000	ug/kg	14.9	8.92 J	6.81 J	9.44 J	227 J	104 J	47.2 J	143 J	146 J [166 J]
Total Organic Carbon												
Total Organic Carbon	- -	- -	mg/kg	653	6,330	671	717	3,260	3,850	516	1,430	608 [767]
Percent Moisture												
Percent Solids	- -	- -	%	79.2	77.4	87.1	89.9	92.5	90.3	91.4	86.1	88.8 [89.5]

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: Sample Depth(Feet): Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-C 2 - 3 10/23/14	PDI-SED-C 3 - 4 10/23/14	PDI-SED-D 1 - 2 10/23/14	PDI-SED-D 2 - 3 10/23/14	PDI-SED-D 3 - 4 10/23/14	PDI-SED-E 0 - 4 10/23/14	PDI-SED-F 0 - 0.5 10/29/14	PDI-SED-F 1 - 2 10/29/14	PDI-SED-F 2 - 3 10/29/14	PDI-SED-F 3 - 4 10/29/14
CPAHs													
Acenaphthene	- -	- -	ug/kg	98.1	53.1	38.9	78.5	103	208	65.7	66.0	130	134
Acenaphthylene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	3.40 J	55.0	7.19	3.91 J	7.87	9.45
Anthracene	- -	- -	ug/kg	29.1	17.4	18.6	36.3	41.9	65.7	13.8	10.6	27.8	15.8
Benzo(a)anthracene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	56.1	5.08	4.00 U	4.30 U	4.20 U
Benzo(a)pyrene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	45.4 J	5.62	4.00 U	4.30 U	4.20 U
Benzo(b)fluoranthene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	30.0 J	5.04 J	4.00 UJ	4.30 UJ	4.20 UJ
Benzo(e)pyrene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	39.4	4.18 J	4.00 U	4.30 U	4.20 U
Benzo(ghi)perylene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	24.2	3.47 J	4.00 U	4.30 U	4.20 U
Benzo(k)fluoranthene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	32.6	4.69 J	4.00 UJ	4.30 UJ	4.20 UJ
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	36.6	2.70 J	4.00 U	4.30 U	4.20 U
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	121	6.64	4.00 U	2.16 J	4.20 U
C1-Fluorenes	- -	- -	ug/kg	17.8 J	9.80	6.90	12.9 J	15.2	39.1	17.7	17.6	38.7	27.7
C1-Naphthalenes	- -	- -	ug/kg	57.8	39.1	42.1	53.6	81.8	91.5	6.01	9.86	18.0	30.5
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	14.0 J	5.80	4.90	14.6	18.4	109	11.9	7.57	18.8	10.6
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	21.0 U	4.20 U	4.00 U	4.30 U	4.20 U
C2-Fluorenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	8.30 J	3.70 J	52.9	11.4	8.89	16.4	10.8
C2-Naphthalenes	- -	- -	ug/kg	75.6	46.5	43.6	66.9	87.2	131	18.6	23.2	44.9	51.9
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	18.0 U	4.20 U	2.30 J	6.60 J	4.20 U	69.4	4.33	2.45 J	3.70 J	4.20 U
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	21.0 U	4.20 U	4.00 U	4.30 U	4.20 U
C3-Fluorenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	62.3	4.20 U	4.00 U	4.30 U	4.20 U
C3-Naphthalenes	- -	- -	ug/kg	32.7	18.1	14.3	24.5	26.1	82.1	19.8	16.6	42.7	29.0
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	47.0	2.77 J	4.00 U	4.30 U	4.20 U
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	21.0 U	4.20 U	4.00 U	4.30 U	4.20 U
C4-Naphthalenes	- -	- -	ug/kg	18.0 U	6.80	6.50	14.5	8.80	52.8	11.8	8.84	16.7	10.1
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	21.0 U	4.20 U	4.00 U	4.30 U	4.20 U
Chrysene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	72.3	6.49	4.00 U	4.30 U	4.20 U
Dibenzo(a,h)anthracene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	21.0 U	4.20 U	4.00 U	4.30 U	4.20 U
Fluoranthene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	150	30.9	15.5	30.3	14.5
Fluorene	- -	- -	ug/kg	10.3 J	11.4	22.9	36.7	49.6	49.1	7.80	14.0	25.7	24.9
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	20.0 J	3.07 J	4.00 U	4.30 U	4.20 U
Naphthalene	- -	- -	ug/kg	13.4 J	13.0	10.9	14.0	16.7	144	6.84	18.4	16.9	22.6
Perylene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	15.5 J	4.20 U	4.00 U	4.30 U	4.20 U
Phenanthrene	- -	- -	ug/kg	119	80.2	84.0	145	166	174	17.7	18.7	41.2	34.0
Pyrene	- -	- -	ug/kg	18.0 U	4.20 U	4.40 U	13.0 U	4.20 U	213	30.7	15.0	28.2	12.8
Total PrPAHs	4,000	35,000	ug/kg	270 J	175	175	311	381 J	1,340 J	214 J	162 J	308	268
Total Organic Carbon													
Total Organic Carbon	- -	- -	mg/kg	530	625	692	477	534	13,400	2,430	2,460	2,900	771
Percent Moisture													
Percent Solids	- -	- -	%	86.2	90.8	89.2	87.4	84.4	90.1	92	91.8	90.3	90.5

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID:	NYSDEC	NYSDEC		PDI-SED-G	PDI-SED-G	PDI-SED-G	PDI-SED-G	PDI-SED-H	PDI-SED-H	PDI-SED-H	PDI-SED-H	PDI-SED-H	PDI-SED-I
Sample Depth(Feet):	Sed	Sed		0 - 0.5	1 - 2	2 - 3	3 - 4	0 - 0.5	0.5 - 1	1 - 2	2 - 3	3 - 4	0 - 0.5
Date Collected:	Class A	Class C	Units	10/23/14	10/23/14	10/23/14	10/23/14	10/21/14	10/21/14	10/21/14	10/21/14	10/21/14	10/23/14
CPAHs													
Acenaphthene	- -	- -	ug/kg	46.8	17.2	336	35.3	23.5 J	5.10 U	4.50 J	5.90	4.90 U	4,770
Acenaphthylene	- -	- -	ug/kg	124	22.1	83.6	34.5	56.7 J	19.0	17.8	14.5	5.10	937
Anthracene	- -	- -	ug/kg	97.7	14.3	83.3	37.2	120	17.6	23.4	20.9	5.00	2,410 D
Benzo(a)anthracene	- -	- -	ug/kg	143	24.4	124	69.5	187 J	55.6	64.0	65.0	9.80	1,900
Benzo(a)pyrene	- -	- -	ug/kg	165	34.5	167	87.8	192 J	82.7	71.8	71.2	13.9	2,210
Benzo(b)fluoranthene	- -	- -	ug/kg	154	22.4	94.7	64.3	173 J	57.0	57.6	57.4	10.8	849 J
Benzo(e)pyrene	- -	- -	ug/kg	168	26.8	120	68.1	156 J	76.2	54.2	53.7	10.8	1,120 J
Benzo(ghi)perylene	- -	- -	ug/kg	129	22.8	96.9	59.0	117 J	55.9	39.3	47.6	8.60	1,010
Benzo(k)fluoranthene	- -	- -	ug/kg	149	23.5	106	66.7	167 J	53.7	59.8	54.7	11.0	1,150
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	102	12.6	57.8	37.2	82.2 J	41.8	36.6	31.7	7.00	280
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	184	35.2	163	78.8	189 J	75.8	73.8	64.6	12.3 UB	2,740
C1-Fluorenes	- -	- -	ug/kg	22.8	5.50	18.7	10.0	25.8	9.20 UB	9.60	7.00 UB	4.90 UB	704
C1-Naphthalenes	- -	- -	ug/kg	71.4	15.1	222	34.5	54.9	9.10	8.60	7.60	2.70 J	892
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	160	20.7	93.9	64.0	178 J	37.5	47.0	37.9	8.20 UB	1,740
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	53.1	7.00	26.6	16.6	33.7	18.5	15.3	15.2	4.40 J	31.2
C2-Fluorenes	- -	- -	ug/kg	25.1	7.90	21.2	12.2	28.1 J	18.5	18.5 UB	13.8 UB	4.90 UB	203
C2-Naphthalenes	- -	- -	ug/kg	62.1	14.2	98.9	30.1	46.5	14.1 UB	19.1 UB	12.7 UB	4.90 UB	1,080
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	103	14.7	65.4	42.9	72.0	31.5	39.9	24.3	6.30 UB	167
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	35.4	4.50 U	27.7	13.7	21.5	5.10 U	13.0	4.70 U	4.90 U	4.20 U
C3-Fluorenes	- -	- -	ug/kg	47.1	4.50 U	29.1	4.70 U	56.2 J	16.7	25.4	4.70 U	4.90 U	64.8
C3-Naphthalenes	- -	- -	ug/kg	45.7	11.2 UB	34.7	22.6	34.2	15.6 UB	22.5	12.8 UB	5.70 UB	174
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	65.7	10.4	51.6	28.0	37.9	30.5	31.9	21.6	5.30 UB	22.5
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	24.9	4.50 U	98.8	74.4	4.60 U	5.10 U	4.90 U	4.70 U	4.90 U	4.20 U
C4-Naphthalenes	- -	- -	ug/kg	33.1	11.1	21.5	15.9	19.7	15.0 UB	21.0	12.5 UB	5.40 UB	25.9
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	20.5	4.90	23.3	10.5	17.4	38.7	22.8	10.9	4.90 U	4.20 U
Chrysene	- -	- -	ug/kg	158	25.4	121	67.4	216 J	78.1	77.4	75.3	12.5	1,640
Dibenzo(a,h)anthracene	- -	- -	ug/kg	29.4	4.70	18.9	14.9	32.5 J	12.2	10.0	14.2	3.00 J	159
Fluoranthene	- -	- -	ug/kg	319	46.2	231	131	527	59.8	127	123	16.0	7,110 D
Fluorene	- -	- -	ug/kg	29.7	6.20	27.3	13.8	54.4 J	7.20	9.60	6.20	4.90 U	2,610
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	102	18.4	76.7	53.3	112 J	40.4	35.0	39.3	7.70	761
Naphthalene	- -	- -	ug/kg	173	61.3	308	116	177	29.7	34.2	14.7	4.50 J	384
Perylene	- -	- -	ug/kg	118	36.9	190	75.5	152	476	377	392	62.2	434
Phenanthrene	- -	- -	ug/kg	208	26.8	161	84.7	436 J	33.8	51.4	44.9	9.20 UB	12,700 D
Pyrene	- -	- -	ug/kg	336	67.6	348	151	431 J	95.5	122	114	17.5	10,800 D
Total PrPAHs	4,000	35,000	ug/kg	2,360	438	2,380	1,090	3,020	698	805 J	769	135 J	**51,400**
Total Organic Carbon													
Total Organic Carbon	- -	- -	mg/kg	8,770	3,070	6,040	3,880	11,900	14,700	13,700	8,860	1,250	6,440
Percent Moisture													
Percent Solids	- -	- -	%	84.7	80.4	83.2	83.2	76	69.6	75.5	77	80.3	84.6

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: Sample Depth(Feet): Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-I 0.5 - 1 10/23/14	PDI-SED-I 1 - 2 10/23/14	PDI-SED-I 2 - 3 10/23/14	PDI-SED-I 3 - 4 10/23/14	PDI-SED-I-1 0 - 2 11/05/14	PDI-SED-J 1 - 2 10/24/14	PDI-SED-J 2 - 3 10/24/14	PDI-SED-J 3 - 4 10/24/14
CPAHs											
Acenaphthene	- -	- -	ug/kg	34,500 D	134	215 J [87.5 J]	202	42.5	136,000 D [143,000 D]	885	3,020
Acenaphthylene	- -	- -	ug/kg	10,000 D	56.9	41.9 J [12.3 J]	3.40 J	11.0 U	7,250 [8,700]	88.5	29.5
Anthracene	- -	- -	ug/kg	18,000 D	66.3	47.4 J [27.2 J]	4.10 J	11.0 U	33,000 D [52,800 D]	184	45.9
Benzo(a)anthracene	- -	- -	ug/kg	8,750	67.3	61.2 J [20.6 J]	3.80 J	11.0 U	16,700 [19,800]	126	23.1
Benzo(a)pyrene	- -	- -	ug/kg	24,300 D	84.5	77.8 J [29.3 J]	5.40	6.24 J	19,800 J [23,800 J]	157	28.7
Benzo(b)fluoranthene	- -	- -	ug/kg	4,730 J	37.3	33.1 J [12.8 J]	3.60 J	11.0 U	7,730 J [9,620 J]	63.2	12.9
Benzo(e)pyrene	- -	- -	ug/kg	12,100 DJ	47.3	42.1 J [16.1 J]	2.70 J	11.0 U	9,710 [11,800]	79.1	15.6
Benzo(ghi)perylene	- -	- -	ug/kg	5,760	44.1	37.8 J [15.1 J]	4.60	11.0	7,420 [8,960]	69.1	13.5
Benzo(k)fluoranthene	- -	- -	ug/kg	5,570	45.7	40.1 J [15.0 J]	3.60 J	11.0 U	9,580 [11,400]	75.2	13.8
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	1,560	13.4	12.1 [3.50 J]	4.40 U	11.0 U	3,100 [3,760]	22.1	5.50
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	14,500	90.5	74.6 J [25.8 J]	5.00 UB	6.03 J	27,200 [33,200]	181	37.5
C1-Fluorenes	- -	- -	ug/kg	3,360	23.7	16.5 [10.4]	4.40 UB	11.0 U	8,870 [9,670]	54.0	29.5
C1-Naphthalenes	- -	- -	ug/kg	2,790	47.0	69.1 J [38.6 J]	126	14.9 B	36,300 [36,800]	213	1,020
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	7,860	50.2	36.5 J [19.4 J]	5.20	7.86 JB	17,900 [20,600]	115	27.7
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	157	4.50 U	4.60 U [4.40 U]	4.40 U	11.0 U	477 [605]	4.50 U	4.20 U
C2-Fluorenes	- -	- -	ug/kg	811	7.20 UB	5.10 UB [4.40 U]	4.40 UB	11.0 U	1,890 [2,130]	11.6	5.40
C2-Naphthalenes	- -	- -	ug/kg	4,220	55.3	56.7 J [31.0 J]	8.20 UB	14.9 B	13,600 [14,600]	96.3	364
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	905	8.30 UB	7.50 UB [4.30 J]	2.40 J	11.0 U	2,180 [2,540]	16.4	6.60
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.40 U	4.50 U	4.60 U [4.40 U]	4.40 U	11.0 U	122 [46.0 U]	4.50 U	4.20 U
C3-Fluorenes	- -	- -	ug/kg	194	4.50 U	4.60 U [4.40 U]	4.40 U	11.0 U	362 [526]	4.50 U	4.20 U
C3-Naphthalenes	- -	- -	ug/kg	613	16.4 UB	9.00 UB [4.90 UB]	4.40 UB	10.7 JB	1,450 [1,620]	10.0 UB	22.7
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	80.3	4.50 U	4.60 UB [4.40 U]	2.20 J	11.0 U	321 [399]	3.80 J	2.50 J
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.40 U	4.50 U	4.60 U [4.40 U]	4.40 U	11.0 U	46.0 U [46.0 U]	4.50 U	4.20 U
C4-Naphthalenes	- -	- -	ug/kg	82.2	6.10 UB	4.60 U [4.00 J]	4.50 UB	7.00 JB	233 [259]	5.80	6.80
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.40 U	4.50 U	4.60 U [4.40 U]	4.40 U	11.0 U	139 [135]	3.20 J	4.20 U
Chrysene	- -	- -	ug/kg	7,240	55.9	43.6 J [21.1 J]	5.80	7.11 J	14,100 [19,000]	119	17.5
Dibenzo(a,h)anthracene	- -	- -	ug/kg	887	6.30	5.00 [2.60 J]	11.0	11.1	1,320 [1,590]	9.70	4.20 U
Fluoranthene	- -	- -	ug/kg	53,500 D	167	128 J [72.6 J]	7.90	11.0 U	46,700 [52,000]	388	75.3
Fluorene	- -	- -	ug/kg	20,300 D	69.6	99.3 J [45.4 J]	8.10	11.0	42,300 [44,800]	357	466
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	4,550	33.8	27.5 J [12.1 J]	7.00	11.0 U	6,410 [7,660]	58.8	10.2
Naphthalene	- -	- -	ug/kg	241	64.7	67.2 [79.1]	181	52.9	173,000 D [201,000 D]	493	345
Perylene	- -	- -	ug/kg	1,910	19.9	13.5 [8.70]	124	109	2,980 [3,330]	24.3	84.6
Phenanthrene	- -	- -	ug/kg	102,000 D	322	274 [185]	14.2	12.4	162,000 D [169,000 D]	1,050	395
Pyrene	- -	- -	ug/kg	81,000 D	247	201 J [109 J]	11.4	12.3	69,400 [77,100]	591	114
Total PrPAHs	4,000	35,000	ug/kg	**381,000**	1,500	1,400 [747 J]	477 J	167 J	**753,000 [850,000]**	**4,710**	**4,610**
Total Organic Carbon											
Total Organic Carbon	- -	- -	mg/kg	5,950	801	1,220 [1,020]	6,600	NA	21,700 [13,800]	930	2,130
Percent Moisture											
Percent Solids	- -	- -	%	89	82.6	82.1 [83.4]	79.8	88.6	79.8 [86.1]	82.7	85.4

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: Sample Depth(Feet): Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-K 1 - 2 10/28/14	PDI-SED-K 2 - 3 10/28/14	PDI-SED-K 3 - 4 10/28/14	PDI-SED-L 0 - 0.5 10/24/14	PDI-SED-L 0.5 - 1 10/24/14	PDI-SED-L 1 - 2 10/24/14	PDI-SED-L 2 - 3 10/24/14	PDI-SED-L 3 - 4 10/24/14	PDI-SED-L-1 5 - 6 10/28/14	PDI-SED-L-2 0 - 2 11/05/14
CPAHs													
Acenaphthene	- -	- -	ug/kg	86,700	1,030	853	507	54,800	50,500	12,100	1,960	115	124
Acenaphthylene	- -	- -	ug/kg	10,400	175	124	301 J	12,400	18,100	3,360	356	45.6	189
Anthracene	- -	- -	ug/kg	62,800 D	673	683	690 J	38,200	47,600 D	8,160	713	41.2	77.6
Benzo(a)anthracene	- -	- -	ug/kg	26,900	544	375	1,300	11,500	16,600	3,280	330	4.40 U	12.0 U
Benzo(a)pyrene	- -	- -	ug/kg	30,000	552	373	1,480 J	8,470 J	13,400 J	2,540 J	269 J	4.40 U	12.0 U
Benzo(b)fluoranthene	- -	- -	ug/kg	12,300	267	164	1,260 J	4,730 J	6,670 J	1,270 J	123 J	4.40 U	12.0 U
Benzo(e)pyrene	- -	- -	ug/kg	14,600	294	186	1,040 J	4,690	6,640	1,280 J	138 J	4.40 U	12.0 U
Benzo(ghi)perylene	- -	- -	ug/kg	9,770	199	118	766	2,850	3,940	754	88.0	4.40 U	12.0 U
Benzo(k)fluoranthene	- -	- -	ug/kg	15,500	349	230	1,150 J	5,280	7,370	1,450 J	165 J	4.40 U	12.0 U
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	7,000	191	126	494 J	8,100	12,200	2,380	225	4.40 U	12.0 U
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	47,100	829	571	1,470	30,200	44,200	8,520	792	122	7.83 J
C1-Fluorenes	- -	- -	ug/kg	12,500	171	133	315	43,200	39,300	6,920	702	53.3	24.2
C1-Naphthalenes	- -	- -	ug/kg	33,900	194	182	333	4,070	10,700	2,400	260	9.64	89.1
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	32,900	639	492	956	78,900	95,500	19,500	1,640	68.2	52.8
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	1,670	47.7	29.5	186 J	4,050	4,290	783	78.9	4.40 U	12.0 U
C2-Fluorenes	- -	- -	ug/kg	3,800	79.0	56.9	343	18,700	21,900	4,060	376	25.8	6.66 JB
C2-Naphthalenes	- -	- -	ug/kg	18,700	208	175	505	65,100	55,900	11,900	1,150	32.7	69.2
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	6,390	191	141	608	22,200	30,000	5,700	498	29.8	12.0 U
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	463	15.4	7.50	102 J	2,860	1,220	100 U	19.4	4.40 U	12.0 U
C3-Fluorenes	- -	- -	ug/kg	874	97.8	49.4	361	4,230	6,080	1,410	84.6	4.40 U	12.0 U
C3-Naphthalenes	- -	- -	ug/kg	4,380	112	93.3	434	60,300	46,000	9,110	825	33.2	23.4 B
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	1,540	60.2	37.6	368	6,660	8,050	1,460	136	4.06 J	12.0 U
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	551	14.8	8.00	73.4 J	2,090	464	100 U	4.70 U	4.40 U	12.0 U
C4-Naphthalenes	- -	- -	ug/kg	1,090	43.5	29.8	337 J	13,700	15,400	2,940	249	10.5	8.68 JB
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	585	15.3	10.8	110	1,590	1,290	245	20.9	4.40 U	12.0 U
Chrysene	- -	- -	ug/kg	28,200	544	500	1,460	10,900	14,400	2,970	303	4.40 U	12.0 U
Dibenzo(a,h)anthracene	- -	- -	ug/kg	2,270	51.1	31.1	248	1,040	1,390	274	27.6	4.40 U	12.0 U
Fluoranthene	- -	- -	ug/kg	58,800	1,290	887	2,670	41,000	33,500	7,370	693	422	210
Fluorene	- -	- -	ug/kg	44,100	444	343	500	63,600	52,400	11,400	1,050	117	58.7
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	8,940 J	180	109	771	2,810	3,900	741	79.1	4.40 U	12.0 U
Naphthalene	- -	- -	ug/kg	42,200	281	239	631 J	1,470	3,100	681	119	20.5	400
Perylene	- -	- -	ug/kg	4,190	96.1	69.3	403	1,550	2,200	444 J	48.9	4.40 U	12.0 U
Phenanthrene	- -	- -	ug/kg	168,000 D	1,740	1,350	1,830 J	146,000	210,000 D	35,000	2,870	59.8	561
Pyrene	- -	- -	ug/kg	87,500	1,830	1,270	2,710	48,100	43,100	9,950	948	658	266
Total PrPAHs	4,000	35,000	ug/kg	**694,000**	**10,100**	**7,650**	**18,300**	**453,000**	**526,000**	**101,000**	**10,100**	1,480	1,890
Total Organic Carbon													
Total Organic Carbon	- -	- -	mg/kg	16,600	4,110	1,350	24,600	40,700	37,900	9,070	3,140	1,340	NA
Percent Moisture													
Percent Solids	- -	- -	%	76.6	84.8	86.3	83.8	80.8	84.1	85.6	81.9	84	89

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: / Sample Depth(Feet): / Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-L-2 2 - 3 11/05/14	PDI-SED-L-2 3 - 4 11/05/14	PDI-SED-L-2 4 - 6 11/05/14	PDI-SED-L-3 2 - 4 11/05/14	PDI-SED-M 2 - 3 10/29/14	PDI-SED-M 3 - 4 10/29/14	PDI-SED-M 4 - 5 10/29/14	PDI-SED-N 0 - 0.5 10/24/14	PDI-SED-N 0.5 - 1 10/24/14	PDI-SED-N 1 - 2 10/24/14
CPAHs													
Acenaphthene	- -	- -	ug/kg	149	32,300	14,700	133	38.9	48.1	38.3	19,000	7,330	7,980
Acenaphthylene	- -	- -	ug/kg	349	75,900	34,800	122	46.2 J	28.5	8.62 J	5,790	2,450	2,750
Anthracene	- -	- -	ug/kg	137	37,700	17,800	63.3	55.0 J	97.4	15.5 J	16,400	5,510	6,320
Benzo(a)anthracene	- -	- -	ug/kg	2.93 J	20,500	9,670	22.0	72.4 J	72.7	15.4 J	10,300	2,850	3,050
Benzo(a)pyrene	- -	- -	ug/kg	4.50 U	24,400	11,400	22.3	132 J	106	26.8	14,400 J	2,840 J	2,770 J
Benzo(b)fluoranthene	- -	- -	ug/kg	4.50 U	8,480	3,870	8.04 J	69.7 J	66.1	13.4 J	6,250 J	1,420 J	1,250 J
Benzo(e)pyrene	- -	- -	ug/kg	4.50 U	12,300	5,940	16.6	91.3 J	74.2	16.9 J	7,740 J	1,440 J	1,420 J
Benzo(ghi)perylene	- -	- -	ug/kg	4.50 U	11,400	5,540	13.0	77.8	61.9	15.7 J	6,550	947	918
Benzo(k)fluoranthene	- -	- -	ug/kg	4.50 U	12,700	6,190	17.2	74.8 J	66.9	14.5 J	7,070 J	1,600 J	1,650 J
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.50 U	6,110	2,360	8.77 J	45.8 J	26.2	17.0 U	3,090	1,840	1,950
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	25.6	24,500	10,900	34.5	110 J	96.2	20.8	15,500	6,360	6,930
C1-Fluorenes	- -	- -	ug/kg	43.0	9,650	4,120	29.3	18.9 J	15.8	9.29 J	5,660	4,250	4,500
C1-Naphthalenes	- -	- -	ug/kg	169	71,700	33,600	97.0	9.52	13.1	17.0 U	4,430	2,250	2,630
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	109	29,400	12,700	60.1	68.3 J	51.8	15.1 J	16,200	12,500	14,000
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.50 U	1,720	660	12.0 U	40.1 J	15.4	17.0 U	742	622	653
C2-Fluorenes	- -	- -	ug/kg	9.37 B	2,560	1,110	9.91 JB	26.2 J	20.5	17.0 U	2,950	2,610	3,010
C2-Naphthalenes	- -	- -	ug/kg	141	39,100	15,400	76.5	17.3 J	15.9	12.9 J	8,410	6,170	6,580
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	9.17	6,080	2,510	13.3	42.6 J	23.1	17.0 U	4,270	3,850	4,260
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.50 U	410 U	430 U	12.0 U	43.4 J	17.6	17.0 U	224	161	213
C3-Fluorenes	- -	- -	ug/kg	4.50 U	705	373 J	12.0 U	31.1 J	19.7	17.0 U	928	848	834
C3-Naphthalenes	- -	- -	ug/kg	32.0 B	7,390	3,080	33.4 B	24.6 J	14.9	10.7 J	5,090	5,110	5,260
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.50 U	1,270	489	12.0 U	37.6 J	17.1	9.05 J	1,140	965	1,110
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.50 U	410 U	430 U	12.0 U	26.9 J	14.6	17.0 U	110 U	82.0 U	366
C4-Naphthalenes	- -	- -	ug/kg	6.74 B	1,540	636	10.3 JB	21.2 J	12.9	14.5 J	1,890	2,000	2,010
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	4.50 U	326 J	430 U	12.0 U	24.9 J	8.69	17.0 U	245	167	206
Chrysene	- -	- -	ug/kg	4.87	20,700	12,600	33.9	92.0 J	87.0	18.5	11,000	2,710	2,850
Dibenzo(a,h)anthracene	- -	- -	ug/kg	4.50 U	1,630	717	12.0 U	12.9	10.8	17.0 U	1,070	284	250
Fluoranthene	- -	- -	ug/kg	303	59,100	29,300	100	145	158	31.4	25,600	6,370	6,830
Fluorene	- -	- -	ug/kg	107	42,700	17,900	72.3	15.6	20.3	17.0 U	10,700	5,710	6,480
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	4.50 U	8,160	3,810	12.0 U	60.3 J	49.8	11.8 J	5,110	880	845
Naphthalene	- -	- -	ug/kg	704	86,200	104,000	417	37.1	56.4	28.6	2,920	2,250	1,890
Perylene	- -	- -	ug/kg	4.50 U	3,680	1,750	9.56 J	68.7	175	65.8	2,130 J	510 J	477 J
Phenanthrene	- -	- -	ug/kg	988	157,000	72,900	295	84.2 J	89.5	22.0	46,300	20,700	24,700
Pyrene	- -	- -	ug/kg	404	90,000	45,500	174	209	221	45.4	37,800	8,140	8,930
Total PrPAHs	4,000	35,000	ug/kg	3,150 J	**689,000**	**391,000**	1,490 J	1,220 J	1,240	306 J	**226,000**	**72,000**	**79,500**
Total Organic Carbon													
Total Organic Carbon	- -	- -	mg/kg	NA	NA	NA	NA	2,230	3,650	1,610	14,400	5,610	9,710
Percent Moisture													
Percent Solids	- -	- -	%	89.1	83.4	91.2	89.1	85.2	87.4	83.7	88.3	90.8	88

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: Sample Depth(Feet): Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-N 2 - 3 10/24/14	PDI-SED-N 3 - 4 10/24/14	PDI-SED-N 4 - 5 10/27/14	PDI-SED-N 6 - 8 10/27/14	PDI-SED-N-I 0 - 2 10/27/14	PDI-SED-O 2 - 3 10/27/14	PDI-SED-O 3 - 4 10/27/14	PDI-SED-O 4 - 5 10/27/14	PDI-SED-P 0 - 0.5 10/28/14	PDI-SED-P 0.5 - 1 10/28/14
CPAHs													
Acenaphthene	- -	- -	ug/kg	889	30.2	176 J	26.8	18.1	456	11.7	23.5	7.82	25.3
Acenaphthylene	- -	- -	ug/kg	123	27.7	16.7 J	11.9	20.5	16.1	8.30 UB	8.90 UB	17.6	106
Anthracene	- -	- -	ug/kg	313	35.9	42.5 J	19.4	18.3	36.3	15.6	31.3	16.6	71.6
Benzo(a)anthracene	- -	- -	ug/kg	183	33.7	22.1 J	12.3	36.6	43.3	12.9	22.9	61.9	102
Benzo(a)pyrene	- -	- -	ug/kg	213 J	36.8 J	16.9 J	10.2	35.0	49.8	16.0	30.7	83.2	127
Benzo(b)fluoranthene	- -	- -	ug/kg	99.5 J	17.9 J	9.50 J	5.90	39.4	23.4	7.90	14.3	77.3	104
Benzo(e)pyrene	- -	- -	ug/kg	117 J	19.1 J	9.60 J	6.00	40.0	28.4	9.70	19.0	68.2	105
Benzo(ghi)perylene	- -	- -	ug/kg	90.7	13.8 J	5.70	3.60 J	26.2	21.0	7.80	15.0	50.8	80.3
Benzo(k)fluoranthene	- -	- -	ug/kg	123 J	21.1 J	12.1 J	6.90	40.0	27.9	9.30	16.9	72.6	96.5
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	83.0	22.9	14.9 J	9.40	25.1	18.9	5.80	4.70	26.6	89.6
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	328	70.3	58.1 J	29.7	57.2	68.9	20.3	29.0	58.5	176
C1-Fluorenes	- -	- -	ug/kg	138	18.7	27.8 J	20.0	9.27	18.2	4.70	5.80	6.34	31.3
C1-Naphthalenes	- -	- -	ug/kg	241	14.1 J	59.5 J	16.2	20.2	16.0	2.50 J	5.80	15.2	24.8
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	492	64.0	72.8 J	51.2	28.9	35.5	11.5 UB	15.7	30.5	97.5
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	25.6	16.0 U	4.80 J	3.70 J	15.4	5.80	4.30 U	4.40 U	13.2	69.5
C2-Fluorenes	- -	- -	ug/kg	107	21.0	16.5 J	13.1	16.2	10.7	3.30 J	4.40 U	8.63	39.7
C2-Naphthalenes	- -	- -	ug/kg	210	18.6	66.5 J	21.7	30.6	16.8	5.70 UB	4.90 UB	16.6	31.9
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	167	27.2	24.8 J	18.9	22.8	16.0	6.50	3.70 J	18.4	112
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.30 U	16.0 U	4.20 U	4.20 U	17.3	4.00 U	4.30 U	4.40 U	10.2	70.9
C3-Fluorenes	- -	- -	ug/kg	40.3	16.0 U	4.20 U	4.20 U	18.3	4.00 U	4.30 U	4.40 U	4.80 U	52.4
C3-Naphthalenes	- -	- -	ug/kg	129	19.9	36.7 J	22.5	14.6	9.50 UB	4.30 UB	4.40 UB	13.0 UB	36.0
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	46.0	15.3 J	12.1 J	6.80	16.9	9.30	2.80 J	2.40 J	10.2	77.3
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	4.30 U	16.0 U	4.20 U	4.20 U	17.0	4.00 U	4.30 U	4.40 U	4.80 U	57.0
C4-Naphthalenes	- -	- -	ug/kg	64.6	16.0 U	15.3 J	13.4	11.0	5.60	4.30 U	4.40 U	9.22	27.6
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	23.9	16.0 U	3.20 J	4.20 U	9.20	4.00 U	4.30 U	4.40 U	4.66 J	32.7
Chrysene	- -	- -	ug/kg	189	33.7	23.1 J	13.0	56.8	49.7	13.9	24.1	65.2	126
Dibenzo(a,h)anthracene	- -	- -	ug/kg	19.7	16.0 U	2.60 J	2.40 J	6.65	4.70	4.30 U	4.40 U	13.8	24.6
Fluoranthene	- -	- -	ug/kg	420	66.4	53.4 J	32.7	86.8	91.7	29.8	74.2	142	197
Fluorene	- -	- -	ug/kg	230	15.2 J	71.1 J	15.3	16.3	20.0	6.00	14.0	7.97	28.0
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	77.0	13.7 J	5.10 J	3.50 J	20.9	16.4	5.50	9.50	44.5	67.0 J
Naphthalene	- -	- -	ug/kg	268	22.8	56.2 J	12.8	15.0	146	6.70	30.3	25.1	23.7
Perylene	- -	- -	ug/kg	149	16.0 U	4.30 J	4.20 U	9.63	162	7.30	7.80	26.8	39.9
Phenanthrene	- -	- -	ug/kg	792	65.7	126 J	52.3	62.1	79.8	29.6	89.1	57.1	111
Pyrene	- -	- -	ug/kg	586	101	73.6 J	44.1	109	155	48.0	115	143	226
Total PrPAHs	4,000	35,000	ug/kg	**4,620**	536 J	713 J	273 J	608	1,240	229	520	886	1,520
Total Organic Carbon													
Total Organic Carbon	- -	- -	mg/kg	3,540	877	470	618	3,210	2,640	821	708	42,300	108,000
Percent Moisture													
Percent Solids	- -	- -	%	89.3	88.6	95.2	87	85.5	89.2	89.2	90.2	79.7	85.1

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Location ID: Sample Depth(Feet): Date Collected:	NYSDEC Sed Class A	NYSDEC Sed Class C	Units	PDI-SED-P 1 - 2 10/28/14	PDI-SED-P 2 - 3 10/28/14	PDI-SED-P 3 - 4 10/28/14	PDI-SED-P 4 - 5 10/28/14	PDI-SED-P-1 0 - 2 11/05/14	PDI-SED-P-1 2 - 4 11/05/14
CPAHs									
Acenaphthene	- -	- -	ug/kg	123	92.7 J [51.0 J]	60.0	152	99.2	201
Acenaphthylene	- -	- -	ug/kg	354	395 [242]	1,440	851	376	78.3
Anthracene	- -	- -	ug/kg	260	485 J [242 J]	1,020	817	185	220
Benzo(a)anthracene	- -	- -	ug/kg	355	432 [311]	1,290	1,020	152	221
Benzo(a)pyrene	- -	- -	ug/kg	428	496 [331]	1,470	1,060	167	219
Benzo(b)fluoranthene	- -	- -	ug/kg	307	341 [224]	846	741	110	182
Benzo(e)pyrene	- -	- -	ug/kg	303	350 [223]	864	654	110	150
Benzo(ghi)perylene	- -	- -	ug/kg	210	211 [165]	610	440	93.4	118
Benzo(k)fluoranthene	- -	- -	ug/kg	285	365 [229]	900	719	125	196
C1-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	294	372 J [214 J]	1,050	696	85.7	94.2
C1-Fluoranthenes/Pyrenes	- -	- -	ug/kg	724	816 [551]	2,470	1,760	206	202
C1-Fluorenes	- -	- -	ug/kg	115	149 [139]	246	342	51.4	63.3
C1-Naphthalenes	- -	- -	ug/kg	86.6	55.1 [52.8]	74.1	277	184	149
C1-Phenanthrenes/Anthracenes	- -	- -	ug/kg	322	377 [236]	1,430	1,040	185	302
C2-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	188	264 J [99.3 J]	397	331	55.6	47.1
C2-Fluorenes	- -	- -	ug/kg	195	286 [186]	438	498	33.6	98.1
C2-Naphthalenes	- -	- -	ug/kg	104	97.7 J [55.2 J]	98.5	226	108	167
C2-Phenanthrenes/Anthracenes	- -	- -	ug/kg	353	336 [226]	1,070	787	95.3	207
C3-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	158	212 J [51.1 J]	125	159	72.1	33.2
C3-Fluorenes	- -	- -	ug/kg	168	188 J [84.3 J]	235	211	37.7	78.6
C3-Naphthalenes	- -	- -	ug/kg	130	102 J [54.8 J]	130	180	53.5	420
C3-Phenanthrenes/Anthracenes	- -	- -	ug/kg	285	267 J [137 J]	439	344	190	87.1
C4-Benzo(a)anthracenes/Chrysenes	- -	- -	ug/kg	95.3	242 J [54.7 J]	77.8	102	39.0	4.30 U
C4-Naphthalenes	- -	- -	ug/kg	131	119 J [70.2 J]	183	202	36.5	585
C4-Phenanthrenes/Anthracenes	- -	- -	ug/kg	124	111 J [40.0 J]	89.7	90.7	422	25.2
Chrysene	- -	- -	ug/kg	376	514 [327]	1,220	978	217	259
Dibenzo(a,h)anthracene	- -	- -	ug/kg	67.7	77.0 [50.6]	183	153	24.6	36.1
Fluoranthene	- -	- -	ug/kg	522	695 [528]	1,380	1,630	396	544
Fluorene	- -	- -	ug/kg	98.6	118 [132]	178	302	131	141
Indeno(1,2,3-cd)pyrene	- -	- -	ug/kg	184 J	206 J [156]	514 J	406 J	86.1	110
Naphthalene	- -	- -	ug/kg	88.0	67.1 [93.8]	81.7	303	391	278
Perylene	- -	- -	ug/kg	114	208 J [107 J]	304	264	41.6	76.2
Phenanthrene	- -	- -	ug/kg	264	386 [274]	634	848	634	503
Pyrene	- -	- -	ug/kg	742	948 [678]	2,380	2,040	460	468
Total PrPAHs	4,000	35,000	ug/kg	**4,660**	**5,830 [4,030]**	**14,200**	**12,500**	3,650	3,770
Total Organic Carbon									
Total Organic Carbon	- -	- -	mg/kg	13,700	26,200 [30,500]	8,780	7,440	NA	NA
Percent Moisture									
Percent Solids	- -	- -	%	84.7	84.6 [88.2]	87.5	89.1	94.5	86.9

See Notes on Page 9.

Table 1
Summary of Sediment Sample Analytical Results

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Lab Qualifiers	Definition
B	
J	Indicates an estimated value.
ND	None detected.
U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

Table 2
Horizontal and Vertical Delineation – Area 1

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Area 1			
Previous Investigation Location	Visual Observations (ft bss)	Total PAHs mg/kg (ft bss)	Delineation
SS-4	None (0-0.9)	0.24 (0-0.9)	Use for horizontal delineation
SS-3-8	None (0-0.5, 1-2)	ND (0-0.5, 1-2)	Use for horizontal delineation
SR-104	Slight Sheen (0-2) None (2-6)	0.57 (0-1)	Use for horizontal delineation
SD-04	Trace Sheen (0-2)	1.48 (0-0.5) 0.11 (0.5-1)	Use for horizontal delineation
H	Faint MGP-like odors 24-27.4	3.02 (0-0.5) 0.70 (0.5-1) 0.81 (1-2) 0.77 (2-3) 0.14(3-4)	Use for horizontal delineation
SS-3-5	Sheen (0-0.5, 1-2) None (2-3)	230 (0-0.5) 340 (1-2)	Use for vertical delineation (2 feet)
I	Faint MGP-like odor (0-0.4 and 2.9-3.1)	51.4 (0-0.5) 381 (0.5-1) 1.5 (1-2) 1.4 (2-3) 0.48 (3-4)	Use for vertical delineation (1 foot)
I-1	None	0.17(0-2)	Use for horizontal delineation.
SS-3-6	Slight sheen (0-0.5, 1-2, 2-3)	130 (0-0.5) 12 (1-2)	Use for vertical delineation (1 foot)
SS-3	Sheen (0-0.5, 0.5-1)	1979 (0-1)	
J	Light NAPL coating, sheen, NAPL blebs, MGP-like odor (0-0.6) Faint MGP like odor (2.6-6.9)	753/ 850 (1-2) 4.71 (2-3) 4.61 (3-4)	Use for vertical delineation (2 feet)
SS-3-3	Sheen (0-0.5, 1-2, 2-4)	31/26 (0-0.5) 720 (1-2) 2 (3-4)	Use for vertical delineation (2 feet)
SS-3-7	None (0-0.5, 1-2)	1.8 (0-0.5) 2.9 (1-2)	Use for horizontal delineation
SS-3-4	None (0-0.5, 1-2)	2.6 (0-0.5) 6.5 (1-2)	Use for horizontal delineation
SD-05	None (0-0.5)	245 (0-0.8)	
SED-2	NA	4230 (0-0.5)	
K	Trace NAPL blebs, trace sheen MGP like odor (0.5-0.8) Trace blebs, sheen, MGP-like odor (2-2.9)	694 (1-2) 10.1 (2-3) 7.65 (3-4)	Use for vertical delineation (3 feet)
SS-3-1	Sheen (0-0.5, 1-2, 2-3) None (3-4)	360 (0-0.5) 1,092 (1-2) 4.1 (3-4)	Use for vertical delineation (3 feet)
SR-102	Staining/ Sheen (0-2) Slight Sheen (8-14) None (2-8, 14- 36)	308/108 (0-2)	
SS-3-2	Sheen (0-0.5)	430 (0-0.5)	
L	Black staining, trace sheen, (0.4-0.7) Trace sheen, faint MGP like odor (2-2.7)	18.3 (0-0.5) 453 (0.5-1) 526 (1-2) 101 (2-3) 10.1 (3-4)	Use for vertical delineation (3 feet)

Table 2
Horizontal and Vertical Delineation – Area 1

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

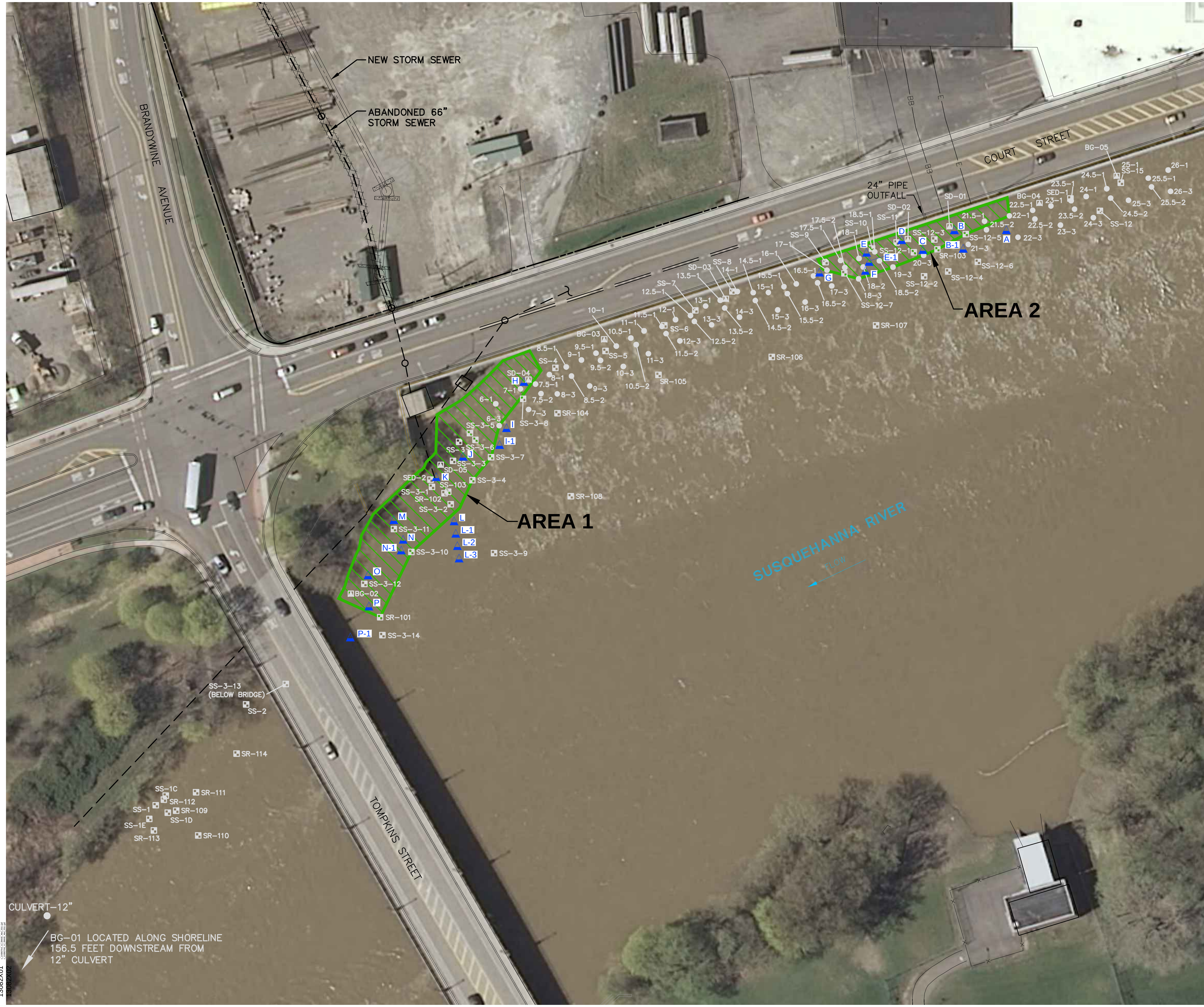
Area 1			
Previous Investigation Location	**Visual Observations (ft bss)**	**Total PAHs mg/kg (ft bss)**	**Delineation**
L-1	Trace sheen (2-2.8) Trace sheen, trace NAPL bleb (4.3-4.8)	1.48 (5-6)	Use for vertical delineation (5 feet)
L-2	Black staining, light NAPL coating, MGP-like odor, trace sheen (2.7-2.9) Faint MGP-like odor (4.2-4.5)	1.89 (0-2) 3.15(2-3) 689 (3-4) 391 (4-6)	
L-3	None	1.49(2-4)	Use for horizontal delineation
SS-3-9	None	ND (0-0.5) 7.2J (1-2)	Use for horizontal delineation
SS-3-11	Slight Sheen (0-0.5) Sheen (1-2) None (2-3)	170 (0-0.5) 140(1-2) 62 (3-4)	
M	None (0-20)	1.22 (2-3) 1.24 (3-4) 0.31 (4-5)	Use for horizontal delineation
N	NAPL blebs, trace sheen, MGP like odor (0.2-2.7) Trace NAPL bleb, faint MGP-like odor (4-4.6)	226 (0-0.5) 72 (0.5-1) 79.5 (1-2) 4.6 (2-3) 0.54(3-4) 0.71 (4-5) 0.27 (6-8)	Use for vertical delineation (2 feet)
N-1	None (0-4)	0.61 (0-2)	Use for horizontal delineation
SS-3-10	None (0-0.5, 1-2)	0.54 (0-0.5) 0.18 (1-2)	Use for horizontal and vertical delineation
SS-3-12	Sheen (0-0.5, 1-2) Slight Sheen (2-3)	26 (0-0.5) 170 (1-2)	Use for vertical delineation (2 feet)
O	None (0-6)	1.24 (2-3) 0.23 (3-4) 0.52 (4-5)	Use for horizontal delineation.
P	Black staining, faint MGP-like odor (0.4-0.7) Trace sheen (2-3)	0.886 (0-0.5) 1.52 (0.5-1) 4.66 (1-2) 5.83/ 4.03 (2-3) 14.2 (3-4) 12.5 (4-5)	Use for vertical delineation (1 foot)
P-1	None	3.65 (0-2) 3.77(2-4)	Use for horizontal delineation.
BG-02	None	1.28 (0-0.2)	Use for horizontal delineation
SR-101	Little Sheen (0-2) None (2-36)	1.3 (0-2)	Use for horizontal delineation
SS-3-14	None (0-0.5, 1-2)	1 (0-0.5) 1.6 (1-2)	Use for horizontal delineation

Table 3
Horizontal and Vertical Delineation – Area 2

Susquehanna River Sediments Pre-Design Investigation Letter Report
Binghamton Court Street Former MGP Site

Area 2			
Location	**Field Observations (ft bss)**	**Total PAHs mg/kg (ft bss)**	**Extent**
SS-12-5	None (0-0.5, 1-2)	ND (0-0.5) 0.31/ND (1-2)	Use for horizontal delineation
SD-01	Little Sheen (0-0.5)	10.7/20.4 (0-0.5)	
A	Faint MGP-like odor (20-22)	0.02 (0-0.5) 0.01 (1-2) 0.01 (2-3) 0.01 (3-4)	Use for horizontal delineation
B	Faint MGP-like odor (2-2.4)	0.23 (1-2) 0.10 (2-3) 0.05(3-4)	Use for horizontal delineation
B-1	None	NA	Use for horizontal delineation
SS-12-6	None (0-0.5, 1-2)	ND (0-0.5, 1-2)	Use for horizontal delineation
SS-12-3	Sheen (0-0.5, 1-2)	2.1 (0-0.5) 2 (1-2)	Use for horizontal delineation
SR-103	None (0-5.5)	ND (0-0.5, 1-2)	Use for horizontal delineation
SS-12-4	None (0-0.5, 1-2)	0.05 (0-0.5) 0.31 (1-2)	Use for horizontal delineation
SD-02	None (0-0.5)	93.8(0-0.5)	
SS-11	Heavy Sheen (0-0.4, 0.4-0.6)	301 (0-0.6)	
D	Trace sheen, faint MGP odor (0-3.1) Faint MGP like odor (4-4.4)	0.18 (1-2) 0.31 (2-3) 0.38 (3-4)	Use for horizontal delineation
SS-12-1	Heavy Sheen (0-0.5,1- 2) None (2-3)	5.7 (0-0.5) 2.3 (1-2) 0.06 (3-4)	Use for vertical delineation (1 foot)
C	None	0.14/ 0.166 (0-0.5) 0.15(1-2) 0.27 (2-3) 0.18(3-4)	Use for horizontal delineation
SS-12-2	None (0-0.5, 1-2)	0.15 (0-0.5) 0.11 (1-2)	Use for horizontal and vertical delineation
SS-10	Heavy Sheen (0-0.7)	26 (0-0.7)	
E	None	1.34 (0-4)	Use for horizontal delineation
E-1	None	NA	Use for horizontal delineation
SS-12-7	None (0-0.5, 1-2)	0.22 (0-0.5) 0.18 (1-2)	Use for horizontal delineation
SS-9	Heavy Sheen (0-0.7)	16 (0-0.7)	
G	None – short boring (recovery only to 2.6 feet)	2.36 (0-0.5) 0.44 (1-2) 2.38 (2-3) 1.09 (3-4)	Use for horizontal delineation
F	Sheen, light to moderate NAPL coating, faint to moderate odor (28.4-29.5 feet	0.21 (0-0.5) 0.16 (1-2) 0.31 (2-3) 0.27 (3-4)	Use for horizontal delineation

Figures



LEGEND:

- FLOOD WALL
- FENCE
- SITE PROPERTY LINES (APPROXIMATE)
- 2014 AREAS IDENTIFIED FOR REMEDIAL CONSIDERATION IN PDI WORK PLAN
- 2014 PDL SEDIMENT BORING LOCATION
- HISTORICAL RIVER SEDIMENT PROBE SAMPLE
- HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION
- 2013 SEDIMENT SAMPLE LOCATION

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.
2. 2014 SEDIMENT SAMPLE LOCATIONS SURVEYED 11/10/2014 BY ARCADIS USING REAL–TIME KINEMATIC GPS METHODS. SEDIMENT SAMPLE LOCATIONS L–1 AND L–2 WERE NOT LOCATED; BOUYS WERE MISSING.
3. 2013 SEDIMENT SAMPLE LOCATIONS SURVEYED 4/2/13 BY ARCADIS USING REAL TIME NETWORK (RTN) GPS METHODS.

0 80' 160'

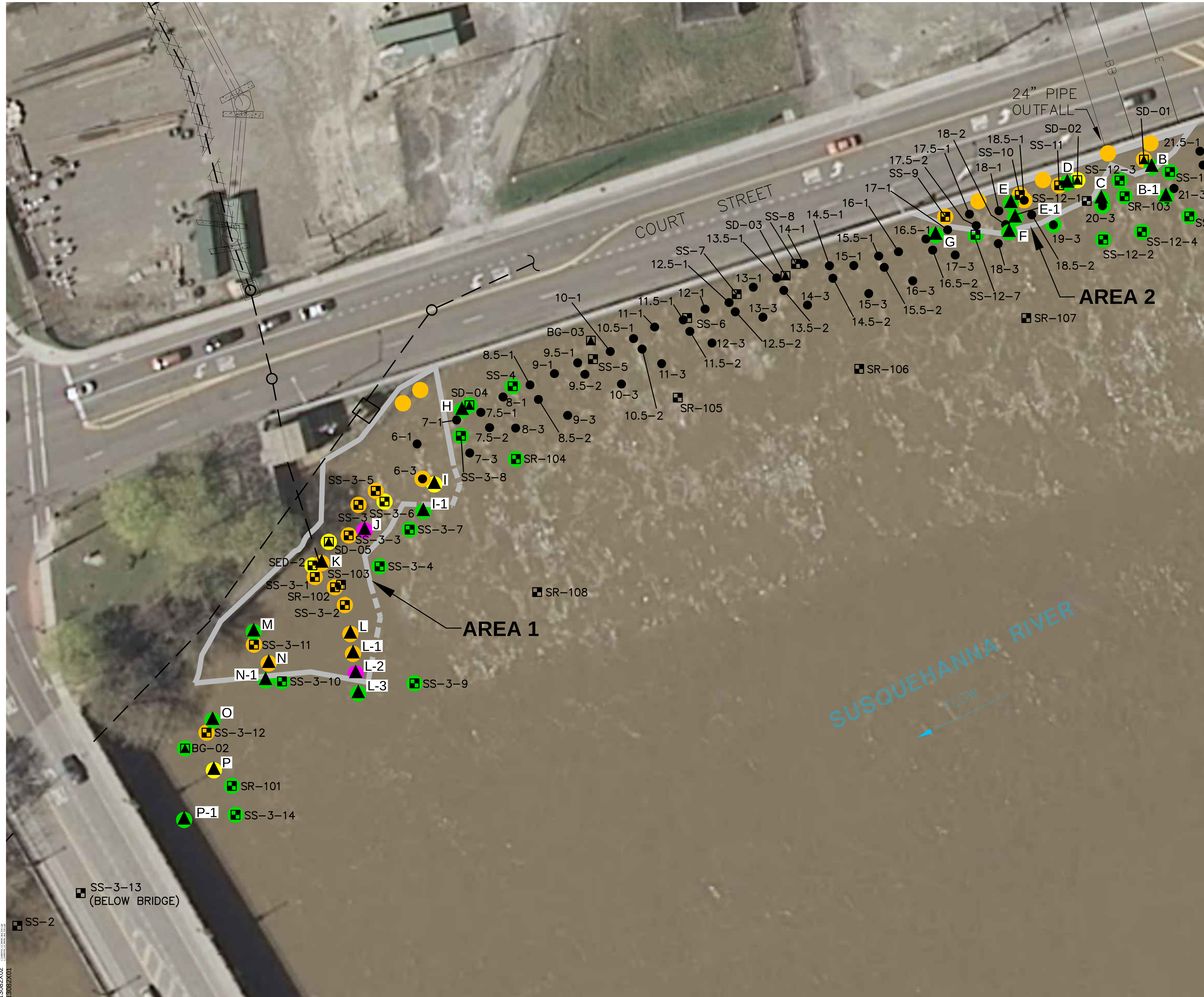
GRAPHIC SCALE

NYSEG
BINGHAMTON, NEW YORK
COURT STREET FORMER MGP SITE
SUSQUEHANNA RIVER SEDIMENT PRE-DESIGN INVESTIGATION

2014 SEDIMENT BORING LOCATIONS

ARCADIS

FIGURE
1



LEGEND:

FLOOD WALL

FENCE

SITE PROPERTY LINES (APPROXIMATE)

PRE-DESIGN INVESTIGATION AREAS IDENTIFIED FOR REMEDIAL CONSIDERATION (BISECTS VISUALLY CLEAN AND >4 ppm) (DASHED IF ESTIMATED)

2014 SEDIMENT BORING LOCATION

HISTORICAL RIVER SEDIMENT PROBE SAMPLE

HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION

2013 SEDIMENT SAMPLE LOCATION

NO VISUAL OR ANALYTICAL ≤4 ppm PAH's

NAPL COATING

SHEEN OR NAPL BLEBS OBSERVED

STAINING OR TRACE SHEEN AND ANALYTICAL >4 ppm PAH's

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.
2. 2014 SEDIMENT SAMPLE LOCATIONS SURVEYED 11/10/2014 BY ARCADIS USING REAL-TIME KINEMATIC GPS METHODS. SEDIMENT SAMPLE LOCATIONS L-1 AND L-2 WERE NOT LOCATED; BOUYS WERE MISSING.
3. 2013 SEDIMENT SAMPLE LOCATIONS SURVEYED 4/2/13 BY ARCADIS USING REAL TIME NETWORK (RTN) GPS METHODS.
4. ALTHOUGH LOCATION F IS IDENTIFIED AS GREEN, IT SHOULD BE NOTED THAT NAPL COATING WAS OBSERVED FROM 28.4 TO 29.5 FT BGS.

0 50' 100'

GRAPHIC SCALE

NYSEG
BINGHAMTON, NEW YORK
COURT STREET FORMER MGP SITE
SUSQUEHANNA RIVER SEDIMENT PRE-DESIGN INVESTIGATION

AREA 1 AND 2
PROPOSED REMEDIAL EXTENT

ARCADIS

FIGURE
2

Attachment A

Susquehanna River Sediment Assessment Report

ARCADIS of New York, Inc.
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Mr. Anthony Karwiel
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7014

ENVIRONMENT

Subject:
Binghamton Court Street Former MGP Site
Susquehanna River
Sediment Assessment Report

Date:
August 19, 2013

Contact:
David A. Cornell, P.G.

Phone:
315.671.9379

Email:
David.Cornell@arcadis-us.com

Our ref:
B0013082 #2.04

Dear Mr. Karwiel:

This letter presents the results of a sediment assessment completed in connection with the Court Street former manufactured gas plant (MGP) site (the “site”) located in Binghamton, New York. The sediment assessment was conducted by ARCADIS, on behalf of NYSEG, between March 11 and May 21, 2013. Due to inclement weather, the fieldwork was performed over three separate mobilizations. The assessment was conducted in accordance with the following correspondence:

- Court Street – Sediment Assessment Work Plan dated August 1, 2012;
- New York State Department of Environmental Conservation’s (NYSDEC) comment email dated September 20, 2012;
- ARCADIS’ Response to comments email dated September 25, 2012 to NYSDEC;
- NYSDEC, NYSEG and ARCADIS conference call on December 11, 2012; and
- ARCADIS’ email to NYSDEC summarizing the agreed upon scope between NYSEG and NYSDEC dated January 4, 2013.

A discussion of the assessment objectives is provided below, followed by a discussion of the completed fieldwork and results of the assessment.

Objectives and Background

The objective of the work was to reassess the quality of sediments in the Susquehanna River adjacent to the site. The purpose for the reassessment was to evaluate potential changes in the distribution and presence of MGP-impacted sediments that were observed approximately 11 years ago (as documented in the 2002 Remedial Investigation [RI] Report). NYSEG believes that changes in the sediment deposits may have resulted from two significant high-flow events that have occurred in the Susquehanna River near the site over the past 11 years. Information on these two record-setting, 100+ year floods is presented in the following table:

Susquehanna River at Binghamton Flooding Events	
Date	**Flood Crest Stage**
June 28, 2006	25.0 feet
September 8, 2011	25.7 feet

Notes:
Flood stage data obtained from the United States Geologic Survey (USGS) web page: http://www.usgs.gov/water/.
Flood stage is 14.0 feet. No other historical crests occurred above 14 feet between 2002 and 2013.

These high-flow events may have affected the distribution and quality of sediments near the site. The following is a list of major flooding events and annual high flow events that have occurred near the site since the RI was completed.

Susquehanna River at Conklin Annual High Flow Events		
Date	**Gauge Height (feet)**	**Streamflow (cfs)**
March 27, 2002	12.09	23,700
March 23, 2003	14.73	33,500
September 18, 2004	19.01	54,700
April 3, 2005	18.08	49,400
June 28, 2006	25.02	76,800
March 28, 2007	12.64	25,100
March 9, 2008	14.26	30,700
March 11, 2009	12.33	24,100
January 25, 2010	13.39	27,600
September 8, 2011	23.94	72,100
January 28, 2012	9.08	15,000

Notes:
Due to available data, the Conklin gauge was used for annual high flows.
Gauge height data obtained from the USGS web page: http://www.usgs.gov/water/.

Two interim remedial actions have also been performed on the upland portion of the site that were designed to mitigate potential transport of non-aqueous phase liquid (NAPL) to the river. These include the passive NAPL barrier that was installed between the former MGP site and the river in 2006, and replacement of the 66-inch storm sewer in 2012 which potentially served as a historical conduit for NAPL migration to the river. The mitigation of these potential NAPL sources to the river could also have an impact on the distribution of MGP-related impacts in present-day river sediments.

Sediment Probing and Reconnaissance

Sediment probing and reconnaissance was conducted along the same area (north bank) of the Susquehanna River that was investigated during the RI (Figure 1). This area extends from approximately 100 feet upstream of the 24-inch outfall (near river sediment probe sample 32-1) to approximately 150 feet downstream of the Tompkins Street Bridge (near sediment sampling location SS-1E), for a total of approximately 900 feet of river reach. The assessment included probing along transects perpendicular to the river bank on 25-foot spacings across the entire investigated reach. Spot probing was also completed between transects. Impacts (i.e., staining, sheen or NAPL) observed at any probing location were further delineated radially from that point with additional probing in an attempt to define the approximate lateral extent of impacts. Specific attention was paid to the four “potential areas of sediment to be addressed” discussed in a February 2003 meeting between NYSDEC, NYSEG and ARCADIS (formerly BBL). These areas are depicted on Figure 1 as Areas A, B, C and D.

Additionally, as requested by NYSDEC, spot probing was also conducted at the first two major sediment depositional areas downstream from Area A. These areas were identified by continuous spot probing between the Tompkins Street Bridge and the downstream dam located approximately 3,300 feet downstream of the site. The two downstream depositional areas depicted on Figure 2 were identified as the “south shore bend area” and the “downstream dam/abutment structure area.

Probing was performed by manually pushing a 1/2-inch diameter steel rod into the sediments until the rod could not be advanced further. Water depth, sediment thickness, general sediment description (by sight and feel), and any observed impacts produced by the probing were recorded in the field log book. In addition to probing, the assessment also included manually overturning rocks, cobbles, and/or debris to determine if potential MGP-related materials were present beneath these objects.

Sediment Sampling

Twelve sediment samples (plus quality assurance/quality control [QA/QC] samples) were collected from 10 sampling locations (SD-1 through SD-5 and BG-1 through BG-5) within visually impacted and unimpacted areas identified during the probing and reconnaissance work. Sample locations identified with an SD prefix were collected from visually impacted areas or from areas previously identified to contain impacted sediments. Sample locations identified with a BG prefix were collected from visually unimpacted areas. All 12 samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) using United States Environmental Protection Agency (USEPA) Method SW8270C and total organic carbon (TOC) by the Lloyd-Kahn method. Sediment sampling locations are shown on Figures 1, 2 and 3.

Sediment sampling at each location was initially attempted by manually driving a 4-foot long steel barrel (i.e., Macrocore®) containing a 2-inch diameter disposable liner and sampling shoe (to hold sediment in the tubing) into the sediment until refusal was encountered. If the sampling method described above was unsuccessful at penetrating the sediment surface or collecting adequate sample volume, then samples were collected using a grab sampler (stainless steel scoop).

Sediment samples were described with respect to predominant sediment types, texture and color. In addition, the presence of odors, sheens, tar, and discoloration were also recorded (if any observed). Sediment probing and sampling observations are summarized in Table 1.

Data Validation

ARCADIS validated the laboratory analytical data and prepared a data usability summary report (DUSR) for each individual sample delivery group (SDG) using the most-recent versions of the USEPA's Function Guidelines (USEPA, 1999; 2002) and USEPA Region II SOPs for data validation. The DUSRs include an assessment of data accuracy, precision, and completeness; significant quality assurance problems, solutions, corrections, and potential consequences; and analytical data validation reports. The results of the data validation have been incorporated into the analytical data presented in Table 2.

Survey

All probing and sampling locations, as well as newly-identified outfalls were surveyed using a survey-grade global positioning system (GPS) device. The horizontal position of each survey point was surveyed in reference to the North American Datum of 1983 (NAD 83). The elevation of the sediment surface at each survey point was surveyed in reference to the North American Vertical Datum of 1988 (NAVD 88).

Sediment Assessment Findings

The following discussion of the 2013 sediment assessment findings is divided into subsections based on the areas that were investigated. Figures 1 and 3 were developed to support the discussion. Figure 1 depicts the 2013 sediment sampling locations and visual observations (red hatched areas) as well as historical sampling locations from the 2002 RI and “potential areas of sediment to be addressed” (orange hatched areas) established in 2003. The 2013 sediment sampling analytical results are summarized in green text boxes on Figure 3. The total PAH (TPAH) concentrations shown on Figure 3 are a summation of the 17 total priority pollutant PAHs. Figure 3 also depicts the historical analytical results and TPAH isoconcentration contours established during the 2002 RI.

Area A

Observations made during the RI fieldwork described Area A as a soft sediment deposit containing a sheen in the upper approximate 1-foot of sediment. TPAH concentrations measured during the RI from the upper 2 feet of sediment in this area ranged from 1.1 parts per million (ppm) (SR-111) to 45 ppm (SS-1D).

During the 2013 assessment, extensive probing was conducted within and near the edges of Area A. A soft sediment deposit could not be identified and no sample could be collected. Only trace amounts of sand (<0.1 feet) between cobbles, boulders and gravel were identified during the probing in this area. Additionally, no sheens were observed at any of the locations in this area during the 2013 probing event. One analytical sample (BG-1) was collected from the first area containing recoverable sediment (described as a fine-to-medium sand and gravel with little silt), approximately 250 feet downstream from Area A. The TPAH concentration in that sample was 3 ppm.

Area B

During the RI, sheens and elevated PAHs were observed in the upper approximately two feet of sediments in this area, which is located near the outfall of the 66-inch storm sewer that drains stormwater from a large portion of the City of Binghamton. Sediment samples collected from this area during the RI contained TPAH concentrations between 0.54 ppm (SS-3-10) and 1,979 ppm (SS-3).

During the 2013 assessment, extensive probing was conducted in Area B. Sediment depths encountered during the probing and sampling were less than one foot and sediments were generally described as sand and gravel with little silt. Sheens were not generated at any sediment probing/sampling location in this area. Two analytical samples [BG-2 (0-0.2') and SD-5 (0-0.5')] were collected within Area B. The TPAH concentration at BG-2 was 1.3 ppm and the TPAH concentration at SD-5 was 240 ppm. Although the TPAH concentration at BG-2 is less than the range of isoconcentration contours depicted on Figure 3 (originally presented in the RI report), sample SD-5 falls within the concentration range for that location.

The fact that no sheens were generated in Area B during the 2013 probing assessment suggests that the condition of the sediment in this area has improved since the RI. Nevertheless, sample SD-5 contained a significant concentration of PAHs, and is consistent with the concentration estimated to be at that location during the RI. The potential source of the PAHs was not determined, and could either be MGP-related or related to the storm sewer, which drains a large portion of the City of Binghamton and could serve as a source of PAHs unrelated to the site. Conversely, at sampling location BG-2, the TPAH concentration of 1.3 ppm is considerably lower than the 20-100 ppm that was estimated to be there during the RI (Figure 3).

It is important to note that when Area B was investigated during the RI, both manual probing and split-spoon sampling from a barge–mounted drill rig were used. With the river bottom in this area being somewhat armored, it is possible that some of the impacted sediment identified using the drilling rig during the RI may still be present but was unable to be penetrated by the recent manual probing.

Area C

The RI fieldwork identified an isolated area of sheen-producing sediments in Area C. A sample collected at SS-6 during the RI contained 35 ppm of TPAH. The 2013 probing of the sediments in this area produced no sheens. Riverbed material encountered during the probing was described as sand, gravel and cobbles with little to no silt and penetration depths of 0.2 feet or less. Analytical samples collected just upstream (SD-3) and downstream (BG-3) of Area C contained TPAH concentrations of 1.6 ppm and 0.97 ppm, respectively. These concentrations are similar to or less than TPAH concentrations documented during the RI.

Area D

Area D comprises a region of sheen-producing sediments identified during the RI. The area is located around and downstream of the outfall of an apparently inactive 24-inch pipe. TPAH concentrations in sediment samples collected during the RI ranged from below detection limits (SS-12-5) to 301 ppm (SS-11).

The extent of sheen-producing sediments observed during the 2013 assessment is depicted on Figure 1 as Area F. As shown on Figure 1, the boundaries of Areas F and D are similar, although the upstream extent of sheen-producing sediments has decreased slightly. Likewise, sediment samples collected in 2013 at locations SD-1 and SD-2 contained 11 ppm and 83ppm of TPAH, respectively, which is consistent with the sampling results reported in the RI Report for Area D. Therefore, Area D appears to remain relatively unchanged between the RI fieldwork and the 2013 assessment fieldwork.

New Area E

As depicted on Figure 1, a new area (Area E) of sediments that produced a sheen during probing was observed during the 2013 assessment. Area E is a square-shaped area that is approximately 30 feet wide and is located 30 to 40 feet upstream of Area B. Two sediment samples were collected at sediment sampling location SD-4 at different depths. The sample collected from 0 to 0.5 feet below the sediment surface (ft bss) contained a TPAH concentration of 1.5 ppm, and the sample collected from 0.5 to 1.0 ft bss contained 0.11 ppm of TPAH. Although recent and historical TPAH concentrations within Area E are low, visible sheens in shallow sediments are present.

Downstream Depositional Areas

As requested by NYSDEC, additional probing was conducted during the assessment to locate the first two depositional areas downstream from Area A. The two downstream areas identified during the fieldwork are shown on Figure 2 as the *South Shore Bend Area* and the *Downstream Dam/Abutment Structure Area.* Both of these areas were extensively probed and visual impacts were not observed in either area. Probing depths ranged between 0 and 1.5 feet. Sediments consisted of sands and gravels with varying amounts of silt.

Please feel free to contact Tracy Blazicek (NYSEG) or me if you have any questions or comments.

Sincerely,

ARCADIS of New York, Inc.

David A. Cornell, P.G.
Senior Geologist

Attachments

Copies:
Keith White, C.P.G., ARCADIS
Tracy Blazicek, CHMM, NYSEG

Table 1
Summary of Susquehanna River Sediment Probing and Sampling Assessment Conducted 4/1/13-4/3/13

NYSEG - Court Street Former MGP Site
Binghamton, New York

Sampling or Probing Transect Location	Date	Probing Depth (feet)	Water Depth (feet)	Northing	Easting	Sediment/ Ground Elevation	Sampling Method	Location Description	Sediment Description	Impacts Observed
Sediment Sampling Locations										
BG-1	4/2/13	0.5	1	766188.0	1006043.1	832.6	Trowel	West of Tompkins St. bridge, 200' downstream from Tompkins St. bridge, edge of north bank.	Brown fine SAND and fine GRAVEL, little Silt.	No Obvious Impacts
BG-2	4/2/13	0.2	2.5	766574.2	1006372.7	832.6	Trowel	East of Tompkins St. bridge, 20' upstream from Tompkins St. bridge, edge of north bank, 100' downstream from 66"outfall pipe.	Brown fine SAND and fine GRAVEL, little Silt.	No Obvious Impacts
BG-3	4/2/13	1.5	1	766776.9	1006574.5	832.8	MacroCore	East of Tompkins St. bridge, 320' upstream from Tompkins St. bridge, edge of north bank, 160' upstream from 66"outfall pipe.	Brown fine to medium SAND and GRAVEL, little Silt, Cobbles.	No Obvious Impacts
BG-4	4/2/13	0.5	1.5	766885.5	1006921.2	832.7	Trowel	East of Tompkins St. bridge, edge of north bank, 140' upstream from 24" RCP outfall pipe.	Brown fine to medium SAND and GRAVEL, little Silt, Cobbles.	No Obvious Impacts
BG-5	4/2/13	0.5	1	766907.1	1006982.8	832.7	Trowel	East of Tompkins St. bridge, edge of north bank, 240' upstream from 24" RCP outfall pipe.	Brown fine to medium SAND and GRAVEL, little Silt, Cobbles.	No Obvious Impacts
SD-1	4/2/13	0.5	3	766866.9	1006849.5	832.7	MacroCore	East of Tompkins St. bridge, edge of north bank, 20' upstream from 24" RCP outfall pipe.	Brown SILT, little fine Sand, fine Gravel, Wood debris.	Little sheen, MGP-like odor
SD-2	4/2/13	0.5	3	766856.7	1006816.4	832.6	MacroCore	East of Tompkins St. bridge, edge of north bank, 20' downstream from 24" RCP outfall pipe.	Brown SILT, little Organics (roots), fine Sand, fine to medium Gravel.	Sheen; moderate to strong MGP-like odor
SD-3	4/2/13	1	2.5	766809.1	1006671.3	832.8	MacroCore	East of Tompkins St. bridge, edge of north bank, 150' downstream from 24" RCP outfall pipe.	Brown fine to medium SAND, some Silt, fine to medium Gravel.	No Obvious Impacts
SD-4	4/2/13	2	1	766744.8	1006514.1	832.7	MacroCore	260' East of Tompkins St. bridge, 100' upstream from 66" outfall pipe, edge of north bank	Brown fine to medium SAND, some Silt, fine to medium Gravel.	Trace sheen
SD-5	4/2/13	0.5	3	766676.9	1006444.2	832.8	MacroCore	160' East of Tompkins St. bridge, edge of north bank, at 66"outfall pipe.	Brown fine SAND and SILT, over Gravel.	No Obvious Impacts
Transect Locations										
T-00	3/11/13	0.2	6-8	766678.1	1006442.8	832.2	--	160' East of Tompkins St. bridge, edge of north bank, at 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts
T-01	3/11/13	0.2-0.5	1-3	766715.3	1006461.0	832.3	--	East of Tompkins St. bridge, 25' East (upstream) of 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts
T-02	3/11/13	0-1.7	1-3	766732.1	1006479.9	832.2	--	East of Tompkins St. bridge, 50' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts
T-03	3/11/13	0.3-2.0	1.5-2.7	766741.3	1006497.6	832.3	--	75' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts

See Assumptions and Notes on Page 2.

Table 1
Summary of Susquehanna River Sediment Probing and Sampling Assessment Conducted 4/1/13-4/3/13

NYSEG - Court Street Former MGP Site
Binghamton, New York

Sampling or Probing Transect Location	Date	Probing Depth (feet)	Water Depth (feet)	Northing	Easting	Sediment/ Ground Elevation	Sampling Method	Location Description	Sediment Description	Impacts Observed
Transect Locations (Cont.)										
T-04	3/11/13	0.2-1.5	0.3-2.0	766756.7	1006521.7	832.4	--	100' upstream from 66"outfall pipe.	SAND & GRAVEL, some Silt, little Cobbles	Trace sheen 5 to 6 ft from shore
T-05	3/11/13	0.1-0.5	1-3	766771.7	1006545.6	832.1	--	125' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	Trace sheen 5 to 10 ft from shore; Sheen ends between T-4 and T-5
T-06	3/11/13	0.2-0.6	0.8-3.5	766778.0	1006569.0	831.8	--	150' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts
T-07	3/11/13	0.0-1.0	0.7-2.8	766787.3	1006591.8	833.0	--	175' upstream from 66"outfall pipe.	SAND & GRAVEL, some Silt, little Cobbles	No Obvious Impacts
T-08	3/11/13	0.1-1.0	0.6-2.5	766795.5	1006618.4	832.1	--	200' upstream from 66"outfall pipe.	SAND & GRAVEL, some Silt, little Cobbles	No Obvious Impacts
T-09	3/11/13	0.8-1.0	1-2	766802.4	1006641.3	832.2	--	225' upstream from 66"outfall pipe.	SAND & GRAVEL, some Silt, little Cobbles	No Obvious Impacts
T-10	3/11/13	1.5	2.0	766810.1	1006664.5	832.4	--	250' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	Trace sheen during probing; could not recreate sheen by additional probing.
T-11	3/11/13	0.2	1.0	766817.2	1006689.0	832.2	--	275' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles, trace Concrete	No Obvious Impacts
T-12	3/11/13	0.1-0.2	0.3-2.5	766825.4	1006713.0	832.2	--	300' upstream from 66"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles, trace Concrete	No Obvious Impacts
T-13	3/11/13	0.0-0.3	0.7-3.5	766831.8	1006736.3	832.0	--	100' West (downstream) from 24"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles, trace Concrete	No Obvious Impacts
T-14	3/11/13	0.2	2.5	766840.6	1006760.7	832.3	--	75' downstream from 24"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles, trace Concrete	Sheen observed between 0 anf 5 ft from wall
T-15	3/11/13	0.5	1.0	766847.5	1006784.4	832.1	--	50' downstream from 24"outfall pipe.	SAND & GRAVEL, little Cobbles, trace Concrete	Sheen observed between 0 anf 10 ft from wall
T-16	3/11/13	0.3	3.0	766856.3	1006808.4	832.1	--	25' downstream from 24"outfall pipe.	SAND & GRAVEL, little Cobbles	Sheen observed between 0 anf 15 ft from wall
T-17	3/11/13	0.5	2.0	766864.2	1006832.6	832.4	--	Adjacent 24"outfall pipe.	SAND & GRAVEL, little Cobbles	Sheen observed between 0 anf 5 ft from wall
T-18	3/11/13	0.6	1.5	766871.0	1006855.8	832.3	--	25' East (upstream) 24"outfall pipe.	SAND & GRAVEL, little Cobbles	Sheen observed between 0 anf 5 ft from wall
T-19	3/11/13	0.2	0.8-3.0	766879.3	1006879.6	832.3	--	50' Upstream from 24"outfall pipe.	SAND & GRAVEL, little Cobbles, trace Concrete	No Obvious Impacts
T-20	3/11/13	0.0-0.3	0.5	766887.1	1006903.6	832.3	--	75' upstream from 24"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts
T-21	3/11/13	0.1-0.4	0.0-1.5	766894.2	1006926.8	832.2	--	100' Upstream from 24"outfall pipe.	SAND & GRAVEL, little Silt & Cobbles	No Obvious Impacts

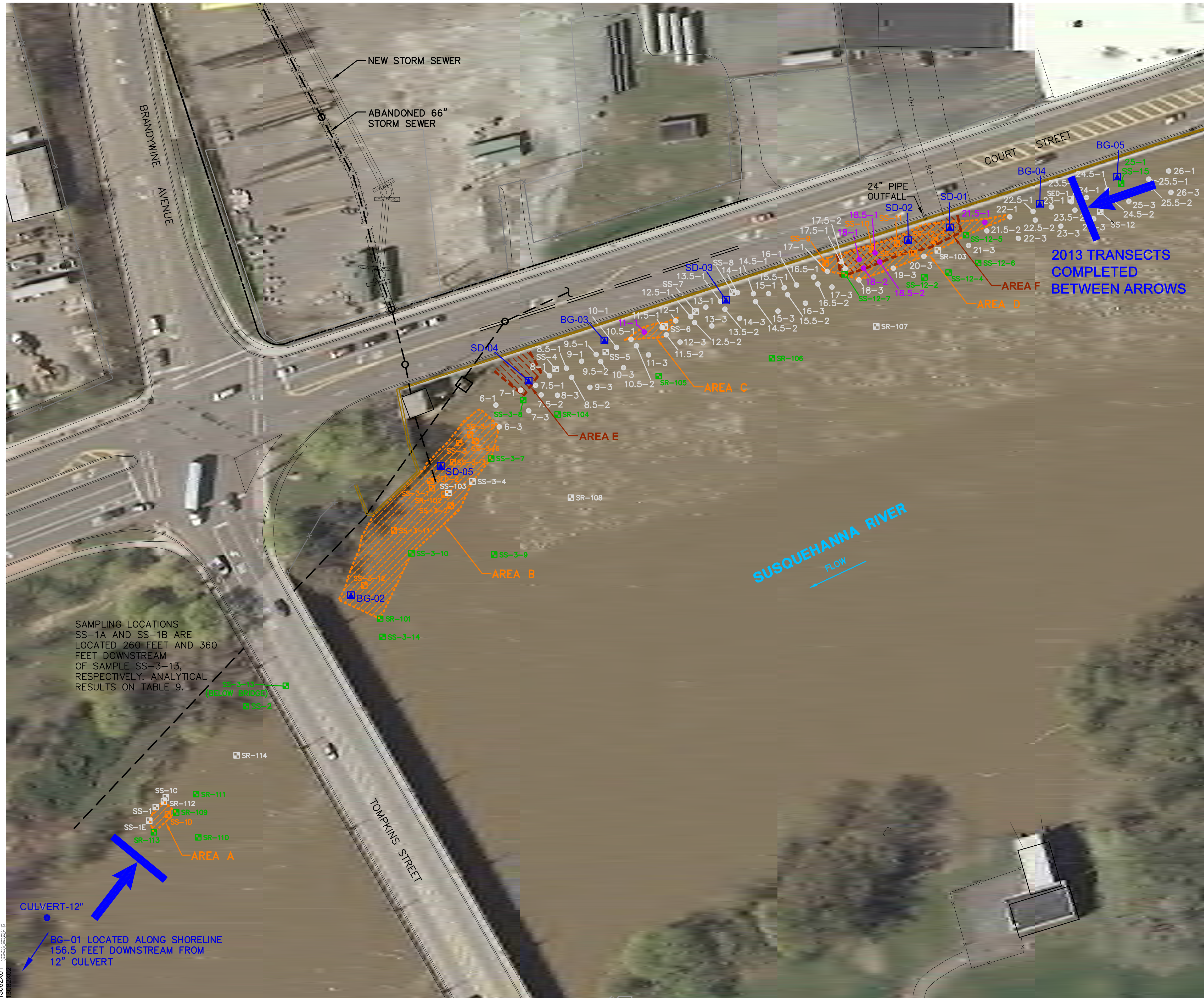
Assumptions and Notes:
*Probing was performed by manually pushing a 1/2-inch diameter steel rod until rod could not be advanced any further.
*In addition to probing, a 2-inch diameter hand auger and shovel were used at select locations.
*RCP = Reinforced Concrete Pipe

Table 2
Summary of Sediment Sample Analytical Results

NYSEG - Court Street Former MGP Site
Binghamton, New York

Location ID: Sample Depth(Feet): Date Collected:	Units	BG-1 0 - 0.5 04/02/13	BG-2 0 - 0.2 04/02/13	BG-3 0 - 0.5 04/02/13	BG-3 0.5 - 1 04/02/13	BG-4 0 - 0.5 04/02/13	BG-5 0 - 0.5 04/02/13	SD-1 0 - 0.5 04/02/13	SD-2 0 - 0.5 04/02/13	SD-3 0 - 0.5 04/02/13	SD-4 0 - 0.5 04/02/13	SD-4 0.5 - 1 04/02/13	SD-5 0 - 0.8 04/02/13
2-Methylnaphthalene	ug/kg	11 U	6.7	3.1 J	2.8 J	2.9 U	6 J	97.4 [232]	11,200	7.4	2.4 U	2.3 U	1,450
Acenaphthene	ug/kg	11 U	9.5	2.9 J	2.5 J	7.8	3.4 J	992 [1,020]	10,200	13.1	2.4 U	2.3 U	24,500
Acenaphthylene	ug/kg	69.5	31.1	29.8	42.2	37.2	20.8	502 [423]	3,780	50.1	24.4	3.2 J	6,300
Anthracene	ug/kg	91.9	34.5	42.2	23.4	61.1	20.8	598 [769]	4,090	47	26.9	3.4 J	23,100
Benzo(a)anthracene	ug/kg	250	96.9	54.7	65.7	204	74.9	462 [1,790]	3,320	128	132	5	11,900
Benzo(a)pyrene	ug/kg	301	143	87.3	113	231	92.8	619 [2,100]	4,020	199	176	11.7	15,200
Benzo(b)fluoranthene	ug/kg	250	98.1	51.6	72.3	178	83.7	271 [1,350]	1,510	111	102	4.1 J	5,740
Benzo(e)pyrene	ug/kg	236	95.3	62	84.1	146	70.9	388 [1,250]	2,190	135	117	10.1	7,440
Benzo(ghi)perylene	ug/kg	224	97.1	65.1	89.3	133	67.3	560 [1,220]	2,920	134	119	10.6	7,000
Benzo(k)fluoranthene	ug/kg	229	113	78.6	105	199	76	415 [1,350]	2,210	146	158	11.6	7,570
C1-Benzo(a)anthracenes/Chrysenes	ug/kg	139	47.9	32.5	38.9	96.2	36.9	305 [1,230]	2,250	60	50.2	2.3 U	3,260
C1-Fluoranthenes/Pyrenes	ug/kg	183	70.7	50.1	58.9	142	50.3	678 [1,380]	5,290	105	71.2	8	15,400
C1-Fluorenes	ug/kg	20.6 J	6.1	4.6 J	4.3 J	8.5	3.8 J	249 [141]	2,440	9.3	2.5 J	2.3 U	3,780
C1-Naphthalenes	ug/kg	15.2 J	7.1	5.5	4.6	3.5 J	7.5	575 [752]	16,000	9.8	2.9 J	2.3 U	3,680
C1-Phenanthrenes/Anthracenes	ug/kg	110	32.4	26.4	27.4	79.7	32.6	763 [742]	6,590	36.8	38.3	2.3 U	8,900
C2-Benzo(a)anthracenes/Chrysenes	ug/kg	114	22.3	18.7	22.8	40.3	22.5	175 [929]	1,100	27.3	23.4	2.3 U	687
C2-Fluorenes	ug/kg	24.4	6	2.6 U	4.3 J	10.1	6.2	221 [116]	2,060	12.2	2.4 U	2.3 U	852
C2-Naphthalenes	ug/kg	52	12.4 B	12.5 B	10.2 B	8.6 B	14.2 B	1,040 [676]	14,700	13.5 B	2.4 U	2.3 U	4,540
C2-Phenanthrenes/Anthracenes	ug/kg	79	19	19	19.7	45.5	22.8	378 [617]	3,340	29.9	24	2.3 U	1,310
C3-Benzo(a)anthracenes/Chrysenes	ug/kg	180	13.9	2.6 U	2.2 U	16.3	14.1	83.4 [634]	399	11.3	2.4 U	2.3 U	248
C3-Fluorenes	ug/kg	11 U	2.5 U	2.6 U	2.2 U	4.8 J	3 U	133 [125]	1,300	12.5	2.4 U	2.3 U	218
C3-Naphthalenes	ug/kg	40.8	8.5	8.7	8.6	9.9	10.3	754 [379]	8,760	16.5	7.6	2.3 U	1,030
C3-Phenanthrenes/Anthracenes	ug/kg	30.2	6.9	8.6	9.7	16.1	10.7	178 [474]	1,560	17.5	10.6	2.3 U	288
C4-Benzo(a)anthracenes/Chrysenes	ug/kg	126	2.5 U	2.6 U	2.2 U	2.9 U	3 U	13 U [464]	23 U	2.2 U	2.4 U	2.3 U	155
C4-Naphthalenes	ug/kg	26.4	5.2	8.9	5.4	9.6	7.7	472 [220]	5,440	19.5	5.7	2.3 U	231
C4-Phenanthrenes/Anthracenes	ug/kg	11 U	2.5 U	4.6 J	3.7 J	2.9 U	3 U	80.6 [369]	450	8.9	9.1	2.3 U	140
Chrysene	ug/kg	269	116	87.5	97.2	243	98.3	520 [1,900]	3,360	149	163	11.9	13,100
Dibenzo(a,h)anthracene	ug/kg	62.2	21.6	14.9	19.8	43.5	19.5	85 [358]	479	28.7	28.2	2.3 U	1,390
Fluoranthene	ug/kg	448	154	81.6	107	377	133	1,190 [2,090]	6,340	171	190	10.8	24,200
Fluorene	ug/kg	11 U	4.4 J	5.7	2.2 U	10.4	4.2 J	320 [301]	3,480	5.8	3.1 J	2.3 U	12,500
Indeno(1,2,3-cd)pyrene	ug/kg	185	80.4	53.2	72	125	57.3	347 [1,050]	2,010	104	99.9	6.8	5,390
Naphthalene	ug/kg	13 J	39.8	4.1 J	4.6	4.5 J	7.2	380 [723]	13,500	28.1	6.3	2.3 U	1,730
Perylene	ug/kg	86.3	31.4	20.6	25.8	52.3	21.7	155 [566]	587	47.7	41.1	4.1 J	1,820
Phenanthrene	ug/kg	158	66.1	35.6	36.2	175	58.5	1,540 [1,310]	11,000	51.8	50.4	7.6	47,100
Pyrene	ug/kg	405	167	96.7	124	313	119	1,800 [2,460]	10,400	247	204	20.9	37,100
Total NOAA 34 PAHs	ug/kg	4,420 J	1,660 J	1,070 J	1,300 J	3,030 J	1,270 J	17,200 [31,300]	157,000	2,190	1,890 J	130 J	298,000
Total Priority Pollutant (17) PAHs	ug/kg	2,960 J	1,280 J	795 J	977 J	2,340 J	943 J	10,700 [20,400]	93,800	1,620	1,480 J	108 J	245,000
General Chemistry													
Percent Solids	%	81.4	72.1	77.6	78.8	66.7	58.5	73.2 [76.6]	84.7	78	77.3	80.4	74.4
Total Organic Carbon	mg/kg	19,400	11,100	3,730	2,110	12,600	18,300	12,900 [9,850]	19,300	6,080	9,740	3,380	26,500

Notes:
B = The constituent detected in an associated blank; its presence in the sample is suspect.
J = Indicates an estimated concentration.
U = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.



LEGEND:

- FLOOD WALL
- FENCE
- SITE PROPERTY LINES (APPROXIMATE)
- POTENTIAL AREA OF SEDIMENT TO BE ADDRESSED (IDENTIFIED IN 2003)
- AREA EXHIBITING A SHEEN OBSERVED DURING 2013 SEDIMENT PROBING
- HISTORICAL RIVER SEDIMENT PROBE SAMPLE
- HISTORICAL RIVER SEDIMENT PROBE LOCATION WITH SHEEN OBSERVED
- HISTORICAL SEDIMENT BORING AND/OR SAMPLING LOCATION
- ORANGE INDICATES THE PRESENCE OF OBSERVED SHEEN THAT EXHIBITS MGP-RELATED COMPOSITIONAL CHARACTERISTICS (2003)
- GREEN INDICATES THE PRESENCE OF NON-MGP-RELATED SHEEN OR NON-MGP-RELATED COMPOSITIONAL CHARACTERISTICS (2003)
- 2013 SEDIMENT SAMPLE LOCATION

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.
2. 2013 SEDIMENT SAMPLE LOCATIONS SURVEYED 4/2/13 BY ARCADIS USING REAL TIME NETWORK (RTN) GPS METHODS.

0 80' 160'
GRAPHIC SCALE

NYSEG
BINGHAMTON, NEW YORK
COURT STREET SITE
SUSQUEHANNA RIVER ASSESSMENT

SEDIMENT SAMPLING AND PROBING LOCATIONS

ARCADIS

FIGURE
1

LEGEND:

- 2013 SEDIMENT SAMPLING LOCATIONS
- DOWNSTREAM DEPOSITIONAL AREAS

NOTE:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997). DATUM = NORTH AMERICAN DATUM OF 1983. AERIALS DOWNLOADED FROM GIS CLEARINGHOUSE ON 6/7/13.

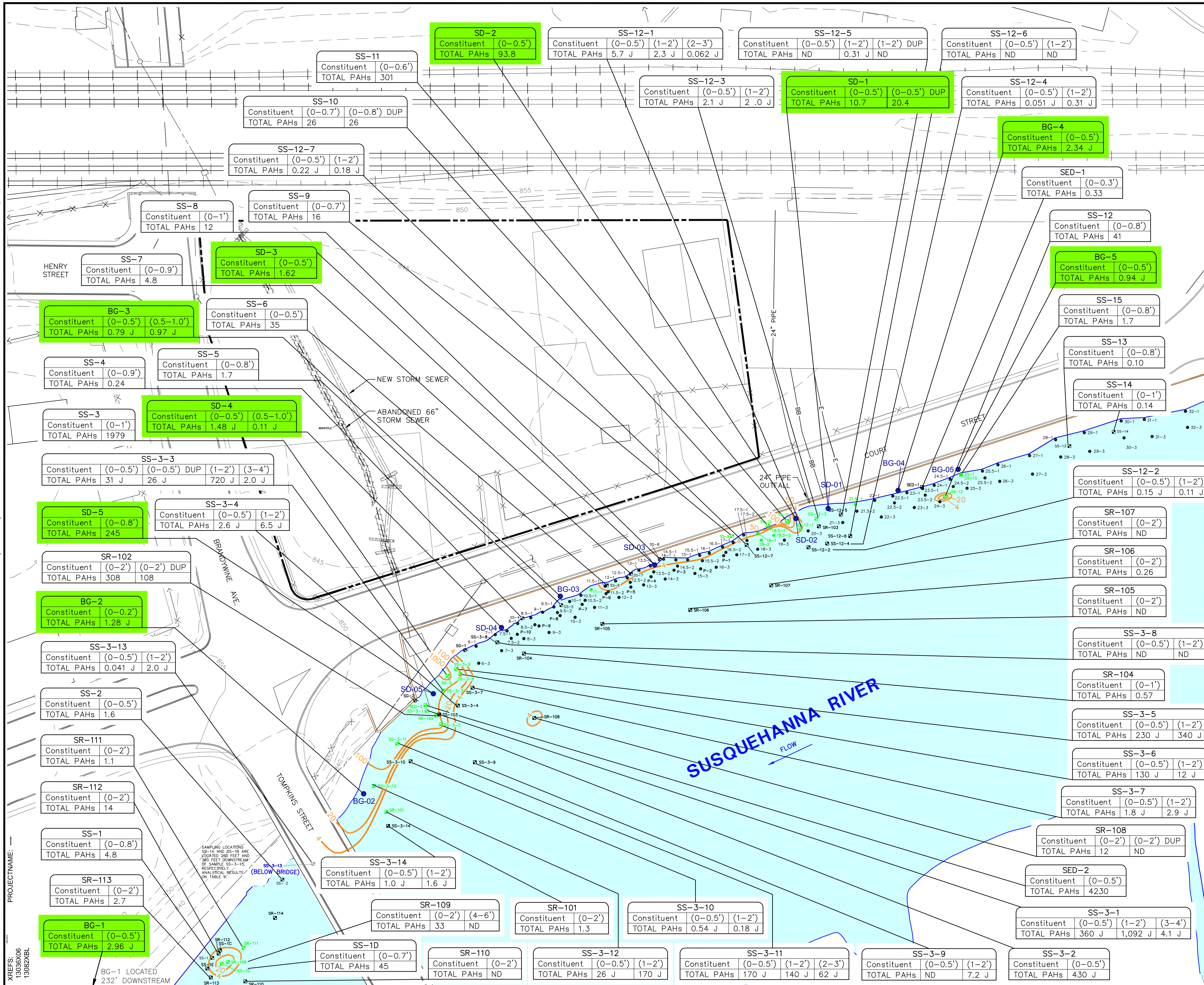
0 400' 800'
GRAPHIC SCALE

NYSEG
BINGHAMTON, NEW YORK
COURT STREET SITE
SUSQUEHANNA RIVER ASSESSMENT

DOWNSTREAM DEPOSITIONAL AREAS

ARCADIS

FIGURE
2



LEGEND:

- FLOOD WALL
- RAILROAD TRACK
- FENCE
- SITE PROPERTY LINES (APPROXIMATE)
- SURFACE ELEVATION CONTOUR (FT. AMSL)
- 20 — 20 TOTAL PAH ISOCONCENTRATION LINES FOR UPPERMOST RIVERBED SAMPLES
- STAFF GAUGE
- HISTORICAL RIVER SEDIMENT PROBE LOCATIONS
- SEDIMENT BORING AND/OR SAMPLING LOCATION
- GREEN INDICATES PRESENCE OF OBSERVED SHEEN
- SD-04 2013 SEDIMENT SAMPLING LOCATION

SS-1	
Constituent	(0-0.8')
TOTAL PAHs	4.8

SAMPLE ID
SAMPLE DEPTH IN FEET
CONCENTRATIONS ARE mg/Kg (ppm)
ND – NOT DETECTED
J – ESTIMATED VALUE
DUP – DUPLICATE SAMPLE
2013 RESULTS ARE SHADED WITH GREEN

NOTES:

1. BASE MAP PROVIDED BY NYSEG (JUNE 12, 1997).
2. SURFACE ELEVATIONS DIGITIZED FROM CITY OF BINGHAMTON MAP, SHEET 303, FLOWN DECEMBER 2, 1973 AND MAPPED APRIL 1, 1974.
3. TOTAL PAH CONCENTRATIONS REPRESENT THE 17 PRIORITY POLLUTANT PAHs.

0 100' 200'
GRAPHIC SCALE

NYSEG
BINGHAMTON, NEW YORK
COURT STREET SITE
SUSQUEHANNA RIVER ASSESSMENT

SEDIMENT SAMPLE ANALYTICAL RESULTS

ARCADIS

FIGURE
3

CITY: Syracuse, NY DIV/GROUP: ENV/IM-DV DB: RCB SDL: R. ALLEN LD: (Opt) PIC: (Opt) PM: S. Powlin TM: (Opt) LYR: (Opt) ON=*; OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0013082\0007\00003\DWG\13082C01.DWG LAYOUT: 3 SAVED: 8/14/2013 9:25 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTHALF.CTB PLOTTED: 8/14/2013 9:25 AM BY: ALLEN, ROYCE
XREFS: 13082X06 13082XBL PROJECTNAME: ----

Attachment B

Boring Logs

Date Start/Finish: 10/31/14 - 11/4/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: L. Pech
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon, 300lb Hammer

Northing: 766863.201
Easting: 1006894.753
Sediment Surface Elevation: 826.85'
Borehole Depth: 30'
Water Depth: 4.2'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-A**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0		1	0-2	1.4	2, 2, 3, 2	5	0.0			Brown fine to coarse subangular GRAVEL, some fine to medium Sand, loose, wet. Gray medium SAND, little to trace Silt, trace fine Sand, loose, wet. Brown fine SAND, little Silt, loose, wet.	Borehole backfilled with portland cement and bentonite grout mixture
	825	2	2-4	1.4	3, 22, 24, 22	46	0.0			Gray fine SAND, some Silt, trace Organics (leaf litter), loose wet. Gray to brown fine to coarse SAND and fine to coarse subangular GRAVEL, trace Silt, loose, wet.	
5		3	4-6	0.5	12, 41, 36, 26	77	0.0			Brown fine to medium SAND and fine to medium subangular GRAVEL, trace Silt, loose, wet.	
	820	4	6-8	0.7	23, 11, 5, 3	16	0.0			Brown fine to medium SAND, little to trace fine to medium Gravel, loose, wet.	
		5	8-10	0.3	45, 55, 38, 40	93	0.0			Brown fine to coarse SAND, some fine to medium subangular Gravel, loose, wet.	
10		6	10-12	0.9	12, 10, 8, 10	17	0.0			Brown fine SAND, trace medium Sand, loose, wet.	
	815	7	12-14	1.4	7, 9, 9, 12	18	0.0				
15		8	14-16	1.2	5, 5, 6, 5	11	0.0				
					5						

Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level;
NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Client: NYSEG

Well/Boring ID: PDI-SED-A

Borehole Depth: 30'

Location:
Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	810	9	16-18	1.8	7, 9, 9	16	0.0				
		10	18-20	1.2	3, 5, 6, 6	11	0.0			Brown fine SAND, little medium Sand, loose, wet.	
20		11	20-22	1.2	6, 10, 13, 6	23	5.1			Brown fine SAND, little medium Sand, trace Silt, faint MGP-like odor, loose, wet.	
	805	12	22-24	2.0	6, 6, 7, 7	13	0.0			Brown fine SAND, little to trace medium Sand, trace Silt, no odors, loose, wet.	Borehole backfilled with portland cement and bentonite grout mixture
25		13	24-26	0.3	10, 10, 13, 7	23	0.0				
	800	14	26-28	1.0	20, 14, 11, 9	25	0.0			Gray to gray/brown fine to medium SAND and fine to coarse subangular to subround GRAVEL, loose, wet.	
		15	28-30	0.8	14, 14, 16, 14	30	0.0			End of boring at 30.0' bss.	
30	795										
35											

Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Date Start/Finish: 10/23/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** Joel Rauscher **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon	**Northing:** 766863.076 **Easting:** 1006853.354 **Sediment Surface Elevation:** 825.75' **Borehole Depth:** 4.0' **Water Depth:** 8.0' **Descriptions By:** Will Stephens	**Well/Boring ID:** **PDI-SED-B** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	825	1	0-2	0.3	15 45 26 21	71	0.0			Gray fine to coarse subangular GRAVEL, some fine to medium Sand, loose, wet.	Borehole backfilled with bentonite pellets.
		2	2-4	0.4	14 19 26 28	45	0.0			Gray to brown fine to coarse subangular GRAVEL and fine to coarse SAND, trace Silt, faint MGP-like odor, loose, wet. End of boring at 4.0' bss.	
5	820									Boring attepmted 2 times due to no recovery during the first attempt.	
10	815										
15	810										

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 140 lb hammer.

Date Start/Finish: 11/5/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: L. Pech
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,300lb Hammer

Northing: 766848.366
Easting: 1006860.415
Sediment Surface Elevation: 820.35'
Borehole Depth: 4.0'
Water Depth: 10.7'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-B-1**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	820	1	0-2	0.4	78 12 6 5	18	0.0			Gray fine to coarse subangular to subround GRAVEL, trace fine Sand, wet.	Borehole backfilled with bentonite chips
		2	2-4	0.8	8 6 9 12	15	0.0			Brown fine SAND, some fine to coarse subangular Gravel, trace Silt, loose, wet. End of boring at 4.0' bss.	
5	815										
10	810										
15	805										

Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', and 2.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Date Start/Finish: 10/23/14	**Northing:** 766847.342	**Well/Boring ID:** **PDI-SED-C**	
Drilling Company: Parratt-Wolff, Inc.	**Easting:** 1006828.295	**Client:** NYSEG	
Driller's Name: Joel Rauscher	**Sediment Surface Elevation:** 821.45'	**Location:** Court Street, Binghamton, New York, Susquehanna River	
Rig Type: Barge-mounted Acker Ace	**Borehole Depth:** 4.0'		
Sampling Method: 3" x 2' Split Spoon	**Water Depth:** 6.5'		
Sampling Method 2:	**Descriptions By:** Will Stephens	**DRAFT**	

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0		1	0-2	0.8	8, 12, 19, 26	31	0.0			Brown to gray fine to coarse SAND and fine to coarse subangular GRAVEL, trace Silt, loose, wet.	Borehole allowed to naturally collapse
	820	2	2-4	0.9	25, 29, 34, 19	63	0.0			End of boring at 4.0' bss.	
5	815										
10	810										
15											

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 140 lb hammer.

Date Start/Finish: 10/23/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** Joel Rauscher **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon	**Northing:** 766855.196 **Easting:** 1006811.432 **Sediment Surface Elevation:** 828.15' **Borehole Depth:** 6.0' **Water Depth:** 5.0' **Descriptions By:** Will Stephens	**Well/Boring ID:** **PDI-SED-D** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	0.9	2 1 1 1	2	0.0			Gray to brown fine to coarse SAND and medium to coarse subangular GRAVEL, trace silt, faint MGP-like odor, trace iridescent sheens, loose, wet.	Borehole backfilled with bentonite pellets
	825	2	2-4	1.1	1 3 8 12	11	0.0				
5		3	4-6	0.4	12 10 5 7	15	0.0			Gray fine to medium SAND, trace fine Gravel , faint MGP-like odor, loose, wet. End of boring at 6.0' bss.	
	820										
10											
	815										
15											

Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 1.0-2.0', 2.0-3.0', 3.0-4.0' and 4.0-6.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 140 lb hammer.

Date Start/Finish: 10/23/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Joel Rauscher
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 4' Split Spoon
Sampling Method 2:

Northing: 766845.173
Easting: 1006783.390
Sediment Surface Elevation: 828.65'
Borehole Depth: 4.0'
Water Depth: 4.5'
Descriptions By: Will Stephens

Well/Boring ID: PDI-SED-E
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-4	0.5	1, 1, 1, 1, 1, 2, 1, 1	2, 3	0.0	X		Gray fine to medium subround GRAVEL, trace fine Sand, very loose, wet. End of boring at 4.0' bss.	Borehole allowed to naturally collapse
	825										
5										Boring attempted three times due to lack of recovery on the first two attempts. Utilized a 4' split spoon in an attempt to achieve greater recovery.	
	820										
10											
	815										
15											

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level;
NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 300 lb hammer.

Date Start/Finish: 11/5/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** L. Pech **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon,300lb Hammer Sampling Method 2:	**Northing:** 766837.864 **Easting:** 1006785.477 **Sediment Surface Elevation:** 823.65' **Borehole Depth:** 4.0' **Water Depth:** 7.4' **Descriptions By:** Will Stephens	**Well/Boring ID:** **PDI-SED-E-1** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	825										
0		1	0-2	0.2	WH 1 2 3	3	0.0			Multicolored medium to coarse subangular GRAVEL, wet. Gray medium SAND, trace fine subangular Gravel, loose, wet.	Borehole backfilled with bentonite chips
	820	2	2-4	0.9	30 2 3 3	5	0.0			Gray to brown fine to medium SAND, some fine to medium subangular Gravel, trace Silt, loose, wet. Brown fine to medium SAND, trace fine subangular Gravel, loose, wet. End of boring at 4.0' bss.	
5											
	815										
10											
	810										
15											

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery; WH= Weight of Hammer
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', 2.0-3.0' and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Project Number: B0013082.0012 Template: G:\Div11\Rockware\Logplot Logs\B0013082
Data File: PDI-SED-E-1.dat Date: 5/6/2015 Created/Edited by: WDS

Date Start/Finish: 10/29/14 - 10/31/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Bill Rice
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon, 300lb Hammer
Sampling Method 2:

Northing: 766830.737
Easting: 1006782.501
Sediment Surface Elevation: 822.35'
Borehole Depth: 30'
Water Depth: 8.7'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-F**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	1.2	5, 5, 8, 9	13	0.0			Multicolored fine to coarse subangular to subround GRAVEL, some fine to coarse Sand, loose, wet.	
										Gray COBBLE in nose of split spoon.	
										Gray fine to coarse subangular GRAVEL, some fine to medium Sand, loose, wet.	
		2	2-4	1.5	12, 151, 12, 17	27	0.0			Lense of tan Silty SAND, some fine to medium Gravel, moist.	
										Gray fine to coarse SAND and fine to coarse subangular GRAVEL, loose, saturated.	
	825									Reddish brown fine to medium SAND and fine to coarse subangular to subround GRAVEL, loose, wet.	
5		3	4-6	NR	NA	NA	NA			Roller bit past due to gravel stuck between bit and 4" casing	
		4	6-8	NR	9, 6, 6, 5	12	NA			No Recovery.	
	820	5	8-10	0.8	8, 8, 12, 14	20	0.0			Multicolored fine to coarse subround GRAVEL, some to little fine Sand, loose, wet.	Borehole backfilled with portland cement and bentonite grout mixture
10										Dark Gray fine to medium SAND, trace fine to medium subangular Gravel, loose, wet.	
		6	10-12	1.8	15, 10, 10, 11	20	0.0			Multicolored fine to coarse subround GRAVEL, some to little fine Sand, trace Silt, loose, wet.	
		7	12-14	0.7	13, 10, 9, 10	19	0.0				
	815									Lense of brown fine SAND, trace fine Gravel, wet.	
15		8	14-16	1.0	14, 10, 9, 12	19	0.0			Gray fine to medium SAND, some fine to coarse subangular Gravel, trace Silt, loose, wet.	
					12					No Recovery.	

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Client: NYSEG

Well/Boring ID: PDI-SED-F

Borehole Depth: 30'

Location:
Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	NR	12 11 12	23	NA			Gray fine to medium SAND, some fine to coarse subangular Gravel, trace Silt, loose, wet.	
20	810	10	18-20	1.1	12 10 9 8	19	0.0			Gray to brown fine to coarse SAND and fine to coarse subangular GRAVEL, trace Silt, loose, wet.	
		11	20-22	0.3	7 6 5 5	11	0.0			Multicolored medium to coarse GRAVEL, trace fine Sand, loose, wet.	
		12	22-24	0.2	10 7 6 7	13	0.0				Borehole backfilled with portland cement and bentonite grout mixture
25	805	13	24-26	1.0	5 5 6 5	11	0.0			Multicolored fine to coarse subangular to subround GRAVEL, little fine to coarse Sand, loose, wet.	
		14	26-28	0.5	12 9 9 12	18	0.0			Gray fine to medium SAND, trace fine Gravel, trace iridescent sheens, faint MGP-like odor, wet.	
30	800	15	28-30	1.7	12 10 11 10	21	196			Gray fine to medium SAND and fine to medium subangular GRAVEL, MGP-like odor, irridescent sheen, light brown NAPL coating with trace blebs, wet. Gray medium to coarse GRAVEL, some fine to medium Sand, moderate black to brown NAPL coating, strong MGP-like odor, wet. Brown Silty CLAY, little medium to coarse Gravel, little fine Sand, Till-like, low plasticity, moist.	
35	795									~~NAPL coating edge of Gravels for from 29.3 to 29.5' bss, with no impacts~~ observed below 29.5' bss. End of boring at 30.0' bss.	

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Date Start/Finish: 10/23/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Joel Rauscher
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon

Northing: 766829.317
Easting: 1006745.946
Sediment Surface Elevation: 828.55'
Borehole Depth: 4.0'
Water Depth: 4.5'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-G**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	0.5	2, 2, 4, 4	6	0.0			Gray fine to coarse GRAVEL, some fine to medium Sand, little Silt, loose, wet.	
										Blue to gray Silty SAND, little fine to medium subangular Gravel, loose, wet.	Borehole allowed to naturally collapse
	825	2	2-4	0.6	3, 2, 4, 5	6	0.0			Gray medium to coarse SAND and fine to coarse subangular GRAVEL, loose, wet. End of boring at 4.0' bss.	
5										Boring attempted twice due to lack of recovery on the first attempt.	
	820										
10											
	815										
15											

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The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 300 lb hammer.

Project Number: B0013082.0012 Template: G:\Div11\Rockware\Logplot Logs\B0013082
Data File: PDI-SED-G.dat Date: 5/6/2015 Created/Edited by: WDS

Date Start/Finish: 10/21/14-10/22/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Joel Rauscher
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon
Sampling Method 2:

Northing: 766742.183
Easting: 1006510.461
Sediment Surface Elevation: 830.45'
Borehole Depth: 30'
Water Depth: 2.3'
Descriptions By: Will Stephens

Well/Boring ID: PDI-SED-H
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	830	1	0-2	0.6	9, 9, 19, 25	28	0.0			Gray to brown fine SAND, some to little fine to medium subround Gravel, little Organics (leaves, wood), wet. Gray fine SAND, some Silt, loose, wet.	
		2	2-7	2.1	35, 31, 20, 20, 54, 20, 15, 17, 17, 12	51	0.0			Gray fine SAND, some Silt, trace Organics (leaves), loose, wet. Light gray to orange mottled Silty CLAY, little fine to medium Gravel, trace Organics, trace Sand, nonplastic, moist to wet. Gray medium to coarse subangular GRAVEL, some fine Sand, little lenses of Silt, loose, wet.	
5	825										
		3	7-9	0.8	41, 22, 21, 15	43	0.0			Gray fine to coarse subangular GRAVEL, little fine to medium Sand, loose, wet.	
10	820	4	9-11	NR	11, 11, 10, 10	21	NA			No Recovery.	
		5	11-13	0.6	17, 9, 10, 12	19	0.0			Gray fine to coarse subangular GRAVEL, trace fine to coarse Sand, loose, wet.	
		6	13-15	0.9	19, 18, 15, 30	33	0.0			Mulitcolored (red, brown, and gray) subangular to subround medium to coarse GRAVEL, trace fine Sand, loose, wet.	
15	815	7	15-17	1.3	40, 40, 34	74	0.0				Borehole backfilled with Bentonite chips
		7	15-17	1.3		74	0.0				

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The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 0.5-1.0', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Sample collected using a 300lb hammer from 19-31' bss.

Client: NYSEG

Well/Boring ID: PDI-SED-H

Borehole Depth: 30'

Location:

Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
					23						
		8	17-19	0.9	47 38 36 33	74	0.0				
20	810	9	19-21	1.3	32 15 12 10	27	0.0			Gray fine SAND, little Silt, trace fine subangular Gravel, moderately dense, wet. Dark gray medium SAND, trace fine subangular Gravel, loose, wet.	
										Roller bit to 22.0' bgs	
		10	22-24	1.7	13 15 14 12	29	0.0			Dark gray fine to medium SAND, loose, wet.	
25	805	11	24-26	2.0	13 14 17 16	31	0.0			Dark gray fine to medium SAND, trace fine Gravel, faint MGP-like odor, wet.	
		12	26-28	1.4	5 5 7 12	12	0.0			Dark gray fine to medium SAND, trace Silt, faint MGP-like odor, loose, wet.	
		13	28-30	1.8	8 8 12 19	20	0.0			Dark gray fine to medium SAND, little fien to medium subround Gravel, trace Silt, loose, wet. End of boring at 30.0' bss.	
30	800										
35											

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 0.5-1.0', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Sample collected using a 300lb hammer from 19-31' bss.

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Date Start/Finish: 10/23/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** Joel Rauscher **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon Sampling Method 2:	**Northing:** 766705.429 **Easting:** 1006496.644 **Sediment Surface Elevation:** 826.05' **Borehole Depth:** 4.0' **Water Depth:** 2.4' **Descriptions By:** Will Stephens	**Well/Boring ID: PDI-SED-I** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	825	1	0-2	0.4	20 46 21 8	67	0.0			Gray to brown fine to medium SAND, some fine to medium subangular Gravel, trace Organics (leaves), faint MGP-like odor, loose, wet. Gray-blue mottled Silty CLAY, trace fine to medium subround Gravel, stiff, nonplastic, moist.	Borehole backfilled with bentonite chips
		2	2-4	1.1	5 11 8 7	19	0.0			Gray Sandy SILT, little fine to medium subround Gravel, stiff, moist. Gray fine to medium SAND and fine to medium subangular GRAVEL, loose, faint MGP-like odor, wet.	
5	820									End of boring at 4.0' bss.	
10	815										
15											

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 1.0-2.0', 2.0-3.0', and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 300 lb hammer.

Date Start/Finish: 11/5/14	Northing: 766691.998	Well/Boring ID: **PDI-SED-I-1**
Drilling Company: Parratt-Wolff, Inc.	Easting: 1006491.175	Client: NYSEG
Driller's Name: L. Pech	Sediment Surface Elevation: 824.45'	Location: Court Street, Binghamton, New York, Susquehanna River
Rig Type: Barge-mounted Acker Ace	Borehole Depth: 4.0'	
Sampling Method: 3" x 2' Split Spoon,300lb Hammer	Water Depth: 6.6'	
Sampling Method 2:	Descriptions By: Will Stephens	

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	825										
0		1	0-2	0.4	3 4 4 4	8	0.0			Gray fine to coarse subangular GRAVEL, little fine to medium Sand, trace Silt, loose, wet.	Borehole backfilled with bentonite chips
		2	2-4	1.2	7 5 2 2	7	0.0			Gray fine to coarse SAND and fine to coarse subangular GRAVEL, loose, wet. End of boring at 4.0' bss.	
	820										
5											
	815										
10											
	810										
15											

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery; WH= Weight of Hammer
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', 2.0-3.0' and 3.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Date Start/Finish: 10/24/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Joel Rauscher
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon
Sampling Method 2:

Northing: 766682.572
Easting: 1006462.011
Sediment Surface Elevation: 827.75'
Borehole Depth: 4.0'
Water Depth: 3.3'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-J**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	0.7	12, 20, 19, 11	67	155.7			Gray coarse subangular GRAVEL, little fine to medium Sand, light brown NAPL coating with NAPL blebs (0.01" diameter), MGP-like odor, sheens, loose, wet. Gray-blue SILT, trace subround Gravel, trace Clay, stiff, moist.	
	825	2	2-4	0.9	6, 7, 10, 8	19	1.8			Gray fine to medium SAND, some fine to coarse subangular Gravel, trace Silt, faint MGP-like odor, loose, wet.	Borehole backfilled with bentonite chips
5		3	4-6	NR	12, 7, 9, 15		NA			No Recovery.	
	820	4	6-8	0.9	14, 44, 50/.3-10/.2, 8		0.0			Gray fine to coarse subangular GRAVEL, little fine to medium Sand, faint MGP-like odor, no visual impacts, loose, wet. Begin using 300 lb hammer at 7.3' bss. End of boring at 8.0' bss.	
10											
	815										
15											

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 1.0-2.0', 2.0-3.0',3.0-4.0' and 6-8'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 300 lb hammer at 7.3' bss.

Date Start/Finish: 10/28/15 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** Bill Rice **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon,300lb Hammer Sampling Method 2:	**Northing:** 766666.288 **Easting:** 1006440.644 **Sediment Surface Elevation:** 828.45' **Borehole Depth:** 8.0' **Water Depth:** 2.6' **Descriptions By:** Will Stephens	**Well/Boring ID:** **PDI-SED-K** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	1.3	21 30 15 16	45	43.3			Gray SILT, little Organics (leaves), trace fine Sand, trace Clay, soft, wet. Gray to dark gray fine to medium SAND, some fine to medium subangular Gravel, MGP-like odor, trace iridescent sheens, trace NAPL blebs, black staining, loose, wet. Gray Silty SAND, some fine to medium subangular Gravel, trace Organics (wood), wet.	Borehole backfilled with bentonite chips
	825	2	2-4	0.9	8 12 10 10	22	19.3			Gray medium to coarse subangular GRAVEL, little fine Sand, trace Silt, wet. Brown fine to medium subangular GRAVEL, some fine to coarse Sand, trace NAPL blebs, iridescent sheens, MGP-like odor, wet.	
5		3	4-6	0.5	18 31 23 30	54	2.7				
		4	6-8	NR	9 8 8 10	16	NA			No Recovery.	
	820	5	8-10	0.4	26 23 24 31	47	0.0			Brown coarse subangular GRAVEL, trace fine Sand, trace Silt, loose, no obvious impacts wet. End of boring at 10.0' bss.	
10											
	815										
15											

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Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 1.0-2.0', 2.0-3.0', 3.0-4.0', 4.0-6.0' and 8.0-10.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Date Start/Finish: 10/24/14	**Northing:** 766631.071	**Well/Boring ID:** PDI-SED-L
Drilling Company: Parratt-Wolff, Inc.	**Easting:** 1006454.929	**Client:** NYSEG
Driller's Name: Joel Rauscher	**Sediment Surface Elevation:** 822.45'	**Location:** Court Street, Binghamton, New York, Susquehanna River
Rig Type: Barge-mounted Acker Ace	**Borehole Depth:** 6.0'	
Sampling Method: 3" x 2' Split Spoon	**Water Depth:** 8.6'	
Sampling Method 2:	**Descriptions By:** Will Stephens	

DRAFT

Depth	Elevation	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Stratigraphic Description
0	822.45	1	0-2	0.7	22, 36, 46, 25	72	4.7	Gray fine to coarse SAND, some fine to coarse subangular Gravel, trace Silt, loose, wet. Black medium to coarse SAND (stained), little fine subangular Gravel, trace sheens, black staining, loose, wet. Gray coarse GRAVEL, little Silt, little fine Sand, faint MGP-like odor, moist to wet.
	820	2	2-4	0.7	22, 13, 16, 25	29	0.0	Gray medium to coarse GRAVEL, little fine Sand, trace Silt, faint MGP-like odor, trace iridescent sheen, loose, moist. Begin using 300 lb hammer at 4.0' bss.
5		3	4-6	0.6	14, 7, 3, 2	10	0.0	Light brown to tan fine to coarse subangular GRAVEL, little fine Sand, trace Silt, loose, wet. End of boring at 6.0' bss.

Depth scale: 0, 5, 10, 15. Elevation scale: 825, 820, 815, 810.

Well/Boring Construction: Borehole backfilled with bentonite chips

Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 0.5-1.0', 1.0-2.0', 2.0-3.0',3.0-4.0', and 4.0-6.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Samples collected using a 300 lb hammer beginning at 4.0' bss.

Date Start/Finish: 10/28/15
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Bill Rice
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,300lb Hammer

Northing: NA
Easting: NA
Sediment Surface Elevation: NA
Borehole Depth: 8.0'
Water Depth: 10.0'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-L-1**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0	1	0-2	0.7	15, 11, 20, 17	31	0.0			Brown fine to coarse SAND and fine to coarse subangular GRAVEL, loose, wet.	Borehole backfilled with bentonite chips
		2	2-4	0.8	14, 16, 19, 16	35	0.0			Dark gray fine to medium SAND, some Silt, black staining, thin lense (<0.01' thick) of brown to black light NAPL coating, MGP-like odor, trace sheens, loose, wet.	
										Red COBBLE.	
5	-5	3	4-6	1.2	17, 9, 14, 16	23	0.0			Gray fine SAND, some fine to medium Gravel, trace Silt, faint MGP-like odor, no visual impacts, loose, wet.	
				0.6	22, 19, 23, 14	42	0.0			End of boring at 8.0' bss.	
10	-10										
15	-15										

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', 2.0-4.0', 4.0-5.0', 5.0-6.0' and 6.0-8.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Date Start/Finish: 11/5/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: L. Pech
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,300lb Hammer
Sampling Method 2:

Northing: NA
Easting: NA
Sediment Surface Elevation: NA
Borehole Depth: 6.0'
Water Depth: 10.5
Descriptions By: Will Stephens

Well/Boring ID: PDI-SED-L-2
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

DRAFT

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0	1	0-2	0.7	8 8 17 12	31	0.0			Brown fine to coarse SAND and fine to coarse subangular GRAVEL, loose, wet.	
		2	2-4	0.9	8 11 10 10	35	0.0			Dark gray fine to medium SAND, some Silt, black staining, thin lense (<0.01' thick) of brown to black light NAPL coating, MGP-like odor, trace sheens, loose, wet.	Borehole backfilled with bentonite chips
										Red COBBLE.	
5	-5	3	4-6	0.5	36 26 20 25	23	0.0			Gray fine SAND, some fine to medium Gravel, trace Silt, faint MGP-like odor, no visual impacts, loose, wet.	
10	-10										
15	-15										

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Remarks: bss = below sediment surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level;
NR = No Recovery
Coordinates are based on the North American Datum of 1983, NEW YORK EASTERN Zone, U.S. Survey Foot.
Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', 2.0-4.0', 4.0-5.0', 5.0-6.0' and 6.0-8.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Date Start/Finish: 11/5/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: L. Pech
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,300lb Hammer

Northing: 766601.485
Easting: 1006458.844
Sediment Surface Elevation: 820.15'
Borehole Depth: 4.0'
Water Depth: 10.9'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-L-3**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	820	1	0-2	NR	6 9 4 4	13	NA			No Recovery, Cobble stuck in nose of split spoon.	Borehole backfilled with bentonite chips
		2	2-4	0.6	6 2 2 1	4	0.0	X		Multicolored fine to coarse subangular GRAVEL, little fine to medium Sand, loose, no obvious impacts, wet. End of boring at 4.0' bss.	
5	815										
10	810										
15	805										

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 2.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

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Date Start/Finish: 10/29/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Bill Rice
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon, 300lb Hammer
Sampling Method 2:

Northing: 766632.108
Easting: 1006406.850
Sediment Surface Elevation: 829.15'
Borehole Depth: 20'
Water Depth: 1.9'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-M**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	0.9	57 23 36 23	59	0.0			Gray fine to coarse GRAVEL, some fine to coarse Sand, trace Silt, dense, wet.	
		2	2-4	0.4	22 20 15 7	35	0.0				
5	825	3	4-6	0.9	5 5 6 5	11	0.0			Gray medium SAND, some to little fine to medium subangular Gravel, loose, wet.	
		4	6-8	0.4	7 6 8 8	14	0.0			Brown fine to medium SAND and fine to coarse subangular GRAVEL, trace Silt, loose, wet.	
	820	5	8-10	0.8	5 6 6 8	12	0.0			Gray fine to coarse SAND and fine to coarse subangular GRAVEL, trace Silt, loose, wet. Gray fine to coarse SAND and multicolored fine to coarse subangular GRAVEL, trace Silt, stiff, wet.	Borehole backfilled with portland cement and bentonite grout mixture
10		6	10-12	0.9	23 30 15 15	45	0.0			Gray fine to coarse SAND and fine to coarse subangular GRAVEL, loose, wet.	
		7	12-14	0.8	9 6 7 9	13	0.0				
15	815	8	14-16	NR	18 15 14 15	29	NA			No Recovery.	
					16					Brown fine to coarse subangular GRAVEL, some to little fine to medium Sand,	

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The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 2.0-3.0', 3.0-4.0', and 4.0-5.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Sample collected using a 140lb hammer from 0-0.5' bss.

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Client: NYSEG

Well/Boring ID: PDI-SED-M

Borehole Depth: 20'

Location:
Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	0.7	13 13 14	26	0.0			trace Silt, loose, wet.	Borehole backfilled with portland cement and bentonite grout mixture
	810	10	18-20	1.5	13 13 16 20	29	0.0			Gray fine to medium SAND, little fine to medium subangular Gravel , trace Silt, loose, wet.	
										Multicolored fine to medium subangular GRAVEL, little fine Sand, trace Silt, loose, wet.	
20										End of boring at 20.0' bss.	
	805										
25											
	800										
30											
	795										
35											

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Analytical samples collected from 2.0-3.0', 3.0-4.0', and 4.0-5.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Sample collected using a 140lb hammer from 0-0.5' bss.

Project Number: B0013082.0012 Template: G:\Div11\Rockware\Logplot Logs\B0013082
Data File: PDI-SED-M.dat Date: 5/6/2015 Created/Edited by: WDS

Date Start/Finish: 10/24/14-10/27/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Joel Rauscher
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,140lb Hammer

Northing: 766616.465
Easting: 1006414.322
Sediment Surface Elevation: 824.65'
Borehole Depth: 8.0'
Water Depth: 6.4'
Descriptions By: Will Stephens

Well/Boring ID: **PDI-SED-N**
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	825										
		1	0-2	0.8	36, 25, 49, 50	74	4.1			Gray coarse GRAVEL, trace fine Sand, black NAPL blebs (<0.01" diameter), MGP-like odor, loose, wet. Gray fine to coarse SAND and fine to coarse subangular GRAVEL, NAPL blebs (<0.01" diameter, abundant), MGP-like odor, trace iridescent sheen, wet.	
		2	2-4	1.1	22, 10, 8, 11	18	3.2			Lense of tan medium SAND. Brown fine to coarse GRAVEL and fine to coarse SAND, loose, wet. Used 300 lb hammer from 2.0- 4.0' bss.	
5	820	3	4-6	0.6	28, 21, 15, 19	36	0.0			Multicolored (Gray, red, and brown) fine subangular to subround GRAVEL, some to little fine Sand, trace medium Gravel, trace Fill (steel bolt), trace NAPL blebs (<0.01" diameter), faint MGP-like odor, loose, wet.	Borehole backfilled with bentonite chips
		4	6-8	0.8	17, 17, 16, 19	33	0.0			Brown to gray fine to medium SAND, little fine subangular Gravel, trace Silt, loose, wet. End of boring at 8.0' bss.	
10	815										
15	810										

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-0.5', 0.5-1.0', 1.0-2.0', 2.0-3.0',3.0-4.0', 4.0-5.0', 5.0-6.0', and 6.0-8.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Project Number: B0013082.0012 Template: G:\Div11\Rockware\Logplot Logs\B0013082
Data File: PDI-SED-N.dat Date: 5/6/2015 Created/Edited by: WDS

Date Start/Finish: 10/27/14	**Northing:** 766607.914	**Well/Boring ID:** **PDI-SED-N-1**	
Drilling Company: Parratt-Wolff, Inc.	**Easting:** 1006412.756	**Client:** NYSEG	
Driller's Name: Bill Rice	**Sediment Surface Elevation:** 824.65'	**Location:** Court Street, Binghamton, New York, Susquehanna River	
Rig Type: Barge-mounted Acker Ace	**Borehole Depth:** 4.0'		
Sampling Method: 3" x 2' Split Spoon,140lb Hammer	**Water Depth:** 6.4'		
Sampling Method 2:	**Descriptions By:** Will Stephens	**DRAFT**	

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	825										
0		1	0-2	0.6	15 18 23 18	41	0.0			Gray fine to coarse subangular GRAVEL, little fine to medium Sand, loose, wet.	Borehole backfilled with bentonite chips
		2	2-4	0.7	12 9 9 18	18	0.0			End of boring at 4.0' bss.	
	820										
5											
	815										
10											
	810										
15											

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', and 2.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Date Start/Finish: 10/27/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** Bill Rice **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon,140lb Hammer	**Northing:** 766588.109 **Easting:** 1006386.385 **Sediment Surface Elevation:** 827.55' **Borehole Depth:** 4.0' **Water Depth:** 3.5' **Descriptions By:** Will Stephens	**Well/Boring ID: PDI-SED-O** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	830										
0		1	0-2	1.0	42 100 38 28	138	0.0			Dark gray fine to medium SAND and fine to coarse subangular GRAVEL, little Silt, trace red Brick, trace Organics (leaves), loose, wet. Dark gray fine to medium SAND, some to little fine to coarse subangular Gravel, trace Silt, loose, wet.	
	825	2	2-4	1.8	38 27 30 39	57	0.0			Dark gray fine to coarse SAND and fine to coarse subangular GRAVEL, trace Silt, trace red Brick, dense, wet. Gray to brown fine to medium SAND and fine to coarse subangular GRAVEL, little Silt, dense, wet.	Borehole backfilled with bentonite chips
5		3	4-6	0.9	40 25 27 30	52	0.0			Gray to brown fine to coarse GRAVEL, some fine to medium Sand, trace Silt, loose, wet. End of boring at 6.0' bss.	
	820										
10											
	815										
15											

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Elevations are based on the North American Vertical Datum of 1988.
The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 2.0-3.0', 3.0-4.0', and 4.0-5.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Used 300lb Hammer from 1.0-4.0' bss.

Date Start/Finish: 10/28/14
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Bill Rice
Rig Type: Barge-mounted Acker Ace
Sampling Method: 3" x 2' Split Spoon,140lb Hammer

Northing: 766563.317
Easting: 1006387.029
Sediment Surface Elevation: 824.85'
Borehole Depth: 6.0'
Water Depth: 6.2'
Descriptions By: Will Stephens

Well/Boring ID: PDI-SED-P
Client: NYSEG
Location: Court Street
Binghamton, New York
Susquehanna River

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DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	825				28					Gray coarse subangular GRAVEL, some red Brick [Fill], trace fine Sand, wet.	
		1	0-2	0.7	70 38 65	108	0.0			Dark gray medium to coarse subangular GRAVEL, some fine to medium Sand, trace Silt, black staining, faint MGP-like odor, wet.	
		2	2-4	1.0	71 42 22 31	64	0.0			Gray to brown fine to coarse subangular GRAVEL, some fine to medium SAND, trace Silt, trace Fill [Glass, red Brick], trace iridescent sheen, wet.	Borehole backfilled with bentonite chips
5	820	3	4-6	0.5	22 18 25 19	43	0.0			Gray to brown fine to coarse subangular GRAVEL, some fine to medium SAND, trace Silt, trace Fill [Glass, red Brick], wet. End of boring at 6.0' bss.	
10	815										
15	810										

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Analytical samples collected from 0-0.5', 0.5-1.0', 1.0-2.0', 2.0-3.0', 3.0-4.0', and 4.0-5.0' bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.
Used 300lb Hammer from 2.5-6.0' bss.

Date Start/Finish: 11/5/14 **Drilling Company:** Parratt-Wolff, Inc. **Driller's Name:** L. Pech **Rig Type:** Barge-mounted Acker Ace **Sampling Method:** 3" x 2' Split Spoon,300lb Hammer Sampling Method 2:	**Northing:** 766538.636 **Easting:** 1006372.263 **Sediment Surface Elevation:** 824.95' **Borehole Depth:** 4.0' **Water Depth:** 6.1' **Descriptions By:** Will Stephens	**Well/Boring ID:** **PDI-SED-P-1** **Client:** NYSEG **Location:** Court Street Binghamton, New York Susquehanna River **DRAFT**

DEPTH	ELEVATION	Sample Run Number	Sample Interval	Recovery (feet)	Blow Counts	N - Value*	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	825	1	0-2	0.4	10 10 4 6	14	0.0			Multicolored fine to medium subangular GRAVEL, little fine Sand, loose, wet.	Borehole backfilled with bentonite chips
		2	2-4	0.8	7 12 12 10	24	0.0			Gray fine to coarse subangular GRAVEL and fine to coarse SAND, trace Silt, loose, wet. End of boring at 4.0' bss.	
5	820										
10	815										
15	810										

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The coordinates and elevations were obtained using Real-Time Kinematic GPS Methods.
Analytical samples collected from 0-2.0', and 2.0-4.0'bss.
Samples were analyzed for NOAA 34 PAH and TOC analyses via the Lloyd Kahn Method.

Project Number: B0013082.0012 Template: G:\Div11\Rockware\Logplot Logs\B0013082
Data File: PDI-SED-P-1.dat Date: 5/6/2015 Created/Edited by: WDS

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