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Final Remedial Action Work Plan (Soil) – Carteret Avenue (Revision 1)

Addendum to the Final Remedial Action Work Plan (Soil) Rev. 4,
Garfield Avenue Group Sites, Jersey City, Hudson County, New Jersey
NJDEP Program Interest Number: G000005480

PPG Garfield Avenue Group
Hudson County Chromate Sites
Jersey City, New Jersey

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- Traffic Safety and Control Plan
- Soil and Stockpile Management Plan
- Program Health and Safety Plan
- Contingency and Communications Plan

List of Acronyms/Definitions

The following acronyms and definitions apply to this document:

ACO	Administrative Consent Order
bgs	below ground surface
CCPW	Chromate Chemical Production Waste, a by-product generated from the production of sodium bichromate, including Chromite Ore Processing Residue (COPR), green-gray mud, and fill mixed with COPR or green-gray mud.
chromium (Cr)	An element found in nature that is commonly used in manufacturing activities. Chromium may be present in soil or water as trivalent chromium (Cr^{+3}) and hexavalent chromium (Cr^{+6}). Cr^{+3} is an essential nutrient at trace concentrations. Cr^{+6} can be present in many forms, some of which are carcinogenic at high concentrations. Total chromium, as measured in soil or groundwater, is the sum of Cr^{+3} and Cr^{+6} .
COPR	Chromite Ore Processing Residue
CrSCC	NJDEP interim Chromium Soil Cleanup Criteria
Cr^{+3}	trivalent chromium
Cr^{+6}	hexavalent chromium
DGA	dense-graded aggregate
EI.	elevation
EPCRA	Emergency Planning and Community Right-to-Know Act
FEMA	Federal Emergency Management Agency
FerroBlack [®] -H	FerroBlack [®] -H is a water-based suspension of 7 to 8% ferrous sulfide and 1 to 2% sodium hydrosulfide. The proprietary reagent is manufactured by Redox Solutions, LLC.
FHA	Flood Hazard Area
ft	foot or feet
GA	Garfield Avenue
groundwater	The supply of fresh water found beneath the Earth's surface, which can be extracted by wells or through natural springs.
HDPE	high-density polyethylene
HEPSCD	Hudson-Essex-Passaic Soil Conservation District
HER	Hardship Exception Request

JCMUA	Jersey City Municipal Utilities Authority
JCO	Judicial Consent Order
JCRA	Jersey City Redevelopment Agency
lbs	pounds
LSRP	Licensed Site Remediation Professional
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NAVD88	North American Vertical Datum of 1988
NJDEP	New Jersey Department of Environmental Protection
N.J.A.C.	New Jersey Administrative Code
NRDCSRS	NJDEP Non-Residential Direct Contact Soil Remediation Standard
ORP	oxidation-reduction potential
PDI	pre-design investigation
ppm	parts per million
PBR	Permit-By-Rule
PSEG	Public Service Electric and Gas Company
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
RDCSRS	NJDEP Residential Direct Contact Soil Remediation Standard
RI	Remedial Investigation
remediation	Actions to reduce, isolate, or remove contamination with the goal of mitigating impacts to human health and the environment.
SESCP	Soil Erosion and Sediment Control Plan
soil	Solid material (other than CCPW). Exceptions to this definition are specifically noted in the text.
SW TEP	Southwestern (Area) Technical Execution Plan
SVOC	semivolatile organic compound
TAL	Target Analyte List
TEE	terminal excavation elevation

TEP	Technical Execution Plan
the City	The City of Jersey City, New Jersey
µg/L	micrograms per liter
VOC	volatile organic compound
WAP	Water Allocation Permit

1.0 Introduction

On behalf of PPG, AECOM has prepared this Soil Remedial Action Work Plan (RAWP) to present the remediation approach for Carteret Avenue (the Project Area), part of the Garfield Avenue (GA) Group of Sites (Sites 114, 132, 133, 135, 137, and 143, Phase 4 Roadways, and Phase 5 Off-Site Properties), located in Jersey City, New Jersey. Carteret Avenue, which includes the portion of Carteret Avenue located between Garfield Avenue and Pacific Avenue, is located within Phase 4 Roadways of the GA Group Sites. Carteret Avenue is tracked under the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) Program Interest (PI) number G000005480 for Site 114. The Project Area is depicted on the Remediation Design Drawings Cover Sheet **Drawing T-01** (attached).

PPG is conducting remediation of Chromate Chemical Production Waste (CCPW)-related impacts in soil within Carteret Avenue in accordance with PPG's obligation under the 1990 Administrative Consent Order (ACO) and the 2009 Judicial Consent Order (JCO). In accordance with the ACO and JCO, PPG is also conducting remediation of non-CCPW-related impacts within Carteret Avenue that have emanated from Site 114. Remediation of impacts within Carteret Avenue that are not subject to the ACO and JCO are to be managed by the City of Jersey City's (the City's) Licensed Site Remediation Professional (LSRP) under the NJDEP LSRP program.

This RAWP has been prepared as an Addendum to the *Final Remedial Action Work Plan (Soil) Rev. 4, Garfield Avenue Group Sites, Jersey City, Hudson County, New Jersey* (GA Group RAWP) (AECOM, 2018e) and presents site-specific details pertaining to the remedial approach to be implemented in the Project Area. Elements of the GA Group RAWP that have not been modified since the submittal of the GA Group RAWP are not resubmitted herein (e.g., Site history, hydrology, sample collection methods, groundwater management). The general remedial approach for soil within Carteret Avenue was discussed in the Technical Memorandum entitled *Carteret Avenue Proposed Remediation Plan Summary – Soil (Revision 1)* (Carteret Avenue Remediation Plan [Revision 1]), dated April 12, 2018 (AECOM, 2018b). PPG will conduct remediation of soil in Carteret Avenue to create a clean corridor for utility workers in coordination with the City of Jersey City (the City) and the Jersey City Municipal Utilities Authority (JCMUA) in accordance with the Carteret Avenue Remediation Plan (Revision 1) (AECOM, 2018b).

Additional technical details of the Carteret Avenue remedial approach are provided in the *Technical Addendum to the Final Remedial Action Work Plan (Soil) – Carteret Avenue (Revision 1), NJDEP Program Interest Number: G000005480, PPG Garfield Avenue Group, Hudson County Chromate Sites, Jersey City, New Jersey* (RAWP Technical Addendum [Revision 1]) (AECOM, 2019c), which is provided as **Attachment A**.

A summary of the RAWP and RAWP Technical Addendum submittals and review history is as follows:

- On June 29, 2018, AECOM issued the *Draft Remedial Action Work Plan (Soil) – Carteret Avenue, Addendum to the Final Remedial Action Work Plan (Soil) Rev. 3, Garfield Avenue Group Sites, Jersey City, New Jersey* (Draft RAWP) (AECOM, 2018c) on behalf of PPG.

- On August 24, 2018, Weston Solutions, Inc. (Weston) provided comments on the Draft RAWP via email on behalf of NJDEP.
- On October 5, 2018, ERFs provided comments on the Draft RAWP via email on behalf of the City of Jersey City (the City).
- On November 21, 2018, PPG/AECOM issued the technical memorandum entitled, *Response to NJDEP/Weston's 08/24/2018 Comments and the City/ERFS's 10/05/2018 Comments on the Draft Remedial Action Work Plan (Soil) – Carteret Avenue* (AECOM, 2018j) (included in **Attachment B**).
- On November 21, 2018, PPG/AECOM issued the *Final Remedial Action Work Plan (Soil) – Carteret Avenue, Addendum to the Final Remedial Action Work Plan (Soil) Rev. 4, Garfield Avenue Group Sites, Jersey City, Hudson County, New Jersey* (Final RAWP) (AECOM, 2018i), which addressed NJDEP/Weston's August 24, 2018 comments and the City/ERFS's October 5, 2018 comments on the Draft RAWP.
- On December 20, 2018, Weston provided comments on the Final RAWP via email on behalf of NJDEP.
- On January 17, 2019, EFRS provided comments on the Final RAWP via email on behalf of the City.
- On March 29, 2019, PPG/AECOM issued the technical memorandum entitled, *Response to NJDEP/Weston's 12/20/2018 Comments and the City/ERFS's 01/17/2019 Comments on the Final Remedial Action Work Plan (Soil) – Carteret Avenue* (AECOM, 2019b), dated March 28, 2019 (included in **Attachment B**).
- On March 29, 2019, PPG/AECOM issued the *Technical Addendum to the Final Remedial Action Work Plan (Soil) – Carteret Avenue, NJDEP Program Interest Number: G000005480, PPG Garfield Avenue Group, Hudson County Chromate Sites, Jersey City, New Jersey* (RAWP Technical Addendum) (AECOM, 2019a), dated March 28, 2019, which was prepared to provide additional technical details of the Carteret Avenue remedial approach requested by NJDEP/Weston in their December 20, 2018 comments on the Final RAWP.
- On April 26, 2019, Weston provided comments on the RAWP Technical Addendum via email on behalf of NJDEP.
- On May 4, 2019, ERFs provided comments on the RAWP Technical Addendum via email on behalf of the City.

The technical memorandum entitled, *Response to NJDEP/Weston's 04/26/2019 Comments and the City/ERFS's 05/04/2019 Comments on the Technical Addendum to the Final Remedial Action Work Plan (Soil) – Carteret Avenue* (AECOM, 2019d), provides PPG/AECOM's responses to NJDEP/Weston's April 26, 2019 comments and the City/ERFS's May 4, 2019 comments on the RAWP Technical Addendum, and is included in **Attachment B**.

The RAWP Technical Addendum (Revision 1) (AECOM, 2019c), which was revised to address NJDEP/Weston's April 26, 2019 comments and the City/ERFS's May 4, 2019 comments on the RAWP Technical Addendum is included as **Attachment A**.

Appendices included as part of the GA Group RAWP, such as the Air Monitoring Plan, Dust Control Plan, Traffic Safety and Control Plan, Soil and Stockpile Management Plan, Health and Safety Plan, and the Contingency and Communications Plan (which are listed in the Appendices within the Table

of Contents), have not been modified from the submittal of the GA Group RAWP and, therefore, are not resubmitted herein. An updated Receptor Evaluation, to include Carteret Avenue, will be included as part of the Remedial Action Report (RAR).

Changes to field procedures during the implementation of the Technical Execution Plans (TEPs) for the Southwestern Area, Phase 1C, Phase 2B-1, Phase 2B-2 through 2B-4, Phase 3A, Phase 3B, Phase 3C, Halladay Street South (the portion of Halladay Street between Caven Point Avenue and Carteret Avenue), Site 135 North, Site 135 South, Al Smith Moving Property, Forrest Street, Forrest Street Properties, and Halladay Street North (the portion of Halladay Street between Carteret Avenue and Forrest Street)/the former Halsted Corporation property (Halsted) also apply to Carteret Avenue. Changes to field procedures have been documented in previously issued Field Change Notification memoranda. A copy of the Field Change Notifications Tracking Sheet for the GA Group, which indicates Field Change Notifications relevant to the Carteret Avenue soil remediation, is included as **Attachment C**.

2.0 Site Layout

The Project Area is located in an industrial area in Jersey City, New Jersey. It is bounded by Site 114, Halladay Street North, Halsted, and the One0One Pacific building on the north side of the street, by Sites 133E, 135, Halladay Street South, Sites 132, 137A, and 143 on the south side of the street, by Garfield Avenue to the west, and by Pacific Avenue to the east. The existing conditions plan is shown on **Drawings C-01.1** and **C-01.2**.

The topography of the Project Area is relatively flat. Underground utilities that run beneath Carteret Avenue include water, gas, a 48-inch combined sewer, and a 96-inch combined sewer (see **Drawings C-01.1** and **C-01.2**). Overhead electric utility lines, which connect to overhead electric utility lines in Garfield Avenue, are present on the west end of Carteret Avenue (see **Drawing C-01.1**). Sheet pile is present along much of Carteret Avenue, including along Site 114, Site 132, Site 137A, Halladay Street South, Site 133E, and a portion of Site 135N (see **Drawings C-01.1** and **C-01.2**).

Most of Carteret Avenue is surrounded by undeveloped land, where soil remediation has been conducted in accordance with the 1990 ACO and 2009 JCO and in compliance with the letter from Mr. Thomas Cozzi of the NJDEP to the former Site Administrator W. Michael McCabe, dated August 13, 2013 (*Updated Method to Determine Compliance with the Department's Chromium Policy Garfield Avenue Group - Sites 114, 132, 133, 135, 137, and 143*) (Method to Determine Compliance) (NJDEP, 2013). The only building adjacent to Carteret Avenue is the One0One Pacific Avenue, LLC building located on Pacific Avenue. However, alleyway access to the Fresenius Kidney Care building, a medical care facility located adjacent to the One0One Pacific Avenue, LLC building, is provided via Carteret Avenue (see **Drawing C-01.2**). The portion of Carteret Avenue between Garfield Avenue and Halladay Street has been closed to the public since January 2014.

3.0 Previous Investigations/Activities

3.1 Remedial Investigation

Remedial Investigation (RI) activities for soil and groundwater have been conducted within the GA Group Sites, including Carteret Avenue. The findings from GA Group RI activities are documented in various reports as noted in the GA Group RAWP. A summary of the findings of the RI were presented in the GA Group RAWP, in the *Final Revision 1 Supplemental Soil Remedial Investigation Report – Soil, Garfield Avenue Group Non-Residential Chromate Chemical Production Waste Sites - 114, 132, 133, 135, 137, 143, and Adjacent Properties and Roadways* (AECOM, 2018d), and in the *Draft Groundwater Remedial Investigation Report, PPG Garfield Avenue Group, Hudson County Chromium Sites, Jersey City, New Jersey* (GW RIR) (AECOM, 2018g). RI soil results specific to Carteret Avenue have also been document in the Technical Memorandum entitled: *Carteret Avenue Terminal Excavation Elevation (TEE) Submittal (Revision 1)* (Carteret TEE Submittal [Revision 1]) (AECOM, 2017b).

3.2 Pre-Design Investigation

Prior to the start of remediation activities, pre-design investigation (PDI) activities, including a physical survey of the area, installation of soil borings, and soil sampling activities, were conducted. Details of the physical survey are provided on the Remediation Design Drawings (attached). RI and PDI analytical results associated with samples collected from Carteret Avenue as of August 2017 were presented as part of the Carteret TEE Submittal (Revision 1).

Performing the soil sampling and analysis as part of the PDI activities enables the excavation to be backfilled without waiting for confirmatory sample results during the excavation activities, resulting in efficient progress of the soil remediation program. However, due to the presence of underground utilities, particularly the 96-inch combined sewer, data gaps exist within the Project Area. Therefore, additional samples will be collected during excavation to complete the dataset in areas and to comply with the Method to Determine Compliance (NJDEP, 2013). The proposed excavation sampling plan is described in detail in **Section 5.6**.

3.3 Sewer Pipe Investigation

In spring 2018, an investigation was planned within Carteret Avenue in an attempt to determine the location and elevation of the top of the 96-inch combined sewer line, to determine the elevation of the sewer spring-line, and to visually and analytically investigate the nature of the sewer pipe bedding material. The work plan for these test pits was described in the Technical Memorandum entitled, *Carteret Avenue Sewer Pipe Bedding Investigation Workplan (Revision 2)*, dated March 30, 2018 (AECOM, 2018a).

One of the planned test pits was advanced in May 2018, but the sewer bedding investigation could not proceed due to the unexpected depth of the pipe, the presence of timber shoring at the side of the pipe, and the soil conditions encountered. A second test pit was advanced during the last week of June 2018, with no attempt to investigate the sewer bedding in accordance with verbal discussions held with NJDEP. The information from these two test pits has been incorporated into the Remediation Design Drawings (attached).

Because the sewer bedding investigation could not be completed during the test pit activities, the sewer pipe bedding will be investigated during remedial construction. During remediation, the pipe will be exposed to the spring-line in several areas. In three locations, approximately Sewer Station 4+20, 5+40, and 7+50 (see **Figure 5-1A** and **5-1B** and **Drawings C-03.1** and **C-03.2**), “soft dig” methods, such as vacuum, hydraulic removal, or hand digging, will be used adjacent to the pipe to investigate the bedding material for the presence of CCPW. These locations were selected based on the highest pre-remediation concentrations of Cr⁺⁶ in soil at the approximate pipe elevations.

3.4 Roadway “Emanating from” Evaluation

An evaluation has been conducted to determine whether non-CCPW-related impacts have emanated from Site 114 into the surrounding roadways within the GA Group. Based on the results of the Roadway “Emanating From” Evaluation, non-CCPW-related impacts (from former Manufactured Gas Plant [MGP]-related operations at Site 114) have emanated from Site 114 into Carteret Avenue, including 2-methylnaphthalene, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene. The results of the Roadway “Emanating From” Evaluation have been presented in the Technical Memorandum entitled, *Halladay Street North, Carteret Avenue and Garfield Avenue – Emanating From Parameters* (AECOM, 2018f). On February 14, 2019, Weston, on behalf of NJDEP, concurred with the memorandum’s conclusions (Weston, 2019).

Remediation of non-CCPW-related impacts, specifically MGP-related impacts, that have emanated from Site 114 into Carteret Avenue will be addressed as part of this Remedial Action as detailed in **Section 5.4**.

3.5 Interim Remedial Measure (IRM)

During site inspections performed on December 28, 2015 and February 8, 2016 in Carteret Avenue, representatives from AECOM and Weston (on behalf of NJDEP) observed green water pooling in the sheet pile pre-trench located at the boundary of Phase 1B, Phase 2B-3, and Carteret Avenue. Additionally, on February 19, 2016, AECOM and Weston representatives observed yellow-tinted water pooling in the sheet pile pre-trench near Site 133 West. The source of this water was either rainwater collecting on top of the pre-trench soil or groundwater seeping through the pre-trench soil. Because the pre-trench soil is impacted by CCPW, the green and yellow color indicated that Cr⁺⁶ had likely leached from the soil into the water.

To prevent Cr⁺⁶ contained in pooling water in the pre-trench from impacting clean backfill in the vicinity of the pre-trench, PPG installed an Interim Remedial Measure (IRM) in the sheet pile pre-trenches. The IRM design was submitted to the Principal Parties in the Technical Memorandum entitled, *Garfield Avenue Group – Surface Water Exposure to Impacted Material Along Perimeter Sheet Pile Pre-Trench* dated March 9, 2016 (AECOM, 2016a), which was approved on March 23, 2016 by NJDEP. The IRM included placement of a 40 millimeter high density polyethylene (HDPE) demarcation liner in the bottom of the pre-trenches and following backfilling with dense-graded aggregate (DGA). The backfill was graded to both prevent pooling of water and prevent contact between rainwater and CCPW-impacted soil. The backfill was amended with FerroBlack[®]-H to prevent contamination of the DGA backfill by groundwater impacted with Cr⁺⁶. Installation of the IRM was completed from April 4, 2016 through April 15, 2016. Monthly inspection of the IRM is ongoing. This IRM is within the proposed excavation footprint, and will be completely removed during remediation. The location of the IRM is depicted in **Drawing C-02.1**.

4.0 Pre-Construction Activities

4.1 Permitting

Prior to starting the field activities, applicable permits will be acquired by the contractor. A list of applicable permits is shown below in **Table 4-1**.

Table 4-1 List of Applicable Permits and Authorizations

Permit Name/ Authorizing Entity	Required for	Status
Traffic engineering permits/Jersey City Traffic Engineering Department	Street or sidewalk closures and/or openings.	A road closure permit has been obtained for a portion of Carteret Avenue. A road closure permit for the remainder of Carteret Avenue and a street opening permit for excavation will be obtained by the Contractor prior to performing the work. Permits will be renewed as needed.
Registration of Excavation / Jersey City Engineering Department	Excavations on public property (roadway).	The registration will be filed by the contractor performing the work.
Building Permit/Jersey City Building Department	The presence of construction and security trailers.	The permits are maintained for construction trailers currently located on Site 135 and for the security trailer located directly adjacent to Carteret Avenue.
Soil Erosion and Sediment Control Plan (SESCP)/Hudson-Essex-Passaic Soil Conservation District (HEPSCD)	Soil disturbances greater than 5,000 square feet (ft).	An SESCP was submitted to HEPSCD on 1/20/2015 and approved on 2/5/2015. The start notice was submitted on 3/20/2015. An application for SESCP re-certification for Carteret Avenue was submitted on 7/18/2018 and approved on 8/10/2018.
Fire Safety Permits/Jersey City Fire Department	The storage of acids and/or combustibles in quantities greater than 55 gallons and the storage and handling of gasoline in closed containers in quantities not greater than 660 gallons.	The Fire Safety Permits are maintained on Site to support the remediation of Carteret Avenue. Permits numbered 18-0549 and 18-0550 were approved on 11/19/2018, and will be renewed and updated as required.

Permit Name/ Authorizing Entity	Required for	Status
New Jersey Community Right-to-Know and federal Emergency Planning and Community Right-to-Know Act (EPCRA)	Having 500 pounds (lbs) or greater of Environmentally Hazardous Substance on site; EPCRA only for having 10,000 lbs or more of other chemicals requiring a Safety Data Sheet but not listed in Table 1: EPCRA Chemicals and Reporting Thresholds of the EPCRA Fact Sheet (USEPA, 2017).	Will be filed if reporting requirements are triggered.
Water Allocation Permit (WAP)/NJDEP	Having the capability to divert in excess of 100,000 gallons per day and <= 6,000,000 gallons per month.	The WAP application for the Garfield Avenue Group Sites remediation project was submitted on 5/6/2019. In the interim, approval for an emergency diversion was requested on 5/20/2019 and approved on 5/28/2019, to support the continuation of soil remediation in Carteret Avenue.
Well Abandonment Permits/NJDEP	Having wells within the confines of the area of disturbance in accordance with New Jersey Administrative Code (N.J.A.C.) 7:9D prior to the start of work.	Wells that require decommissioning are listed in Table 4-2 .
Flood Hazard Area (FHA) Individual Permit and Hardship Exception Request (HER)	Regulated (excavating and filling) activities that fall within the 100-year flood elevation as depicted on the 2006 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map. The HER is for the staging/storing or processing of hazardous substances within the FHA.	An FHA permit modification for the GA Group project area, which included additional contiguous properties to the FHA permit that are located within the flood hazard area, was approved on 8/11/2017. The permit modification was recorded at the Hudson County Register of Deeds on 8/23/2017.
Discharge to Groundwater Permit-by-Rule (PBR) (only applicable if FerroBlack®-H amended backfill is used)	For application of FerroBlack®-H (amended backfill) for the GA Group of Sites.	Approved as of 10/17/2012, with modification approved on 3/24/2017. A new PBR renewal application was submitted in July 2017 prior to its expiration on 10/17/2017. The new PBR authorization request was approved on 10/11/2017. Refer to Section 5.7.2 for additional information.

4.2 Well Decommissioning

Monitoring wells listed in **Table 4-2** are located within the Project Area, as shown on **Drawings C-01.1** and **C-01.2**. To facilitate the excavation, these monitoring wells will be decommissioned by a New Jersey licensed driller in accordance with the requirements of *Well Construction and Maintenance; Sealing of Abandoned Wells, N.J.A.C. 7:9D* (NJDEP, 2007). As identified in **Table 4-2**, a subset of these wells is proposed to be replaced during restoration of Carteret Avenue as shown on **Drawings C-02.1, C-02.2, C-04.1, and C-04.2**.

Table 4-2 Wells to be Decommissioned

Well ID	Well Permit Number	Total Depth (ft bgs)	Screened Interval (ft bgs)	Head Configuration	Inner Well Diameter (inches)	Proposed Action
114-MW22A	26-00081-172	19.0	7.0-19.0	Flush Mount	2.0	Decommission and Replace
114-MW22B	26-00081-173	33.0	28.0-33.0	Flush Mount	2.0	Decommission and Replace
114-P2B3-MW1	E201409186	15.0	5.0-15.0	Flush Mount	2.0	Decommission*
114-P2B3-MW2	E201409187	17.0	7.0-17.0	Flush Mount	2.0	Decommission and Replace
114-P2B4-MW1	E201409188	17.0	7.0-17.0	Flush Mount	2.0	Decommission**
132-P3A-MW1	E20140048	15.0	5.0-15.0	Flush Mount	2.0	Decommission and Replace*
132-P3A-MW5	E20140052	17.0	7.0-17.0	Flush Mount	2.0	Decommission**
137-P3B-MW1	E201413188	15.0	5.0-15.0	Flush Mount	2.0	Decommission
MW-34	E201211015	18.0	8.0-18.0	Stick-Up	2.0	Decommission
MW-35	E201211016	18.0	8.0-18.0	Stick-Up	2.0	Decommission

Notes:

* Well could not be located during the May 2018 well gauging event.

**NJDEP may request replacement of these wells, contingent on their review of the GW RIR (AECOM, 2018g).
ft bgs – feet below ground surface

4.3 Utility Relocation

The existing underground utilities within the work area, including water, a 48-inch combined sewer, a 96-inch combined sewer, and gas, are shown on **Drawings C-01.1** and **C-01.2**. Existing above-ground utilities within the work area, which include overhead electric utility lines, are shown on **Drawing C-01.1**. Refer to **Section 5.8**, for details regarding utility restoration requirements.

4.3.1 Water

There is a water line that runs from Pacific Avenue into Carteret Avenue, where it terminates (see **Drawing C-01.2**). The portion of the water line that terminates in Carteret Avenue does not service any buildings or other infrastructure (e.g., fire hydrants), and will be decommissioned as shown on **Drawing C-02.2**. PPG will ensure that active businesses in the area maintain sufficient access to water service during construction.

4.3.2 Combined Sewer

A 96-inch carbon steel combined sewer main, which is owned by the JCMUA, runs the length of Carteret Avenue. As discussed in the Carteret Avenue Remediation Plan (Revision 1) (AECOM,

2018b), the 96-inch combined sewer line will be protected in place during excavation. The 96-inch combined sewer line runs the entire length of Carteret Avenue and slopes from west to east. There is a siphon associated with the former Morris Canal located at approximately Sewer Station 3+30 to 3+90 (see **Drawing X-01.1**)

As shown on **Drawings C-01.1** and **C-01.2**, a 48-inch concrete combined sewer line runs along the eastern portion of Carteret Avenue. This sewer line services Halladay Street, Forrest Street, and areas north. JCMUA has indicated that they plan to decommission the 48-inch sewer; a timeframe for the decommissioning has not been set. Excavation within the area of the 48-inch sewer will extend to El. 3.5 ft NAVD88, which is approximately 3.5 ft above the top of the pipe. Therefore, remedial excavation in Carteret Avenue will not impact the existing 48-inch sewer.

Catch basins and drain connections within the excavation footprint in Carteret Avenue will be removed and replaced, while the nearby catch basin and drain connections in Garfield Avenue and Pacific Avenue will be protected in place, as shown on **Drawings C-02.1** and **C-02.2**.

4.3.3 Gas

There are two gas lines that terminate in Carteret Avenue. One of the gas lines runs from Garfield Avenue and one the runs from Pacific Avenue as shown in **Drawings C-01.1** and **C-01.2**, respectively. The portions of these gas lines that terminate in Carteret Avenue do not service any nearby buildings and will be decommissioned as shown on **Drawings C-02.1** and **C-02.2**.

4.3.4 Overhead Electric

There is an overhead electric utility line that runs from Garfield Avenue into Carteret Avenue, where it terminates (see **Drawing C-02.1**). This portion of the electric utility line does not service any buildings and will be decommissioned, as shown on **Drawing C-02.1**.

4.4 Public Health and Safety

In consideration of the health and safety of occupants of the Pacific Avenue buildings adjacent to the excavation area and of the public, non-construction vehicle access to Carteret Avenue will be prohibited. Jersey barriers with chain-link fencing will be used to prevent non-construction vehicles from inadvertently accessing the work zone from Garfield Avenue, Halladay Street, and Pacific Avenue as shown on **Drawings C-02.1** and **C-02.2**. Signage and a police detail will be provided as required by the traffic engineering permits (to be obtained prior to commencing work). Additional details on traffic control measures can be found in the Traffic Safety and Control Plan (maintained on-Site in the AECOM trailer).

Details on measures to protect the Pacific Avenue building occupants from construction-related dust are found in the Air Monitoring Plan and Dust Control Plan (maintained on-Site in the AECOM trailer). Locations for Perimeter and Fenceline Air Monitoring Stations, to be placed during the excavation and backfilling of Carteret Avenue, are presented in *Air Monitoring Plan Amendment 35 (Amendment to the AECOM, Air Monitoring Workplan for Ground Intrusion Activities at the Garfield Avenue Site in Jersey City, New Jersey December 2010 Revision. July 2011)* (AECOM, 2018h) (**Attachment D**), which was approved by NJDEP on November 7, 2018 (NJDEP, 2018).

5.0 Construction Activities

The construction activities (including soil excavation, soil sampling, stormwater management, and dust suppression activities) for Carteret Avenue will be implemented in the manner described in the *Final Technical Execution Plan, Southwestern Area Soil Excavation, PPG Site 114 – Garfield Avenue, Jersey City, New Jersey* (SW TEP) (AECOM, 2012a) and the *Technical Execution Plan - Southwest TEP Addendum (Site 135 South Soil Excavation)* (SW TEP Addendum) (AECOM, 2016b). A general description of key parts of these activities is described below.

5.1 Excavation

As presented in the Carteret Avenue Remediation Plan (Revision 1) (AECOM, 2018b), and as requested by the City, excavation in Carteret Avenue will be conducted to create a clean corridor with no CCPW-related or historic fill-related impacts down to elevation 3.5 ft in the North American Vertical Datum of 1988 (NAVD88), where technically feasible. Excavation will continue below elevation 3.5 ft NAVD88 to remove soil with concentrations of hexavalent chromium (Cr^{+6}) greater than 20 milligrams per kilogram (mg/kg) down to the spring-line of the pipe, and deeper than the spring-line of the pipe to remove source material (i.e., visible CCPW and Cr^{+6} concentrations in soil greater than 1,000 mg/kg), where present. Visible CCPW includes Chromite Ore Processing Residue (COPR) and/or green-gray mud.

As presented in **Drawings C-03.1** and **C-03.2**, remedial excavation will extend across the entire span of the Carteret Avenue 60-ft wide right-of-way from the intersection with Garfield Avenue to a point approximately 30 ft west of the intersection with Pacific Avenue, except where a 15-ft excavation buffer is required adjacent to the Pacific Avenue properties as discussed in **Section 5.2.4**. Sampling conducted to date indicates that CCPW-related impacts are not present within Carteret Avenue within a distance of 30 ft west of the intersection with Pacific Avenue.

Excavation within 24-inches of the 96-inch combined sewer will be conducted using “soft dig” methods, such as vacuum, hydraulic removal, or hand digging to reach the surface of the pipe, as presented in the Carteret Avenue Remediation Plan (Revision 1) (AECOM, 2018b). If the excavation needs to extend below the spring-line of the pipe to accommodate removal of source material, a 4-foot horizontal offset from the pipe has been established based on an agreement made between PPG and JCMUA at an October 22, 2018 meeting at the JCMUA office in Jersey City.

Some soils with Cr^{+6} concentrations greater than the NJDEP interim Chromium Soil Cleanup Criteria (CrSCC) will be left in place below the clean corridor, as limiting excavation in this area will protect the existing combined sewer. Remaining impacts surrounding the existing combined sewer will be managed as described in **Section 5.5**. CCPW-related impacts anticipated to remain following excavation based on the proposed excavation cut lines are depicted on **Figures 5-1A** through **5-2C** and on **Tables 5-1A** through **5-2B**. The CCPW source material observed to date will be removed based on the proposed excavation cut lines. CCPW-related impacts to remain in Carteret Avenue following excavation will be remediated by PPG in the future in accordance with the Method to Determine Compliance (NJDEP, 2013) if and when the 96-inch combined sewer is removed for replacement.

Excavation pit bottom and sidewalls will be sampled, as needed, to confirm that remedial objectives have been met. Excavation sampling is discussed in **Section 5.6**. Excavation pit bottoms and sidewalls will be visually assessed for potential CCPW impacts by a PPG representative with Weston oversight. CCPW source material observed as part of field investigation activities or during excavation will be excavated until CCPW source material is no longer observed. If CCPW source material is observed at the excavation boundaries (adjacent to Garfield Avenue or Pacific Avenue/Pacific Avenue properties), it will be documented for removal during a future phase of work, as described in **Section 5.2**.

The approximate horizontal and vertical excavation limits are shown on **Drawings C-03.1** and **C-03.2** and on **Figures 5-1A** through **5-2C**. **Figures 5-1A** through **5-2C** also show soil samples with CCPW-related impacts (i.e. Cr⁺⁶ and CCPW-related metals [antimony, chromium, nickel, thallium, and vanadium] concentrations in excess of the applicable standards described in the GA Group RAWP, and visible CCPW). **Tables 5-1A** and **5-1B** present validated and non-validated Cr⁺⁶ analytical results, respectively, for soil samples collected within Carteret Avenue. **Tables 5-2A** and **5-2B** present validated and non-validated CCPW-related metals analytical results, respectively, for soil samples collected within Carteret Avenue. Excavation cross sections, depicting the proposed excavation limits, are presented on **Drawings X-01.1** and **X-01.2**.

5.2 Excavation Boundaries and Support of Excavation

5.2.1 Adjacent to Garfield Avenue

Excavation adjacent to Garfield Avenue will be achieved by sloping. Excavation along this boundary will be limited by the presence of utilities within Garfield Avenue. The excavation design will maximize the removal of impacted material while protecting the 96-inch combined sewer in Carteret Avenue and the existing infrastructure in Garfield Avenue, in particular the storm sewer and associated catch basins and the gas line. As a result, some impacted material may remain in place within Carteret, which will be addressed as discussed in **Section 5.5**.

5.2.2 Adjacent to Site 114

Sheet pile has been installed between Site 114 and Carteret Avenue, which will provide support to the excavation along that boundary.

5.2.3 Adjacent to Halladay Street North and Halsted

Excavation adjacent to Halladay Street North and Halsted will be achieved by sloping from the Carteret Avenue excavation up towards the existing ground surface in Halladay Street North and Halsted. Note that materials in the sloped portion between Carteret Avenue and Halladay Street North will be remediated as part of the future Halladay Street North remedial excavation.

5.2.4 Adjacent to Pacific Avenue Properties

Excavation adjacent to the Pacific Avenue properties will be achieved by sloping. Excavation along this boundary will be limited by the presence of the vacant building, owned by One0One Pacific Ave, LLC, which is being renovated for use as a brewery. The Structural Engineer has completed a structural evaluation of the Pacific Avenue buildings adjacent to the excavation area and the results are provided as **Attachment E**. Based on the results of the structural evaluation, a 15-ft excavation buffer with a maximum slope of 1.5H:1V has been established adjacent to the Pacific Avenue properties to protect the building owned by One0One Pacific Ave, LLC as shown on **Drawing C-03.2**.

The excavation design will maximize the removal of impacted material while protecting the existing building. As a result, some impacted material may remain in place adjacent to the Pacific Avenue properties, which will be addressed as discussed in **Section 5.5**.

5.2.5 Adjacent to Pacific Avenue

Excavation adjacent to Pacific Avenue will be achieved by sloping. The excavation in Carteret Avenue will extend to approximately 30 ft west of the intersection with Pacific Avenue as presented on **Drawings C-03.2** and will slope up towards Pacific Avenue. If conditions observed in the field indicate that the excavation must extend closer to Pacific Avenue, excavation will be designed and sequenced to minimize impacts to existing infrastructure in Pacific Avenue. If impacts are observed to extend into Pacific Avenue, they will be addressed at a later date and are not part of the Carteret RAWP.

5.2.6 Adjacent to Sites 135 and 143

Sheet pile has been installed between a portion of Site 135 and Carteret Avenue, which will provide support to the excavation along that boundary (see **Drawing C-01.2**). Excavation adjacent to the remaining portion of Site 135 and adjacent to Site 143 where no sheet pile is installed will be achieved by excavating to the property line and sloping up into Site 135 and Site 143.

5.2.7 Adjacent to Sites 132, 133, and 137, and Halladay Street South

Sheet pile has been installed along the portion of Carteret Avenue adjacent to Halladay Street South, Sites 132, 133, and 137, which will provide support to the excavation along that boundary.

5.3 CCPW-Related Metals

In accordance with PPG's obligation under the 1990 ACO and the 2009 JCO, PPG is responsible for remediating CCPW-related metals within Carteret Avenue. PPG has conducted a review of CCPW-related metals data collected to date within Carteret Avenue, and based on the proposed excavation cut lines, no CCPW-related metal concentrations in soil greater than the NJDEP RDSCRS or NRDCRS are anticipated to remain following excavation. If it is determined that CCPW metals will remain in soil within Carteret Avenue following excavation based on additional data to be collected during excavation (i.e., 10% parameter samples), PPG will work to achieve compliance in accordance with NJDEP's *Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria*, dated September 24, 2012 (NJDEP, 2012a), which may include compliance averaging or implementation of institutional and engineering controls as described in **Section 5.5**.

5.4 Non-CCPW-Related Impacts

Based on analytical sample results from previous field investigations, including PDI and RI, non-CCPW-related impacts, including MPG-related impacts and historic-fill-related impacts, are present in soil and groundwater within Carteret Avenue. PPG is responsible for non-CCPW-related impacts within Carteret Avenue that have emanated from Site 114 into Carteret Avenue. As discussed in **Section 3.4**, PPG conducted an evaluation to determine if non-CCPW-related impacts have emanated from Site 114 into Carteret Avenue. Based on the results of the "emanating from" evaluation, specific MGP-related "emanating from" parameters have been identified in Carteret Avenue (see **Section 3.4**).

Based on analytical sample results and boring logs generated during previous field investigations conducted by PPG and Public Service Electric and Gas Company (PSEG), MGP-related impacts are

present in Carteret Avenue. Carteret Avenue is entirely within the limits of the PSEG groundwater classification exception area designated as “AOC-4, Groundwater Impacted by MGP Residuals” as part of the *Remedial Investigation Report, Former Halladay Street Gas Works, Jersey City, New Jersey* (AMEC, 2014). In accordance with the 1990 ACO and 2009 JCO, PPG and PSEG are jointly responsible for remediation of the MGP-related impacts emanating from Site 114.

Some non-CCPW-related impacts, including MGP-related impacts and historic fill as defined by N.J.A.C. 7:26E-1.8 (NJDEP, 2012a), will be removed during excavation of the clean corridor in Carteret Avenue; however, some impacted soils will remain following excavation. Remaining MGP-related impacts will be addressed as discussed in **Section 5.5**.

Areas where removal of historic fill that does not contain CCPW or MGP-related impacts (i.e., non-chrome fill) is required to establish a clean corridor in Carteret Avenue are detailed in the Technical Memorandum entitled, *Carteret Avenue Non-Chrome Fill Soil Re-Use Plan (Revision 2)* (AECOM, 2019e), included as **Attachment F**. While PPG is not responsible for remediation of impacts within Carteret Avenue that are related to historic fill, it has agreed to excavate historic fill on behalf of Jersey City to establish a clean corridor for future utility work. As the generator of the material (i.e., the to-be-excavated historic fill within Carteret Avenue), PPG has developed the re-use plan for this material to be placed as backfill below the clean corridor.

Data gaps exist in areas where non-chrome fill material is required to be excavated in order to establish a clean corridor. Therefore, additional sampling of the non-chrome fill to be excavated will be conducted to confirm the absence of CCPW-related impacts. Sampling of the non-chrome fill material will be conducted in accordance with the Method to Determine Compliance (NJDEP, 2013). The non-chrome fill areas within Carteret Avenue, for which the soil re-use plan has been prepared, are presented in **Figures 1A, 1B, 2A, and 2C**. Either the City or PPG will arrange for off-site transportation and disposal of the non-chrome fill material in accordance with the cost-sharing agreement between the City and PPG. If it is determined that the City will be responsible for off-site transportation and disposal of the non-chrome fill material, the City will serve as the generator and will be required to obtain a United States Environmental Protection Agency Identification Number (EPA ID No.) separate from PPG’s EPA ID No.

Engineering controls (clean fill cap) and institutional controls (notice in lieu of deed notice [see **Section 5.5**]) will be implemented to prevent exposure to soils containing MGP-related “emanating from” impacts, that will remain in soil within Carteret Avenue at concentrations greater than the NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS) and/or Non-Residential Direct Contact Soil Remediation Standards (NRDCSRS) following excavation.

5.5 Institutional and Engineering Controls

Impacts to remain in Carteret Avenue following excavation, including CCPW-related impacts and MGP-related impacts will be documented in notices in lieu of deed notice. A draft notice in lieu of deed notice will be submitted as part of the RAR, to be prepared by PPG, and will include CCPW-related impacts remaining following excavation. It is anticipated that PSEG will file a separate notice in lieu of deed notice for MGP-related impacts remaining following excavation.

Although Carteret Avenue is not specifically listed as a sewer site per the September 7, 2011 Consent Judgment (2011 Consent Judgment) (Superior Court of New Jersey, Law Chancery Division – Hudson County, 2011), CCPW-related impacts remaining in Carteret Avenue will be addressed through implementation of standard operating procedures and worker training requirements

developed in accordance with the Sewer Protocol. The Sewer Protocol, authored in 2011, is part of the Orphan Chromium Site Agreement between NJDEP, PPG, Honeywell, and Tierra Solutions. The Sewer Protocol addresses the remediation approach to be implemented when impacted soils are rendered inaccessible due to their proximity to infrastructure such as sewer lines. Within the Carteret Avenue right-of-way, PPG and utility owners shall utilize the *Procedure for Coordinating Utility Work within Chromium Soil Areas, Honeywell Sites, Jersey City, New Jersey* (AMEC, 2017a) and the *Worker Training Manual for Managing Contaminated Soils and Groundwater, Honeywell Sites, Jersey City, New Jersey* (AMEC, 2017b), in substantially the forms prepared by AMEC Environment & Infrastructure, Inc. for Honeywell Sites.

A 2-ft thick clean fill cap (DGA) will be placed above the base of the excavation (or on top of the non-chrome fill, where re-used). As depicted on **Drawing D-02**, a visual demarcation layer will be installed between the base of the excavation (and on top of the non-chrome fill, where re-used) and the clean fill cap, in accordance with the *Technical Requirements for Site Remediation, N.J.A.C. 7:26E* (NJDEP, 2012c). The clean fill cap will be an engineering control to restrict access to soils within Carteret Avenue where CCPW-related impacts and MGP-related impacts remain following excavation. The engineering control will be maintained in accordance with *Technical Requirements for Site Remediation, N.J.A.C. 7:26E* (NJDEP, 2012c).

Remaining CCPW-related impacts in Carteret Avenue will be further remediated by PPG in the future, in accordance with the Method to Determine Compliance (NJDEP, 2013), if and when the inaccessible areas become accessible and if required when utility work is necessary.

5.6 Post-Excavation Sampling

In locations where the PDI sampling is not completed or is deemed insufficient, post-excavation (pit bottom and sidewall) sampling will be conducted. Post-excavation sampling will also be conducted within locations with identified data gaps, as presented in the Technical Memorandum entitled, *Carteret Avenue Terminal Excavation Elevation Submittal (Revision 1)* (AECOM, 2017b). Post-excavation samples will be collected consistent with the requirements set forth in the Method to Determine Compliance (NJDEP, 2013), the August 10, 2015 email from Weston to AECOM, Subject: *RE: Sidewall Sampling Exceedance Procedure* (Weston, 2015), and the GA Group RAWP (AECOM, 2018e). Sampling will be performed in accordance with the *Field Sampling Plan/Quality Assurance Project Plan, Non-Residential and Residential Chromium Sites, Hudson County, New Jersey* (AECOM, 2010), as updated. Sidewall samples will not be collected where the excavation area abuts sheet pile (i.e., along Sites 114, 133, 135 (portion of), and 137, and Halladay Street South), or adjacent to areas where remediation of soil has been conducted (i.e. Halsted).

Post-excavation samples will be analyzed for Cr⁺⁶, pH, and oxidation-reduction potential (ORP). Additionally, samples will be analyzed at a frequency of 10% for Target Analyte List (TAL) metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) (10% parameters).

If visual or analytical results indicate that additional excavation onto adjacent properties not currently part of the GA Group (i.e., One0One Pacific or Pacific Avenue) is required, remediation will be addressed at a later date and is not part of this Remedial Action.

As described in **Section 5.1**, the excavation will be designed to streamline excavation operations and minimize internal sidewall sampling during excavation.

5.7 Backfill

5.7.1 Elevations

Prior to placing backfill, the bottom of the excavation will be surveyed by a surveyor licensed in the State of New Jersey and a visual demarcation layer will be installed as described in **Section 5.5**. The excavation area will be backfilled with DGA from the bottom of the excavation up to the bottom of the existing road subgrade elevation (see **Drawings C-04.1, C-04.2, X-02.1, and X-02.2**), compacted to a minimum 90% of maximum density as determined using the Standard Proctor test in accordance with the City of Jersey City standards. Backfilling to these elevations is proposed to achieve the Backfill Complete milestones set forth in the Master Schedule (Riccio, 2018). The Restoration Plan is presented on **Drawings C-04.1, C-04.2, X-02.1, and X-02.2**.

If visual or analytical results indicate that additional excavation onto adjacent properties not currently part of the GA Group of Sites (i.e., One0One Pacific or Pacific Avenue) is required, a plastic demarcation barrier will be placed between the clean backfill and remaining impacted areas (if accessible); remediation will be addressed at a later date and is not included within this RAWP.

5.7.2 Amendment

During previous excavations within the GA Group of Sites, the backfill amendment FerroBlack[®]-H has been used to reduce Cr⁺⁶ concentrations in shallow groundwater. Use of the backfill amendment FerroBlack[®]-H was approved for use in select areas within the GA Group of Sites as documented in the *Discharge Approval and Monitoring Requirements Associated with a Permit-By-Rule Discharge Authorization for PPG Industries (Permit by Rule)* (NJDEP, 2012b). The permit was modified in March 2017 to include additional areas within the GA Group of Sites and to increase the maximum allowable tonnage of FerroBlack[®]-H amendment. The approval for the PBR modification, which included Carteret Avenue, was granted on March 24, 2017, and reauthorized on October 11, 2017.

Cr⁺⁶ concentrations in shallow groundwater listed in **Table 5-3** below served as the basis for the use of FerroBlack[®]-H in other areas within the GA Group of Sites.

Table 5-3 Basis for Use of FerroBlack[®]-H

Cr ⁺⁶ Concentration in Shallow Groundwater	FerroBlack [®] -H Solution by Weight
Less than 1 ppm	0
Less than 100 ppm, but greater than 1 ppm	0.7%
Greater than 100 ppm	2%

Note:

ppm – parts per million

Data presented in the *Progress Report for Groundwater Pilot Study and FerroBlack[®]-H Amended Backfill Permits-by-Rule – 2016 Fourth Quarter (October to December)* (AECOM, 2017a) indicates that Cr⁺⁶ concentrations in shallow groundwater within Carteret are greater than the thresholds requiring the use of FerroBlack[®]-H (**Table 5-3**) within from Garfield Avenue to the eastern boundary of the Carteret Avenue and Halladay Street intersection. While post remediation shallow groundwater concentrations will likely be less than the threshold values, meadow mat in Carteret Avenue has been disturbed along the 96” sewer footprint, and intermediate groundwater concentrations are elevated throughout the street footprint. Therefore the backfill will be amended with FerroBlack-H at 2% from the bottom of excavation to the ground surface.

Based on the site conditions within Carteret Avenue and the criteria established as part of the *Capillary Break Design Final Report (Revision 2)* (AECOM, 2017c), a capillary break would be required in Carteret Avenue because of the presence soil with Cr⁺⁶ concentrations greater than 20 mg/kg. However, the use of DGA amended with FerroBlack[®]-H (2% solution by weight) will place an amended clean fill buffer of at least 7 feet above impacted materials. Based on this physical separation, a capillary break is not planned at this time.

The results of the evaluation of the capillary break and DGA amended with FerroBlack[®]-H within Carteret Avenue will be documented in a future addendum to the *Capillary Break Design Final Report (Revision 2)* (AECOM, 2017c) to be submitted for NJDEP/Weston review prior to the start of restoration in Carteret Avenue.

5.8 Sewer Rehabilitation/Restoration and Demobilization

Following backfill placement in Carteret Avenue, wells to be replaced as described in **Section 4.2** will be reinstalled. Wells to be replaced following backfill completion are shown on **Drawings C-02.1** and **C-02.2**.

JCMUA will mobilize to the Project Area and conduct the 96-inch combined sewer rehabilitation. As part of the sewer rehabilitation effort, JCMUA currently plans to abandon-in-place the siphon associated with the former Morris Canal. Where backfill amended with FerroBlack[®]-H is removed during rehabilitation of the 96-inch sewer, it will be replaced.

The final phase of remedial activities to be conducted within Carteret Avenue includes site restoration activities before demobilization from the area. Restoration of the Project Area will be conducted following rehabilitation of the 96-inch combined sewer. **Drawings C-02.1** and **C-02.2** and **Drawings C-04.1** and **C-04.2** indicate infrastructure to be replaced following rehabilitation of the 96-inch combined sewer. The conceptual details of restoration are included in **Drawing D-02**. Restoration Cross Sections are included in **Drawings X-02.1** and **X-02.2**. A determination of which party will be responsible for conducting restoration in Carteret Avenue is pending negotiations between PPG and the City, which are currently ongoing; restoration of the site will be conducted in accordance with the final agreement. The site restoration activities include the following:

- Eight inches of DGA backfill material will be placed within Carteret Avenue to form the street subgrade, which will be compacted to a minimum 95% of maximum density as determined using the Standard Proctor test in accordance with the City of Jersey City standards. DGA backfill will meet the requirements set forth in the previously approved SW TEP (AECOM, 2012a).
- Final grades within Carteret Avenue excavation limits will be as shown in **Drawing C-04.1** and **C-04.2** and **Drawings X-02.1** and **X-02.2**.
- The final surface finish in Carteret Avenue will match the pre-construction finish; the roadway will be restored to pre-remediation conditions to provide newly functional surfaces. Restoration will be consistent with City of Jersey City standard construction details and pre-construction conditions of Carteret Avenue.
- Storm drain replacement (**Drawings C-04.1** and **C-04.2**) will be performed in accordance with utility owner approvals. Materials that are compatible with FerroBlack[®]-H amendment will be used, as necessary.
- The work area will be cleared of temporary construction equipment.

- The work area and municipal roadways will be cleaned of residual dust or soil.
- Temporary signs used for traffic control will be removed.

Final restoration of Carteret Avenue, which includes replacement of infrastructure (e.g., road subgrade material, asphalt pavement, catch basins, etc.), will be conducted by PPG in kind or through reimbursement to the City and JCMUA in accordance with ongoing negotiations between PPG and JCMUA.

6.0 Schedule

The Carteret Avenue remediation is anticipated to be conducted in accordance with the project's current Master Schedule (Ricchio, 2019), with the exception of the Excavation Start milestone. The Excavation Start milestone is May 2019; however, excavation began one working day later on June 3, 2019. Excavation start was delayed due to needed repairs to the GA Group groundwater treatment plant. Excavation is anticipated to be completed by March 2020, backfilling is anticipated to be complete by April 2020, and restoration is anticipated to be complete by May 2020, in accordance with the project's Master Schedule.

7.0 References

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AECOM, 2017a. *Progress Report for Groundwater Pilot Study and FerroBlack[®]-H Amended Backfill Permits-by-Rule – 2016 Fourth Quarter (October to December)*. February 2017.

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AECOM, 2018c. *Draft Remedial Action Work Plan (Soil) – Carteret Avenue, Addendum to the Final Remedial Action Work Plan (Soil) Rev. 3, Garfield Avenue Group Sites, Jersey City, New Jersey*. June 2018.

AECOM, 2018d. *Final Revision 1 Supplemental Soil Remedial Investigation Report – Soil, Garfield Avenue Group Non-Residential Chromate Chemical Production Waste Sites - 114, 132, 133, 135, 137, 143, and Adjacent Properties and Roadways* August 2018.

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AECOM, 2018j. *Technical Memorandum: Response to NJDEP/Weston's 08/24/2018 Comments and the City/ERFS's 10/05/2018 Comments on the Draft Remedial Action Work Plan (Soil) – Carteret Avenue. November 11, 2018.*

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