



115 Tabor Road
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November 28, 2016

via Express Mail

Mr. David Doyle, Case Manager
New Jersey Department of Environmental Protection
Division of Responsible Party Site Remediation
401 East State Street, Mail Code 401-06
Trenton, NJ 08625-0420

**Re: RIR/RAWP/RAR Addendum
Study Area 5 – Site 153 Former Morris Canal
Jersey City, Hudson County, NJ
NJDEP PI# G0000008767**

Dear Mr. Doyle:

Honeywell is transmitting for NJDEP review three copies of the enclosed Addendum to the Remedial Investigation Report (RIR), Remedial Action Work Plan (RAWP) and Remedial Action Report (RAR) for Site 153 Former Morris Canal (Site).

The RIR/RAWP/RAR was submitted to the NJDEP in December 2014, and subsequently as a revised document in March 2015, to address comments received from Plaintiffs in a letter dated February 10, 2015.

The enclosed Addendum document provides additional information regarding soil delineation to address NJDEP comments on the remedial investigation (RI) portion of the report received via electronic mail correspondence dated July 31, 2015. Honeywell transmitted responses to the NJDEP comments via memorandum prepared by Amec Foster Wheeler on November 10, 2015 and discussed soil delineation at a meeting with NJDEP on May 5, 2016. The enclosed Addendum supplements the RI section of the report and provides the following information regarding completion of soil delineation:

- Soil delineation discussion including Site-wide overview and discussion of horizontal and vertical delineation for offsite adjacent properties
- Results of additional soil delineation sampling for the Eden Wood Realty, LLC property completed during 2015
- Revised/updated soil results figures for total and hexavalent chromium (Figures 4A through 4E)

Honeywell is submitting the enclosed document for NJDEP review and seeks approval for: (a) completion of RI requirements; (b) the proposed remedial actions for the specific properties adjacent to the Morris Canal discussed in the RAWP section of the report; and (c) the previously implemented Interim Remedial Measures at the Morris Canal Site discussed in the RAR section of the report, as the final remedial actions.

Honeywell is continuing its work with adjacent property owners to obtain consent for the remedial actions and implementation of institutional controls.

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In accordance with the Consent Decrees applicable to the Site, Honeywell provided the enclosed document to the BMUA and Plaintiffs for review 30 days prior to submittal to the NJDEP, and no comments were received from the parties.

If you have any questions, please call me at 973-455-3302.

Sincerely,



Maria Kaouris
Remediation Manager

MK:eg/sgf

Enclosure: Addendum to the RIR/RAWP/RAR for Site 153 Morris Canal
(3 hard copies; 3 electronic copies on compact disk)

cc: (electronic copy)
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**Remedial Investigation Report/Remedial Action Work Plan/
Remedial Action Report Addendum
November 2016**

**Site 153 Morris Canal
Jersey City, Hudson County, NJ
NJDEP PI# G0000008767**

Amec Foster Wheeler on behalf of Honeywell has prepared this Addendum to the Site 153 RIR/RAWP/RAR dated December 2014 and revised March 2015. This document provides additional information regarding soil delineation to address NJDEP comments on the remedial investigation (RI) portion of the report in a memorandum dated July 22, 2015 (transmitted to Honeywell via email dated July 31, 2015). Honeywell transmitted responses to the NJDEP comments via memorandum prepared by Amec Foster Wheeler on November 10, 2015, and discussed soil delineation at a meeting with NJDEP on May 5, 2016.

This Addendum supplements the RIR (Section 5) of the report, and provides the following information regarding completion of soil delineation:

- RI sampling program summary
- Soil delineation discussion including Site-wide overview and horizontal and vertical delineation for offsite adjacent properties in each direction relative to Site 153
- Results of additional soil delineation sampling completed during 2015 for the Eden Wood Realty, LLC property
- Revised/updated soil results figures for total and hexavalent chromium (**Figures 4A through 4E**)

1.0 Site Background and History

The following background and historical information is taken from the RIR/RAWP/RAR for context and understanding of soil conditions for this submittal.

Site 153 Morris Canal (Site) is part of Study Area 5 (SA-5) and consists of a narrow strip of land (approximately 24 feet wide) along the east side of Route 440 adjacent to other SA-5 sites including Sites 090/184 (Baldwin Steel/M.I. Holdings; New Jersey City University [NJCU] property) and Site 117 (Ryerson Steel; current Home Depot retail facility). For the purpose of site identification and remedial action, Site 153 has been divided into several sections as described in the SA-5 Consent Decrees: Site 153 North (next to NJCU property), Site 153 South Upper Segment (next to Site 117) and Site 153 South Lower Segment (south of Site 117). The Site was originally identified in the 1993 Administrative Consent Order as

Block 1289.5, Lot E, located between Danforth Avenue and Carbon Place. The Site property is currently designated as Block 21902, Lot 1 (main parcel between Danforth Avenue and Carbon Place) and Block 26704, Lot 5 (small parcel south of Danforth Avenue).

The Site was the location of the former Morris Canal, which operated from the mid-1800s to the early 1900s. In 1924, the Morris Canal was drained and closed, and from 1924 through 1935 the Morris Canal bed was filled. Chromium contamination at Site 153 is associated with chromite ore processing residue (COPR) used to fill portions of the canal during its closure between 1924 and 1935. The Morris Canal was originally owned and operated by the Morris Canal & Banking Company (MCBC). From 1871 to 1924, the canal was operated by the Lehigh Valley Railroad (LVRR) under a lease agreement with MCBC. After its closure, the Jersey City portion of the former canal was retained by the LVRR and then conveyed to Consolidated Rail Corporation in 1976, and subsequently acquired by the City of Bayonne in 1988. During 1990, the City of Bayonne excavated a section of the former Morris Canal and installed a new sewer pipeline. The Site property was acquired by a Honeywell subsidiary (425/445 Route 440 Property, LLC) in 2007.

An assessment of the former Morris Canal in the SA-7 Final GIR (including reprints of engineered drawings dated 1920 and 1934) indicate that the bottom of the canal in the area of SA-5 was estimated at -0.2 feet mean sea level (MSL) elevation, which is consistent with the top of the meadow mat and corresponds to about 10 to 12 feet below current grade.

The Site is used as a utility easement and contains various utility lines including a 36-inch diameter sanitary sewer pipeline (force main) operated by the Bayonne Municipal Utilities Authority (BMUA). The sewer pipeline (known as the BMUA force main) is constructed of concrete encased pre-stressed concrete cylinder pipe, with depths to the top of the pipeline ranging from just below the surface pavement (next to NJCU and Site 117) to approximately 4 to 6 feet below grade (south of Site 117). The sewer pipeline conveys sewage from the City of Bayonne to the Passaic Valley Sewerage Commission. Other utilities along portions of the Site include electric, gas, storm sewer, water, and telephone lines that provide service to adjacent commercial properties.

2.0 RI Soil Sampling Program Summary

RI soil sampling included 21 borings during the initial RI in 1997-1999 and over 100 borings during additional investigation and delineation activities between 2009 and 2015. The more recent soil delineation sampling was conducted in accordance with a RIWP Addendum dated June 2005; modified by a letter from Honeywell dated September 18, 2006. The work plan was approved by the NJDEP via electronic mail correspondence on April 8, 2009. Soil sampling focused mainly on the shallow fill zone and was not intended to address native

soils below the fill, based on the presence of meadow mat and/or native soils directly below the fill and because chromium concentrations in native soils below the fill in certain portions of the Site are likely influenced by groundwater conditions (as indicated in Section 3.1 of the RIR/RAWP/RAR and discussed in more detail later in this Addendum).

The RI included soil borings and sampling within Site 153 and on the following offsite properties for delineation:

Property Owner	Land Use/Description	Location Relative to Site
NJDOT Route 440 ROW	State highway (shoulder area)	West
Regnal Realty, LLC	Highway commercial (occupied by Langer Transport)	East
Eden Wood Realty, LLC	Commercial (warehouse building)	East
Danforth Realty, LLC	Commercial (gas station facility)	East
Mon-West Realty, LLC	Commercial (office building)	East
440 Fisk Realty, LLC	Commercial (car dealership lot)	North
Water Street ROW	City street	Northeast

Soil delineation sampling included step-out borings and cluster-type sampling on adjacent properties, with samples biased to locations and depths where exceedances were detected within or along Site 153 and continuing until hexavalent chromium results were non-detect or less than the NJDEP soil criterion of 20 mg/kg.

For the Eden Wood Realty property, previous RI sampling results provided in the RIR/RAWP/RAR included soil sampling on the outside of the existing warehouse building. In order to evaluate the extent of hexavalent chromium contamination under the building, soil borings were completed on the north and south sides of the building to provide data for estimating potential chromium-impacted soils beneath the building footprint. During 2015, after obtaining an access agreement with the property owner for soil sampling beneath the building, additional soil sampling was performed to confirm delineation and define the extent of chromium-impacted soils. The additional sampling results are discussed herein and shown on the attached figures. A separate RIR/RAWP for the Eden Wood Realty, LLC property will be submitted to the NJDEP and will include documentation and laboratory data deliverables for the samples collected during 2015.

3.0 Soil Delineation

The following discussion addresses horizontal and vertical soil delineation with respect to the NJDEP soil criterion of 20 mg/kg, including Site-wide overview and detailed discussion for each of the adjacent offsite properties regarding delineation in each direction relative to Site 153.

Site-Wide Overview

Within the Site 153 property boundary, the highest concentrations of hexavalent chromium (i.e., 1,000 mg/kg to over 10,000 mg/kg) were detected at depths between approximately 2 and 12 feet, coincident with field observations of COPR fill within the northern portion of the Site next to other SA-5 sites (Site 090, 117 and 184). In some locations, hexavalent chromium was detected above 20 mg/kg at depths up to 24 feet. Soil samples collected from adjacent properties indicate substantially lower concentrations compared to soil data from within the Site 153 boundary. Overall Site-wide delineation is summarized as follows.

Horizontal Delineation

The horizontal and vertical extent of hexavalent chromium in soils has been delineated to the north, south, and east of the Site. In some locations, delineation of chromium-impacted soils extends into portions of the following offsite commercial properties and roadway areas: Danforth Realty, LLC; Eden Wood Realty, LLC; 440 Fisk Realty, LLC; Route 440 ROW (shoulder area); and City of Jersey City ROW areas proximate to the Site.

Delineation to the south is completed based on the soil boring 153-SB-032, located at the southern end of the Site (south of Danforth Avenue) (see **Figure 4A**). Delineation to the north is completed based on soil boring 153-SB-069, located within City of Jersey City ROW at the northern end of the 440 Fisk Realty property (see **Figure 4D**). Delineation to the east is completed based on soil borings completed on the following adjacent properties going from north to south: Water Street ROW, Eden Wood Realty, Regnal Realty, Mon-West Realty and Danforth Realty. Soil sample results and delineation in the area of these properties is shown on **Figures 4A-E** and discussed later in this section.

Delineation to the east in the area of other SA-5 sites (Sites 79, 090/184, 117) is not required as part of the Site 153 RI because delineation of chromium-impacted soils within these other sites has been completed and documented in previous report submittals to the NJDEP.

Delineation along the western boundary of Site 153 (within Route 440 ROW) is not fully completed due to the impracticability of conducting such work within an active roadway. Additional delineation to the west will be coordinated with future RI sampling associated with Site 187 Route 440 Median Strip and/or during work associated with future Route 440

roadway improvements. From a study area-wide perspective, soil delineation farther to the west is achieved based on data for other sites (SA-6, SA-7) located on the west side of Route 440. Remedial actions at SA-7 consisted of excavation of soils to 20 mg/kg to achieve unrestricted use. Remedial actions at SA-6 are in progress and will be documented in separate Remedial Action Reports for SA-6 North and South, expected to be submitted to the NJDEP during the fourth quarter of 2016.

Vertical Delineation

Vertical delineation was determined based on the initial RI soil data collected in 1997-1998 (indicating that hexavalent chromium was not detected above 20 mg/kg in the majority of samples collected at depths between 16 and 20 feet bgs), supplemented with additional data collected between 2009 and 2014. As previously noted, the more recent soil sampling delineation program focused on the shallow fill zone based on the presence of meadow mat and/or native soils directly below the fill and because chromium concentrations in native soils below the fill in certain portions of the Site (next to Sites 090 and 117) are likely influenced by groundwater conditions.

Soil sample results for the majority of Site 153 indicate that hexavalent chromium was detected above 20 mg/kg at depths mainly up to 12 feet. This depth corresponds with the depth of the meadow mat (peat and/or fine grained sediments such as silt and clay), which was encountered in most borings at approximately 10 to 14 feet below grade. The depth of the meadow mat corresponds with the depth of the former canal based on historical information indicating the depth of the former canal at approximately -0.2 feet MSL or about 10 to 12 below current grade. Native soils below the meadow mat consist of brown, grayish-brown and reddish brown fine to medium sand and silty sand with occasional clay lenses, encountered at depths below 12 to 14 feet as indicated on boring logs provided in appendices to the RIR/RAWP/RAR (initial RI boring logs in Appendix C-1; more recent RI boring logs in Appendix D). The native soils correspond to the Lacustrine Sand deposits underlying the meadow mat and are described as fine to medium-grained sand with some fine-grained silt lenses throughout. Refer to soil boring logs for 153-SB-A1 through 153-SB-A20 (from the initial RI) and 153-SB-001 through 029 (from the more recent RI), located within and along the perimeter of Site 153 between Carbon Place and Danforth Avenue.

Some soil samples collected along the northern part of Site 153 (near the boundary between Sites 090 and 117) had hexavalent chromium concentrations above 20 mg/kg at depths greater than 14 feet as follows: 153-SB-A05 (up to 16 feet), 153-SB-A06 (up to 24 feet), 153-SB-A07 (up to 20 feet), 153-SB-015 (up to 16 feet), 153-SB-016 (up to 20 feet), and 153-SB-017 (up to 16 feet). Soil boring logs for these locations indicate native soils at depths greater than 12 feet including clay/silt soils between 12 and 14 feet and fine sand below 14 feet. The

hexavalent chromium exceedances detected at depths greater than 14 feet at these locations are low (less than 100 mg/kg in most samples) and likely influenced by groundwater conditions based on data from the SA-7 regional groundwater investigation indicating hexavalent chromium groundwater concentrations up to approximately 100 mg/L within the intermediate sand zone beneath the fill; the elevated groundwater concentrations in this zone reflect impact from historical releases of sodium chromate from the former plant and are being addressed as part of the SA-7 regional investigation and remedy.

Soil sample results for the following borings within the Site 153 property boundary indicate hexavalent chromium was detected above 20 mg/kg in the bottom sample: 153-SB-A05 (187J mg/kg; 14-16 feet), 153-SB-A06 (63.9J; 22-24 feet), and 153-SB-A07 (34.1J; 18-20 feet). Based on these results and groundwater concentrations within deeper zones (native soils beneath the fill), it may not be feasible or practicable to delineate to the soil criterion of 20 mg/kg by collecting deeper soil samples at these locations. Therefore, vertical soil impacts are assumed to extend down to bedrock (100 feet bgs est.) in the area of borings 153-SB-A05, -A06 and -A07 (within Site 153 next to the northern portion of Site 117 and southern portion of Site 090) as a result of groundwater impacts in that area. Soil delineation borings (153-SB-015, -016, -017) within the Route 440 shoulder area next to the above borings included samples with results less than 20 mg/kg at depths between 20 and 24 feet bgs, thus delineation to the west at these depths is completed.

In some of the borings along the Route 440 shoulder (153-SB-014, -018, -020, -025, -026), hexavalent chromium was detected above 20 mg/kg in the bottom sample at depths between 6 to 12 feet. Deeper samples were not analyzed at these locations based on the presence of native soils at depths greater than 12 feet (i.e., clay/silt, fine sand) and because vertical delineation was established within Site 153 itself in the area of these borings. Vertical delineation at these locations is interpolated based on soil data collected within the Site 153 property boundary with results less than 20 mg/kg at various depths greater than 12 feet (at 153-SB-A04, -A09, -A12, -A15, -A17). In addition, some of the soil borings within the shoulder area (next to Sites 090/184 and 117) included samples at depths below 10 feet with results less than 20 mg/kg (e.g., 153-SB-011, 012, 015, 016, 017, 019, 021, 027), which provide additional evidence of vertical delineation along the western perimeter of Site 153.

Chromium contamination within deeper groundwater zones (below the shallow fill and meadow mat) is being addressed as part of the SA-7 regional remedy. The SA-7 regional groundwater remedy includes monitoring to document groundwater conditions within the SA-5/6/7 area and performance of the regional groundwater remedy. Regional Classification Exception Areas (CEAs) have been established for the chromium-impacted groundwater zones (shallow, deep overburden, bedrock) in the area of SA-5/6/7.

The following sections provide a more detailed discussion of soil sampling results and delineation for offsite properties (going from north to south relative to Site 153):

Delineation to the North

440 Fisk Realty, LLC Property: Block 22004, Lot 1 (Figure 4D)

This property consists of a narrow strip of land within the location of the former canal, approximately one block north of Site 153 and next to Site 079. The property is used as a parking lot for a car dealership and comprises an “island” bounded by Route 440, Water Street, Fisk Street and Culver Avenue. Honeywell submitted a separate RIR/RAWP for this property to the NJDEP in December 2014 to facilitate coordination of remedial actions for chromium and non-chromium contaminants with the property owner. The RIR/RAWP was approved by the NJDEP in a letter dated June 11, 2015.

Soil sampling for delineation of Site 153 to the north included 5 locations within the “island” associated with 440 Fisk Realty property (153-SB-060 to -063, and -069), 5 locations within the Water Street ROW to the east (153-SB-070 to -074), and 4 locations within the narrow landscaped area along Route 440 to the west (153-SB-075 to -078). Sampling and delineation results for borings within the “island” area (location of the former canal) are summarized as follows.

- Field observations indicate fill material (e.g., coal, ash, brick, glass) at depths up to about 8 to 10 feet, with native soils (e.g., clay/silt, sands) below 10 feet. Peat was encountered in some borings at depths between 10 and 13 feet.
- COPR was not observed in soil borings. Hexavalent chromium concentrations ranged from non-detect (ND) to 163 mg/kg, with the highest concentrations detected at depths between 6 and 10 feet.
- Delineation to the north is completed based on results of the northernmost boring (153-SB-069) indicating no exceedances of 20 mg/kg. Delineation to the south is not required due to adjacent Site 079 and Site 153 located farther south of this property.
- Delineation to the east is completed based on soil borings completed within the Water Street ROW (discussed below).
- Delineation farther to the west is achieved based on data for SA-6 located on the west side of Route 440. If needed, additional delineation within the Route 440 ROW will be coordinated with Site 187 Route 440 Median Strip.

- Vertical delineation is achieved based on soil data at depths between 10 and 14 feet indicating results ND or below 20 mg/kg.

Water Street ROW (east of 440 Fisk Realty Property):

- Five soil borings (153-SB-070 to -074) were completed to depths up to 10 feet bgs including two borings (153-SB-070 and -071) near the eastern perimeter of the “island” and three step-out borings (153-SB-072 to -074) farther east within the Water Street ROW. Soil boring (079-SB-001; within Water Street ROW) was previously completed as part of the Site 079 RI activities.
- COPR was not observed in soil borings. Field observations indicate fill material (e.g., coal, ash, brick, glass) at depths up to about 10 feet, with native soils (clay/silt, sands) below 10 feet.
- Hexavalent chromium concentrations in the first line of borings (next to the “island”) ranged from ND to 362 mg/kg, with the highest concentrations detected at depths from 4 to 10 feet. No exceedances were detected in shallower samples (0-4 feet bgs).
- Delineation to the east (toward car dealership) was completed based on results for easternmost borings within Water Street (153-SB-072, 073, 074) indicating results ND or less than 20 mg/kg. Soil samples from borings 153-SB-072 and -073 within the 0 to 4 feet depth zone were not analyzed because sample results at this depth in the first line of soil borings (153-SB- 070, 153-SB-071, 079-SB-001) were less than 20 mg/kg for hexavalent chromium. Sample depths for these borings were between 4 and 10 feet, corresponding to the depth interval where exceedances were detected in the first line of borings within Water Street and where the highest detections were encountered within the area of the former canal.
- Vertical delineation is achieved based on soil data at depths between 8 and 10 feet within Water Street ROW and data from 440 Fisk Realty Property at depths between 10 and 14 feet indicating results ND or below 20 mg/kg. It is noted that soil sample results for 153-SB-070 (within Water Street) indicated hexavalent chromium at 46.7 mg/kg at 8-10 feet and no data below this depth interval; samples were not analyzed at depths below 10 feet based on field observations of native soils (i.e., sand at 10-11’; clay and peat at 11-12’) and data from surrounding borings (153-SB-060, -062, -063, -071) indicating no exceedances at depths between 10 and 14 feet bgs.

Route 440 ROW (landscaped area along western perimeter 440 Fisk Realty Property):

- Four soil borings (153-SB-075 to -078) were completed to depths of 4 feet, with soil samples collected and analyzed for total and hexavalent chromium. These borings only went to 4 feet because they were done to provide data for evaluation of remedial

actions, i.e., to determine if existing shallow soils may serve as an engineering control (cap).

- Field observations indicate shallow soils consist of mulch/topsoil (0-1') and fill material consisting of sand, gravel, and coal/cinders (1-3').
- Hexavalent chromium was detected above 20 mg/kg in two out of four soil boring locations at a depth of 1.5-2.0 feet (maximum detection 55.6 mg/kg).
- Additional delineation within the Route 440 roadway and remedial actions (if required) will be coordinated with Site 187 and addressed as part of future submittals for Site 187 Route 440 Median Strip. The landscaped strip will be further evaluated via hand auger focusing on the top one foot and a recommendation will be made regarding remedial action, e.g., re-landscape area to provide suitable soil cap rather than compliance averaging (as proposed in the RIR/RAWP/RAR).

Delineation to the West (between Carbon Place and Danforth Avenue)

Route 440 ROW (shoulder area along west side of Site 153) (Figures 4A, 4C and 4D)

- Fifteen soil borings (153-SB-011 to 022; 025, 026, 027) were completed to depths ranging from 3 to 14 feet.
- Field observations indicate fill material (e.g., coal, ash, brick, glass, wood) at depths up to approximately 10 feet, with meadow mat and/or clay/silt soils below 10 feet.
- Hexavalent chromium concentrations ranged from ND to 1,060 mg/kg, with the highest concentrations detected at depths between 2 to 4 feet within the northern portion of the Route 440 shoulder (next to Sites 90/184).
- Soil sample results for other portions of the Route 440 shoulder ranged from less than 150 mg/kg (south of Site 117) to less than 400 mg/kg (next to Site 117).
- Delineation to the south was completed based on soil data from the southernmost boring within the Route 440 shoulder (153-SB-027).
- Additional delineation to the west will be coordinated with RI sampling associated with Site 187 Route 440 Median Strip and/or during future construction work associated with Route 440 roadway improvements.
- Vertical delineation is completed based on soil sample results indicating results less than 20 mg/kg in samples from depths between 8 to 24 feet bgs.

As indicated in the Site-wide delineation section, hexavalent chromium was detected above 20 mg/kg in the bottom sample at depths between 10 to 12 feet in some of the soil borings along the Route 440 shoulder area as follows: 153-SB-014, -018, -020, -025, and -026.

Deeper samples were not analyzed at these locations based on the presence of native soils at depths greater than 12 feet (i.e., clay/silt, fine sand) and because vertical delineation was established within Site 153 itself in the area of these borings. Vertical delineation at these locations is interpolated based on soil data collected within the Site 153 property boundary with results less than 20 mg/kg at various depths greater than 12 feet (153-SB-A04, -A09, -A12, -A15 and A-17).

Delineation to the East

As indicated in the Site-wide overview section, delineation to the east in the area of other SA-5 sites (Sites 79, 090/184, 117) is not required because delineation within these sites has been completed and documented in separate report submittals to the NJDEP. Delineation to the east next to the southern portion of Site 153 (south of Site 117) was completed based on soil boring samples completed on the following adjacent properties.

Eden Wood Realty Property (Block 26101, Lot 3) (Figure 4E)

- A total of 15 borings (8 to 14 feet depth) were completed in several phases during 2010-2011 and 2015, including three borings along the western perimeter (153-SB-057, 058, 059), two borings along the north side of warehouse building (153-080, 081), and 11 borings within the western portion and south side of the building (153-SB-201 to 153-SB-209). Soil sampling included several lines of step-out borings within the warehouse building going to the east (away from Site 153) with samples from step-out borings analyzed based on results from other borings nearer to Site 153.
- Field observations indicate fill material (e.g., sand, gravel, coal, ash, brick, glass, gravel) at depths up to about 10 feet, with clay/silt soils below 10 feet. Observations from soil borings within the building indicate that the concrete floor slab is in good condition and no visual indication of chromium residue or blooms was noted within the concrete floor materials or underlying soils. The concrete floor slab was observed to be approximately six inches in thickness.
- Hexavalent chromium concentrations ranged from non-detect to 1,520 mg/kg; the highest concentration was detected at 153-SB-057 (6-6.5 feet bgs), located along the western property boundary near Site 153. Suspected COPR material was observed at depths between 4 and 6 feet in three borings (153-SB-057, 058, 081) along the west western perimeter of the property next to Site 153.
- Soil samples collected beneath the building indicate that hexavalent chromium was detected above 20 mg/kg in some of samples from the first line of borings (153-SB-201 to 204; near the western end of the building) and in one sample from the second line of borings (153-SB-205; 4-6' depth). The hexavalent chromium detections above 20

mg/kg were at depths mainly between 4 and 10 feet and ranged from less than 1 mg/kg to 121 mg/kg (153-SB-203; 6-8 feet bgs).

- Delineation to the east relative to Site 153 is completed based on data from the following soil borings: 153-SB-059 and 153-SB-209 (south side of building); 153-SB-080 (north side of building); and 153-SB-206, -207 and -208 (within the building going to the east). Delineation to the west is not required due to the presence of Site 153; delineation farther to the west from Site 153 will be coordinated with the RI for Site 187 Route 440 Median Strip.
- Vertical delineation is completed based on soil sample results indicating that hexavalent chromium was not detected above 20 mg/kg in samples at depths between 6 to 14 feet and data from other borings to the west within Site 153 (153-SB-A12, -A13, -A14). At one boring next to the west side of the building (153-SB-057), samples below 8 feet could not be collected due to drilling refusal; vertical delineation at this location is interpolated based on data from surrounding borings with results below 20 mg/kg at depths between 8 and 14 feet.

Regnal Realty/Langer Transport Property: Block 26101, Lot 9 (Figure 4A)

- Ten soil borings (153-SB-001 to 010) were completed along the eastern perimeter of Site 153 to depths ranging from 8 to 14 feet bgs.
- Field observations indicate fill material (e.g., coal, ash, brick) at depths up to about 8 feet, with clay/silt soils below 8 feet. Peat was observed in some borings at depths between 9 and 11 feet.
- Hexavalent chromium concentrations ranged from ND to 19.6 mg/kg, less than the NJDEP soil criteria of 20 mg/kg. The majority of sample results were ND; the highest concentration was detected at 153-SB-007 (19.6 mg/kg at 10-11 feet; duplicate sample result 15 mg/kg). Delineation along the east side of Site 153 is completed based on soil boring results.

Mon-West Realty Property: Block 26101, Lot 8 (Figures 4A&B)

- Three soil borings (153-SB-066 to -068) were completed to depths of 12 to 13 feet. Field observations indicate fill material (e.g., coal, ash, brick, glass, ceramics, wood) at depths up to about 10 feet, with clay/silt soils below 10 feet. Native soils (clayey silt) and peat was encountered at depths between 10 and 13 feet.
- Hexavalent chromium concentrations ranged from ND to 10.7J mg/kg, less than 20 mg/kg. Delineation to the east of Site 153 in this area is completed based on soil borings results less than 20 mg/kg.

Danforth Realty Property: Block 26101, Lot 7 (Figures 4A&B)

- Sampling on this property was performed to delineate chromium-impacted soils to the east based on results at 153-SB-029 (located within Site 153; near Danforth Avenue), where hexavalent chromium was detected above 20 mg/kg at depths from 4 to 10 feet and suspected COPR was observed between 6 and 10 feet bgs.
- A total of 16 soil borings (153-SB-065; 153-101 to -115) were completed to depths ranging from 2 to 14 feet. Soil sample depths were based on field observations and intervals where exceedances were detected in soil borings along Site 153, i.e., 153-SB-029 (up to 10 feet bgs) and 153-SB-107 (up to 5 feet). Sampling was also limited by the presence of subsurface utilities (storm sewer) at some locations.
- Field observations indicate fill material (e.g., coal, ash, brick, wood) at depths up to about 10 feet, with clay/silt soils below 10 feet.
- Hexavalent chromium concentrations ranged from ND to 7,000 mg/kg, with concentrations above 20 mg/kg detected at various depths up to approximately 8 feet below grade (beneath the paved parking lot). The majority of detections were less than 500 mg/kg; the highest detection was at 153-SB-108 (7,000 mg/kg at 1.0-2.0') and COPR was observed at this location.
- Delineation to the east is completed based on data from the following soil borings: 153-SB-66, -67, -104, -110, -113, -114, and -115. Delineation farther to the south is completed based on data from borings on the south side of Danforth Ave. Delineation to the west is completed based on results of the southernmost boring completed within the Route 440 shoulder area next to Site 153.
- Vertical delineation is completed based on soil data indicating results ND or below 20 mg/kg in samples collected at depths from 8 to 14 feet. At some locations, hexavalent chromium was detected above 20 mg/kg in the bottom sample at depths from 1.5 to 11 feet as follows: 153-SB -106 (1-1.5'), 153-SB -108 (1-1.5'), 153-SB -109 (4-4.5 feet), 153-SB-111 (6-6.5 feet), 153-SB -112 (10.5-11 feet) Vertical delineation is interpolated based on soil sample results from surrounding borings indicating no detections above 20 mg/kg and field observations of native clay/silt soils at depths below 10 feet including 153-SB-029 (within Site 153), 153-SB-065, 153-SB -066, 153-SB -104, and 153-SB -113.

Non-Chromium Contaminants within Site 153

Honeywell owns the property comprising Site 153. The RIR/RAWP/RAR (Section 1.1) indicates that, as owner of the Site, Honeywell is also addressing non-chromium contaminants associated with historic fill and PA/SI requirements for Site 153. As indicated in the RIR section of the report, metals detected in fill soil samples above the NJDEP SRS

included arsenic, lead, mercury, and vanadium. Arsenic and lead are typically associated with historic fill. Mercury may be associated with historic fill and/or former industrial operations at sites located along the east side of the former canal. Vanadium may be associated with COPR and/or historic fill. The low frequency of detections and concentrations of these metals indicate that historic fill impacts are relatively minor compared with chromium-impacted fill (see RIR Section 5.7; page 45).

The RAR section of the report describes the remedial actions completed for chromium at Site 153 (combination of shallow excavation and engineering controls) and indicates that the remedial actions for chromium also address non-chromium contaminants associated with historic fill (metals, PAHs) that may occur coincidentally with hexavalent chromium on portions of the Site (see Section 7.1, top of page 62). The existing deed notice and draft modified deed notice (in Appendix J of the report) identifies hexavalent chromium and non-chromium contaminants within the limits of the restricted area and engineering controls associated with the Site 153. The engineering controls include a combination of clean fill/vegetative cover and asphalt pavement cap on most of the Site, and a multi-layered cap system on the portion of the Site within the NJCU Commercial Area (east of the force main sewer pipeline, within Site 153 North). The chromium remedy including implementation of engineering controls is protective for other metals and PAHs which may occur coincidentally with hexavalent chromium within portions of the Site.

4.0 Summary of RI Findings – Soils

- The overall RI included over 100 soil borings and analysis of over 550 samples for characterization and delineation of chromium-impacted soils at Site 153 (Former Morris Canal). Soil borings included 21 borings during the initial RI in the late 1990s and over 100 borings during additional investigation and delineation activities between 2009 and 2015. Chromium contamination is associated with historical deposition of COPR fill, which occurred during filling and closure of the former Morris Canal from 1924 to 1935.
- The highest concentrations of hexavalent chromium (i.e., 1,000 mg/kg to over 10,000 mg/kg) were detected at various depths between approximately 2 and 12 feet, coincident with field observations of COPR-impacted fill within the northern portion of the Site next to other SA-5 sites (Site 090, 117 and 184).
- Hexavalent chromium concentrations within the southern portion of Site 153 (south of other SA-5 sites) are about an order of magnitude lower (e.g., less than 1,000 mg/kg) compared to the northern portion next to other SA-5 sites. COPR was generally not observed within the southern portion of the Site, with the exception of a few locations in the southern part of the Site near Danforth Ave. Data from soil samples collected from

beneath the Route 440 shoulder indicate substantially lower concentrations compared to soil data from within the Site boundary.

- The horizontal and vertical extent of hexavalent chromium in soils above the NJDEP soil criteria of 20 mg/kg has been delineated to the north, south, and east of the Site. In some locations chromium-impacted soil is delineated into portions of the following offsite commercial properties and roadway areas: Danforth Realty, LLC; Eden Wood Realty, LLC; 440 Fisk Realty, LLC; Route 440 ROW (shoulder area); and City of Jersey City ROW areas proximate to the Site. Chromium concentrations on adjacent properties are substantially lower compared to soil data from within the Site 153 property boundary.
- Horizontal delineation along the western Site boundary (within Route 440 ROW) is not fully completed due to the impracticability of conducting such work within an active roadway; additional delineation to the west may be coordinated with future RI sampling associated with Site 187 Route 440 Median Strip and/or during future work associated with Route 440 roadway improvements. From a study area-wide perspective, soil delineation farther to the west is achieved based on data for other sites (SA-6, SA-7) located on the west side of Route 440.
- Vertical delineation is achieved based on soil data indicating that hexavalent chromium was not detected above 20 mg/kg in the majority of samples collected at depths between 16 to 20 feet bgs (i.e., below the meadow mat). There were a few detections above 20 mg/kg at depths below 16 feet (within native soils beneath the fill) which based on all existing evidence can be attributed to the groundwater conditions. Specifically, in a limited portion of the Site (in the area of 153-SB-05, -06, -07; next to Site 090 and northern part of Site 117), vertical impacts are assumed to extend down to bedrock (approximately 100 feet bgs). These impacts are being addressed as part of the SA-7 regional groundwater remedy and administratively are associated with the corresponding CEA.
- RI field observations indicate other types of fill at the Site including historic fill as defined by the NJDEP both within and outside the areas of COPR fill. The historic fill consists of sand, gravel, coal cinders, ash, brick, glass and wood. Samples collected for fill characterization indicate the presence of PAHs and metals typically associated with historic fill.
- Metals detected in fill samples above the NJDEP SRS included arsenic, lead, mercury, and vanadium. Arsenic and mercury concentrations were detected above the RDCSRS and NRDCSRS. Lead and vanadium were detected above the RDCSRS but below the NRDCSRS. Arsenic and lead are typically associated with historic fill. Mercury may be associated with historic fill and/or former industrial operations at sites located along the east side of the former canal. Vanadium may be associated with COPR and/or historic

fill. The low frequency of detections and concentrations of these metals indicate that historic fill impacts are relatively minor compared with chromium-impacted fill.

- Hexavalent chromium was not detected above 20 mg/kg in soil samples collected from the Regnal Realty, LLC (Langer Transport) property and Mon-West Realty, LLC property. Based on the RI results, no further investigation or action is required for these properties.

Regarding the draft modified Deed Notice in Appendix J of the RIR/RAWP/RAR, Honeywell proposes to add the following statement: Soil contamination beneath existing engineering controls extends up to approximately 10 to 20 feet below grade based on hexavalent chromium soil sample results exceeding the NJDEP soil criteria of 20 mg/kg. Within a limited portion of the Site (next to Site 090 and the northern part of Site 117), native soils below the fill at depths greater than 20 feet may contain hexavalent chromium above 20 mg/kg due to groundwater conditions. The draft modified Deed Notice will also be revised to include reference to the following documents required by the SA-5 Consent Decrees pertaining to monitoring and maintenance of engineering controls at Site 153: Long Term Monitoring Plans, Worker Training Manual, and Standard Operating Procedure for the identification, notification and coordination of subsurface work. Following NJDEP review, Honeywell will submit a revised modified Deed Notice and Termination Form for the existing Deed Notice to the NJDEP for review and approval prior to recording with the Hudson County Register.

Attachment A

Soil Sample Results Figures

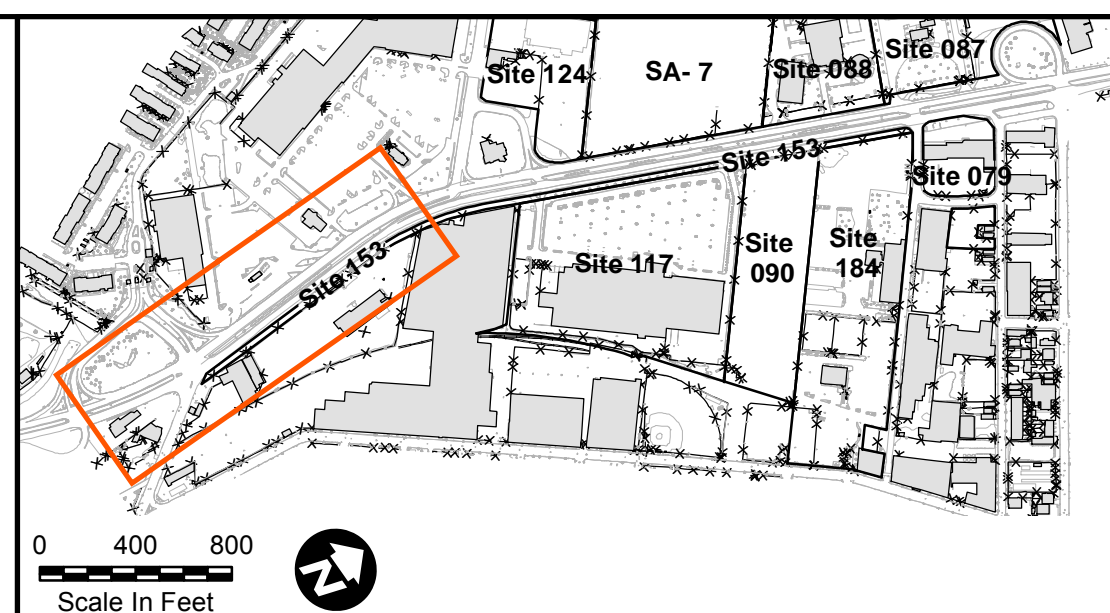
Figure 4A: Site 153 South Lower Segment

Figure 4B: Danforth Realty, LLC (Block 26101, Lot 7)

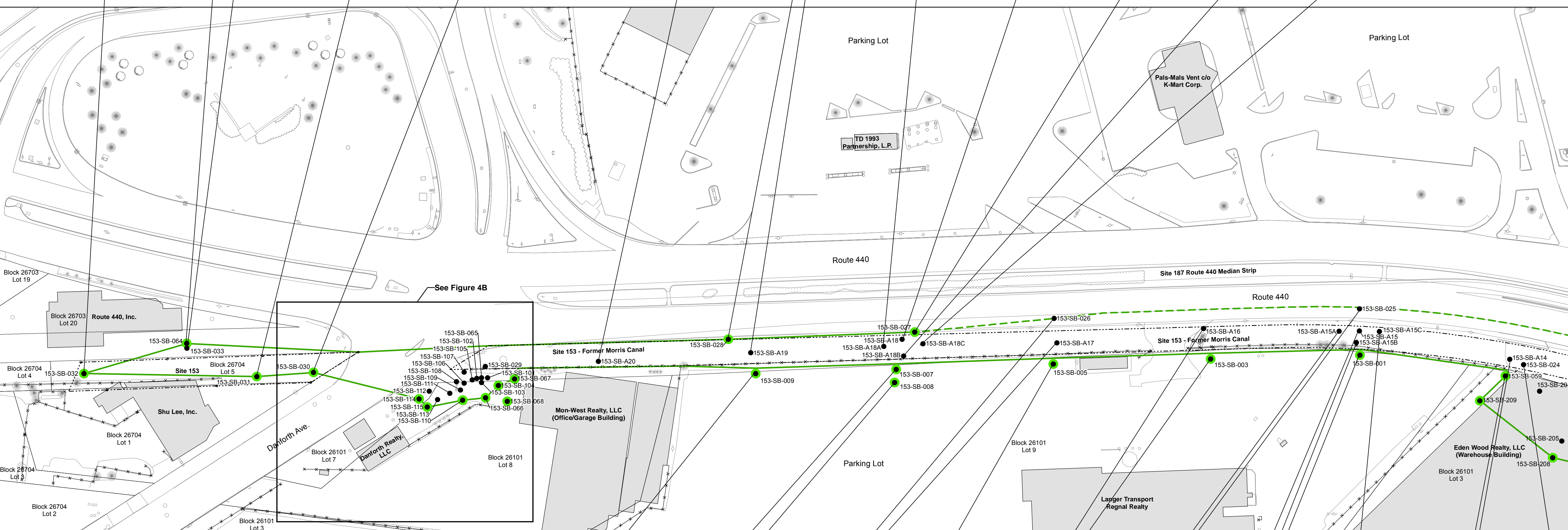
Figure 4C: Site 153 South Upper Segment

Figure 4D: Site 153 North

Figure 4E: Eden Wood Realty, LLC (Block 26101, Lot 3)



153-SB-022			153-SB-033			153-SB-031			153-SB-030			153-SB-A20			153-SB-A19			153-SB-027		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	0.91	57.8 J	0002	1.7 J	16.2	0002 DUP	7.9	105 J	0002	1.5	18.5 J	0002	2.3 U	208 J	0002	2.1	24.9 J	0002	4.2	49.9 J
0204	3.2	34.8 J	0204	2.2 J	53	0204	5	68.5 J	0204	0.9	15.6 J	0204	2.3 U	208 J	0204	3.3	14 J	0204	4.2	49.9 J
0406	3.1	19.1	0406	2.1 J	18.6	0406	0.81	30.9 J	0406	0.47 U	12.1 J	0406	2.3 U	208 J	0406	3.3	14 J	0406	4.2	49.9 J
0608	1.4 U	9.2	0608	1.2 J	8.7	0608	0.75	92.5 J	0608	0.75	92.5 J	0608	2.3 U	208 J	0608	3.3	14 J	0608	4.2	49.9 J
0810	1.2 U	8.7	0810	1.4 U	77.3	0810	0.75 U	16.5 J	0810	0.51 U	16.5 J	0810	14.2 J	67.4 J	0810	8.6 J	181	0810	9.3	310
1012	1.5 U	190	1012 DUP	74.7 J	5030	1012	0.87 U	85.1 J	1012	1.9	106 J	1012	3.1 J	15.2 J	1012	77.2 J	464 J	1012	5.2 J	22100
1214	0.98 U	16.2	1214	2.1	5330	1214	0.76 U	150 J	1214	0.76 U	150 J	1214	3.1 J	15.2 J	1214	3.9 J	12300	1214	5.2 J	22100
1416	0.93 U	13.5	1416 DUP	0.95 U	6.7	1416 DUP	1.5	26 J	1416	1.2	9.8 J	1416	0.99 U	65.7 J	1416	44.9	421 J	1416	4.46	6620 J



Legend

- Soil Boring Location
- Soil Boring Location < 20 mg/kg Hexavalent Chromium
- Delineation completed
- - - Further delineation to the west to be completed and coordinated with future RI sampling at Site 187 Route 440 Median Strip.
- - - Site Boundary
- Fenceline
- Buildings

153-SB-A188		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	446	6620 J

Soil represented by sample result was excavated during previous interim remedial measures.

Notes:

Figures 4A – 4D include soil sample results from the 1997-1999 RI (TetraTech, 1999) and additional RI sampling during 2009-2014. Figure 4E includes soil sample results for Eden Wood Realty property collected during 2015.

Bold and shaded sample result exceeds the NJDEP soil criteria for hexavalent chromium of 20 mg/kg.

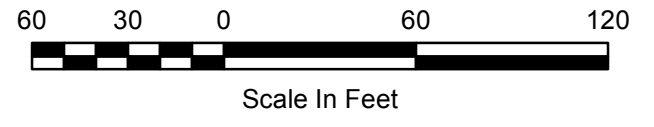
U = Compound was not detected.

J = Data indicates the presence of a compound that meets the identification criteria. The concentration given is an approximate value.

DUP = Duplicate soil sample.

NA = Not Analyzed.

mg/kg = milligrams per kilogram.



153-SB-009			153-SB-007			153-SB-026			153-SB-005			153-SB-A16			153-SB-A15A			153-SB-A15			153-SB-001			153-SB-009			153-SB-024		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)	Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)			
0002	1.8 U	23.5	0002	1.8 U	22.4 J	0002	2.3 J	29.5 J	0002	1.9 U	36.6 J	0002	5.7	56.2 J	0002	948	12100 J	0002	1.7 U	23 J	0002	1.7 U	23 J	0002	14.7	172 J			
0204	1.9 U	382	0204	4.5	58.4 J	0204	2 U	83 J	0204	3	48.1 J	0204	2.3 U	14.3 J	0204	14.9 J	154 J	0204	2.1 U	13.8 J	0204	2.1 U	13.8 J	0204	2.7	24.1 J			
0406	1.1	122	0406	2.1 U	83 J	0406	1.1 J	9.9 J	0406	2.5 U	149 J	0406	2.3 U	24.6 J	0406	2.3 U	20.5 J	0406	2.2 U	20.5 J	0406	2.2 U	20.5 J	0406	6.6 J	59.7 J			
0608	2.1 U	309	0608	2.1 U	1850	0608	1 U	8.8 J	0608	2.3 U	37.9 J	0608	5.4 U	37800 J	0608	3.5	29.1 J	0608	1.7 U	91.1 J	0608	1.7 U	91.1 J	0608	17.1 J	91.1 J			
0810	4.1 U	97.4	0810 DUP	4.1 U	787	0810	19.6	35.4	0810	2.3 U	19.2 J	0810	2.3 U	19.2 J	0810	5.4 U	5100 J	0810	1.1 J	10.2 J	0810	1.1 J	10.2 J	0810	12.5	207 J			
1012	6.3 U	147	1012 DUP	15 U	281	1012	39.9 J	1530 J	1012	2.3 U	9.8 J	1012	2.3 U	9.8 J	1012	2.3 U	21.5 J	1012	12.5	207 J	1012	12.5	207 J	1012	0.48 J	11.1 J			
1214	15 U	8.3																											

Amec Project No. 3480150471

Prepared/Date: WSL 12/05/14 | Checked/Date: AG 12/05/14

amc foster wheeler ENVIRONMENT & INFRASTRUCTURE 200 AMERICAN METRO BLVD, SUITE 113 HAMILTON, NEW JERSEY 08619

Figure 4A
Soil Sample Results - Total and Hexavalent Chromium
Site 153 South Lower Segment
Study Area 5
Site 153 - Former Morris Canal
Jersey City, New Jersey

REV	DATE	DESCRIPTION	STATUS
1	06/14/16	Added revised chemboxes and delineation line.	WSL AG

153-SB-112		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
1-1.5	6.8	89.8 J
2-2.5	27.6	349 J
2-2.5 DP	17.6	268 J
4-4.5	137	2880 J
7.5-8	250 J	1140 J
8-8.5	24.4	1420 J
10.5-11	55.6	496 J

153-SB-111		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	20.8	NA
1-1.5	125	NA
2-2.5	106	NA
4-4.5	227	NA
6-6.5	126	NA

153-SB-108		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	48.9	NA
1-1.5	7000	NA

153-SB-107		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	163	NA
1-1.5	169	NA
2-2.5	24	NA
4-4.5	122	NA
6-6.5	7.9	NA

153-SB-029		
Depth	HEXAVALENT CHROMIUM	TOTAL CHROMIUM
0002	10 J	485 J
0204	16.2 J	160 J
0406	117 J	5100 J
0608	1730 J	12900 J
0810	7860	20100 J
1012	1 J	1060 J
1214	1.6 UJ	41.8 J

153-SB-101		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
2-2.5	22	NA
4-4.5	0.88	NA
6-6.5	2.5	NA
8-8.5	0.52	NA

153-SB-113		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
1.5-2	2.9	24.4 J
2.5-3	0.56 J	6.5 J
4.5-5	1 J	14 J
4.5-5 DP	1 J	23.7 J
6.5-7	68.3	201 J
8.5-9	7.4	503 J
10-10.5	7.7	26.3 J

153-SB-114		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
6.5-7	11.5	38.3 J

153-SB-115		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
2.5-3	2.7	22.8 J
4-4.5	7.8	69.4 J
6.5-7	8.1	17.4 J
8.5-9	3.4 U	36.4 J

153-SB-106		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	322	NA
1-1.5	146	NA

153-SB-109		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	248	NA
1-1.5	576	NA
2-2.5	12.3	NA
4-4.5	464	NA

153-SB-110		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	6.9	NA
1-1.5	6.6	NA
2-2.5	1.7	NA
4-4.5	3	NA
6-6.5	3.1	NA

153-SB-105		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0.5-1	16.1	NA
1-1.5	2.9	NA
2-2.5	5.8	NA
4-4.5	14.1	NA
6-6.5	112	NA

153-SB-102		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
2-2.5	109	NA
4-4.5	68.5	NA
4-4.5 DP	69.5	NA
6-6.5	160	NA
8-8.5	0.63 U	NA

153-SB-065		
Depth (feet)	Hexavalent Chromium (mg/kg)	Chromium (mg/kg)
0204	20.5	435
0406	24	488
0608	58	699
0810	2	579
1012	0.87 UJ	8730

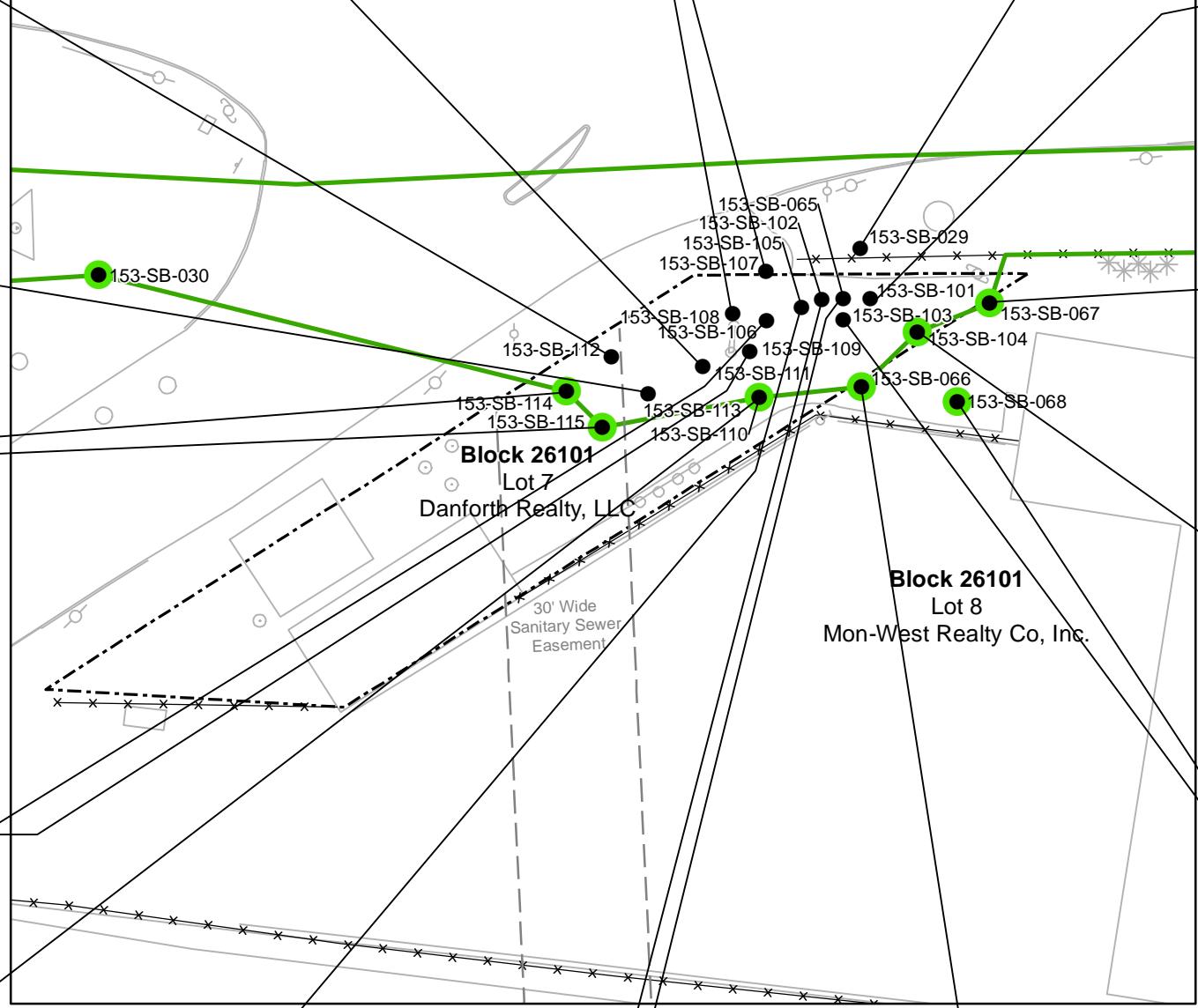
153-SB-066		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	2 J	17.2
0204	0.58 U	18.7
0406	0.64 UJ	19.9
0608	2.5	19.3
0810	0.91 UJ	43.4
1012	3.2 J	441

153-SB-067		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	0.46 U	13.3
0204	3.2	17.5
0406	0.86 U	10.1
0608	0.59	10.1
0810	0.97 U	12.4
1012	0.95 UJ	11700
1214	4.1 U	39.8

153-SB-104		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
1-1.5	0.79	NA
3-3.5	0.67	NA
5-5.5	0.92	NA
7-7.5	0.54	NA
9-9.5	5 U	NA
11-11.5	5.9	NA
12-12.5	7.3 U	NA

153-SB-068		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	4.1 J	65.6
0204	0.59 UJ	16.3
0406	0.8 J	20.4
0608	0.61 U	19.8
0810	0.71 U	21.4
1012	10.7 J	24200
1214	0.7 UJ	41.5

153-SB-103		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
2-2.5	1.2	NA
4-4.5	0.89	NA
6-6.5	0.68	NA
8-8.5	0.73 U	NA



Legend

- Soil Boring Location
- Soil Boring Location < 20 mg/kg Hexavalent Chromium
- Delineation Complete
- - - Further delineation to the West to be completed and coordinated with future RI sampling at Site 187 Route 440 Median Strip.
- Danforth Realty Property Boundary
- Existing Building

153-SB-A188		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	446	6620 J

Soil represented by sample result was excavated during previous interim remedial measures.

Notes:

This figure includes soil sample results from the 1997-1999 RI (TetraTech, 1999) and addition RI sampling during 2009-2014.

Bold and shaded sample result exceeds the NJDEP soil criteria for hexavalent chromium of 20 mg/kg.

U = Compound was not detected.

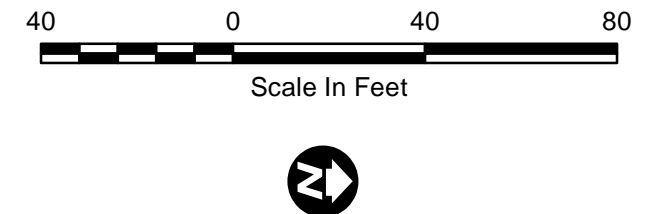
J = Data indicates the presence of a compound that meets the identification criteria. The concentration given is an approximate value.

DUP = Duplicate soil sample.

NA = Not Analyzed.

mg/kg = milligrams per kilogram.

Map Reference:
Danforth Realty property boundary from Maser Consulting, P.A. electronic AutoCAD survey file, received 1/13/13.



REV NO.	DATE	STATUS	CHECKED BY	APPROVED BY
1	06/14/16	Added revised chemboxes and delineation line.	WSL	AG

Amec Project Number:
3480150471

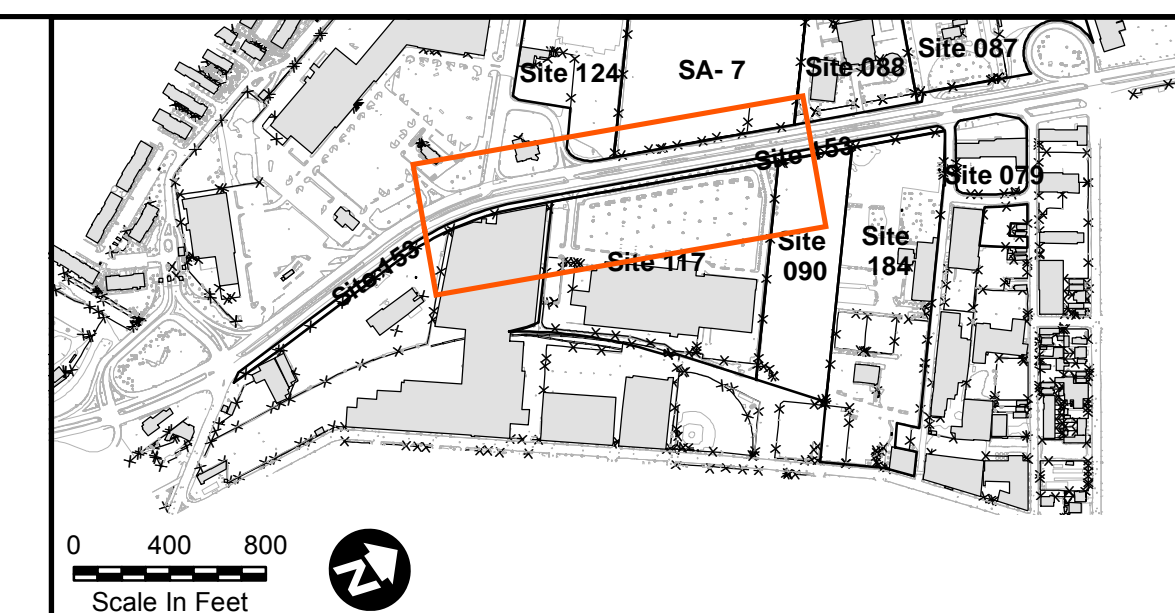
Prepared/Date:
WSL 12/05/2014

Checked/Date:
AG 12/05/2014

amec foster wheeler

ENVIRONMENT & INFRASTRUCTURE
200 AMERICAN METRO BLVD, SUITE 113
HAMILTON, NEW JERSEY 08619

Figure 4B
Soil Boring Results - Total and Hexavalent Chromium
Danforth Realty
Block 26101, Lot 7
Site 153 Former Morris Canal
Jersey City, New Jersey



Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	14.7	172 J
0204	2.7	24.1 J
0406	6.6 J	59.7 J
0608	17.1 J	91.1 J
0810	1.1 J	10.2 J
1214	2.3 UJ	8.3 J
1416	2.5 UJ	10.7 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	4.7	83.5 J
0204	16	269 J
0406	60.9	1320 J
0608	1.1 J	494.0 J
0810	0.84 J	834.0 J
0810 DUP	1.2 UJ	350.0 J
1012	1.6 UJ	46.1 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	13.9	1699 J
0204	25.5	192 J
0406	12.9	900 J
0608	50 J	847 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	1.6	29 J
0204	1.5	29 J
0406	389	3140 J
0608	2950	11700 J
0810	1.8 UJ	11100 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	13.2	617 J
0204	13.2	617 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	110	683 J
0204	20.6	105 J
0406	21.4	133 J
0608	19.4 J	1820 J
0810	71.7	5090 J
1012	128	7560 J

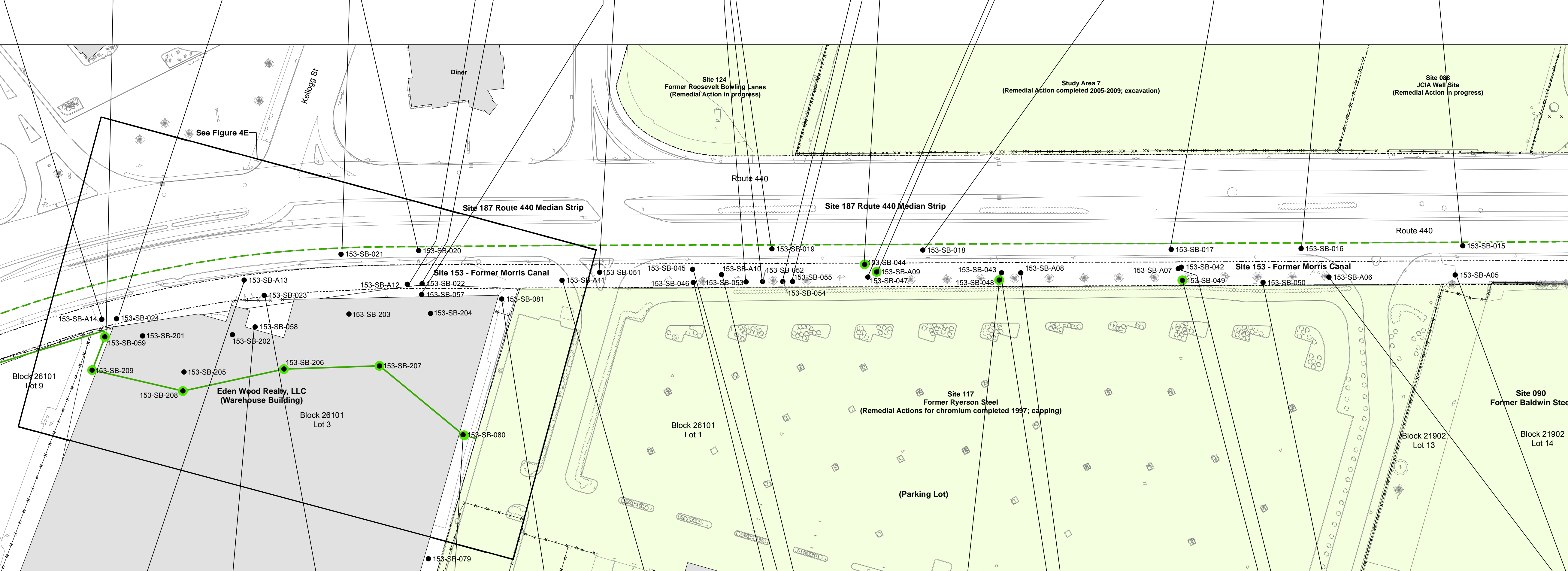
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	19.3	560 J
0204	8.9	71.4 J
0406	9.8	90.3 J
0608	8.9	44.5 J
0810	7.6	22.0 J
0810	38.4	729 J
1012	109	4080 J
1214	160	6790 J
1416	151	10000 J
1618	171	965 J
1820	54	1000 J
1820 DUP	59.4	2020 J
2022	13	35.7 J
2224	9	32.4 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	2.4	19.3 J
0204	115	2140 J
0406	44	491 J
0608	64.1 J	1000 J
0810	18.5	1350 J
1012	42.1	790 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	155	1730 J
0204	110	683 J
0406	58 UJ	41300 J
0608	2.3 UJ	8 J
0810	2.6 UJ	11 J
1820	2.5 UJ	2.9 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	2.4	19.3 J
0204	115	2140 J
0406	44	491 J
0608	64.1 J	1000 J
0810	18.5	1350 J
1012	42.1	790 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	10.8 J	132 J
0204	11.8 J	375 J
0406	121	10100 J
0608	56.9 J	698 J
0810	111	3040 J
1012	128 J	4030 J
1214	399 J	89400 J
1416	149 J	3880 J
1618	171	965 J
1820	15.6	85.3 J
1820 DUP	13.5	66.0 J
2022	17.2	498 J
2224	9	32.4 J



- Legend**
- Soil Boring Location
 - Soil Boring Location < 20 mg/kg Hexavalent Chromium
 - Delineation completed
 - - - Further delineation to the West to be completed and coordinated with future RI sampling at Site 187 Route 440 Median Strip.
 - Other Chromium Sites - Remedial Actions completed or in progress
 - Site Boundary
 - Fenceline
 - Buildings

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	446	6620 J

Soil represented by sample result was excavated during previous interim remedial measures.

Notes:
 Figures 4A – 4D include soil sample results from the 1997-1999 RI (TetraTech, 1999) and addition RI sampling during 2009-2014. Figure 4E includes soil sample results for Eden Wood Realty property collected during 2015.

Separate RAWP to be submitted for Eden Wood Realty, LLC property.

Bold and shaded sample result exceeds the NJDEP soil criteria for hexavalent chromium of 20 mg/kg.

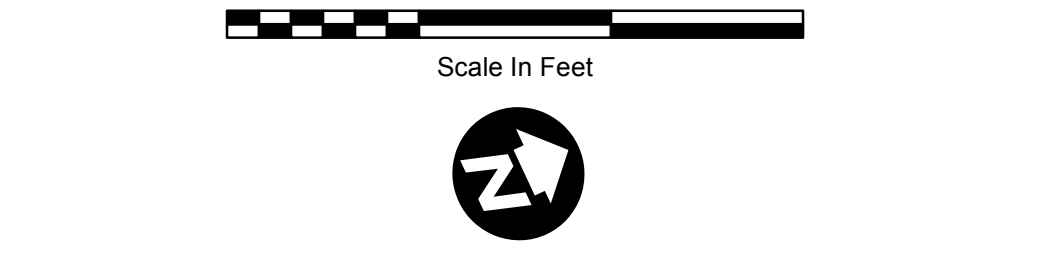
U = Compound was not detected.

J = Data indicates the presence of a compound that meets the identification criteria. The concentration given is an approximate value.

DUP = Duplicate soil sample.

NA = Not Analyzed.

mg/kg = milligrams per kilogram.



Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	33.9 J	433 J
0204	54.5 J	1180 J
0406	34.4 J	198 J
0810	232 J	4440 J
1416	2.7 J	9.5 J
1416 DUP	6.6	17.7 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	22.7 J	501 J
0204	13.7	109 J
0406	601	6950 J
0608	0.54 UJ	3.3 J
0810	0.93	10.4 J
1012 DUP	1.2	16.9 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0406	269	13300 J
0608	435	10600 J
0810	5.2	33000 J
1012	1.9	91.3 J
1012 DUP	1.4 UJ	68 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	12.3	192 J
0204	7.3	153 J
0406	3	16 J
0608	1	8.1 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	18.7	636 J
0204	89.7	4550 J
0406	65.4	653 J
0608	0.64 UJ	10.1 J
0810	2.4 UJ	21.9 J
1012	0.65	17.7 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	58.5 J	737 J
0204	10900 J	35300 J
0406	67 J	210 J
0608	481 J	5380 J
0810	675 J	25700 J
0810 DUP	560	14700 J
1214	2.3 UJ	16.5 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0406	47.2	2110 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	59.8 J	902 J
0204	599 J	10300 J
0406	2450 J	8180 J
0810	3680 J	15300 J
1012	8 J	26.2 J
1214	2.3 UJ	11 J
1416	2.3 UJ	8 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0406	1.3	26.6 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	13100	19900 J
0204	4750	18100 J
0406	3110	16000 J
0608	9070	23300 J
0608	8970	25000 J
0810	5380	14000 J
1416	14	35.4 J
1416	10.8	28.4 J
1618	5.2	20.1 J
1820	3.9	10.5 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0406	1.2	23.4 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	2.2 J	125 J
0204	92.6 J	1860 J
0406	0.61	26.4 J

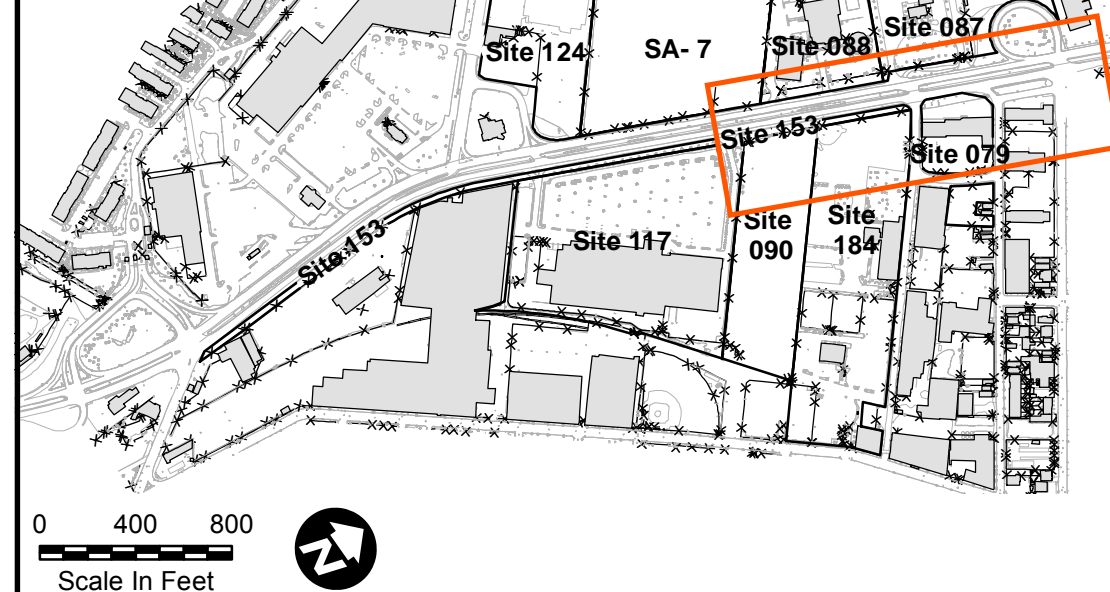
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	179 J	3090 J
0204	624 J	11200 J
0406	1520 J	19500 J
0608	7750 J	27700 J
0810	38	1050 J
1214	7.7 UJ	48300 J
1618	30.4 J	131 J
1820	34.1 J	156 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	624 J	11200 J
0204	4520 J	24900 J
0406	8250 J	36000 J
0608	9150 J	38800 J
0810	7020 J	31200 J
1214	2570 J	29900 J
1416	187 J	1270 J

Amec Project No. 3480150471		Prepared/Date WSL 12/05/14		Checked/Date AG 12/05/14	
1	06/14/16	Added revised chemboxes and delineation line.		WSL	AG
REV.	DATE	STATUS		Prepared By	Checked By



Figure 4C
 Soil Sample Results - Total and Hexavalent Chromium
 Site 153 South Lower Segment to South Upper Segment
 Study Area 5
 Site 153 - Former Morris Canal
 Jersey City, New Jersey



0 400 800
Scale In Feet

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	10.8 J	132 J
0204	11.8 J	375 J
0406	121 J	10100 J
0608	56.9 J	698 J
0810	111 J	3040 J
1012	128 J	4030 J
1214	399 J	89400 J
1416	149 J	38800 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	8 J	84.8 J
0406	7680 J	25400 J
0608	33.2 J	134 J
0810	93 J	755 J
1012	222 J	1130 J
1214	229 J	1810 J
1416	9 J	324 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	10.3 J	263 J
0204	1060 J	7080 J
0406	24.9 J	570 J
0608	33.7 J	1450 J
0810	28.1 J	2230 J
1012	1.7 U	1310 J
1214	0.97 U	20.5 J
1416	14.1 J	42.8 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	7.9 J	105 J
0204	7.7 J	75.9 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	5.7 J	46.9 J
0204	3.1 J	30.2 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	29.6	540 J
0204	17.5	254 J

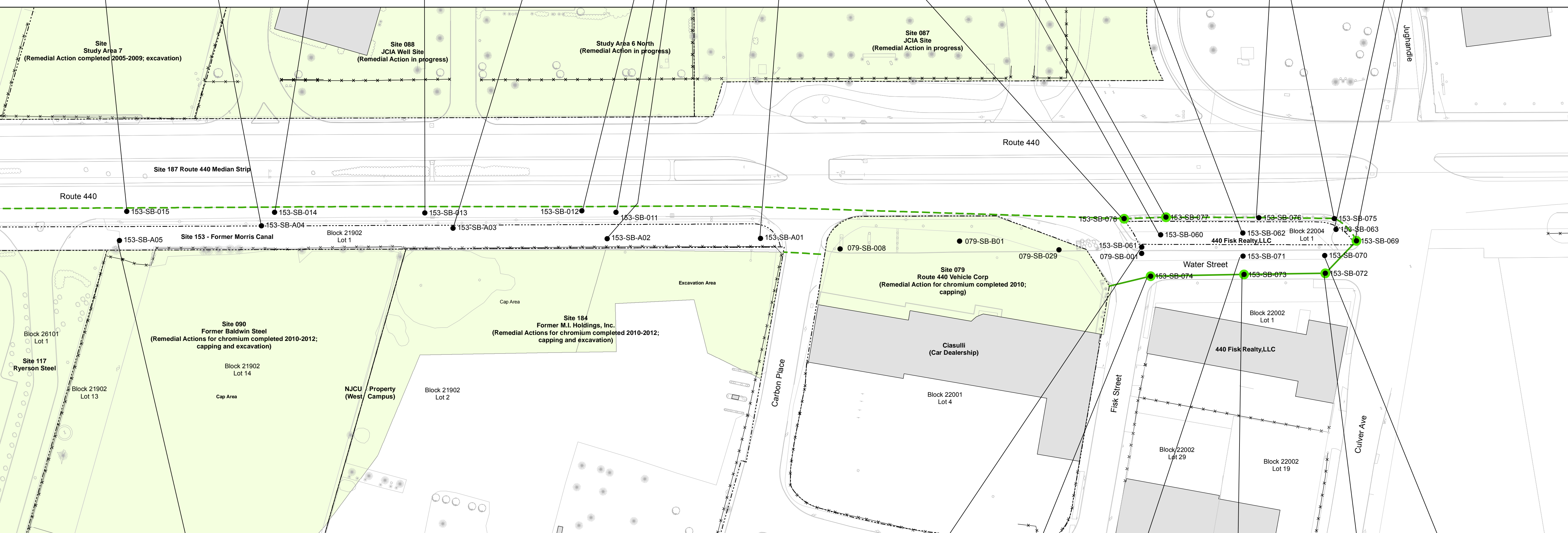
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	32.2 J	293 J
0204	0.92 U	58.5 J
0406	0.48 J	14.1 J
0608	37.4 J	1750 J
0810	109 J	637 J
1012	0.56 U	880 J
1214	0.81 U	9160 J
1416	1.1 J	27.8 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	11.3 J	115 J
0406	0.55 U	3250 J
0608	0.87	12.5 J
0810	0.51 U	21.4 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	20.1 J	304 J
0204	41.4 J	203 J
0406	16.6 J	154 J
0608	26.9 J	114 J
0810	2 J	9670 J
1012	1.3 J	34.8 J
1214	1.6 J	168 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	9.4 J	129 J
0204	15.6 J	154 J
0406	36.9 J	2130 J
0608	163 J	2130 J
0810	0.68 U	29 J
1012	0.74 J	9.8 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	55.6 J	285 J
0204	8.5 J	86.4 J



- Legend**
- Soil Boring Location
 - Soil Boring Location < 20 mg/kg Hexavalent Chromium
 - Delineation completed
 - Further delineation to the West to be completed and coordinated with future RI sampling at Site 187 Route 440 Median Strip.
 - Other Chromium Sites - Remedial Actions completed or in progress
 - Site Boundary
 - Fenceline
 - Buildings

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	446	6620 J

Soil represented by sample result was excavated during previous interim remedial measures.

Notes:
 Figures 4A – 4D include soil sample results from the 1997-1999 RI (TetraTech, 1999) and addition RI sampling during 2009-2014. Figure 4E includes soil sample results for Eden Wood Realty property collected during 2015.
 Separate RAWP to be submitted for Eden Wood Realty, LLC property.
 Bold and shaded sample result exceeds the NJDEP soil criteria for hexavalent chromium of 20 mg/kg.
 U = Compound was not detected.
 J = Data indicates the presence of a compound that meets the identification criteria. The concentration given is an approximate value.
 DUP = Duplicate soil sample.
 NA = Not Analyzed.
 mg/kg = milligrams per kilogram.

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	624 J	11200 J
0204	4520 J	24900 J
0406	8250 J	36000 J
0608	9150 J	39800 J
0810	7020 J	31200 J
1214	2570 J	29900 J
1416	187 J	1270 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	1.9 J	13.7 J
0204	1.6 J	15.5 J
0406	113 J	1970 J
0608	30 J	1270 J
0810	2.1 J	442 J
1012	0.66 U	26 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	9.5	97 J
0406	0.49 U	6.1 J
0608	0.49 U	4.9 J
0810	0.49 U	5.3 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	6.9	87.3 J
0204	0.47 U	12.7 J
0406	59.8	507 J
0608	0.48 U	NA
0810	0.48 U	NA
0406 DUP	55.5	836 J
0810	1.5	72.7 J
1012	11.4	256 J

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	0.51	NA
0406	0.51	NA
0608	0.48 U	NA
0810	0.48 U	NA

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	18	NA
0406	0.47 U	NA
0608	0.47 U	NA
0810	0.52	NA

Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	4.8	87.2 J
0204	0.75	25.8 J
0406	360	3230 J
0608	174	4150 J
0810	46.7	1240 J

60 30 0 60 120
Scale In Feet



Amec Project No.
3480150471

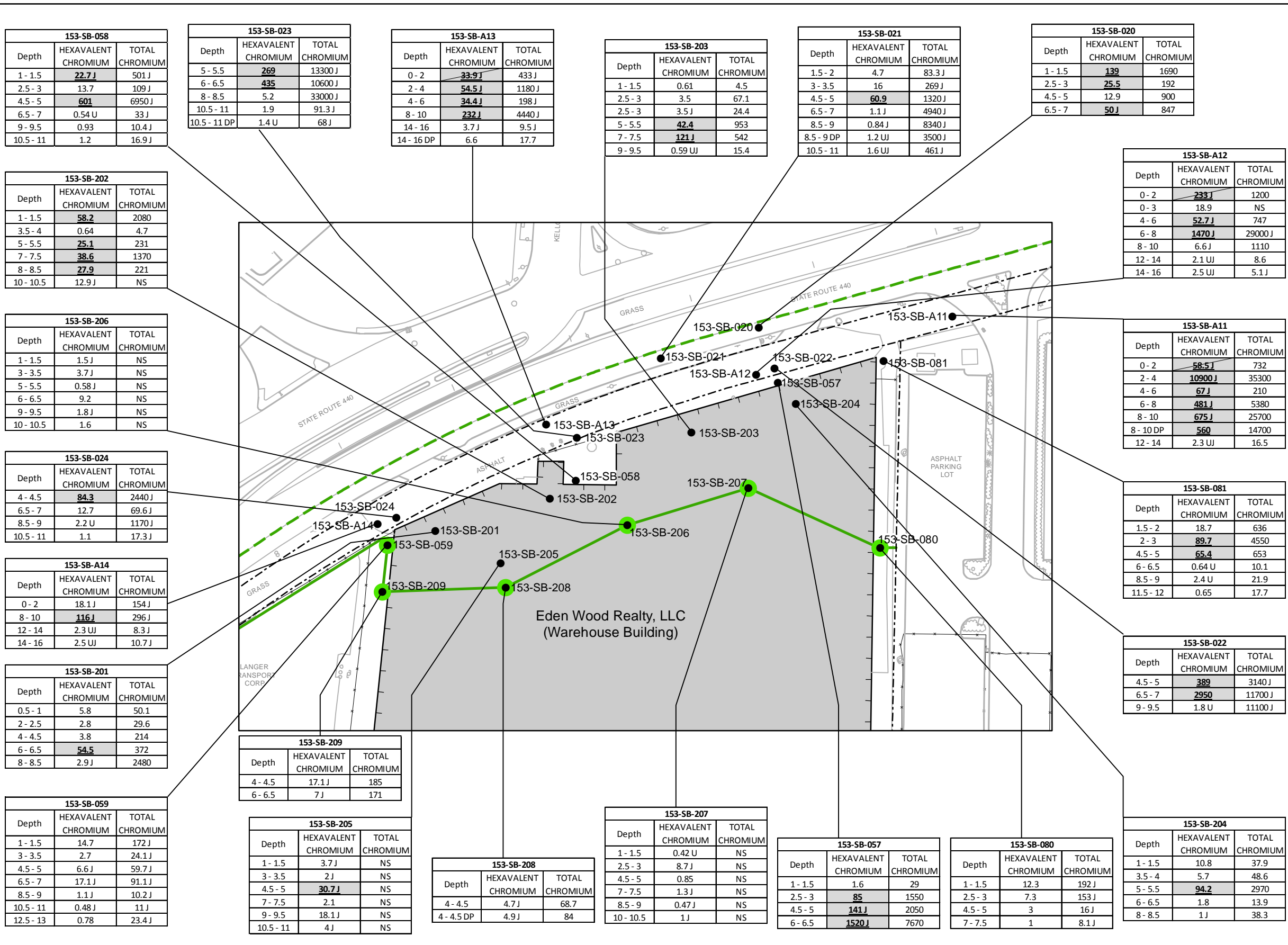
Prepared/Date
WLS 12/05/14

Checked/Date
AG 12/05/14

amec foster wheeler
 ENVIRONMENT & INFRASTRUCTURE
 200 AMERICAN METRO BLVD, SUITE 113
 HAMILTON, NEW JERSEY 08619

Figure 4D
 Soil Sample Results - Total and Hexavalent Chromium
 Site 153 North Segment
 Study Area 5
 Site 153 - Former Morris Canal
 Jersey City, New Jersey

REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY
1	06/14/16	Added revised chemboxes and delineation line.	WLS	AG



- Legend**
- Soil Boring Location
 - Soil Boring Location < 20 mg/kg Hexavalent Chromium
 - Delineation Complete
 - - - Further delineation to the West to be completed and coordinated with future RI sampling at Site 187 Route 440 Median Strip.

- ▭ Eden Wood Realty Boundary
- ▭ Existing Building

Soil represented by sample result was excavated during previous interim remedial measures.

153-SB-A18B		
Depth (feet)	Hexavalent Chromium (mg/kg)	Total Chromium (mg/kg)
0002	446	6620

- Notes:**
- This figure includes soil sample results from the 1997-1999 RI (TetraTech, 1999) and additional RI sampling during 2009-2014.
- Bold and shaded sample result exceeds the NJDEP soil criteria for hexavalent chromium of 20 mg/kg.
- U = Compound was not detected.
- J = Data indicates the presence of a compound that meets the identification criteria. The concentration given is an approximate value.
- DUP = Duplicate soil sample.
- NA = Not Analyzed.
- mg/kg = milligrams per kilogram.

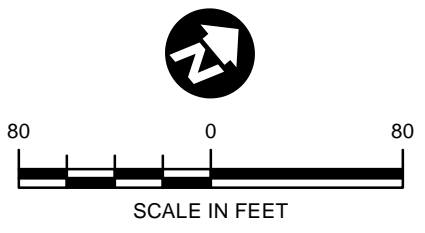


Figure 4E
Soil Boring Results - Total and Hexavalent Chromium
Eden Wood Realty, LLC
Block 26101, Lot 3
Site 153 Former Morris Canal
Jersey City, New Jersey

PROJECT NUMBER: 3480150471

PREPARED/DATE:
WSL 05/03/2016

CHECKED/DATE:
AG 05/11/2016

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200 AMERICAN METRO BLVD, SUITE 113
HAMILTON, NEW JERSEY 08619

REV NO.	DATE	STATUS	CHECKED BY	APPROVED BY

PATH: P:\GIS\PROJECTS\NEWELL STUDY AREA\5 SITE 153 - FORMER MORRIS CANAL\20111118 - RI REPORT\FIGURE 4E - SOIL SAMPLE RESULTS.MXD