NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau C
625 Broadway, 12th Floor, Albany, NY 12233-7014
P: (518) 402-9662 I F: (518) 402-9679
www.dec.ny.gov

Transmitted via E-Mail Only

July 11, 2022

Melissa Abt, P.G.
Project Manager
EH&S, Remediation
Consolidated Edison Company of New York, Inc.
31-01 20th Avenue
Long Island City NY 11105-2048
AbtM@coned.com

Re: Revised Remedial Investigation Report
CE - Woodworth Ave. MGP Yonkers
NYSDEC Site No. 360164

Dear Melissa Abt,

The New York State Department of Environmental Conservation (DEC) and the New York State Department of Health (NYSDOH) have reviewed the revised Remedial Investigation Report (RIR), dated April 2022, for the CE - Woodworth Ave. Manufactured Gas Plant (MGP) Yonkers site. The RIR is hereby approved.

As discussed in a conference call between DEC and Consolidated Edison Inc. on June 3, 2021, the findings of this RIR warrant the administrative separation of the CE - Woodworth Ave. MGP Yonkers site into multiple operable units. The first operable unit is the On-Site/Former MGP, with the April 2022 RIR having primarily focused on this operable unit. The second operable unit is the Off-Site. A third operable unit may be required if the additional Off-Site investigation suggest impacts to the Hudson River. As noted by the RIR, hereby referred to as the OU1 RIR, additional investigations are recommended and will be required for the off-site areas.

Please ensure that all copies of the final report include this approval letter, and place copies of the report in the document repositories. If you have any questions, please feel free to contact me at justin.starr@dec.ny.gov or 518-402-9662.

Sincerely,

Justin C. Starr, P.G.
Assistant Geologist, Remedial Bureau C
Division of Environmental Remediation

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

ec.: A. Omorogbe, NYSDEC (amen.omorogbe@dec.ny.gov)
S. Deyette, NYSDEC (scott.deyette@dec.ny.gov)
J. Starr, NYSDEC (justin.starr@dec.ny.gov)
D. Bendell, R3 NYSDEC (daniel.bendell@dec.ny.gov)
A. Martin, NYSDOH (angela.martin@health.ny.gov)
C. Bethoney, NYSDOH (charlotte.bethoney@health.ny.gov)
K. Kaiser, Con Edison – (KAISERK@coned.com)
D2

WOODWORTH AVE. MGP
CITY OF YONKERS, NEW YORK
REMEDIAL INVESTIGATION REPORT
(NYSDEC AOC INDEX NO. CO0-20180516-519, SITE NO: 360164)

CONSOLIDATED EDISON CO. OF NEW YORK, INC.
31-01 20th Avenue
Long Island City, NY 11105

Prepared by:

GEI Consultants, Inc., P.C.
455 Winding Brook Dr., Suite 201
Glastonbury, CT 06033

April 2022

Certification

I, Melissa J. Felter, certify that I am currently a NYS registered professional geologist and that this Remedial Investigation Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

April 8, 2022
Date

Melissa J. Felter
GEI Consultants, Inc., P.C.
New York State Professional Geologist
License Number 000883-1

Table of Contents

Tables

Figures

Appendices

MO/ah:bdp
B:\Working\CON ED\1900674 Former Woodworth Ave MGP Site\Reports\RIR-2021\FINAL DRAFT RIR REPORT\FINAL REPORT DEC COMMENTS\Report.hw360164.2022-04-08.RI.docx

Abbreviations and Acronyms

ADT	Aquifer Drilling and Testing, Inc.
AOC	Areas of Concern
ASTM	American Society for Testing and Materials
AWQS	Ambient Water Quality Standards
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAMP	Community Air-Monitoring Plan
Con Edison	Consolidated Edison Company of New York, Inc.
COCs	Contaminants of Concern
CSM	Conceptual Site Model
CSO	Combined Sewer Overflow
DER	Division of Environmental Remediation
DNAPL	Dense non-aqueous phase liquid
DUSR	Data Usability Summary Report
EDR	Environmental Data Resources, Inc.
FWRIA	Fish and Wildlife Resource Impact Analysis
GEI	GEI Consultants, Inc., P.C.
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
LNAPL	Light non-aqueous phase liquid
MGP	Manufactured Gas Plant
MTA	Metropolitan Transportation Authority
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAPL	Non-Aqueous Phase Liquids
NAVD	North American Vertical Datum
NWI	NAPL water interface
NYS AWQS	New York State Ambient Water Quality Standards
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
PAHs	Polycyclic Aromatic Hydrocarbons
PID	Photoionization Detector
PPE	Personal Protective Equipment
PSC	Public Service Commission
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QHHEA	Qualitative Human Health Exposure Assessment
RI	Remedial Investigation
Sanborn	Sanborn Fire Insurance
SC	Site Characterization

Abbreviations and Acronyms (continued)

SCGs	Standards, Criteria and Guidance Values
SCO	Soil Cleanup Objectives
SCR	Site Characterization Report
SSGVs	Saltwater Sediment Guidance Values
SVOCs	Semivolatile Organic Compounds
TAL	Target Analyte List
TOGS	Technical and Operational Guidance Series (NYSDEC)
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds

MEASUREMENTS

bgs	below ground surface
ft/ft	feet per foot
ft^2/day	square feet per day
mg/kg	milligrams per kilogram
mg/L	milligrams Per Liter
ppb	parts per billion
ppm	parts per million
µg/L	micrograms per liter

Executive Summary

Consolidated Edison Company of New York, Inc. (Con Edison) contracted with GEI Consultants, Inc., P.C. (GEI) to conduct a Remedial Investigation (RI) for the former Woodworth Avenue Works Manufactured Gas Plant Site (herein referred to as the "Site") in, Yonkers, New York. The Site is bounded by Woodworth Avenue to the east, Alexander Street to the west, Ashburton Avenue to the south, and Babcock Place to the north. Work at the Site is conducted under Administrative Order on Consent (AOC) Index No. CO0-20180516-519, Site No. 360164, signed July 25, 2018, between Con Edison and the New York State Department of Environmental Conservation (NYSDEC). Work at the Site prior to 2017 was conducted under a Voluntary Cleanup Agreement (Index No. D2-0003-02-08) until the Voluntary Program ended on March 31, 2018.

The RI was conducted in December 2020 and between April and July 2021 in accordance with the NYSDEC-approved work plan titled, *Remedial Investigation Work Plan (GEI, 2021)* and work plan modification letter titled, *Remedial Investigation Work Plan Modifications,* dated March 17, 2021. A Site Characterization (SC) was completed at the Site in 2019, and a SC Report (SCR) was approved by NYSDEC in April 2020. The purpose of the RI was to collect sufficient data to evaluate the nature and extent of chemical compounds within the Site's subsurface soils and groundwater that may be associated with the manufactured gas plant (MGP) formerly located at the Site and to provide information as to whether potential pathways of MGP-related contaminants exist through which human health or the environment could be exposed.

The Site encompasses an area of approximately 4.3 acres which was formerly an MGP consisting of retorts, coke, and coal storage sheds, two 263,000 cubic foot gas holders, one subsurface gasholder/ tar tank of unspecified size, six above ground crude oil storage tanks of varying sizes, engine room, pump room, meter room, two purifying houses, a drying house, tar barrel area, lard oil tank, coal pile, and oil house. A dock was also situated to the west of the former MGP when the Hudson River abutted the western side of the MGP before the area was filled in 1898.

Commercial buildings currently on the eastern portion of the Site consist of a former paint shop and existing machine shop (located within the former MGP building), a former auto repair shop, and a former filling station on the southeast corner of the Site. The southwestern portion of the site was developed to include an area of motor oil storage from the 1950s to the 1970s and is now used as a bus turnaround. Metro-North commuter railroad tracks and substation bisect the central portion of the Site. The western portion of the Site is currently used by Greyston Bakery. Properties to the south, and to the west along the Hudson River

were recently developed into residential apartment buildings. A Deed Restriction exists for the parcel occupied by the Greyston Bakery that restricts the Site usage to commercial or industrial use.

The majority of the surface area of the Site (approximately 90%) is developed and covered by buildings and asphalt surfaces; therefore, immediate exposure to potential subsurface contaminants is limited. The remaining 10% is fill that was likely imported to the Site after the MGP was decommissioned. The eastern portion of the Site is located approximately 25 feet above North American Vertical Datum (NAVD) on a hillside sloping downward toward the Hudson River, to the west. The western portion of the Site is approximately 5 feet above NAVD and continues to gradually slope down toward the Hudson River. Surface water and groundwater flow is toward the Hudson River.

The SC and RI included the excavation of 5 test pits completion of 49 soil borings, installation of 15 monitoring wells, the completion of a soil vapor investigation, groundwater sampling and the collection of subsurface soil samples to assess potential source areas for impacts. The soil vapor investigation consisted of the collection and analysis of nine soil vapor samples and one ambient outdoor air sample. A total of 27 groundwater samples, 132 soil samples, and two sediment samples were collected for laboratory analysis during the SC and RI. Associated Quality Assurance/Quality Control (QA/QC) sampling requirements were incorporated into all the sampling events.

The SC and RI identified the presence of three former gas holder foundations at the Site. The bottoms of the holder foundations all appear to be built on or very close to the glacial till surface. Gas Holder No. 1 is approximately 80 feet in diameter with a bottom depth of approximately 22.5 feet bgs. Gas Holder No. 3 is approximately 70 feet in diameter with a concrete bottom at a depth of approximately 17 feet bgs. The MGP's southernmost gas holder, Holder No. 2, was approximately 50 feet in diameter with a brick bottom at a depth of approximately 19 feet. Based on the 1917 Sanborn map, Holder No. 2 was later converted into a tar tank. An uncovered section of the wall of the gas holder was constructed of concrete. The remaining subsurface elements of the Gas Holder No. 2/tar tank foundation are considered to be intact due to the presence of tar within the holder. No other former MGP-related structures were uncovered during the SC or RI.

The soil vapor investigation identified volatile organic compounds (VOCs) present in soil vapor at levels consistent with background ambient air collected during the field investigation with the exception of several chlorinated VOCs which are present at elevated concentrations in two samples. Chlorinated VOCs are not associated with the former MGP operations.

MGP tar was observed between 8.5 to 19 feet bgs in SB-108 which was advanced within Holder No. 2. Lenses of non-aqueous phase liquid (NAPL) saturated and coated soils were

observed at 13.3 feet bgs directly west of Holder No. 2/tar tank. NAPL coated soil was also observed in six downgradient borings on the western portion of the Site (west of the train tracks) at varying depths ranging from nine to 88 feet bgs. NAPL coated lenses were observed in multiple borings at depths ranging from 3.5 to 21.5 feet bgs on the central portion of the Site west of the train tracks and downgradient of the former gas holders and purifying houses. Although NAPL was not observed in Holder No. 1 and Holder No. 3, Polycyclic Aromatic Hydrocarbon (PAH) concentrations exceeding the Industrial Site Cleanup Objectives (SCOs) were detected in soil borings adjacent to former holder locations near the depth of the inferred bottoms. In the area of the former oil house, shallow impacts were observed in fill material above the peat in SB-208 or SB-213. The former "oil house", referenced in 1898 and 1917 Sanborn maps, could represent the potential as an additional source of NAPL for this area.

Bedrock was encountered at depths that ranged between 91.5 feet bgs (SB-207) and 148.7 feet bgs (SB-209). No impacts were observed within 50 feet of the bedrock surface.

Petroleum-impacted soil was found in the borings drilled downgradient of the MGPs former crude oil storage tank and tar barrel storage areas, as well as in the former area of the MGP's retorts and generators.

A total of 15 monitoring wells were installed on the Site during both the SC and RI at depths ranging from 5 to 65.8 ft-bgs. Groundwater elevations range from 9.92 feet bgs (25.28 feet NAVD) in MW-101 located on the northeastern corner of the Site to 2.93 feet bgs (3.18 feet NAVD) in MW-210 located on the south side of the Site. DNAPL was observed during the SC or RI at monitoring wells MW-102, MW-103, MW-105, MW-107, MW-108, MW-111, MW-112, MW-210, and MW-221. DNAPL thickness ranged from trace levels to a maximum of 9.80 feet at MW-107. Trace amounts (less than 0.1 feet) of light non-aqueous phase liquid (LNAPL) were observed in MW-102 MW-103, and MW-108. Based on the results of the NAPL recovery testing, recoverable NAPL is present at MW-107. The analytical data collected from the groundwater monitoring wells indicates that there was one or more exceedance of the New York State Ambient Water Quality Standards (NYS AWQS) in all the monitoring wells sampled.

A video inspection of the sewer along Ashburton Avenue showed no evidence of MGP impacts within the Combined Sewer Overflow (CSO).

Data collected during the RI show that the vertical extent of MGP impacts have been delineated. The lateral extent of MGP impacts on the portion of the Site east of the Metro North Railroad has been delineated. On the portion western portion of the Site, the lateral extent of MGP-related impacts was delineated to the south and west during separate NYSDEC

approved third party remediation projects at adjacent properties. Impacts north of the western portion of the Site and Babcock Place have not been delineated.

Based on the findings of the RI, MGP related impacts are present at the Woodworth Avenue Works former MGP Site and there are limited data gaps that require further investigation. If access to off-site properties is available, additional investigation conducted as an Off-Site RI would provide more information to:

- Evaluate extent of impacts to the north of Babcock Place.
- Determine if MGP-related contaminants of concern (COCs) are present in sediments.
- Evaluate potential NAPL migration pathways beneath the roads including the sewer bedding plane.

In addition, the development and implementation of an Interim Site Management Plan and Excavation Work Plan would be utilized to mitigate potential exposure to utility and/or construction workers.

1. Introduction

This Remedial Investigation Report describes the environmental investigations conducted by GEI Consultants, Inc., P.C. (GEI) on behalf of Consolidated Edison Company of New York, Inc. (Con Edison) at the former manufactured gas plant (MGP) site located at the city block bound by Woodworth Avenue to the East, Ashburton Avenue to the South and Alexander Avenue to the West in the City of Yonkers, New York (the Site). The report presents and interprets all data and information generated during the Remedial Investigation (RI) in 2021. The investigations were conducted in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved work plans and pursuant to NYSDEC Administrative Order on Consent (AOC) Index No. CO0-20180516-519. The NYSDEC Site number is #360164. A Site Characterization (SC) was completed at the Site in 2019, and a SC Report (SCR) was approved by NYSDEC in April 2020.

The Site encompasses seven tax parcels and is currently occupied by a commercial auto garage building (95 Woodworth Avenue), a Welding Shop (107 Woodworth Avenue), a storage warehouse (119 Woodworth Avenue), a commercial bakery facility (104 Alexander Street), and a Metro North Railroad storage/ electrical building (7 Ashburton Avenue). The general location of the Site is provided in Figure 1 and the current and historic layout of the Site and MGP structures is provided in Figure 2.

GEI performed the RI field work in December 2020 and April through July 2021 in accordance with the *Remedial Investigation Work Plan (GEI, 2021)*. The *Remedial Investigation Work Plan Modifications* letter was submitted to NYSDEC in March 2021 and approved on March 19, 2021. Additional modifications to this RI scope of work were made with NYSDEC concurrence based on field conditions. The NYSDEC approval letters are in Appendix A. The Remedial Investigation Work Plan combined with the previous investigations was completed as a Remedial Investigation for the Site at the request of the NYSDEC. The work is hereafter referred to as the 2021 Remedial Investigation.

1.1 Purpose

The purpose of the investigation was to collect sufficient data to evaluate the nature and extent of chemical compounds within the Site's soil and groundwater that may be associated with the former MGP that existed from 1854 to between 1928 and 1930. The work was also intended to provide information on whether potential pathways exist at the Site through which people, flora, or fauna could be exposed to any MGP-related residuals that may be present. The RI included five elements, as requested by NYSDEC, as follows:

- Evaluate whether there are impacts present to the east of Woodworth Avenue.
- Delineate MGP impacts south of Holder 2 toward Ashburton Avenue including the potential non-aqueous phase liquid (NAPL) migration from Holder 2 area.
- Evaluate the 48-inch diameter brick sewer along Ashburton Avenue to assess potential preferential migration pathway for MGP impacts as it relates to a potential preferential migration pathway from this 48-inch brick sewer to the Hudson River.
- Evaluate existing wells for potential dense non-aqueous phase liquid (DNAPL) recovery.
- Update the Qualitative Human Health Exposure Assessment (QHHEA) based on results of the RI.

The NYSDEC-approved Work Plans present the methods and procedures that are consistent with NYSDEC's *Division of Environmental Remediation (DER)-10 Technical Guidance for Site Characterization and Remedial Investigation* (revised May 3, 2010).

1.2 Report Organization

This report is organized into ten sections including this introduction.

- Section 2 presents the Site background and physical setting, historical ownership and property use, operational history of the former MGP, and environmental records reviewed for the Site and surrounding properties.
- Section 3 describes the scope and methods used to collect, analyze, and present the data.
- Section 4 addresses the geologic and hydrogeological characteristics of the Site
- Section 5 presents an interpretation of the nature and extent of the Site's contaminant impacts by medium.
- Section 6 presents a QHHEA.
- Section 7 presents a Fish and Wildlife Resource Impact Analysis (FWRIA).
- Section 8 presents the Conceptual Site Model (CSM).
- Section 9 presents a summary of the work completed, conclusions from the data collected, and recommendations for future site activities.
- Section 10 includes a listing of references cited in this report.

This report includes tables, figures and plates following the text that support the findings, conclusions, and recommendations. Select site historical documentation, field program photographs, soil boring logs, investigation-derived waste records, and laboratory analytical results and data usability reports are included as appendices.

2. Background

The Site background information presented below has been summarized from the January 2003 *Historical Investigation Report-Former Yonkers-Woodworth Avenue MGP Site (Site #V00564)* prepared by RETEC Group Inc. (RETEC) (2003 History Report). The findings of the research are documented in the 2003 History report and formed the basis for the initial scope of the SC Work Plan and ultimately the RI Work Plan. The site background information presented below has been excerpted or summarized from the referenced MGP History Report.

2.1 Site Description, Zoning, Current Use and Water Supply

The Woodworth Avenue Works former MGP Site is located on the west side of Woodworth Avenue between Babcock Place to the north, Alexander Street to the west, and Ashburton Avenue to the south in the City of Yonkers, Westchester County, New York. The general location of the Site is illustrated in Figure 1, and the Site's historic MGP layout is shown in Figure 2.

The former MGP occupied approximately 4.3 acres of land. The Metro-North Commuter Railroad runs north-south, bisecting the Site into its western and eastern portions. The Site is comprised of three blocks and seven lots, designated by the City of Yonkers Assessor's Office as follows:

Tax Block/Lot	Land Use	Current Tenants	Current Property Owner
Block 2618, Lot 1	Industrial	Greyston Bakery	104 Ashburton Avenue, LLC
Block 2618, Lot 2	Bus turnaround	Not Applicable	Yonkers CDA
Block 2618, Lot 200	Vacant	Vacant	State of New York
Block 7000, Lot 1	Railroad	Metro-North Railroad	MTA Metro-North
Block 2100, Lot 1	Storage	Unknown	I Park Studios North LLC
Block 2100, Lot 4	Industrial	Unknown	I Park Studios North LLC
Block 2100, Lot 10	Storage	Unknown	I Park Studios North LLC

A Deed Restriction exists for Block 2618, Lot 1 occupied by the Greyston Bakery that restricts the Site usage to commercial or industrial use.

There are five buildings currently present on the Site. Three of the Site buildings are located east of the railroad with their frontage along Woodworth Avenue. From north to south, the buildings are as follows:

- 119 Woodworth Avenue (Block 2100, Lot 1) – a one-story industrial/commercial storage building with three loading docks.
- 107 Woodworth Avenue (Block 2100, Lot 4) – a three-story industrial/commercial building (former MGP structure).
- 95 Woodworth Avenue (Block 2100, Lot 10) – a one-story industrial/commercial garage with three bays.

The remaining two buildings are located on the western portion of the Site. From east to west the buildings are as follows:

- Ashburton Avenue (Block 7000, Lot 1) – a one-story storage/electrical building used as a substation by Metro-North Railroad.
- 104 Alexander Street (Block 2618, Lot 1) – a three-story commercial building occupied by Greyston Bakery.

The Site slopes down to the west toward the Hudson River. Based on topographic data, the elevation at the Site along Woodworth Avenue is approximately 35 feet above NAVD88 and is approximately 6 feet NAVD88 along Alexander Street. Several mature trees are present along the Metro-North railroad to the east and west. A retaining wall is present between the auto repair property and the Metro-North Railway.

2.2 Site Ownership and Operational History

As indicated in the MGP History Report, the history of the former MGP was compiled from the following resources:

- Chain-of-title searches.
- Environmental Data Resources, Inc. (EDR) report which included search of available government environmental database records and Sanborn Fire Insurance (Sanborn) maps.
- Available historical maps obtained from the Hastings-on-Hudson Historical Society
- Brown's Directory of American Gas Companies (Brown's Directory).
- Archive Reports of the New York Public Service Commission at the New York State Museum in Albany.
- Information collected at the Westchester County Historical Society.

An excerpt of the 2003 History Report and select historical site figures and supporting research documentation is included in Appendix B. An EDR report, dated February 2020, was used in historical research of the former MGP and is included in Appendix C.

GEI retained EDR to conduct an environmental records search for the Site to meet the requirements of American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments, E 1527-05. EDR reviewed standard federal and state environmental sources for the minimum search distances required by E 1527 and provided their report dated February 6, 2020.

2.2.1 Site Ownership History

The ownership history of the Woodworth Avenue Works former MGP Site was compiled from Brown's Directories, PSC reports, Sanborn Maps, and a chain-of-title search. Below is a summary of the ownership history based on research conducted and summarized in the 2003 History Report.

PSC Reports indicate that the Yonkers Gas Light Company was incorporated in 1854 and owned property on the eastern portion of the Site (Block 2100, Lot 10) in 1854. In 1900, the Yonkers Gas Light Company merged into the Westchester Lighting Company and by 1905, the Westchester Lighting Company was acquired by the Consolidated Gas Company of New York, the predecessor company to Con Edison.

Following the cessation of the MGP in 1928, the Westchester Lighting Company continued to operate at the Site until selling the eastern portion of the site to a private owner in February 1946 and the western portion of the site to a different private owner in April 1946. Since 1946, the property has been used for commercial/industrial purposes. The railroad property bisecting the Site (Block 7000, Lot 1) is owned by Metro-North Hudson Division and contains some property that was historically owned and used by the former MGP. A table detailing the history of Site ownership is included below.

Site Ownership History

Utility Ownership History		
Date	Owner(s)	Parcels Included in Sale
11/18/1854	Yonkers Gas Light Company	Block 2100, Lot 10
7/21/1861	Yonkers Gas Light Company	Block 2168, Lots 1 and 2
3/1/1872	Yonkers Gas Light Company	Block 2100 Lots 1 and 4
7/1/1872	Yonkers Gas Light Company	Block 2100, Lot 200
1900	Yonkers Gas Light Company Merges with Westchester Lighting Company	Block 2100, Lots 1, 4 and 10; Block 2168 Lots 1, 2, and 200
7/12/1904	New York and Westchester Lighting Company	Block 2100, Lots 1, 4 and 10; Block 2168 Lots 1, 2, and 200

Utility Ownership History		
Date	Owner(s)	Parcels Included in Sale
10/20/1904	Westchester Lighting Company merger with New York and Westchester Lighting Company	Block 2100, Lots 1, 4 and 10; Block 2168 Lots 1, 2, and 200
Current Site Ownership		
Date	Owner(s)	Parcels Included in Sale
6/28/1983	NYSDOT	Block 2100, Lot 200
5/8/1985	Yonkers Community Development Agency	Block 2618, Lot 2
12/27/2001	104 Ashburton Avenue LLC	Block 2618, Lot 1
5/27/2021	I Park Studios North LLC	Block 2100 Lot 1
5/27/2021	I Park Studios North LLC	Block 2100 Lot 4
5/27/2021	I Park Studios North LLC	Block 2100 Lot 10

2.2.2 Site Operational History

The Woodworth Avenue Works was incorporated in 1854 by the Yonkers Gas Light Company on the eastern portion of the Site. The Yonkers Gas Light Company continued to expand and subsequently purchased the western portion of the site (currently identified as Block 2618, Lots 1, 2, and 200) in 1861. The 1868 Beers Atlas map shows the location of the MGP which consisted of four buildings and one gas holder all located on the eastern portion of the property.

By 1886, the MGP expanded onto the western portion of the Site. At this time, the eastern portion of the property consisted of two gas holders, retorts, coal and coke sheds, an engine room, a pump room, valve meter room, tool house, office and superintendents dwelling. Both gas holders were constructed as sheet iron structures with below-grade foundations. The western portion of the property consisted of a purifying house, drying house, oil tank, and a tar barrel storage area. Deeds reviewed in the History Report show that the western property lines of the Site extended into the Hudson River. A pier is shown on the southwest corner of the Site based on the 1886 Sanborn map. The 1887 Brown's Directory listed Yonkers Gas Light Company as using the Lowe's carbureted water-gas process for manufacturing gas at the Site.

A June 1888 drawing prepared by the City of Yonkers for the Ashburton Avenue Sewer shows a dock with a slip extending west from the original MGP shoreline over the Hudson River. By 1898, the area west of the Site where the dock was located was filled and the river is shown approximately 400 feet to the west. An additional gas holder has been built between the two existing gas holders. Multiple new storage buildings and sheds have been erected on the eastern and western portions of the Site. The retorts have been replaced by generators, suggesting coal gas was no longer produced. On the western side of the railroad tracks, the

purifying house has been expanded and two storage buildings are shown to the south along with a lard oil tank. By 1917 the MGP contained:

- Two 263,000 cubic foot gasometers (Holder No. 1 and 3)
- One subsurface tar tank (formerly Holder No. 2)
- Purifying house
- Several Sheds
- Three crude oil tanks
- Three oil tanks
- Generators
- An oil house
- Coal pile

Gas Holder No. 1 was a single lift iron holder which was built with a subsurface brick water-seal tank. The bottom of the tank was constructed underground approximately 20 feet below ground surface (bgs) and was 80 feet in diameter. Gas Holder No. 2, which later was used as a subsurface tar tank, was roughly 50 feet in diameter and had a roof that was at ground level and Holder No. 3 was 30 feet high and 70 feet in diameter.

The MGP was dismantled in 1930, with the demolition of remaining structures in 1931. The 1940 aerial photographs and 1942 Sanborn Maps confirm that most of the above ground portions of the plant were removed by that time. However, the two buildings on the northeast corner of the Site along Woodworth Avenue remained.

2.3 Current Site Usage

The Woodworth Avenue Works former MGP Site and is zoned Industrial. Five buildings are located on the Site and are currently utilized as follows: 119 Woodworth Avenue is occupied by tenants and the use is unknown; 107 Woodworth Avenue is occupied by tenants and the use is unknown; and 95 Woodworth Avenue is used for auto repair. Upon the RI fieldwork, this property was observed as an active vehicle maintenance facility.

On the western portion of the site located at 7 Ashburton Avenue is a Metro-North Railroad storage/ operations facility. Additionally, Greyston Bakery is located on the western portion of the site located at 104 Alexander Street.

2.4 Surrounding Property Use

The Woodworth Ave Works former MGP Site is located within an industrial, commercial, storage and light manufacturing area that includes residences to the northeast and east. There has been a significant amount of property development in the vicinity of the Site. To the south-southeast of the Site are newly erected residential apartment buildings. To the west and

northwest are more newly erected residential/ commercial apartment buildings along the Hudson River as well as a New York/ New Jersey transit system bus parking terminal. There are commercial/industrial buildings and warehouses to the north along Babcock Place. To the southeast of the Site along Ashburton Avenue are commercial/government buildings including Yonkers Family Court Building.

Some residences are located upgradient of the Site on the opposite side of Woodworth Avenue and further east on Warburton Avenue. Until recently, the use of the surrounding properties appeared to have remained relatively consistent over the course of the past 100 years, based on review of historic Sanborn® Maps and aerial photographs. Sanborn® Maps show industrial and commercial businesses historically located in the Site vicinity.

2.5 Site Topography and Hydrology

2.5.1 Site Topography

Topography at the Site is moderately sloped from east to west towards the Hudson River. The approximate elevation near the western portion of the Site along Woodworth Avenue is approximately 35 feet NAVD88. The elevation approaches about 6 feet NAVD88 near the western end of Ashburton Avenue at the intersection of Alexander Street. East of the Site, the land surface elevation rises sharply, increasing approximately 230 feet within one-half mile.

A 20-foot-tall retaining wall is located on the south-central portion on the eastern parcel of the Site, between the former gas works location and the Metro-North Railway. This retaining wall was constructed before 1917 due to the steep grade in this area of the Site. The garage now sits to the east of the retaining wall on top of the ground backing the retaining wall.

Based on surface topography, stormwater runoff at the Site and in the immediate area appears to drain towards Ashburton Avenue from the eastern parcel and ultimately westward towards the Hudson River, which is located approximately 400 feet of the Site. Storm drains are located along Woodworth Avenue, Ashburton Avenue, Babcock Place and Alexander Street in the vicinity of the Site.

The Site and surrounding properties are serviced by the United Water Company (potable water) and Con Edison (gas and electric).

2.5.2 Regional Hydrologic Setting

A preliminary groundwater use survey was reviewed within the 2003 History Report to identify potential receptors and to determine if the aquifer beneath and downgradient of the Site is used for public purposes. Information on public water supply wells (residential and industrial) within a 1-mile radius of the Site was obtained from multiple sources. An

electronic database records search from EDR, which included information from the United States Geological Survey (USGS), Federal Reporting Data System Public Water Supply System, and the New York State Database, was completed by RETEC during their initial site investigation.

The search results indicate that twelve wells, are located within the one-mile search radius of the Site. None of the wells identified were located within a quarter mile radius of the site. Two wells were located within one-half mile of the site, which were installed to withdraw water for industrial purposes. One of those wells is not currently used. Another well, located three-quarters of a mile to the south of the site is an active public supply well (NY0006622). The rest of the wells identified are between one-half and one mile from the site. Each of these wells was installed to withdraw water for industrial purposes and five of them are no longer in use. The EDR database map showing the well locations was not included within the History Report.

According to the History Report, one well was drilled in the vicinity of the Woodworth Avenue Former MGP and was documented in *The Ground Water Resources of Westchester County* (Asselstine and Grossman, 1955). This well was located one-quarter mile south of the Site and was drilled in 1942 into bedrock at the Otis Elevator Company property. The well was drilled to a total depth of 305 feet bgs and the stratigraphy is described as follows:

- 0-55 feet- Clean, fine sand;
- 55-160 feet, Limestone;
- 160-170 feet, pink feldspar; and
- 170-305 feet, limestone.

Depth to groundwater at the Site ranges from 2.92 feet bgs to 9.97 feet bgs based on gauging measurements collected during high tide on July 16, 2021 during the RI groundwater sampling event. Based on the groundwater elevation data across the Site, the groundwater flow direction is to the west, toward the Hudson River.

The Site is located within approximately 400 feet of the east bank of the Hudson River. The Hudson River has been classified as Class I Saline Surface Water by the NYSDEC. Class I waters are suitable for secondary contact recreation and fishing and are suitable for fish propagation and survival.

The regional topography and the Hudson River are most likely the primary controlling influences on groundwater depth and flow direction at and around the Site. Groundwater in the vicinity of the site is tidally influenced, further discussed in Section 4.1.2. In addition, most of the man-made land located west, and northwest of the Site is within a Federal Emergency Management Agency (FEMA)-designated 100-year flood zone. The eastern half

of the site is designated within FEMA's zone X which is designated as areas determined to be outside of the 0.2% annual chance floodplain.

2.5.3 Regional Geologic Setting

A preliminary understanding of the geology of the Site area was compiled from geologic maps of the Lower Hudson Valley (Caldwell, 1989; Fisher, et.al., 1970). The Site is mapped as being underlain by till glacial deposits that are characteristically variable in texture and poorly sorted, well-rounded to angular lithologies. The site is located in the Manhattan Prong, which is a geologic sub-province of the New England Upland Physiographic region of New York that encompasses Westchester County. The bedrock at the Site is the Fordham Gneiss of the Upper Proterozoic Age. This gneiss is a metamorphic rock comprised of garnet, biotite, quartz, and plagioclase. Bedrock geology maps of the Lower Hudson Valley show a boundary between the Fordham Gneiss and the Inwood Marble (observed at SB-209) trending along the southwestern border of the Site (Fisher, et al. 1970). This map is presented in Appendix B. Although not shown on the map, Manhattan Schist was referenced on boring logs completed as part of the investigation work on the adjacent former Polychrome West (Research and Development laboratory) Site (BCP Site ID C360099).

2.6 Potential Receptors

A preliminary survey of potential receptors was included within the 2003 History Report to identify public and environmental receptors within a 0.25-mile radius of the Site. Information pertaining to potential receptors was taken from Site reconnaissance observations, as well as from several electronic database searches. Information reviewed included the identification of public receptors (e.g., day care centers, medical centers, nursing homes, schools, hospitals, arenas, and prisons) and environmental receptors (e.g., federal land, threatened or endangered species, wetlands, and water wells).

2.6.1 Public Receptors

As discussed above, the Site is located within an industrial/commercial area with residential properties located upgradient and downgradient. The overall demographics of the Site and immediately surrounding area are unknown and were not discernable during the 2003 site reconnaissance or 2019 field program. A number of schools are located within $^{1}/_{8}$ and ½ mile upgradient or cross-gradient of the Site. Based on the on-site building usage and the Site setting, it is possible that children and/or the elderly reside or visit the on-site and/or adjacent buildings. These populations represent particularly sensitive public receptors.

Pedestrian traffic in the vicinity of the Site is moderate due to a number of area services. The Ashburton Avenue corridor south of the Site and the Woodworth Avenue would be the most frequented. Additionally, Warburton Avenue further upgradient to the east would be highly frequented by pedestrian traffic. An Amtrak/Metro North commuter station is located roughly

one block south of the Site, and a moderately sized commuter and municipal lot is located within 1/8 mile of the Site.

In addition, the waterfront development plan for the area includes the continuation of residential and commercial development along the riverfront and includes the addition of community services and facilities within the area. Two Brownfield Cleanup Program (BCP) sites, the former Polychrome East Site (BCP Site ID C360098) and the former Polychrome West (Research and Development laboratory) Site (BCP Site ID C360099) are located adjacent to the Site. Both sites were recently remediated under the BCP and have been redeveloped as multi-story residential apartment complexes.

2.6.2 Environmental Receptors

Environmental receptors near the Site include the Hudson River and its shoreline. The Hudson River is located downgradient and within approximately 400 feet of the Site. The eastern shoreline of the river is within this area is listed on the United States Fish and Wildlife Service's National Wetland Inventory.

An EDR search identified two water supply wells within a one-half-mile radius, south and side-gradient of the Site. The first well, identified as a USGS-NY #WE 16, is listed as a USGS monitoring well having a depth of 305 feet. This well is screened in bedrock.

The second well, identified as NYSDEC Well #WE6277, is listed as having a depth of 1,500 feet. This well is screened in bedrock and has been identified as a geothermal well.

The EDR search identified NY0006622 as an active public supply well located approximately ¾ of a mile south of the site, which is considered side gradient. However, it appears that this well may be mapped incorrectly as it has an address associated with it of 15 Satmar Drive, Monroe, NY. The New York State Department of Health was contacted and does not have a record for this well. The EDR report is provided as Appendix C.

2.7 Environmental Records Review

An environmental records search for the Site was initially completed by EDR and included in the 2003 History Report. An updated EDR was completed for the Site as part of this SC. The updated EDR information was utilized to update the original information provided in the 2003 History Report and is summarized in this section. EDR searched available environmental government database records and completed a report to meet the requirements of American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments, E 1527-05. EDR reviewed standard federal and state environmental sources for the minimum search distances required by E 1527. Below is a summary of the results of the records search (excerpted from 2003 History Report and the 2020 EDR Report).

2.7.1 Site Findings

The Yonkers Gas Light Company, listed at Woodworth Avenue, was listed in the EDR proprietary database of former manufactured gas plant sites.

2.7.2 Surrounding Property Findings

The Federal Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) contains data on potentially hazardous waste sites that have been reported to the U.S. Environmental Protection Agency (EPA) by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS sites designated No Further Remedial Action Planned (NFRAP) are sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the National Priority List (NPL), or the contamination was not serious enough to require Federal Superfund Action or NPL consideration. The CERCLIS-NFRAP database indicates one site located at equal or higher elevation within and one site located at lower elevation within a 0.125- mile radius from the target property.

The Federal Resource Conservation and Recovery Act Information System (RCRIS) database includes selected information on sites that generate, store, treat or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA. The EDR review of the RCRIS-TSD list dated December 16, 2019, identified one treatment, storage, or disposal site located within approximately 0.125-mile from the target property at a lower elevation. The EDR review of the RCRIS- large quantity generator (LQG) list dated December 16, 2019, identified three LQG sites located within 0.125- mile from the target property at an equal or higher elevation and one site located within 0.125-mile from the target property at a lower elevation. The EDR review of the RCRIS Small Quantity Generator (SQG) list dated December 16, 2019 identified one SQG site located at a lower elevation within 0.125-mile. One very small quantity generator (VSQG) site located within 0.125-mile from the target property at an equal or higher elevation, and one VSQG located within 0.125 miles from the target property at a lower elevation.

The State Hazardous Waste Sites (SHWS) records are the states' equivalent to the CERCLIS. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data came from the Department of Environmental Conservation's Inactive Hazardous Waste Disposal Sites in New York State. EDR's review of the SHWS list revealed that there is one SHWS site located at an equal or higher elevation within approximately 0.5-mile of the target property and one SWF/LF (Solid Waste Facilities/ landfill Sites), at equal or higher elevation.

The State Leaking Storage Tank Incident Reports (LTANKS) database includes an inventory of reported leaking storage tank incidents reported from April 1, 1986 through the most recent update. A review of the LTANKS lists dated November 11, 2019, as provided by EDR, revealed that there are 61 LTANK sites at equal or higher elevation within approximately 0.5-mile of the target property. Two of these sites are located within approximately 0.125- mile of the target property, with one of them either on or immediately adjacent to and upgradient of the Woodworth Avenue former MGP site. These include Pollack Paint located on the site (119 Woodworth Avenue) and former Scott Station (178 Warburton Avenue) located immediately upgradient. Note that the addresses for the upgradient sites are indicated in the EDR database as Alexander Street, however, they are all shown located on the EDR map along Babcock Place to the north of the former MGP site. There are also eight LTANK sites at a lower elevation within approximately 0.5-mile of the target property. One of these sites is located immediately adjacent to the former MGP site to the west. These leaks at these properties included unidentified material, #2 fuel oil, #4 fuel oil, and diesel fuel. In some cases, contaminated soil was left in place.

The State Underground Storage Tank (UST) database contains registered USTs. The data comes from the Department of Environmental Conservation's Petroleum Bulk Storage Database. EDR's review of the UST lists dated November 11, 2019, has revealed that there are 17 UST sites at equal or higher elevation within 0.25-mile of the target property. Four of the sites are within 0.125-mile of the target property, two of which are on the site (Steven's Paint Corp., 107 Woodworth Avenue, with five UST with unknown product; Proctor Paint & Varnish, 95 Woodworth Avenue, with three USTs storing unleaded gasoline) and three of which are immediately adjacent to the site. There are seven sites at lower elevation from the target property, all of which are immediately downgradient and adjacent to the site.

The State or Local ASTM Supplemental Chemical Bulk Storage (CBS) Database includes registration data collected as required by 6 NYCRR Part 596. It includes facilities storing hazardous substances listed in 6 NYCRR Part 597, in aboveground tanks (ASTs) with capacities of 185 gallons or greater, and/or in underground tanks of any size. EDR's review of the CBS UST lists dated September 23, 2019, has revealed that Steven's Paint Corp., located on the site at 107 Woodworth Avenue, is a CBS UST site, although the tank is indicated as not currently in service. Steven's Paint Corp. is also on the CBS AST database and maintains two ASTs that store xylene. Four additional sites located at equal or lower elevations adjacent to the site are listed on the CBS AST database.

The State Voluntary Cleanup Program (NY VCP) covers virtually any kind of site and contamination. EDR's review of the VCP lists dated November 11, 2019 has revealed that there are four VCP sites at lower elevation. The type of residuals at these sites was not identified in the database.

The State Major Oil Storage Facilities (MOSF) database includes MOSF's licensed or closed since April 1, 1986, (responsibility was transferred from DOT on October 13, 1985) plus available data obtained from DOT facilities licensed since Article 12 became law on April 1, 1978. EDR's review of the MOSF UST lists dated January 01, 2002 has revealed that there is one MOSF UST sites at a lower elevation located immediately adjacent to the target property. This property operated by A. Tarricone Inc. stores unleaded gasoline, #1, #2, and #4 fuel oil, and diesel fuel. The property is also listed on the NY Spills database and recorded a spill of #2 fuel oil that affected the Hudson River in 1987.

3. Site Investigation Scope and Methods

This section summarizes the methods and procedures applied during each investigation.

The investigations included the following tasks, which are described in more detail in the subsections below:

- Preliminary Site Visits
- Video Inspection of the 48-inch diameter brick CSO along Ashburton Avenue
- Utility Clearance Activities
- Field Investigation Sampling and Analysis
- Investigation-Derived Waste Management
- NAPL PREDicT Modeling and Summary
- Survey and Sample Point Location
- Quality Assurance/Quality Control (QA/QC) and Data Validation
- Report Preparation

GEI implemented a site-specific Health and Safety Plan (HASP), a Field Sampling Plan, and a Quality Assurance Project Plan during the investigations. A Community Air Monitoring Plan (CAMP) was also executed during intrusive field activities. These plans were included as appendices to the RI Work Plan and updated as necessary prior to each mobilization.

GEI conducted the RI field activities in December 2020 and April through July 2021.

The field work was conducted in general accordance with the NYSDEC-approved Work Plans prepared by GEI on behalf of Con Edison. Due to physical site constraints and conditions encountered prior to and during field investigation work, GEI modified proposed sample locations and/or intrusive sample collection methods (i.e., excavation and drilling techniques), as necessary, to maintain the goals of the work. These modifications are noted in the subsections below. Con Edison maintained communications with the NYSDEC and New York State Department of Health (NYSDOH), as appropriate, during the course of the field activities. NYSDEC representatives visited the Site during the RI field tasks to observe work progress and encountered conditions. NYSDEC representatives were present at the Site during a portion of the RI field tasks. GEI provided NYSDEC with encountered conditions and deviations of the Work Plan were agreed upon as necessary.

The following firms were contracted to assist in the field work and sample analysis:

- Bloodhound LLC: Underground Utility Locator of Pennsylvania and New York conducted the video inspection of the sewer and performed the private utility clearance and geophysical surveys.
- Aquifer Drilling and Testing, Inc. (ADT) of Mineola, New York, performed the intrusive utility clearance, drilling work, site restoration, and traffic controls.
- Eurofins Test America of Edison New Jersey, performed laboratory analysis and reporting for all soil, water, waste characterization, and DNAPL samples collected.
- Torkelson Laboratory of Tulsa, Oklahoma performed the physical properties analyses and reporting for DNAPL samples collected.
- MJ Engineering and Land Surveying of Clifton Park, New York performed the soil boring and monitoring well elevation surveying and locating at the site after the RI work was completed.

GEI implemented the CAMP, maintained field sampling and screening equipment, collected samples for laboratory analysis and provided oversight for the RI. In addition, GEI kept dedicated logbooks for the documentation of field activities and observations.

3.1 Pre-investigation Site Walks

On April 8, 2021, Con Edison, ADT, GEI, and the property manager of 104 Alexander Street met at the Site to review site logistics and discuss and adjust (as necessary) proposed sampling locations for the RI borings and monitoring wells.

3.2 Utility and Geophysical Survey

Prior to RI mobilization, underground utilities within the public rights-of-ways (e.g., sidewalks and streets) adjacent to the Site were marked by the New York City One Call Center prior to initiation of intrusive RI field investigation work. ADT contacted the New York City One Call Center and maintained a current utility mark-out ticket as the drilling contractor for the RI field investigation. Town sewer and water maps were obtained from the City of Yonkers and the United Water Company, respectively. Con Edison obtained gas and electric plates for the locale.

As a supplement to the public area underground utility mark-outs, GEI contracted Bloodhound to perform a private utility survey of the proposed sampling locations within the work areas, sidewalks, and roadways adjacent to the Site. Bloodhound conducted the private utility survey work on April 13, 14, and June 2, 2021. A GEI representative accompanied Bloodhound personnel during the mark-out activities to identify the areas of proposed subsurface sampling and to work with USC to identify alternate locations as appropriate.

Bloodhound personnel used ground penetrating radar (GPR) and an electro-magnetic pipe, cable and box locator to survey the RI boring locations at the Site. Specifically, the primary technologies used were a GSSI 3000 Passive/Active 400 MHz GPR Cart System, and Radiodetection 8100 CAT pipe/cable locators were also used.

3.3 Intrusive Utility Clearance

Subsequent to the public and private utility mark-outs, ADT performed intrusive clearance activities at each soil boring location proposed in the applicable Work Plans. Clearance work was completed using a combination of hand tools and vacuum extraction. The locations were cleared to a minimum 5 feet below grade or to refusal (i.e., obstruction), in which case the borehole was shifted and the new location cleared. The utility clearance excavations were visually inspected for MGP-related impacts and field screened with a photoionization detector (PID) by GEI personnel. Pertinent information associated with the utility clearance excavations is included on the soil boring logs provided in Appendix E.

Once cleared, each location was backfilled with the removed materials to close the hole until drilling commenced. Spoils from the intrusive activities were containerized in 55-gallon New York State Department of Transportation (NYSDOT)-approved drums for subsequent off-site transportation and disposal, as discussed in subsection 3.9.

3.4 Community Air Monitoring

Pursuant to NYSDEC and NYSDOH requirements, GEI implemented a CAMP at the Site during utility clearance, test pit excavation and drilling. The objective of the CAMP was to provide a measure of protection for the downwind community (i.e., off-site receptors, including residences and businesses and on-site workers not involved with the site activities) from potential airborne contaminant releases as a direct result of field investigation activities. GEI implemented the CAMP in general accordance with the applicable Work Plans.

Additional air monitoring was implemented for work-zone air quality. Air quality was monitored within the breathing zone (4 to 5 feet aboveground level) at each utility clearance, test pit excavation and soil boring location during intrusive operations. Details regarding the implemented worker health and safety air-quality monitoring are provided in the HASP included in Appendix E of the SC Work Plan.

Throughout the entire duration of intrusive activities, GEI monitored the CAMP equipment and documented CAMP interferences, exceedances and response measures. During the field activities there were no concentrations of volatile organic compounds (VOCs), or particulates measured above the action levels.

3.5 Video Camera Inspection of Combined Sewer Overflow (CSO)

A combined sewer overflow (CSO) conduit is located adjacent to the southern property boundary of the Site. The brick-lined CSO was constructed in the mid 1800's and extends from the corner of the former MGP property located at the corner of Ashburton and Woodworth Avenue to the west, along Ashburton Avenue, towards the Hudson River. At one point in time, the CSO could be observed above the level of the river as it extended from the former shoreline along the Hudson River. Over time, the Hudson River was filled in to create made land and thus the CSO was encapsulated by material and was fully contained under the ground surface. GEI, Con Edison, and the NYSDEC determined that if the CSO had a compromised integrity, that it could be a conduit for MGP source material to leave the Site and migrate towards the outfall location and ultimately the Hudson River.

On the evening of December 14 into December 15, 2021, Blood Hound Underground Utility locators utilized remote controlled video camera inspection devices to inspect the interior of the CSO for MGP impacts. The inspection extended from the corner of Ashburton Avenue and Woodworth Avenue down to a regulator box located at the intersection of Alexander Street and Ashburton Avenue.

The inspection revealed that the CSO did not exhibit any signs of compromised integrity, cracking or missing segments. There was no evidence of MGP impacts in the main CSO. In one instance, a conduit with potential stained material around the conduit piping entering the CSO was identified. This potential staining was observed at a pipe entering the CSO approximately 57.5 feet to the east of the 5th manhole located along Ashburton Avenue (manholes are numbered from east to west along Ashburton Avenue). The video does not confirm that this staining was caused by MGP-related impacts. Evidence of this potential staining can be viewed within the photographic log contained in Appendix D. There was no evidence of MGP impacts in the main CSO at or downgradient of this pipe. The inspection ceased after blockages were observed in the CSO approximately 100 feet to the east of the outfall location and the Hudson River. Avalon conducted a video inspection of the CSO downgradient of the Site. No evidence of impacts was observed during Avalon's inspection.

3.6 Sediment Sample Collection

Sediment samples were collected from two locations (SED-01 and SED-02) within sediment located adjacent to the outfall of the CSO which runs east to west along the southern property boundary and discharges to the Hudson River. Sample SED-01 was collected from the sediments on the south of the outfall and sample SED-02 was collected from the sediment the north side of the outfall. The samples were collected with a hand auger from 0 to 6 inches below grade. The hand auger equipment was decontaminated in the vicinity of the sample location. Deviations from the work plan included not being able to advance the hand auger to

two feet below the top of the sediment due to the rising tide covering up the borehole once sampling equipment was removed.

The two sediment samples were submitted under chain-of-custody protocol to Eurofins Test America for laboratory analysis. The samples were placed in a cooler with ice and were transported via a laboratory-provided courier. Samples were analyzed for VOCs by United States Environmental Protection Agency (EPA) Method 8260D, and Fingerprint analysis. The full list of analyses describe in the RI Work Plan were not collected due the lack of quantity able to be collected because of the rising tide.

3.7 Subsurface-Soil Sample Collection

Subsurface samples were collected from upgradient of, downgradient of, and adjacent to former MGP structures during the 2021 RI fieldwork. With the exception of SB-207, SB-210, SB-211, and SB-221, two analytical soil samples were collected from the groundwater table interface or observed highest contamination based on PID readings and/or visual olfactory evidence, and the boring termination. In accordance with the RIWP, only one sample was collected at SB-210 and SB-211 from the most impacted interval based upon PID readings and or visual olfactory evidence. These borings were advanced to support NAPL recovery along the southern property boundary. Three bedrock borings (SB-207 through SB-209) were advanced downgradient of Holder No. 2 to evaluate the integrity of the bedrock. Analytical samples were not collected at these locations in accordance with the RIWP. A sample was collected below impacts at SB-207 at the anticipated depth of bedrock, however bedrock was observed deeper than anticipated. SB-221 was a boring added to the RI scope of work after the work had begun, to delineate the soil profile along the Site's northern property boundary. One sample was taken from this boring at the most impacted interval based upon PID readings and visual and olfactory evidence. Samples were analyzed for VOCs by United States Environmental Protection Agency (EPA) Method 8260D, semivolatile organic compounds (SVOCs) by EPA Method 8270E, Target Analyte List (TAL) metals by EPA Method 6000/7000 series and total cyanide by EPA Method 9012.

Quality control samples were also collected and submitted for laboratory analysis as further described in subsection 3.11.

3.7.1 Test Pits

On June 2, 2021, three test pits (TP-201 through TP-203) were advanced within the roadway along Ashburton Avenue on the northern edge of the CSO that extends the length of the Site. The CSO was targeted as a potential conduit and receptor for MGP impacts to migrate offsite. ADT utilized a compressor with a jackhammer as well as hand tools to open the test pit locations within the roadway. Asphalt and cobble stones were containerized within 55-gallon

drums for offsite disposal. The test pits were temporarily patched with cold patch asphalt and were restored with hot patch asphalt at a later date.

ADT advanced the test pits with a jackhammer to break up the top layer of asphalt followed by hand tools to break up and remove soil below the asphalt. Test pit TP-201 was advanced to 24 inches below grade at the corner of Ashburton and Woodworth Avenue along the northern edge of the CSO. Test pit TP-202 was advanced to 20 inches below grade at the western-most driveway entrance to Greyston Bakery property. TP-202 was implemented to correlate impacts observed during the CSO video inspection to the soils below grade directly adjacent to the CSO. TP-203 was advanced to 16 inches below grade at the intersections of Ashburton Avenue and Alexander Street to assess the potential for impacts along the CSO downgradient of former MGP. The bottom depths for all test pit locations were based on limitations encountered during test pit advancements and increased soil integrity and compaction along the northern edge of the CSO. This increased soil density did not allow for further advancement via hand tools at the test pit locations. Mechanical means could not be utilized because of the unknown depth to the sewer as well as the proximity to other utilities. Test pit logs which include soil description, photographs, and PID measurements for fill materials encountered during the excavation are provided in Appendix E.

No soil samples were collected from the bottom of the test pit locations due to the limited advancement depths and the fact that MGP impacts were not observed.

Following the observations and field screening tests, the test pits were backfilled with the removed soils in reverse order of advancement. The backfill of the three test pits were supplemented with a total of 11 bags of 00 well sand, and 14 bags of cold patch asphalt. Each test pit location was compacted with a hand tamper and had cold patch asphalt patch filled flush to roadway surface. June 8, 2021, the test pit locations were restored by ADT with hot-patch asphalt that replaced the cold patch asphalt remaining flush to the roadway surface.

3.7.2 Soil Borings

A total of eighteen soil borings were installed during the 2021 RI. Thirteen soil borings (SB-201, SB-202, SB-204, SB-205, SB-212 through SB-218, SB-220 and SB-221) were drilled and advanced to the overburden/bedrock interface.

- Borings SB-207 through SB-209 were not advanced to the full depth of 10 feet into bedrock as described in the RIWP due to the lack of impacts observed below the till layer. SB-207 through SB-209 were advanced between 1.3 and 5.0 feet into bedrock.

- Two soil borings (SB-210 and SB-211) were advanced to the top of the peat layer located between 20 and 30 feet bgs for the installation of potential DNAPL recovery wells.
- Two borings (SB-201 and SB-202) were advanced via Geoprobe 7288DT located at the upgradient properties at 102 Woodworth Avenue and 122 Woodworth Avenue which had smaller work areas and where bedrock was inferred to be at a shallower depth. The depth of bedrock was not confirmed at these borings due to using the Geoprobe 7288DT.
- Soil boring SB-206 was not installed to the south of the Site, across Ashburton Avenue due to the lack of available space in the public right-of-way.
- Two additional borings (SB-220 and SB-221) were added to further delineate the soil profile downgradient of former holders. Table 1 describes the boring and sample rationale and analyses.

For the remaining borings, ADT used a remote-controlled Sonic 250 Max and other versions of Sonic track-mounted drilling rigs to advance the soil borings to the top of the till or bedrock on the Site and offsite to the North.

An attempt was made to advance each boring to bedrock. In some instances, overburden till material comprised of cobbles and boulders were encountered and determinations were made to stop boring advancement prior to encountering the bedrock interface due to the lack of impacts observed within the till layer. Till thicknesses ranged from at least 8 feet in SB-214 to 86.6 feet in SB-220. Soil borings SB-210 and SB-211 were advanced to the top of the peat confining layer located between 20 and 30 feet bgs in accordance with the work plan.

A GEI scientist logged the soils in the field and collected PID measurements of VOC vapors taken directly from the plastic liners. Soil descriptions, sample collection intervals, relevant drilling information and VOC field screening measurements are included on the individual boring logs provided in Appendix E.

3.8 Well Installation

Two monitoring wells, MW-221 and MW-210, were installed during the 2021 RI.

- Monitoring well MW-221 was installed at boring location SB-221 to delineate deep overburden impacts downgradient of former MGP structures and adjacent to the northern property boundary along Babcock Place. This well was constructed with 2-inch-diameter PVC riser and a 0.010-inch slot 10-foot-long screen, from 55.8 to 65.8 feet bgs, with Number 2 US Silica filter sand pack backfilled to approximately 2 feet above the screen. Bentonite chips were poured and set to 2

feet above the sand followed by grout up to 1 foot below the surface. This monitoring well includes a 2-foot sump from 65.8 to 67.8 feet bgs.

- MW-210 was installed at boring location SB-210 to assess the potential for DNAPL recovery. MW-210 was constructed with 4-inch diameter PVC riser and a 0.020-inch slot 15-foot-long screen, from 5 to 20 feet bgs, with Number 2 US Silica filter sand pack backfilled to approximately 2 feet above the screen. Bentonite chips were poured and set to 2 feet above the sand followed by grout up to 1 foot below the surface. This monitoring well included a 2-foot sump from 20 to 22 feet bgs.
- The monitoring well at SB-211 was not installed due to the lack of MGP impacts observed during boring advancement.

A 1 foot by 1-foot concrete well pad and flush mount well cap completed the well construction at each well location. Well construction details are presented in Table 2.

3.9 Groundwater and DNAPL Sample Collection

Groundwater elevation measurements were collected from all monitoring wells located at the Site during low and high tide on July 16, 2021 (Table 3). Low tide groundwater contours are shown in Figure 3 and high tide groundwater contours and analytical concentrations are shown in Figure 4. Low-flow groundwater samples were collected using a peristaltic pump from 11 of the 15 monitoring wells (MW-101, MW-102, MW-104, MW-106, MW-109, MW-110 MW-111, MW-112, MW-113, MW-210, and MW-221). These 11 wells did not contain NAPL. Final groundwater parameters are provided in Table 4. Purge water was monitored for dissolved oxygen, pH, temperature, specific conductivity, oxidation reduction potential, and turbidity through a flow through cell. The samples were placed on ice for preservation and submitted to Eurofins Test America of Edison, New Jersey, for analysis of VOCs by EPA Method 8260D, SVOCs by EPA Method 8270E, TAL metals by EPA Method 6000/7000 series, and total cyanide by EPA Method 9012.

DNAPL samples were collected from monitoring wells MW-103, MW-105, MW-107, and MW-108 for VOCs by EPA Method 8260D and Fingerprint analysis by Eurofins Test America. DNAPL samples for fingerprint and VOC analyses were collected using a peristaltic pump. DNAPL samples collected from wells MW-105 and MW-107 for the purpose of DNAPL characteristics were collected via 2-inch poly bailer. Some DNAPL samples contained a mix of NAPL and water.

3.10 DNAPL PREDicT Modeling

DNAPL transmissivity was evaluated at monitoring well MW-107 using the patent-pending Precision Recoverability Evaluation for DNAPL via Transmissivity (PREDicT) methodology. PREDicT is a modification of the procedures for calculating LNAPL transmissivity via a bail-

down test that are described in ASTM E2856-13, the Standard Guide for Estimation of LNAPL Transmissivity, for wells with DNAPL. The modification allows for the evaluation of multiple mobile NAPL intervals (MNIs) that are frequently encountered at DNAPL sites. The procedure utilizes the interpretation of the drawdown versus discharge (DvD) graph to identify the number, location, and thickness of MNIs in the formation as described below. The results can be used to calculate the DNAPL transmissivity of each MNI and as a composite transmissivity value for the well.

3.11 Investigation-Derived Waste Management

One hundred seventy-nine drums of waste material were generated during the 2021 RI field work: 46 drums of soil, 111 drums of liquid (purge and decontamination water), 17 drums of personal protective equipment (PPE) (decontamination material, plastic, and PPE), 4 drums of construction material (concrete, asphalt, cobbles), and 1 drum consisting of NAPL and groundwater.

GEI submitted waste characterization samples for soil and groundwater for offsite disposal during the SC and the waste profiles were renewed. A copy of the waste profile forms and analytical results are included in Appendix F. All material was non-hazardous.

On behalf of Con Edison, Clean Earth of North Jersey Inc, located in Kearny, New Jersey removed the following drums from the Site:

- 42 water drums on May 13, 2021.
- 31 water drums on May 28, 2021.
- 30 drums of soil cuttings, 1 drum of water,3 drums of PPE, and 1 drum of purged NAPL and groundwater on June 1, 2021.
- 36 water drums on June 10, 2021.
- 16 drums of soil cuttings, 13 drums of PPE, and 4 drums of construction debris (asphalt, cobbles) on June 11, 2021.
- 1 water drum and 1 drum of PPE on July 19, 2021.

Con Edison provided oversight and signed the non-hazardous shipping manifests.

3.12 Survey and Sample Point Location

On July 16, 2021, a MJ Engineering and Land Surveying, a New York Licensed Land Surveyor, surveyed the soil boring and monitoring well locations and elevations sin the New York State Plane Coordinate System East Zone and NAVD. At each monitoring well, the surface flush mount and top of riser elevation was surveyed.

All survey data was used to generate accurate maps depicting existing structures, sample locations, subsurface cross sections, and groundwater contours.

3.13 Quality Assurance/Quality Control and Data Validation

QA/QC protocols and procedures were implemented to ensure accuracy, precision, and completeness of chemical data collected during the investigation activities. QA/QC samples were collected to evaluate the validity of the sampling, decontamination, and analytical methods used.

QA/QC samples collected during field sampling activities included duplicates, field blanks (equipment rinsates) and trip blanks. Field duplicates consisted of two types: coded "blind" duplicates and matrix spike/matrix spike duplicate (MS/MSD) samples. Coded duplicates were split samples from the same source, analyzed by the laboratory as separate samples, with no indication given to the laboratory that the samples were duplicates. This precaution allowed GEI to verify the laboratory reproducibility of analytical data. MS/MSD samples were identified on the chain-of-custody documents so that the laboratory could perform internal quality checks on instrument performance and laboratory sample handling and preparation. Field blanks (i.e., equipment rinsates) were used to monitor the adequacy of field equipment decontamination procedures that were used to prevent cross-contamination from one sample location to another. Trip blanks were used to monitor possible sources of contamination from sample transport and storage.

Samples submitted to Eurofins Test America for analysis were evaluated and reported by the laboratory according to EPA Methods 8260D (VOCs), 8270E (SVOCs), 6000/7000 (TAL metals), and 9012 (total cyanide). Eurofins Test America provided a full data evaluation package in accordance with NYSDEC Electronic Data Deliverables requirements. The analytical results were validated by qualified data validation professionals in accordance with USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, January 2005 and the USEPA Region II SOP for the Validation of Organic Data acquired using SW-846 8260D and 8270E, modified to accommodate the SW-846 methodologies.

Data usability summary reports (DUSRs) were prepared which summarize the validation results, including a discussion of:

- Preservation and Technical Holding Times
- Calibration Verification Results
- Blanks
- Field Duplicates
- Laboratory Fortified Blank Recovery

Copies of the validated Eurofins Test America Form 1's and DUSRs are provided in Appendix H. Data qualifiers used in the presentation of the analytical results are included with those reports.

3.14 Data Reduction and Reporting

Physical evidence and analytical results from the subsurface investigation activities were incorporated into summary tables and figures to provide a more complete interpretation and analysis of site conditions for the evaluation of potential MGP-related impacts. Descriptors and regulatory standards used to assess the physical observations and analytical data for the investigations are provided below. A discussion of field observations and the distribution of compounds detected in soils and water at the Site is provided in Section 4.

3.14.1 Physical Observations and Descriptions

Visual and olfactory observations made during the field investigations were characterized and recorded according to the terminology and descriptions presented below:

- **Sheen:** Iridescence was observed within a soil sample. Sheens are typically noted in moist to wet soils.
- **Odor:** If an odor was observed, it was described based on its relative intensity and characteristics. Modifier terms such as strong, moderate, and faint or slight were used to describe relative odor intensity. Descriptive terms such as tar-like or petroleum-like odors were also used if the characteristics of the odor were discernible.
- **Stained:** The soil sample exhibited a discoloration not associated with natural processes. The color of the observed stain was noted and, if the characteristics of the staining material were discernible, they were also noted (i.e., tar-stained or petroleum-stained).
- **Blebs, and globs:** The soil sample exhibited free product associated with former MGP processes. These blebs and globs can be observed within soil and also on sampling media (sonic plastic bag liner).
- **Coating and Lenses:** The soil sample exhibited staining and NAPL coated soil granules usually observed in stratigraphic layers.
- **Saturated:** The entire sample pore space is saturated with NAPL.
- **Solid NAPL:** NAPL that is in a solid or semi-solid phase.

As observed, physical evidence of impacts was recorded in the field and are presented on the environmental boring logs included in Appendix E. These observations are also summarized on the geologic cross sections A-A′ through G-G′ shown in Figure 8.

3.14.2 Analytical Results and Comparisons

The results of the laboratory analyses of soil, water, and sediment samples from the remedial investigation are summarized in Table 5 through 7 and Figures 4, 9, and 10. The results of the laboratory analyses of soil vapor samples from the SC are summarized in Table 8.

The sampling results are presented in the following units:

- Soil and sediment sample results are reported in milligrams per kilogram (mg/kg), which are equivalent to parts per million (ppm).
- Water sample results are typically reported in micrograms per liter (µg/L), with the exception of some inorganic concentrations reported in milligrams per liter (mg/L). Parts per billion (ppb) are equivalent units to µg/L; ppm are equivalent units to mg/L.

The analytical results for the soil and water samples collected during the investigations were compared to applicable New York State standards. Detected concentrations of the target compounds analyzed were compared as follows:

- Compounds detected in soil samples were compared to the Unrestricted Use SCOs and Industrial Use SCOs presented in Table 375-6.8(a) of the regulations codified in Title 6 of New York Codes, Rules and Regulations (NYCRR) Part 375. Typical background concentrations of metals for the Eastern United States were also referenced to evaluate potential MGP-related impacts versus background conditions; Table 9 lists regional background polycyclic aromatic hydrocarbon (PAH) and metals concentrations as reported by Bradley, et. al. (1994) and Shacklette and Boerngen (1984).
- Compounds detected in groundwater samples were compared to the New York State AWQS, presented in the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1.
- In accordance with NYSDEC regulations, sediment sampling results were compared to the June 24, 2014, NYSDEC Screening and Assessment of Contaminated Sediment, Saltwater Sediment Guidance Values (SSGVs).

For purposes of this Report, compounds considered when referencing PAHs include those listed below:

2-Methylnaphthalene	Pyrene
Acenaphthene	Benz(a)anthracene
Acenaphthylene	Benzo(a)pyrene
Anthracene	Benzo(b)fluoranthene
Benzo(g,h,i)perylene	Benzo(k)fluoranthene

Fluoranthene	Chrysene
Fluorene	Dibenz(a,h)anthracene
Naphthalene	Indeno(1,2,3-cd)pyrene
Phenanthrene	

Concentrations of total cyanide were also reported and are included in the discussions of the soil results. Cyanide (mostly in the form of complex metal cyanides) is included as it was a common by-product of the manufactured gas purification process.

The analytical results tables are summarized and organized by sample medium. To complement the analytical summary tables, analytical exceedances in soils are also summarized and illustrated in Figures 9 and 10.

4. Site-Specific Physical Characteristics

The section presents the site-specific physical characteristics for the geologic and hydrogeological conditions.

4.1 Site Geology and Hydrogeology

The site-specific geology and hydrogeology is based on regional information described in Section 2 and field observations made during test pit excavation and soil boring advancement during the field work. Seven cross sections were developed to illustrate the stratigraphy underlying the Site and are shown in Figure 8. In addition to encountered geologic conditions, these cross sections depict the physical observations of subsurface impacts. Figure 3 and 4 presents the high and low tide groundwater contours, respectively.

4.1.1 Site Geology

In 2021, sonic drilling methods were used to sample soil and drill into bedrock to characterize the rock. Sixteen borings were drilled to bedrock or perceived bedrock. The Unified Soil Classification System (USCS) was used to characterize the overburden soil. Detailed geologic descriptions of overburden materials are provided in the environmental boring logs in Appendix E and are further described below.

4.1.1.1 Fill

Fill materials and soils are present immediately beneath the unpaved, and paved asphalt areas throughout and downgradient of the Site. In general, the thickness of the fill horizon outside the holder ranges from 5 to approximately 30 feet (see cross sections Figure 8) moving from east to west across the Site. The fill consists of brown, tan, orange- gray and black, well-graded sands with variable gravel and silt content and 5 to 30% construction and building-related debris. The debris primarily includes brick, glass, concrete, and wood fragments.

The presence and depth of the fill materials suggests that demolition and burial of former structures at or in the near vicinity of the Site was historically conducted. The foundations of the on-site buildings may be close to 100 years in age; therefore, fill materials are most likely from land development dating back to the late 1800s and early 1900s. The former shoreline of the Hudson River extended further east than it does today. Fill materials may have been utilized in creating made land where the river once was and within the former MGP footprint, and areas downgradient. The bottom depth of the fill horizon across the site varies. On the eastern side of the property, fill may have been used as a slope stabilizer or former building structures that were demolished in place. On the western side of the property, the fill horizon

thickness can be attributed to the amount of material required to create made land up to where the former shoreline of the Hudson River extended.

4.1.1.2 Peat, Clay, and Silt

Peat was observed on the western portion of the Site beneath the fill layers at depths ranging from 16.5 to 38.2 feet bgs. This peat layer is concentrated along the historic Hudson River shoreline. The peat thickness ranges from 1.6 feet in SB-217 to 18.5 feet (interbedded) in SB-221. The peat material acts as a semi-confining layer in some borings, with impacts above the peat layer related to historic MGP operations and the creation of made land (fill) along the former Hudson River shoreline. Clay and silt are also present at the Site at depths ranging from directly below the peat down to 50 feet bgs in SB-214. Often interbedded with sands, these clay and silt layers are often found bearing shells and organic fibered material.

4.1.1.3 Glacial Sand and Sandy Till Deposits

Beneath the fill and peat horizons across the site are variably graded fine to coarse sands and 35% fine to coarse gravel and 15 to 25% silty and clayey fines. Layers of silty sand, silt, and clayey sand and clay are also interbedded in this overall sandy deposit. Given the type of soils present in the fill horizon, it is possible that the variable characteristic of this stratum at shallow depths is wholly or partially the result of reworking of site soils and/or area deposits during historical construction and demolition activities (see discussion in Section 6).

Deeper overburden soil at the Site and off site is generally consistent and is characterized as variably graded fine to coarse sands with less than 20% fines. Sands with 10 to 45% fine to coarse gravel, cobbles, and boulders are present approximately 20 to 145 feet bgs (directly above the bedrock interface). The thickness of this layer is largest on central portion of the site where the former shoreline of the Hudson River extended to.

4.1.1.4 Bedrock

Sonic drilling methods used during the 2021 RI went beyond previous refusal depths and confirmed that bedrock was much deeper than described in the SC report. Depth to bedrock ranged from 8.5 (SB-202) to 148 feet (SB-209) below ground. Weathered bedrock was typically encountered above competent bedrock. At boring locations SB-207, SB-208, SB-209, and SB-214 tooling was advanced slightly into bedrock to confirm the overburden/bedrock interface and the lack of impacts in the top of the bedrock but were not advanced deeper than 5 feet into the bedrock.

4.1.2 Site Hydrogeology

Based upon the July16, 2021 groundwater level measurements, overburden groundwater flow direction at the Site and vicinity is from the east to the west (Figure 3). This is consistent with

surficial topography and with discharge to the Hudson River to the west. Table 3 presents a summary of depths to groundwater and groundwater elevations at low and high tide. The Site is located within approximately 400 feet of the east bank of the Hudson River. Tidal influence on the Sites groundwater elevations was assessed by recording elevations at both low tide and high tide. Groundwater elevations between all the wells on the Site varied by less than 0.19 feet between high and low tide, except for MW-102 which was sampled prior to the high tide groundwater gauging event. The flow gradient was approximately 0.24 feet per foot (ft/ft) from MW-104 at Woodworth Avenue to the deep screened well at MW-221. The gradient for eastern portion of the site from MW-105 toward Babcock Place was approximately 0.79 ft/ft.

5. Nature and Extent of Contamination

In this section, field observations and analytical results for subsurface soils, groundwater, sediment, soil vapor, and NAPL are discussed for each investigation. In general, the analytical results are discussed in terms of total VOCs and SVOCs, as well as cyanide. Unless otherwise indicated, benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds comprise the majority of the total VOCs detected in the Site samples, while PAHs comprise the majority of the total SVOCs detected in the samples. BTEX and PAHs are groups of compounds that are commonly associated with former MGP operations, as well as non-MGP sources.

5.1 Subsurface Soils

A total of 132 soil samples were collected from 50 borings and test pits advanced throughout the Site as part of the SC and RI (Figure 2). Subsurface soils were collected from onsite, upgradient properties located at 102 Woodworth Avenue, and 122 Woodworth Avenue, and north of the Site (MTA access road). These locations are shown in Figure 2. Physical impacts are shown in Figures 5 through 7 and field observations are presented on the subsurface profiles in Figure 8. Subsurface soil sample analytical results are summarized in Table 5. Analytical exceedances of Unrestricted and Industrial Use SCOs for subsurface soil sample results are depicted in Figures 9 and 10. A discussion of field observations and laboratory findings are summarized below.

Physical Impact Summary

Physical MGP-related impacts (i.e. NAPL saturation, coating, sheens, odors, etc.) were observed at shallower elevations in and within the vicinity of the former holder locations. A summary of physical impacts are presented in Figures 5 through 7. The following is a summary of MGP related impacts in the vicinity of the former holder area.

- SB-102 was completed within the footprint of former Gas Holder No. 1. A slight sheen was observed at a depth of 20 to 22.5 feet bgs, immediately above the bottom of the holder.
- SB-108 was completed within the footprint of former Gas Holder No. 2/tar tank. Tar saturation was observed between 8.5 and 19 feet bgs. The tar was observed to be highly viscous in nature.
- SB-104 was completed within the footprint of former Gas Holder No. 3. A slight naphthalene-like odor was observed between 9.5 to 10 feet bgs.

- Soil borings SB-105, SB-106, SB-109, SB-110, SB-207, and SB-220 were completed immediately downgradient of the holder locations. NAPL saturation, NAPL-coated soils, solid tar, and sheens were observed at these locations at depths ranging between 9 and 40 feet bgs.
- NAPL coated soils were also observed at SB-124 between 9 and 12 feet bgs.

Petroleum-like odors and staining were observed in SB-111 and SB-123 near boring refusal of 5 feet bgs and 7 feet bgs, respectively. These borings were located between the Metro-North Railroad and the retaining wall, downgradient of the auto garage. Impacts observed in these borings could be related to the former MGP. It is also possible that the impacts could be associated with historic petroleum releases from non-MGP related sources including the three former gasoline underground storage tanks located on the parcel. SB-204 and SB-205 exhibited only petroleum like staining and odors at depths ranging from 6.6 to 30.0 feet.

Physical MGP-related impacts were observed downgradient of the holders, west of the railroad at depths ranging between 3.2 and 95.0 feet bgs. The following is a summary of MGP related impacts west of the railroad.

- NAPL saturation was observed between 0 and 25 feet bgs at SB-113, SB-117, SB-118, SB-122, SB-127, SB-129, SB-130, and SB-131. NAPL saturation was observed within deeper zones at SB-131 between 85-88 feet bgs.
- NAPL coated soils were observed between 0 and 25 feet bgs at SB-112, SB-117, SB-119, SB-121, SB-122, SB-124, SB-126, SB-130, SB-208, SB-209, SB-210, SB-212, SB-213, SB-214, SB-215, SB-216, and SB-221.
- NAPL coated soils were observed within deeper zones at SB-119, SB-121, SB-126, SB-130, SB-131, SB-209, SB-212, SB-214, SB-215, and SB-221.
- Lessor MGP related impacts including sheens, odors, and staining were also observed at SB-114, SB-117, SB-119, and SB-211.

Petroleum-like sheen, staining, and or saturation were observed at SB-113, SB-115, SB-126, and SB-128, SB-205, SB-209, SB-210, SB-211, and SB-213 at depths ranging from 0.61 to 30 feet bgs. These borings are located at the southern and western extents of the Site along Ashburton Avenue and Alexander Street. Borings along Ashburton Avenue are located downgradient of the former crude oil tanks used by the former MGP (Figure 2).

To the north of the Site and Babcock Place, along an MTA access road, borings SB-217 and SB-218 were installed to delineate the northern property boundary. NAPL coated lenses and staining were observed at depths ranging from 30 to 36.6 feet bgs in SB-217 to 75.5 to 80 feet bgs in SB-218. Petroleum like staining was noted in these two borings at depths ranging from 6.5 to 25 feet bgs in SB-217 and from 10 to 20 feet bgs in SB-218.

Analytical Summary

In general, most soil borings had one or more samples that exceeded the Unrestricted and Industrial Use SCOs for VOC and/or PAHs.

- The maximum total VOC concentration was detected at 76,930 mg/kg at SB-105 (2.5-3.0). No VOC compounds exceeded the Industrial Use SCOs within any of the samples collected during the RI. One or more VOC compounds exceeded the Unrestricted Use SCOs in samples collected from 41 out of the 50 boring locations. Three samples collected during the SC, SB-105 (2.5-3.0), SB-108 (18.5-19.0), and SB-118 (9.0-9.5) exceeded the Industrial Use SCOs for some or all the BTEX compounds.
- The maximum total PAH concertation was detected at 56,004 mg/kg at SB-108 (18.5-19). One or more PAH compounds exceeded the Industrial Use SCOs in 41 out of 50 boring locations. One or more PAH compounds exceeded the Unrestricted Use SCOs in 42 out of 50 boring locations.
- VOCs and PAHs were not detected above either SCO standards in soil samples collected from borings SB-102, SB-115, SB-201, SB-202, and SB-207.

SB-105 contained the highest VOC concentrations, which was installed immediately adjacent to Holder No. 3. VOCs were detected exceeding SCOs in four of the five soil samples collected from boring including: SB-105 (2.5-3.0), SB-105 (9.0-9.5), SB-105 (24.0-25.0), and SB-105 (31.5-32.0). Total VOC concentrations exceeding Industrial Use SCOs were detected in SB-105 (2.5-3.0) at 76,930 mg/kg. During field investigation activities these shallow impacts were observed outside of a loading dock located at the 119 Woodworth Avenue property and was noted as being within historic fill and the material below that 2.5-3.0-foot interval is noted as having a solvent/ paint like odor. PAH concentrations for this 2.5-3.0-foot sample interval were considerably low but increased with depth. Based on field observation and analytical results, the shallow VOC exceedance in detected in SB-105 (2.5-3.0) do not appear to by MGP-related and are likely related to other, post-MGP operations at the Site, potentially including the paint shop.

Soil sample SB-108 (18.5-19.0) was collected from the interval within the former holder, as confirmed by the excavation of the sub-grade holder wall in test pit TP-102. SB-108 (18.5-19.0) contained the second highest detection of total VOCs at 8,782 mg/kg. The total SVOC concentration in this sample was 56,004 mg/kg. PAHs were the primary contributors to the total SVOC concentration, with concentrations of several PAHs in the sample exceeding Industrial Use SCOs. Based on field observations and analytical results from SB-108 (18.5-19.0), MGP-related residual impacts are present at the location of former Gas Holder No. 2/tar tank.

Metal exceedances above the Industrial Use SCOs were generally limited to soil samples collected within the shallow, urban fill interval, with the exception of SB-122 (17.0-17.5) which had an exceedance of mercury above Industrial Use SCOs. Metal exceedances were also compared to the Eastern United States and New England typical background concentrations listed in Table 9:

- Lead and chromium were detected at concentrations above the Industrial Use SCOs in SB-105 (2.5-3.0), located downgradient of the former Holder No. 3. These concentrations also exceed the typical background concentration range for lead and chromium.
- Arsenic was detected at concentrations above the Industrial Use SCOs in eight subsurface soil samples collected within throughout the Site with the highest concentration detected in SB-127 (6.0-6.5). However, three of these samples, SB-130 (5.0-5.5), SB-118 (3.5-4.0) including its duplicate, and SB-127 (6.0-6.5), exceed the typical background concentration range for arsenic.
- Mercury was detected at concentrations above the Industrial Use SCOs in five subsurface soil samples collected within throughout the Site with the highest concentration detected in SB-105 (2.5-3.0). These concentrations also exceed the typical background concentration range for mercury.

Metals did not exceed any of the Unrestricted Use SCOs in 18 of the 50 boring locations. The remaining 32 boring locations had at least one or more metal exceedance above either the Unrestricted or Industrial Use SCOs.

Total cyanide was detected above the Unrestricted Use SCO of 27 mg/kg in three soil samples ranging from 35.3 mg/kg [SB-108 (18.5-19 feet bgs)] to 48.7 mg/kg [SB-105 (2.5-3.0 feet bgs)].

The results of the fingerprint analysis indicated that soil at sample SB-218 (23-24 feet bgs) contained an unidentified mixture of hydrocarbons in the motor oil range; SB-218 (78-80 feet bgs) contained a petroleum product which most closely resembles Creosote Oil; and SB-216 (22-23 feet bgs) and SB-215 (86-88 feet bgs) contained a petroleum product which most closely resembles Degraded Tar oil. Results for SB-216 (105-107 feet bgs) and SB-215 (98-100 feet bgs) were inconclusive as they determined that the sample consisted of an unidentified mixture of hydrocarbons. The laboratory reports are in Appendix H. Table 13 summarizes DNAPL characteristics from samples collected during the SC and RI. Table 14 summarizes the DNAPL fingerprint characteristics.

5.2 Groundwater

Groundwater samples were collected from ten of the thirteen monitoring wells installed during the SC field program in 2019. MW-105, MW-107, and MW-108 were not sampled due to the presence of NAPL. Groundwater samples were collected from all fifteen monitoring wells installed during the SC or RI field program in 2021. Groundwater samples were submitted for analysis of VOCs, SVOCs, total metals, and total cyanide except monitoring wells where NAPL was observed. Groundwater samples from MW-107, MW-108, MW-111, MW-112, MW-210 and MW-221 were only analyzed for VOCs and fingerprint due to the presence of NAPL within the well. The analytical results for groundwater samples are summarized in Table 6. Wells MW-103 and MW-105 were sampled for VOCs and fingerprint analysis, however the results were reported as NAPL rather than groundwater by the laboratory. Results for the NAPL analysis are discussed in Section 5.5 below.

One groundwater grab sample was collected from boring SB-111 during soil characterization activities as part of the SC due to the presence of LNAPL observed on top of groundwater within the pre-cleared boring location. The groundwater sample collected from MW-106, screened from 10 to 20 feet bgs, located approximately 30 feet north of SB-111, had a concentration of total BTEX of 715 ug/L and a concentration of PAH's of 1,200 ug/L. This contrasts with observations noted in the grab sample, collected at an approximate depth of 4 feet bgs from boring SB-111 from the same area. The groundwater grab sample exhibited lower concentrations of total BTEX (76 ug/L) and increased concentrations of PAH's (3,019 ug/L) and individual metals, with the exception of manganese. The increased metal concentrations are likely attributed to the sample being an unfiltered grab sample.

In groundwater samples collected during the RI, the concentrations of total VOCs ranged from not detected above laboratory reporting limits in samples MW-109 and MW-110 to 16,658.4 µg/L in MW-102. Of the detected VOCs, BTEX, acetone, chloroform, cis-1,2-dichloroethene, isopropyl benzene, methyl tert-butyl ether, styrene exceeded the NYS AWQS in one or more sample. Chlorinated solvents are not related to the former MGP operations and are likely derived from other, post-MGP operations at the Site or surrounding area.

The concentrations of total SVOCs in groundwater samples collected during the RI ranged from not detected above laboratory reporting limits in sample MW-101, MW-109, and MW-110 to 6,308.07 ug/L in sample MW-102. Of the detected SVOCs, acenaphthene, benzo(a)anthracene, benzo(a)pyrene, naphthalene, phenanthrene, biphenyl, 2-methylphenol, 4-methylphenol, and phenol exceeded the respective NYS AWQSs.

The concentrations of the following metals exceed the NYS AWQS in one or more sample collected during the RI: iron, manganese, selenium, and sodium. Concentrations of iron and sodium exceeded the NYS AQWS in all groundwater samples and are naturally occurring.

Total cyanide concentrations ranged from ND in MW-101, MW-109, and MW-110 to 144 µg/L in MW-113 which is below the NYS AQWS standard of 200 µg/L.

5.3 Sediment

Sediment samples were collected during the RI from the Hudson River sediment near the CSO outfall location. The CSO follows Ashburton Avenue from east to west along the southern boundary of the former MGP and daylights to the west of Alexander Avenue at the Hudson River. Sediment samples were collected from two locations with depths ranging from 0 to 6 inches and analyzed for Total VOC's and DNAPL fingerprint analysis. SED-201 was collected from the southern side of the outfall and SED-202 was collected from the northern side of the outfall.

Physical Impact Summary

A sheen was observed in the sediment samples during sample collection.

Analytical Summary

Ethylbenzene was the only VOC detected which exceeded the SSGV Class B or C. Based on this exceedance, this sample qualifies as a Class C sediment. The results of the fingerprint analysis were inconclusive as they determined that the samples consisted of an unidentified mixture of hydrocarbons.

5.4 Subsurface Soil Vapor

A total of ten soil vapor samples were collected including two duplicate samples during the SC. Duplicate samples were collected at the SV-104 and SV-109 locations during two separate field mobilizations. In addition, an ambient air sample was collected at one outdoor location. The soil vapor sample locations are shown in Figure 2. Sub-surface soil vapor, and outdoor ambient air sample analytical results are summarized in Table 8.

In general, VOCs are present in soil vapor samples at levels that are consistent with background ambient air collected during the field investigation with the exception of several chlorinated VOCs which are present at elevated concentrations in 2 samples (SV-105 and SV-110). Chlorinated VOCs are not associated with the former MGP operations.

The soil vapor results showed low concentration detections of chemical compounds which are comparable to concentrations present in the ambient air sample. The following compounds were detected in in all six air samples: BTEX (benzene, toluene, ethylbenzene, and xylenes), butane, chloroform, n-nonane, n-decane, 1,3-dichlorobenzene, dichlorodifluoromethane, 1,2,4-trimethylbenzene, n-heptane, n-hexane, tetrachloroethene, and trichlorofluoromethane.

5.5 DNAPL

DNAPL samples were collected from monitoring wells MW-103 and MW-105, for VOC and Fingerprint analysis and MW-105 and MW-107 for viscosity and density analysis during the RI. NAPL samples that also contained groundwater (MW-107, MW-108, MW-111, MW-112, MW-210 and MW-221) are reported as groundwater and described above in Section 5.2. Fingerprint results for these samples are discussed below. Laboratory data are presented in Appendix H. Table 13 summarizes the DNAPL characteristics from the SC and the RI. Table 14 summarizes the DNAPL fingerprint characteristics.

DNAPL measurements and DNAPL recovery quantities for MW-105 and MW-107 are summarized in Table 10 and Table 11, respectively. DNAPL analytical results are summarized in Table 12.

NAPL was gauged on May 16, 2019, July 24, 2019, and November 14, 2019, during the SC. During the May 16, 2019 event, DNAPL was observed at monitoring wells MW-105 (4.41 feet), and MW-107 (8.61 feet). Trace amounts (less than 0.1 feet) of LNAPL were observed in MW-102 and MW-103.

Following the initial observations of DNAPL during the May gauging event, a NAPL recovery event was conducted to provide more information about its potential for recovery. The NAPL pumping event was conducted on June 27, 2019, at MW-105 and MW-107 using a Super Sonic Pump©. The DNAPL was measured for thickness prior to pumping, the approximate volume of NAPL removed was recorded in gallons, and the thickness of DNAPL after one hour of pumping was recorded (Table 11). Approximately 0.4 gallons of NAPL was removed from MW-105 and 2.0 gallons of NAPL was removed from MW-107. The thickness of NAPL in MW-107 remained around 8.0 feet thick after 1 hour of pumping. NAPL samples were collected from MW-105, MW-107, and MW-108 and analyzed for fingerprint analysis by EPA Method 8015B. The results of the fingerprint analysis determined that the samples most closely resemble coal tar.

Following the recovery event, NAPL was again gauged on July 24, 2019. DNAPL thicknesses rebounded in MW105 (2.65 feet) and MW-107 (9.80 feet), indicating that NAPL can potentially be recovered at these locations. DNAPL was also gauged in MW-104 (0.10 feet), and MW-108(0.10 feet). Trace amounts of LNAPL was also observed in MW-108 during the July 24, 2019, gauging event.

NAPL gauging was also completed on a limited number of wells on November 14, 2019. DNAPL was observed in MW-105 and MW-107 at thicknesses of 2.26 feet and 9.70 feet, respectively. MW-108 had measurable amounts of LNAPL and DNAPL during the July 2019 sampling event but was not gauged during the November 2019 event due to the well not being accessible.

NAPL was gauged on May 5, May19, May 20, May 28, and June 2, 2021, during the RI. During the May 19, 2021 event, DNAPL was observed at monitoring wells MW-103 (1.1 feet) MW-105 (2.5 feet), and MW-107 (10.1 feet). Trace amounts (less than 0.1 feet) of LNAPL were observed in MW-102 and MW-108. A NAPL pumping event was conducted on May 19, 2021 at MW-105 and MW-107 using a disposable Proactive submersible pump. The DNAPL was measured for thickness prior to pumping, the approximate volume of NAPL removed was recorded in gallons, and the thickness of DNAPL 21 hours after pumping was recorded (Table 11). Approximately 3.5 gallons of NAPL was removed from MW-105 and 21 gallons of NAPL was removed from MW-107. DNAPL transmissivity was evaluated at monitoring well MW-107 using the patent-pending PREDicT methodology as described below.

Analytical Summary

Analytical samples for DNAPL were collected from MW-103 and MW-105. Total VOC concentrations of the DNAPL ranged from 316 mg/kg in MW-105 to 15,047 mg/kg in the duplicate sample from MW-103.

The results of the fingerprint analysis indicated that NAPL at monitoring wells MW-107, MW-108, MW-111, and MW-112 most closely resemble coal tar and MW-210 contained a petroleum product which most closely resembles #2 diesel fuel. Results for MW-221 were inconclusive as they determined that the sample consisted of an unidentified mixture of hydrocarbons. The laboratory reports are in Appendix H.

DNAPL PREDicT Modeling Results

DNAPL samples were collected from MW-105 and MW-107 and submitted it to Torkelson Geochemistry, Inc., for analysis of its fluid properties (viscosity and density) to support the DNAPL recovery evaluation. The results are in Appendix H.

On May 19, 2021, the bail-down test was initiated by purging 21 of gallons of DNAPL from the well to the extent feasible so that a pressure transducer could be immersed in the DNAPL at the start of the test. The DNAPL thickness in the well prior to purging was about 10.1 feet and recovered to 9.3 feet within 21 hours after purging. It varied between 9.3 and 9.8 feet from May 20 through June 2, 2021. The recovery of fluids toward equilibrium was continuously monitored and the data logged at 1-minute intervals using pressure transducers until June 2, 2021, when the test was suspended.
The fluid elevation data were analyzed to estimate the apparent DNAPL drawdown (difference between equilibrium and measured DNAPL-water interface (NWI)) and the DNAPL discharge rate from the formation into the well, throughout the test. The NWI was assumed to be in equilibrium at the start of the test. The resulting DvD graph is shown in

Figure 11. Individual MNIs were identified based on alternating periods of constant and decreasing trends on the DvD graph. Periods of decreasing discharge represent the NWI in the well moving through MNIs in the formation. Periods of constant discharge represent intervals where the NWI in the well is between MNIs in the formation.

The transmissivity of each interval is calculated according to the NAPL skimming equation in the ASTM standard E2856-13, "Standard Guide for Estimation of LNAPL Transmissivity":

$$T_n = \frac{Q_n ln\left(\frac{R_{oi}}{r_w}\right)}{2\pi s_n} \quad \text{Eq. 1}$$

where T_n is the NAPL transmissivity (length squared per time, L^2/Θ), Q_n is the NAPL discharge rate (L^3/Θ), R_{oi} is the radius of influence (L), r_w is the radius of the well (L), and s_n is the NAPL drawdown (L). The quantity $\ln(R_{oi}/r_w)$ can be assumed to be a value of 4.6 with little additional error in the calculation (ASTM, 2013). The overall transmissivity is of MW-107 was determined to be 2-3 ft^2/day which indicates that NAPL is likely recoverable at this location.

6. Qualitative Human Health Exposure Assessment

This QHHEA qualitatively evaluates how human receptors may be exposed to COCs associated with MGP-related residuals detected in Site media. This assessment identifies COCs in Site media at concentrations above specific regulatory screening criteria and standards provided by NYSDEC, NYSDOH, and federal risk-based screening levels that may result in complete exposure pathways for human receptors under current and future use of the Site and surrounding area. The purpose of the assessment is to identify potential human exposure pathways to the identified COCs for the on-Site and surrounding community and to indicate the potential need for mitigative measures to reduce potential exposures. The QHHEA is consistent with Appendix 3B of *Draft DER-10, Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2010).

This QHHEA uses the SC and RI investigation data and findings, information on the Site setting and background (Section 2), Site geologic and hydrogeologic characteristics (Section 4.1), and the nature and extent of environmental impacts identified at the Site (Section 5) to complete the assessment. This QHHEA was prepared considering the data collected to date.

6.1 QHHEA Scope and Limitations

An exposure pathway describes the means by which a potential receptor may be exposed to contaminants originating from a site. Assessment of potential exposure pathways includes the following five elements (NYSDEC, 2010):

1. A contaminant source
2. Contaminant release and transport mechanisms
3. A point of exposure
4. A route of exposure
5. A receptor population

The qualitative exposure assessment summarizes the COCs at the study area (elements 1 and 2), the media in which COCs are present (potential exposure points, element 3), the potential exposure routes of the COCs, including ingestion, inhalation, and dermal absorption (element 4), and the assumed potential human receptors (element 5). The NYSDEC and NYSDOH consider an exposure pathway complete when all five elements of an exposure pathway are documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present and will never exist in the future (NYSDEC, 2010).

It is important to note that this QHHEA assumes that contaminant conditions have not or will not be mitigated. In this sense, a "baseline" of potential exposures is presented. This evaluation is conducted in accordance with Appendix 3B of the *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010), which summarizes the approach for preparing a QHHEA. It should be noted that while the Unrestricted Use Soil Cleanup Objectives listed in 6 NYCRR Part 375 are used as screening criteria, the final cleanup objectives, if any, for the Site may vary. The remedy selection process allows for remedial alternatives that achieve a restricted use of the Site which may be proposed by the remedial party. I n these cases, NYSDEC may approve the restricted use cleanup objectives if the remedy "achieves a cleanup which is more stringent than the current, intended and reasonably anticipated future land uses of the site and its surroundings." Therefore, the soil results are also evaluated with respect to the Industrial Use SCOs, which may be more appropriate to evaluate potential human exposures given the current industrial use of the Site. It is also important to recognize that determination of a complete or potentially complete exposure pathway as determined through this QHHEA process does not necessarily mean that there is an actual risk posed to a potential receptor.

The identification of exposure pathway elements is presented below. The following subsections discuss the identification of COCs, contaminant release and transport mechanisms, exposure points, and potential receptors.

6.2 Identification of Exposure Pathway Elements

6.2.1 Contaminants of Concern

COCs are identified as those VOCs, SVOCs, metals and/or cyanide that were detected at concentrations exceeding 6 NYCRR Part 375 Unrestricted Use SCOs in soil and/or NYSDEC AWQS in water [Standards, Criteria, and Guidance values (SCGs)]. The COCs identified in soil and groundwater include the following: the four BTEX compounds; a subset of VOCs, sixteen PAH compounds; a subset of SVOCs; metals; and cyanide. Tables 5 and 6 summarize the soil and groundwater COCs, their maximum detections and SCGs. Subsurface soil COCs, including PAHs and metals, although associated with MGP-residuals, may also be attributable to imported fill placed at the Site and surrounding area.

NAPL

Sediment samples were collected from a CSO outfall location in the Hudson River, which is located approximately 400 feet west of the Site. The CSO which originates at the Site could serve as a conduit for MGP source material to migrate offsite. The CSO was video inspected for MGP impacts and none were noted. In addition, there were no MGP-related VOCs identified in sediment (Table 7). Identification of COCs in the sediments and within the

sewer bedding plan could not be achieved due to field conditions at the time of the investigation. Further evaluation of the sediments and sewer is required to assess potential exposure pathways.

If one or more COCs at the maximum detected concentration exceeded the screening criteria, there exists a potential exposure pathway. Table 15 identifies the COCs for subsurface soil at the site and identifies the exceeded screening criteria which create a potential exposure point as summarized below.

6.2.2 Contaminant Release and Transport Mechanisms

The potential mechanisms for migration of the COCs include volatilization, sorption, groundwater transport, and fugitive dust. The COCs detected in soil and groundwater at the Site are discussed with respect to their affinity to each of these mechanisms. These mechanisms are summarized below:

- **Volatilization:** this action describes the movement of a chemical from the surface of a liquid or solid matrix to a gas or vapor phase. Detected VOCs, including BTEX compounds, and to a lesser extent naphthalene, tend to volatilize, while PAHs and inorganics do not tend to volatilize outside of extreme pressure and/or temperature conditions.
- **Sorption**: this action is usually defined as the reversible binding of a chemical to a solid matrix. However, there is evidence in the published literature that there is a partially irreversible component related to the time that the compound has been sorbed to a soil matrix (Brusseau, et al., 1989; Brusseau, et al., 1991; Loehr, et al., 1996). Sorption of BTEX, PAHs, and metals limits the fraction available for other fate processes such as volatilization and/or solubility. In general, VOCs, including BTEX compounds, have low sorption potential, coupled with high water solubility and high volatility, which make sorption a relatively minor environmental fate process for these compounds compared to other mechanisms. PAHs exhibit varying degrees of binding affinity to organic matter and soil particles; this affinity is dependent upon their individual molecular structures. In general, the higher molecular weight PAHs (e.g., benzo(a)pyrene) are strongly sorbed, whereas the lighter PAHs (e.g., naphthalene) are less strongly sorbed (EPA, 1979; EPA, 1986). Therefore, the higher molecular weight PAHs are expected to remain sorbed to soils, while the lighter PAHs may be desorbed and transported by other mechanisms. Metals may remain sorbed to soils depending on oxidation-reduction conditions and the availability of anions with which the metals could bind. Metals that do not remain sorbed to soils could be available for transport through surface or groundwater in solution.

- **Fugitive Dust:** COCs sorbed to soil particulates could be transported as fugitive dust if exposed to wind erosion. As discussed above, PAHs exhibit varying degrees of binding affinity to organic matter and soil particles; this affinity is partly dependent upon their individual molecular structures. In general, the higher molecular weight PAHs (e.g., benzo(a)pyrene) are strongly sorbed, whereas the lighter PAHs (e.g., naphthalene) are less strongly sorbed (EPA, 1979; EPA, 1986). Therefore, the higher molecular weight PAHs and metals which exhibit an affinity to soil particulates may be transported as fugitive dust.
- **Solubility:** this is the measure of a chemical's ability to dissolve in water. More soluble COCs sorbed to surface soil may dissolve in water and be transported in surface water, while soluble COCs sorbed to subsurface soils may dissolve in water and be transported via the groundwater aquifer system. PAHs have varying degrees of solubility. The lighter PAHs are more soluble, while the heavier PAHs are less soluble and typically do not dissolve into water. Soluble metals in the subsurface soils could dissolve and continue to leach into the groundwater system. However, the solubility of metals is highly dependent upon the pH and oxidation-reduction conditions of the aquifer, the valance state of the specific metal, and the availability of anions that the metals could bind with to become immobile.

6.2.3 Potential Exposure Points

Potential exposure points for COCs detected in soil and groundwater at the Site based on contaminant sources and contaminant release and transport mechanisms are presented below.

- **Subsurface Soil** - COCs were detected in subsurface soil at the Site at depths ranging from 2 to 95 feet bgs. The **majority** of the surface area of the Site (approximately 90%) is developed and covered by buildings and asphalt surfaces. Therefore, subsurface soil is a potential exposure point; however, surface soil is not considered an exposure point at the Site because the ground surface is primarily paved or covered by buildings.
- **Groundwater** – COCs were detected in groundwater at the Site. Depth to groundwater at the Site ranges from approximately 3 to 10 feet bgs and the groundwater flow direction is to the west, toward the Hudson River. Two groundwater wells were identified within a one-half-mile radius, south and side-gradient of the Site; however, these wells are not used for drinking water or industrial use. Shallow groundwater is considered a potential exposure point at the Site.
- **Air –** Volatile COCs detected in soil and groundwater at the Site may volatilize and migrate in soil vapor to ambient air and indoor air of buildings present at the

Site and surrounding area. Because volatile COCs are present at the Site in soil and groundwater, ambient and indoor air are considered potential exposure points.

- **Fugitive Dust –** COCs detected in subsurface soil may sorb to particulates and be transported as fugitive dust if subsurface soil is exposed. Therefore, fugitive dust is a potential exposure point at the Site and surrounding area if the ground cover at the Site is removed.
- **Surface Water / Sediment –** COCs were not identified in sediment based on CSO outfall sediment samples collected at the Hudson River. However, the direction of groundwater flow at the Site is towards the Hudson River. Although the VOC subset of the COCs were not identified in sediment, that identification of the remaining COCs is incomplete and the evaluation of the sediment as part of an exposure pathway cannot be completed without further investigation. Hudson River surface water and sediment may be a potential exposure point due to downgradient migration of groundwater COCs and discharge to surface water.

6.2.4 Potential Receptors

For potential exposure points identified above, the potential receptors and exposure routes for COCs are determined based on current land use and reasonably anticipated future land use at the Site and surrounding area. The Site is currently zoned for industrial use. Five buildings currently located at the Site are utilized as the following: commercial storage buildings; an auto repair shop; a Metro-North Railroad storage/operations facility; and a commercial bakery facility occupied by Greyston Bakery.

The Site is located within an industrial, commercial, storage and light manufacturing area that includes residences to the northeast and east. There has been a significant amount of property development in the vicinity of the Site. To the south-southeast of the Site are newly erected residential/commercial apartment buildings. To the west and northwest are more newly erected residential/ commercial apartment buildings along the Hudson River as well as a New York/ New Jersey transit system bus parking terminal. There are commercial/industrial buildings and warehouses to the north along Babcock Place. To the southeast of the Site along Ashburton Avenue are commercial/government buildings including Yonkers Family Court Building.

The following human receptors were identified at the Site and surrounding area under current and potential future land use:

- **On-Site Commercial Worker** – This receptor includes adults working at the commercial facilities located at the Site.

- **Landscape/Maintenance Worker** – This receptor includes adult outdoor workers conducting maintenance and landscaping activities at the Site.
- **Adjacent Off-site Receptor** – This receptor includes adults and children working, residing, or visiting adjacent properties surrounding the Site.
- **Utility Worker** – This receptor includes adult workers conducting short duration excavations to repair underground utilities at the Site.
- **Construction Worker** – This receptor includes adult workers conducting subsurface excavations as part of construction/redevelopment projects at the Site.

6.3 Assessment of Complete Exposure Pathways

The data collected within the study area and summarized in the tables, figures and plates of this report was used to evaluate whether potential complete exposure pathways exist at the Site and surrounding area. An exposure pathway is eliminated from further evaluation when any one of the elements comprising an exposure pathway (COCs in Site media, point of exposure, route of exposure, and receptor population) has not existed in the past, does not exist in the present and will never exist in the future.

Table 15 presents the matrix for the Site based on the identification of COCs in soil and groundwater at the Site. The matrix identifies the COCs and evaluates if a complete exposure pathway exists for potential receptors. A discussion of potential complete exposure pathways based on Site-specific conditions is presented below.

6.3.1 Soils

Human receptors are not directly contacting surface soil at the Site because the ground surface is primarily paved or covered by buildings. A complete exposure pathway to COCs in subsurface soil exists for human receptors at the Site and surrounding area if ground intrusive work is conducted at the Site. During excavations, utility workers and construction workers may be exposed to COCs in subsurface soil through ingestion, dermal contact, and inhalation of volatiles and fugitive dust. In addition, during ground intrusive work at the Site, on-Site commercial workers, landscape/maintenance workers, and adjacent off-Site receptors may be exposed to COCs in subsurface soil through inhalation of volatiles and fugitive dust that have migrated in air from excavation areas.

6.3.2 Groundwater

Groundwater at the Site and surrounding area is not used for drinking water or industrial use. A complete exposure pathway to COCs in groundwater exists for human receptors at the Site and surrounding area if ground intrusive work is conducted at the Site. During excavations, utility workers and construction workers may be exposed to COCs in groundwater through

dermal contact and inhalation of volatiles. In addition, during ground intrusive work at the Site, on-Site commercial workers, landscape/maintenance workers, and adjacent off-Site receptors may be exposed to COCs in groundwater through inhalation of volatiles that have migrated in air from excavation areas.

6.3.3 Soil Vapor

Construction and utility workers involved in excavation activities at the Site may have complete exposures to COCs in soil vapor via inhalation. Work zone monitoring of VOCs and implementation of established actionable levels during excavation work will need to occur in accordance with a site-specific HASP and will mitigate potential exposures to the VOCs in soil vapor. As part of any intrusive work, offsite receptors may have potential for exposure due to inhalation of VOCs released during the intrusive work and are included as potential receptors. As such a site-specific Community Air Monitoring Program (CAMP) with be implemented to prevent exposures during intrusive work.

6.3.4 Indoor Air

A complete exposure pathway to volatile COCs that have migrated from subsurface soil and groundwater to indoor air may exist for human receptors at the Site and surrounding area. The Greyston Bakery parcel was remediated as part of the voluntary cleanup program (Site V00361). As part of the remedy, an active sub-slab depressurization system was installed to prevent impacts to indoor air quality. Downgradient properties have also been remediated under the Brownfields program. However, an evaluation would need to be conducted in conjunction with any future building construction or parcel development to evaluate whether there is potential for a complete exposure pathway.

6.3.5 Surface Water / Sediment

MGP-related VOCs were not identified in sediment based on sediment samples collected at the CSO outfall in the Hudson River. The CSO which originates at the Site was video inspected for MGP impacts and none were noted; however, the direction of groundwater flow at the Site is towards the Hudson River. Hudson River surface water and sediment may be a potential exposure point due to downgradient migration of groundwater COCs and discharge to surface water. Further evaluation of the sediments was not conducted during this field effort and would be required to assess potential exposure pathways.

6.3.6 Complete Exposure Pathway Summary

In summary, subsurface media (soil, groundwater, soil vapor) may provide an exposure pathway if excavation activities are conducted at the Site. Receptors involved in excavation activities (construction and utility workers) may come into contact with subsurface soil, groundwater and soil vapor. Potential exposure pathways also exist in sewer bedding material, and other potential utility corridors, under adjacent roadways. These additional

potential exposure pathways require further evaluation. Further evaluation of the sewer and other utility corridors is required to assess potential exposure pathways.
On-site and off-site receptors may have a complete exposure pathway to air-borne particulates (as fugitive dusts) and volatile compounds (nuisance odors) during times of excavation work when materials are disturbed. However, the implementation of worker protection plans, such as HASPs that include PPE procedures and action levels, as well as the implementation of work zone and community air monitoring plans and soil and groundwater management plans during earthwork activities, can mitigate potential exposure issues and eliminate a complete exposure pathway.

A complete exposure pathway to volatile COCs that have migrated from subsurface soil and groundwater to indoor air may exist for human receptors at the Site and surrounding area. Remedial measures were implemented at the Greyston Bakery parcel and downgradient properties to prevent impacts to indoor air quality. However, an evaluation would need to be conducted in conjunction with any future building construction or parcel development to evaluate whether there is potential for a complete exposure pathway. Further evaluation of the sediments was not conducted during this field effort and would be required to assess potential exposure pathways.

7. Fish and Wildlife Impact Analysis

The Site is located in a highly urbanized setting. The Site and neighboring properties are situated in a developed area zoned for mixed commercial and residential use. The Metro North MTA railroad is located directly between the two halves of the Site, and residential homes are located a less than a block away.

The NYSDEC Environmental Resource Mapper was used to identify natural resources and environmental features that are state protected, or of conservation concern that are near the Site. There are no state-regulated surface water bodies or freshwater wetlands within 0.5 miles of the Site. The Hudson River, which is a significant natural community, is within 0.5 miles of the Site. The NYSDEC groundwater classification for the Hudson River is Class GA Fresh Groundwater.

Groundwater at the Site flows toward and discharges into the Hudson River. Three of the four wells down-gradient of the Site are impacted with potentially MGP-related contaminants (MW-110, MW-111, and MW-113). Recoverable NAPL is present in offsite recovery wells directly downgradient of the Site. The network of offsite wells is located within 100 feet of the Hudson River shoreline.

According to the New York Natural Heritage databases, the area generally within 0.5 miles of the Site is inhabited by the endangered Atlantic Sturgeon.

Soil contamination is localized and generally confined under buildings and paved areas. There is little habitat for flora or fauna (aside from transient urban species) at or near the Site. The lack of habitat is a function of development in and around the Site. The flora and fauna at the Site show no signs of stress. Therefore, no ecological assessment is necessary for the on-Site portion of the MGP. Revisions to the FWIA and the subsequent need for an ecological assessment for the off-Site may be necessary once the sediment and any potential off-Site preferential pathways have been thoroughly evaluated.

8. Conceptual Site Model

The CSM was developed based on the Site history, subsurface characteristics, and the nature and extent of compounds detected in soils, groundwater, and soil vapor at the Site.

The CSM provides a holistic framework for the physical and chemical contaminant distribution. It serves as a basis for future decisions regarding investigation or remediation. The CSM will discuss the nature of the impact sources, pathways for source migration, and potential human and ecological receptors. Other contaminant impact issues and potential exposure concerns, such as those relating to non-MGP related VOCs (e.g., tetrachloroethylene) are not addressed in detail as part of this CSM.

The former MGP occupied approximately 4.3 acres of land located on the west side of Woodworth Avenue between Babcock Place and Ashburton Avenue in the city of Yonkers, Westchester County, New York (Figures 1 and 2). During its operational period it contained a purifying house, crude oil storage tanks, two 263,000 cubic foot gas holders (Holder Nos. 1 and 3) and one smaller gas holder (Holder No. 2), one subsurface tar tank which replaced Holder No. 2 c. 1917, several sheds, an oil house and oil storage tanks, retort generators, and a coal storage shed. After the MGP was completely demolished, the property was used for commercial/industrial purposes. Some of these operations included: a machine shop, a paint shop, storage, auto repair shop, Metro-North substation, and a bakery.

8.1 Contaminant Sources

The data collected during the SC and RI identified both MGP-related impacts (NAPL and petroleum) as well as other impacts not likely related to the former MGP (petroleum and solvent-like impacts) at the Site at depths up to 95 feet bgs.

Findings from the investigations indicate that the primary source of NAPL contamination likely originated from the areas of the three Gas holders. The source of DNAPL is primarily from Gas Holder No. 2/tar tank. Impacts were observed in soils at the bottom of each of the three former gas holders including a sheen at Holder No. 1 (SB-102), tar-saturated soils at Holder No. 2 (SB-108), and naphthalene-like odors at Holder No. 3 (SB-104). Tar saturated and tar coated soils were primarily observed on the eastern and central areas of the Site near the location and downgradient from Holder No. 2/tar tank and the purifying houses. The foundation of Holder No. 2 appears to be near the till surface and DNAPL from the holder appears to follow the till surface from Holder No. 2 to the west toward Alexander Street.

Based on historical figures, the east bank of the Hudson River was located adjacent to the western boundary of the former MGP site. A dock, labeled on a historic site plan by the City of Yonkers dated June 1888 as the "Yonkers Gas Light Co.'s Dock" was also shown in this area and would have been the main area where ships would be loaded and offloaded with MGP materials and/or byproducts. MGP-like impacts were observed at depths in SB-118 and westward to SB-130 above the peat and clay confining layer which is likely the former riverbed deposits (Cross Sections A-A', B-B', and C-C' in Figure 8). The source of these impacts is derived from the former upgradient holders, primarily Holder No. 2, the former oil house, and possibly from the loading/off-loading operations along the river during MGP operations. MGP-like impacts, odors, and sheens were observed in soils on the northern portion of the Greyston Bakery property and to the north on the Metro-North Railroad property north of Babcock Place. The northern extent of impacts has not been delineated.

Petroleum-like impacts, odors, and sheens were observed in soils on the 104 Alexander Street property in the vicinity of the former crude oil tanks. Sources for these petroleum impacts potentially include the former oil tanks/crude oil tanks and retort generators as well as historic operations on site following the MGP decommissioning (Figure 5). Petroleum -like odors and staining were also observed between the Metro-North Railroad and the retaining wall, downgradient of the auto repair garage. As there is no MGP-related upgradient source for these impacts, it is possible that the impacts could be associated with historic petroleum releases from non-MGP related sources including the three former gasoline underground storage tanks located on the parcel. Petroleum-like impacts, odors, and sheens were observed in soils on the Metro-North Railroad property north of Babcock Place. These impacts are associated with historic petroleum releases from non-MGP related sources.

Chlorinated compounds were observed in soil vapor (SV-105, SV-110) and groundwater (MW-101, MW-102) samples at elevated concentrations. In addition, solvent-like odors were observed in SB-105 which is located on the eastern portion of the Site. Sources of solvent related impacts are not related to the former MGP operations at the Site.

8.2 Potential Migration Pathways and Extent

Fate and transport mechanisms for impacts include movement as NAPL, sorption to subsurface soil, and dissolution into groundwater.

8.2.1 NAPL

The source of the DNAPL is primarily from the area of Gas Holder No. 2, which was converted into a subsurface tar tank c. 1917. NAPL impacts were observed in the borings located in the immediate area and downgradient of Holder No. 2 between 8.5 to 40 feet bgs. Holder No. 2/tar tank appears to be near the till surface and DNAPL from the holder appears to follow the till surface from Holder No. 2/tar tank to the west toward Alexander Street and

south toward Ashburton Avenue. This former MGP structure appears to be the main source of DNAPL impacts on the Site impacting soil and groundwater downgradient of Holder No. 2/tar tank. In the area of the former oil house, shallow impacts were observed in fill material above the peat in SB-208 and SB-213. The former oil house and potential loading/off-loading operations along the river during MGP operations could represent additional sources of NAPL in this area.

8.2.2 Soil

MGP-impacted soils (sheen, staining, blebs, NAPL coating and/or saturation) were visually observed in the following borings and a summary of visual impacts is included in Figures 5 through 7:

- SB-102
- SB-105 through 110
- SB-112
- SB-113
- SB-114
- SB-117 through 119
- SB-121
- SB-122
- SB-124
- SB-126
- SB-127
- SB-129 through 131
- SB-207 through 210
- SB-212 through 218
- SB-220 through 221

Petroleum-impacted soils were observed in SB-115, SB-128, and SB-211, which advanced in proximal vicinity of each other and downgradient of the former oil tanks. These impacts are shallow, less than 10 feet bgs, and localized to their potential sources, the former auto garage on the eastern portion of the Site (SB-111, SB-123, and SB-205) and the former oil tanks on the western portion of the Site (SB-113 through SB-116, SB-128, SB-211, and SB-213).

Impacts in the following borings were limited to odors:

- SB-103
- SB-104
- SB-111
- SB-116
- SB-120
- SB-123
- SB-204

Borings SB-101, SB-125, SB-201, and SB-202 did not contain any visual or olfactory impacts. These borings bound the lateral extent of MGP-impacted soil at the northeast corner and eastern boundary of the Site. On the western portion of the Site, the lateral extent of MGP-related impacts was delineated to the south and west during separate NYSDEC approved third party remediation projects at adjacent properties. Although these impacts have been delineated, potential migration pathways could exist below roadways, within utility trenches, and within the sewer bedding material along Ashburton Avenue. Off-Site delineation of MGP-impacts further west in the Hudson River is incomplete. The northern extent past Babcock Place west of the railroad has not been defined as lateral impacts appear to spread outside the bounds of the Site. The vertical extent of NAPL in overburden soils extend vertically to as deep as 95 feet bgs in SB-130 and SB-131 as shown on the cross-sections presented in Figure 8.

8.2.3 Groundwater

Groundwater flows west-southwest across the Site at low and high tides, towards the Hudson River. PAHs were detected in groundwater at all the monitoring wells except for MW-111 during the July 2019 sampling event, a downgradient well located along Alexander Street and at all wells except MW-101 (upgradient well), 109, and 110 (downgradient wells located along Alexander Street) during the 2021 sampling event. The highest concentrations of total PAHs were detected MW-103 at 9,075 ug/L, which is located on the eastern portion of the Site downgradient from Gas Holder Nos. 2 and 3. The highest total BTEX concentrations were observed in MW-102 which is located downgradient of Gas Holder No. 1 and 3 and the former machine shop (operations post-date the MGP).

Concentrations of COCs, including BTEX, isopropylbenzene, naphthalene and acenaphthene, were detected above the AWQS in MW-102 through MW-104, MW-106 through MW-108, MW-111 through MW-113, MW-210, and MW-221 which are located adjacent to and downgradient from the former gas holders and purifying house structures. These PAH exceedances in these wells also correlated with observed impacts at these respective boring locations including NAPL coated and saturated soils.

Concentrations of chlorinated VOCs (trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, cis- and trans-1,2-dichloroehtene, and styrene) were detected in MW-101, MW-102, MW-104, MW-111, MW-112, and MW-221 which are located upgradient and along the Babcock Place. The highest concentrations of chlorinated VOCs were detected in centrally located wells, MW-102 and MW-112, located downgradient of the former machine shop as well as in upgradient well, MW-101. Chlorinated VOCs area not associated with MGP operations and byproducts which suggests an upgradient source from either the former machine shop (operations post-date the MGP) and other upgradient, off-site sources.

9. Summary and Conclusions

A RI of the former Woodworth Avenue Works MGP Site was completed in December 2020 and between April and July 2021 pursuant to AOC Index Number: CO0-20180516-519, Site No. 360164 between Con Edison and the NYSDEC. The RI was completed in accordance with the NYSDEC-approved work plan and modification. The purpose of the RI was to collect sufficient data to evaluate the nature and extent of chemical compounds within soil vapor, soils and groundwater that may be associated with the former MGP. The investigation was also intended to provide information on whether potential pathways exist to potential receptors.

Based on observations and data collected during the RI, the following conclusions can be made:

- Evidence of MGP impacts is present in soil and groundwater at the Site and appear to originate from the former MGP operations including the former gas holders, purifying house, and oil storage area. Holder No. 2 appears to be the primary source of MGP impacts. Secondary sources of impacts are located in the vicinity of the former petroleum storage tanks and possibly from the loading/off-loading operations along the River during MGP operations.
- The subsurface foundation of Holder No. 2, constructed of brick and mortar, were found during the excavation of TP-102 and advancement of SB-108. Due to the presence of tar observed within the tank, it appears that the holder is intact. NAPL was also observed in soil borings and groundwater monitoring wells downgradient from Holder No. 2.
- Remnants of Holder 1 and Holder 3 were also encountered during the investigation, at depths of 22.5 feet bgs and 17.5 feet bgs, respectively.
- VOCs associated with MGP contamination are present in the Site soil vapor at levels consistent with ambient air. The elevated concentrations of chlorinated VOCs in soil are not considered to be related to the former MGP. Post MGP industrial/ commercial site use is likely the source of chlorinated VOCs.
- VOC, PAHs, and metals at concentrations above the NYSDEC Industrial Use Soil Cleanup Objectives were detected in soils on the eastern portion of the Site in the areas directly adjacent and downgradient to the former holders at depths ranging from 2 to 32 feet bgs.

- VOCs, PAHs, and metals were detected at concentrations above NYSDEC Industrial Use Soil Cleanup Objectives in soils on the western portion of the Site downgradient from MGP operations, at depths ranging from 2.5 to 94.5 feet bgs.
- Groundwater elevations range from 25.23 feet NAVD (9.97 feet bgs) in MW-101 located on the northeastern corner of the Site to 3.19 feet NAVD (2.92 feet bgs) in MW-210 located on the southwest side of the Site. Based on the groundwater elevations, groundwater flow is to the west-southwest toward the Hudson River.
- VOCs and SVOCs were detected in groundwater above NYS AWQSs on both the eastern and western portion of the Site.
- DNAPL was observed during the SC or RI at monitoring wells MW-102, MW-103, MW-105, MW-107, MW-108, MW-111, MW-112, MW-210, and MW-221. DNAPL thickness ranged from trace levels to a maximum of 9.80 feet at MW-107. Trace amounts (less than 0.1 feet) of LNAPL were observed in MW-102 MW-103, and MW-108. Based on the results of the NAPL recovery testing, recoverable NAPL is present at MW-107.
- Bedrock was encountered at depths that ranged between 91.5 feet bgs (SB-207) and 148.7 feet bgs (SB-209). No impacts were observed at the bedrock surface.
- There was no evidence of MGP impacts within the CSO based on the video inspection.
- The exterior of the sewer was not able to be inspected during the RI due to compact material and adjacent unknown utilities. Conclusions about the sewer and other potential migration pathways underlying the roads cannot be drawn without further investigation.
- The lateral extent of MGP impacts on the portion of the Site east of the Metro North Railroad has been delineated.
- The lateral extent of MGP impacts on the portion of the Site west of the Metro North Railroad was delineated to the south and west during NYSDEC-approved third party remediation projects at adjacent properties, however uncertainty exists within the roadways. Impacts north of the western portion of the Site and Babcock Place have not been delineated.
- The vertical extent of MGP impacts has been delineated.

Based on the findings of the RI, MGP related impacts are present at the Woodworth Avenue Works former MGP Site and there are limited data gaps that require further investigation. If access to off-site properties is available, additional investigation conducted as an Off-Site RI would provide more information to:

- Evaluate extent of impacts to the north of Babcock Place.
- Determine if MGP-related COCs are present in sediments.
- Evaluate potential NAPL migration pathways beneath the roads including the sewer bedding plane.

In addition, the development and implementation of an Interim Site Management Plan and Excavation Work Plan would be utilized to mitigate potential exposure to utility and/or construction workers.

10. References

Beers, F.W., 1868. *Atlas of New York and Vicinity*.

Beers, F.W., 1891. *Atlas of the Hudson River from New York City to Troy*.

Brown's Directory. *Brown's Directory of American Gas Companies*. Review of gas statistics for companies from 1887 through 1957.

Caldwell, D.H. and R.J. Dineen, 1989. The Surficial Geology Map of New York – Lower Hudson Sheet. University of the State of New York, State Education Department, Map and Chart Series #40, published by New York State Museum, Geological Survey

EDR, Environmental Data Resources, Woodworth Avenue Former MGP. February 6, 2020. Environmental Data Resources Radius Map, Topographic maps, Aerial photographs, Sanborn maps, and city directories.

Fisher, D.W., 1970. Geologic Map of New York – Lower Hudson Sheet. University of the State of New York, State Education Department, Map and Chart Series #15, published by the New York State Museum and Science Service.

GEI Consultants, Inc. 2021, P.C. *Remedial investigation Work Plan,* Former Woodworth Avenue Works, Yonkers, New York.

GEI Consultants, Inc. 2021, P.C. *Remedial investigation Work Plan Modifications,* Former Woodworth Avenue Works, Yonkers, New York. March 17, 2021.

New York State Department of Environmental Conservation (NYSDEC), 2010, *DER-10 Technical Guidance for Site Investigation and Remediation*.

New York State Department of Environmental Conservation (NYSDEC). *New York State Code of Rules and Regulations,* 6NYCRR Title 6, Chapter 100, Part 700-705.

GEI Consultants, Inc., 2020. Site Characterization Report, Woodworth Avenue Former MGP Site, 95, 107, and 119 Woodworth Avenue and 104 Alexander Street, City of Yonkers, New York, January 18, 2008.

PSC Reports. The New York Public Service Commission Reports for the years 1907 to 1968.

The RETEC Group, Inc. (RETEC), 2003. *Historical Investigation Report – Former Yonkers – Woodworth Avenue MGP Site (Site #V00564).*

Shacklette, H.T., and Boerngen, J.G., 1984. *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States.* U.S. Geological Survey Professional Paper 1270. 105p.

To request the remainder of this report, please contact walshb@coned.com