CONTAMINATED MATERIAL AND WATER MANAGEMENT WORK PLAN

For Construction Activities Associated with Christina River Bridge Project Wilmington, Delaware (DE-0334)

DelDOT Contract T201612101

Prepared For:

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INTERNAL QUALITY CONTROL SHEET

This Contaminated Material and Water Management Work Plan (CMWMWP) was prepared by BrightFields, Inc. (BrightFields) for the Christina River Bridge Project. This CMWMWP represents BrightFields' knowledge of conditions on the subject site at the time of preparation.

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TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

CONTAMINATED MATERIAL AND WATER MANAGEMENT WORK PLAN

This CMWMWP was revised in November 2016 to reflect current project plans.

DOCUMENT OVERVIEW

SITE & LOCATION: The Delaware Department of Transportation (DelDOT) is completing both the Christina River Bridge and Approach Road projects to accommodate additional traffic due to the redevelopment along the Wilmington Riverfront. The limits of both projects are shown on Figure 1. The first phase of the project consisted of improvements adjacent to the Riverfront Hotel Site, which was completed in April 2014. Additional phases of the project include activities associated with construction of the Christina River Bridge and Approach Roads such as construction of the bridge and approach roads, relocating overhead utilities underground, curb improvements, and the installation of electric lines, lighting, drainage infrastructure, landscaping, and hardscaping (Figure 2). This Contaminated Materials and Water Management Work Plan is for the Christina River Bridge contract only.

BrightFields has been contracted to identify the locations and types of contaminants that may be encountered during intrusive activities for the Christina River Bridge and to develop environmental management documents for use during construction.

The construction of the Christina River Bridge is scheduled to begin in early 2017 and additional construction of the Approach Roads is anticipated to begin in late 2017 or early 2018, and take three years to complete. On-site health and safety oversight and environmental management of all aspects of this project will be provided by the Delaware Department of Natural Resources and Environmental Control (DNREC) or DNREC's Hazardous Site Cleanup Act (HSCA)-certified environmental consultant.

PURPOSE OF THIS CMWMWP: The purpose of this Contaminated Material and Water Management Work Plan (CMWMWP) is to provide guidelines for safe handling of contaminated materials on the Christina River Bridge Project.

TYPES OF INTRUSIVE ACTIVITIES: This CMWMWP covers the activities of workers under contract for the Christina River Bridge Project. Types of intrusive activities include, but are not limited to: excavation for the installation of utilities, light poles, bollards, road beds, drainage infrastructure, landscaping, hardscaping, and excavation for bridge pilings and piers.

SCHEDULED DATES: This CMWMWP is in effect for the duration of the project. Construction for the Christina River Bridge is scheduled to begin in early 2017 and additional construction for the Approach Roads is anticipated to begin in late 2017 or early 2018 and last approximately three years.

Note: The purpose of this CMWMWP is to provide guidance for handling known environmental conditions and unknown environmental conditions that may be encountered during the intrusive activities for the Christina River Bridge Project. This CMWMWP is intended to be used in conjunction with the Christina River Bridge Project Health and Safety Plan (HASP) (BrightFields, Revised November 2016).

1.0 INTRODUCTION

The Christina River Bridge and Approach Roads (DE-0334) (Site) area encompasses multiple tax parcels along either side of the Christina River in Wilmington, Delaware (Figure 2). A Site Specific Assessment (SSA) was performed by BrightFields in April 2009 to investigate the properties associated with Christina River Bridge Orange A Alignment and found several areas of environmental concern associated with this bridge option. After further evaluation by transportation engineers, the Orange B Alignment became the preferred option. As shown in Figure 2, the approach roads begin at Beech Street, continue south to the southern extent of the Shipyard Shops (west of the Christina River), the bridge crosses over the River, and approach roads continue through the 707 S. Market Street Jablow property (north of James Court) and connect to Market Street, Walnut Street, and Garasches Lane east of the River.

The Site was historically maintained as undeveloped marsh land, commercial, and industrial properties. Retail businesses and a riverwalk are located to the west of the River, north of the proposed approach road. To the east of the River are various businesses including retail shops, electroplating, asphalt sealing, a rim and wheel distributor, a glass and tire distributor, landscaping, metal works, a car shop, and a truck service business. Additional properties have non-operational businesses.

There are many Delaware Department of Natural Resources and Environmental Control (DNREC) Hazardous Substance Cleanup Act (HSCA) sites and Tank Management Section (TMS) sites within and surrounding the Christina River Bridge and Approach Roads Site. Some of these sites have been remediated; however, residual contamination may remain and or extend into the Site project area.

This CMWMWP shall be implemented by the excavation and trades contractors during intrusive activities associated with the Christina River Bridge Project (Project). Intrusive activities are defined as activities penetrating the existing ground surface which include, but are not limited to the following:

- Excavation associated with the bridge structure including bridge pilings, bridge piers, abutments, and retaining walls
- Excavation of trenches for the installation of utilities (such as electric lines, manholes, storm drains, and drainage swales) and light poles
- Backfilling of all excavated areas

- Management of native site soil, including stockpiling and disposal
- Stockpiling of soil consistent with this CMWMWP
- Dewatering activities
- Test pits and test holes
- Street-scaping such as installation of pavers and benches
- Landscaping such as tree pits
- Hardscaping such as concrete, sidewalks, and asphalt

This CMWMWP is to provide guidance for handling known environmental conditions and unknown environmental conditions that may be encountered during the construction process Therefore this CMWMWP describes the procedures to excavate, handle, and manage the following:

1. Soil and excavated materials, including but not limited to concrete, railroad ties and debris, originating from the project area, and/or near adjacent properties

2. Sludge and silt materials removed within the project area (if necessary)

3. Potentially contaminated groundwater encountered during intrusive activities and any dewatering activities

In order to prevent the uncontrolled migration of contaminated soil and groundwater, DNREC or DNREC's consultant and the contractor will work together to implement all procedures outlined in this CMWMWP, so that the health and safety of construction workers, the public, and the environment is protected.

The contaminants of concern (COC) in soil that may be encountered in the project area include metals (such as antimony, arsenic, barium, lead, manganese, and mercury), cyanide, petroleum hydrocarbons, pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The COCs that may be encountered in groundwater in the project area include: metals, cyanide, petroleum hydrocarbons, pesticides, PCBs, PAHs, VOCs, and SVOCs. Non-Aqueous Phase Liquid (NAPL) may also be encountered within the project area.

2.0 SITE BACKGROUND

The purpose of this section is to summarize existing reports from previous investigations in the project area. In general, the properties surrounding the project area have historically been used for commercial and industrial purposes. The following section summarizes previous investigations and remediation that has occurred on properties along the project area. The first section presents investigations that cover multiple sites and large portions of the project area. The second section presents investigations in order from North to South on the west side of the Christina River and then follows the approach roads extending South to North on the east side of the River. The sites discussed below are shown on Figure 2 and potential areas of concern for construction are shown on Figure 3 and on Figure 3A.

2.1 Summary of Previous Investigations – Multiple Property Studies

2.1.1 South Wilmington Environmental Assessment, Quadrant 1 & 2 (DE-0286)

DNREC completed an Environmental Assessment of South Wilmington (east), Quadrant 1 and 2 (DE-0286) (DNREC-1996) in 1996 which consisted of a large investigation effort performed by DNREC - Site Investigation and Restoration Branch (SIRB) to collect samples from various properties encompassing approximately 110 acres of South Wilmington. Quadrant 1 is the area between South Walnut Street and Buttonwood Street and is bordered to the north and south by B Street and Garasches Lane, respectively.

A total of 51 soil samples were collected from the East Assessment Area through test pit excavation and borings. Two samples, one shallow and one deep, were collected from test pit TP-26, located east of South Market Street within the area of the Christina River Bridge Approach Road. Samples TP26S and TP26D were field screened for inorganics and organic compounds using DNREC's Mobile Laboratory. Several inorganics, pesticides, polychlorinated biphenyls (PCBs), Gasoline Range Organics (GRO), and Diesel Range Organics (DRO) were detected in TP26D and TP26S, but were below Risk Based Concentration (RBC) criteria. Polycyclic aromatic hydrocarbons (PAHs) were detected in TP 26S above 0.5 mg/kg, but were not detected in TP26D above 0.01 mg/kg. One monitoring well, MW-5 was installed toward the south end of the Christina River Bridge Approach Road. Analysis reported iron and manganese concentrations exceeding RBC criteria in the filtered groundwater samples. DNREC concluded that trace amounts of volatile organic compound (VOC) and semi-volatile organic compound (SVOC), and Tentatively Identified Compounds (TICs) in MW-5 may be related to tar and roofing asphalt

reportedly dumped in the area during the 1950s or a former gasoline station shown on historic maps.

2.1.2 South Wilmington Environmental Assessment, Quadrant 3 & 4 (DE-0286)

DNREC completed the South Wilmington Environmental Assessment, Quadrant 3 and 4 (DE-0286) (DE-286) in 1996 which consisted of a large investigation effort performed by DNREC-SIRB to collect samples from various properties encompassing 85-acres in South Wilmington. Quadrant 3 is the area between South Market Street and the Christina River. Quadrant 4 is located between South Market and South Walnut Streets, and south of B Street. This includes those properties along James Court, which are south of the eastern approach road.

Three shallow soil samples were collected (SS-17, SS-18, and SS-100) and screened for select parameters. Screening results showed concentrations above the RBC criteria in at least one sample for arsenic, lead, GRO, and DRO. Two soil samples were sent for laboratory analysis. Confirmation laboratory results indicated that arsenic and lead concentrations were below Industrial RBC criteria but the lead concentration in one sample exceeded the residential RBC criteria. Several SVOCs were detected, including benzo[a]pyrene which exceeded the RBC criteria. PCB Aroclor 1260 was detected at a concentration above the residential RBC criteria.

One surface water sample and one sediment sample were also collected as a part of the Environmental Assessment. In the surface water sample, aluminum, iron, and lead concentrations exceeded the Ambient Water Quality Criteria (AWQC) freshwater chronic criteria. In the sediment sample, GRO and DRO were not detected during screening. Confirmatory laboratory analytical results indicated 14 inorganic constituents above the Industrial or Residential RBC, and/or three times the background concentration for that particular analyte. PCBs exceeded the RBC Residential and Background level criteria. No notable VOCs or SVOCs were detected at concentrations exceeding the RBC criteria.

2.1.3 Christina River Bridge Site Specific Assessment (DE-0334)

On behalf of the Delaware Department of Transportation, under contract to DNREC, BrightFields conducted a Site Specific Assessment (SSA) of the 32-acre area for the initial proposed Christina River Bridge alignment (DE-0334) (BrightFields, 2009). A total of 39 soil borings were advanced on either side of the River, revealing mostly imported fill on the west side of the River and industrial fill on the east side. Laboratory analysis indicated that several contaminants including metals (arsenic and lead), PAHs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and

dibenz[a,h]anthracene), PCBs, and some petroleum compounds are potential contaminants of concern under a restricted use scenario. Five monitoring wells were installed and groundwater samples were collected from each well. Arsenic was detected above the Uniform Risk-Based Standards (URS) criteria and the City of Wilmington Industrial Pretreatment Regulations limit. Although other metals (aluminum, barium, iron, and manganese) were detected at elevated concentrations in the groundwater, they are not considered contaminants of concern. Four sediment samples were collected and screened. One sediment sample was sent for confirmatory analysis. Metals, one VOC, and PAHs were identified as potential contaminants of concern in sediment. In general, the possible sources of the contamination include spillage from prior USTs, filling activities that previously occurred in this area of the City, and/or from current or past site operations.

2.1.4 Market Street Safety Improvements Environmental Summary Report (DE-1485)

BrightFields completed the Market Street Safety Improvement Environmental Summary Report (DE-1485) in 2009 (BrightFields, 2009). This investigation included soil and groundwater sampling along the project area in September 2009 prior to safety improvements including relocating overhead utilities underground, installation of drainage infrastructure, importing up to 4 feet of fill to raise the roadway elevation, and installation of landscaping and hardscaping. The extent of this project along Market Street was from A Street to just north of the Market/Walnut Street split.

A total of 27 borings were drilled along S. Market Street and 67 soil samples were collected. All 67 soil samples were screened for metals at BrightFields and then 27 samples were analyzed at a HSCA certified laboratory. Based on the X-Ray Fluorescence (XRF) screening results, field observations, existing data, and estimated soil quantities, the project area was broken down into eleven disposal grids. Analysis of the disposal grid soil samples indicated concentrations of lead above the URS criteria and petroleum products above the Delaware Risk-Based Corrective Action Program (DERBCAP) Tier 0 action levels. Groundwater samples were collected at four locations and analyzed for the City of Wilmington Discharge Permit parameters. Concentrations of arsenic, copper, and zinc exceeded both the DNREC URS value and the City of Wilmington Discharge permit limits. Several other metals and some SVOCs exceeded their respective DNREC URS in groundwater samples as well.

Excavated soil and groundwater was managed and properly disposed as part of the DelDOT Market Street Safety Improvements Project completed in March 2012.

2.1.5 Christina River Bridge Subsurface Investigation Report (DE-0334)

BrightFields completed the Christina River Bridge Subsurface Investigation Report (DE-0334) in 2012 (BrightFields, 2012). BrightFields performed this subsurface investigation to characterize the site soil to approximately 20 feet below ground surface (bgs) in areas which are anticipated to be impacted by the construction of the Christina River Bridge and Approach Roads. A total of 27 boring locations were drilled and sampled. Screening results indicated concentrations of metals (arsenic, lead, iron, antimony, and manganese) exceeding their respective restricted use URS criteria were present in soil samples. Confirmatory analyses reported concentrations of metals and SVOCs (benzo[a]pyrene) above the URS criteria. PCBs, arsenic, lead, PAHs (specifically benzo[a]pyrene), petroleum hydrocarbons, and VOCs were present in the soil across the area.

Based on data from the 2009 Christina River Bridge SSA and data from the 2012 Jablow Property Brownfield Investigation, aluminum, arsenic, barium, iron, lead, manganese, vanadium, and MTBE were detected in groundwater. Groundwater samples were not collected during this Subsurface Investigation because groundwater was planned to be sampled closer to the time of construction. Once design plans are finalized to show areas of deep excavation, groundwater samples will be collected and analyzed for the purpose of obtaining a discharge permit from the City of Wilmington for water management during construction.

2.1.6 Christina River Bridge Subsurface Investigation Report #2 (DE-0334)

In September 2013, a total of 13 boring locations were drilled by the Walton Corporation using a hollow stem auger drill rig and split spoon sampling techniques. All of the September 2013 borings were part of the geotechnical investigation conducted by RK&K for the Christina River Bridge project's newest alignment. BrightFields performed the health and safety oversight in addition to the environmental sampling. Total boring depths ranged from 20 to 100 feet. At an additional 5 locations, Cone Penetrometer Test (CPT) Borings were drilled but no samples were collected and health and safety oversight was unnecessary due to minimal intrusiveness. From the additional borings that were advanced, a total of 35 soil samples were collected from the Dravo Shipyard property, the Jablow property, and the Industraplate Corporation property at intervals of 0 to 6 feet bgs, 6 to 12 feet bgs, and 12 to 18 feet bgs. Soil from the split-spoon samples and soil cutting to at least a depth of 20 feet bgs were field screened by a BrightFields on-site scientist using a PID. Thirty-two of the 35 soil samples were chemically screened at DNREC-SIRS

laboratory in New Castle, Delaware for metals, PCBs, pesticides, VOCs, and SVOCs. Samples collected from geotechnical boring SA-3 were not analyzed due to its close proximity to previously sampled borings. Screening of soil samples identified arsenic at concentrations exceeding its default Delaware background concentration as well as detectable concentrations of PAHs, TPH (Total Petroleum Hydrocarbons), and Tentatively Identified Compounds (TICs). Laboratory analytical data reported concentrations of various metals and SVOCs exceeding the URS. This report also includes a summary of findings from test holes advanced in 2015 and summaries of contaminants associated with all of the DNREC SIRS and TMS sites located within the 2015 bridge and approach roads alignment. This report was completed by BrightFields and approved by DNREC-SIRS in August 2016.

2.1.7 Final Plan of Remedial Action - Christina River Bridge and Approach Roads (DE-0334)

The Proposed Plan of Remedial Action (PPRA) for Christina River Bridge and Approach Roads was advertised on September 22, 2016. No comments from the public were received during the 20-day public comment period; therefore the PPRA was adopted as the Final Plan of Remedial Action (FPRA) on October 17, 2016. The FPRA requires the following remedial actions for the Site, which need to be completed before a Certificate of Completion of Remedy (COCR) can be issued:

1. *The Site must be capped with at least one foot of clean fill or impervious material (e.g. buildings, asphalt, or concrete).*

2. *Submit to DNREC a CMMP within 60 days of the issuance of a Final Plan of Remedial Action. The CMMP will allow construction workers to safely handle any potential contaminated soil and groundwater at the Site.*

3. *Submit and Environmental Covenant to DNREC for approval within 60 days of the completion of the remedial actions required in the Proposed Plan;*

4. *Record an Environmental Covenant, consistent with Delaware's Uniform Environmental Covenants Act (7 Del.C. Chapter 79, Subchapter II) in the office of the Recorder of Deeds within 60 days of DNREC approving the Long Term Stewardship Plan. The Environmental Covenant will include the following:*

    a. *<u>Use Restriction.</u> Use of the Property shall be restricted solely to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts;*

    b. *<u>Interference with Remedy</u>. There shall be no digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing activities on the Property*

without the prior written approval of DNREC-SIRS;

c. *Limitation of Groundwater Withdrawal. No groundwater wells shall be installed, and no groundwater shall be withdrawn from any well on the Property without the prior written approval of DNREC-SIRS and DNREC Division of Water;*

5. *A Long-Term Stewardship (LTS) Plan shall be submitted to DNREC for approval within 60 days of the completion of the remedial actions required in this Proposed Plan. The LTS plan will consist of an agreement between DelDOT and the City of Wilmington, notification to DNREC-SIRS, and following the CMMP if digging below the cap in order to ensure the long-term integrity of the remedy.*

6. *The LTS Plan must be implemented within 60 days of its approval by DNREC.*

7. *Remedial Action Completion Report must be submitted to DNREC within 60 days of the completion of the remedial actions required in this Proposed Plan.*

8. *A request for a Certification of Completion of Remedy (COCR) must be submitted to DNREC within 60 days of approval of the Remedial Action Completion Report.*

2.2 Summary of Previous Investigations – Specific Properties

2.2.1 Wilmington Coal Gas Site – South (DE-0114)

The Wilmington Coal Gas Site – South (DE-0114) is located at Beech Street and Madison Street. The former Wilmington Coal Gas Site is separated into two (north and south) sections by Beech Street. Past uses include a manufactured gas plant which operated from 1889 until 1961, a vehicle storage area, an electrical substation, and a storage building. The surrounding area has mainly been industrial and commercial properties, including ship and car building operations.

Numerous investigations and evaluations have been performed at the site, which was placed on the State priority list in January 1993. Some notable investigations on the property are summarized below. In 1993, Duffield Associates prepared a Preliminary Environmental Site Assessment (ESA) for proposed land acquisition and road improvements to South Madison and Beech Streets. Soil samples contained elevated PAH concentrations when compared to the New Jersey Department of Environmental Protection and Energy (NJDEPE) proposed clean-up standards (DNREC had not yet established standards for clean-up). In 1994, Earth Tech prepared a Facility Evaluation summarizing field investigations and performed a Human Health Risk Assessment. Notable detections in soil samples include PAHs; benzene, toluene, ethylbenzene, and xylenes (BTEX); metals (arsenic, iron, and lead in the surface soil and copper, zinc, and lead in the subsurface soil); and cyanide (in the subsurface). In groundwater samples, notable detections

include PAHs, BTEX, and cyanide. Samples of Dense Non-Aqueous Phase Liquid (DNAPL) were also collected and found to be #2 Fuel Oil.

A particular concern on the site is Non-Aqueous Phase Liquid (NAPL), which has led to close monitoring of the site. In 1996 a bio-venting/bio-sparging remedy was implemented and operated for eight years. The system was effective at removing the lighter fraction of hydrocarbons, but not the extent of the NAPL. In 2007 DNREC-SIRB prepared a NAPL Delineation for the Wilmington Coal Gas West Site and the Stadium Site. The investigation found mainly fill across both sites and evidence of soil contamination including visually, by odor, and by photo-ionization detector (PID) readings. Analytical results reported PAHs and TPH in several of the samples. DNREC believed that the Wilmington Coal Gas Site was the source of the contamination. In 2010, AECOM prepared a Focused Feasibility Study (FFS) Report to evaluate additional remedial alternatives.

In December 2010 an Amended Final Plan of Remedial Action was published, which proposed coal tar NAPL remediation through solidification/stabilization and excavation, implementation of a Groundwater Management Zone (GMZ), recording of an Environmental Covenant (EC), development of a Contaminated Material Management Plan, and preparation of a Long Term Stewardship (LTS) plan for soil and asphalt caps. In-situ solidification began in December 2012 and continued through April 2013. In January 2014, AECOM submitted a Final Site Closure Report and Remedial Activity Summary to DNREC outlining the remedial actions performed on the Site. Remedial actions to the Site included the in-situ stabilization (ISS) performed in the southwestern portion of the property (ISS-1) and in the area southeast of the coal gas holder (ISS-2) and, as shown in Figure 3. Additionally, a combustion turbine was decommissioned and a 30,000-gallon above-ground storage tank (AST) was removed from the Site. A total of 12,042 cubic yards of contaminated soil was remediated through ISS. ISS-1 area was backfilled with a stone dust cap, paved with asphalt and ISS-2 area was backfilled with excavated soil that met reuse requirements with a one-foot topsoil cap.

A LTS plan for the southern parcel of the site, prepared by AECOM, was submitted by Delmarva Power & Light (DP&L) and accepted by DNREC in February 2015. The LTS plan requires semi-annually gauging of the monitoring wells and groundwater sampling of the monitoring wells for metals, BTEX, PAHs, and TPH, as well as removing NAPL if significant accumulations are observed. DP&L will also semi-annually inspect stormwater structures for sedimentation, erosion, or blockage; visually inspect topography for any changes; inspect the topography for any changes;

and annually inspect the integrity of the asphalt and vegetative cap. Repairs to the cap, including reseeding, and maintenance of the stormwater structures will be conducted as necessary.

2.2.2 Stadium Site (DE-1004)

The Stadium Site (DE-1004) is currently the location of Frawley Stadium and the associated parking areas. It was historically part of a larger shipyard.

In 1992, Duffield Associates prepared a Phase II ESA for the Proposed Wilmington Multipurpose Sports Stadium and found trace concentrations of several target analytes and compounds in soil and groundwater samples. However, the concentrations were considered acceptable when compared to NJDEPE proposed clean-up standards. Petroleum product was observed in the subsurface soil along the northern site boundary, possibly from historic practices on a neighboring site. The Phase II ESA also mentioned an undated ESA by Medlab Environmental Testing, Inc., a 1991 Limited Environmental Risk Assessment by Tetra Tech, a 1992 Phase I ESA by Schranze and Associates, and a 1992 Proposed Phase II ESA by Schranze and Associates. The reports documented that the historical use of the site included use as a shipyard and that past analyses showed elevated levels of metals (arsenic, lead, cadmium, and chromium), petroleum hydrocarbons, and SVOCs in the fill material and groundwater. In 1997 Duffield performed a subsurface evaluation in the northwestern portion of the site to evaluate the presence of petroleum hydrocarbons. The petroleum found during the evaluation was characterized as coal tar oil which is relatively immobile in unsaturated soil. The report also mentions that in 1992 Delmarva Power assessed the petroleum condition and found a free product plume approximately 200 feet by 100 feet and up to eight inches thick located in the southwestern corner of the southern parcel. As mentioned above, in 2007 DNREC released a NAPL Delineation for the Wilmington Coal Gas West Site and the Stadium Site and found PAHs and TPH in many of the samples.

2.2.3 Dravo Shipyard – Harbor Associates (DE-1096)

The Dravo Shipyard (DE-1096) consists of approximately 120 acres that were historically used for shipbuilding and other heavy industrial activities. Much of the area was marshland that was filled with slag and other industrial waste products. Approximately 33 acres formerly owned by Harbor Associates is located on the western and southern portion of the former Dravo Shipyard. The Dravo Shipyard was divided into two sites, the Amer property (DE-1092) and the Harbor Associates property (DE-1096). The report summaries below focus on the Harbor Associates (DE-1096) portion of the Dravo Shipyard, the location of the western approach roads.

A letter from 1979 indicated that a 500-gallon underground storage tank (UST) was located at the south end of the Madison Street property. In 1993 Schranze & Associates, PC performed a Phase II Environmental Assessment and found localized elevated levels of zinc and lead in surficial soil samples. A 1,000-gallon UST was removed in 1998. In 1998 a Brownfield Preliminary Assessment II was performed by DNREC to characterize contamination on the site. Notable detections include arsenic, lead, and SVOCs (mainly benzo[a]pyrene) in soil and sediment samples, as well as metals (aluminum, lead, iron, and manganese) in surface water samples. In 1999 EA Engineering, Science, and Technology performed a Remedial Investigation/Feasibility Study and compared contaminant concentrations to disposition criteria and suggested placing an impermeable cap over the site. The maximum detected lead concentration in soil exceeded the DNREC unlimited re-use criteria. Metals (aluminum, iron, and manganese) exceeded their respective URS values in groundwater samples. In 2000 EA prepared an OUIV Analytical Sediment Summary Report. Concentrations of several VOCs, PAHs, and metals (arsenic, lead, chromium, and zinc) exceeded their respective URS criteria in sediment samples. In February 2001 a Final Plan of Remedial Action was developed which evaluated alternatives and found the most appropriate alternative to be containment of impacted soil. In addition, it required a deed restriction for non-residential use, notification and approval from DNREC prior to future intrusive activity, placement of a groundwater management zone (GMZ), and development of an Operations and Maintenance (O&M) Plan for the containment system. In 2012 an O&M Plan was prepared for the site, excluding two properties that are being addressed by current owners, the Riverfront Hotel Parcel and the Amer Parcel. The 2012 O&M Plan states that ECs will be placed on the different parcels within the site. Currently, this property is used for commercial retail space, a riverwalk, a parking lot, and open land.

2.2.4 Riverfront Hotel (DE-1518)

The 0.75 acre Riverfront Hotel property (DE-1518) was redeveloped with a ten story hotel. The site was an industrial property since the late 1700s and through at least 1992, with uses including building steamships and producing paper. The parcel was part of the former Dravo Shipyard operations and was certified as a Brownfield in February 2012. It was previously part of the Dravo Shipyard Harbor Associates Voluntary Cleanup Program Site (DE-1096).

In 2012 Weston Solutions, Inc. submitted a Brownfield Remedial Investigation which found contamination including benzo[a]pyrene and arsenic in soils, VOCs and various metals in groundwater, and benzene in soil gas. In 2012 a Final Plan of Remedial Action was published which outlined the future use of the property as a hotel and required proper management of

contaminated materials. In addition, it required an EC to restrict future land use to commercial and industrial purposes and prohibit groundwater well installation for drinking water. The redevelopment of the property was completed in April 2014.

2.2.5 Jablow (DE-1329) (3-002382)

The Jablow property (DE-1329) is a 6-acre property located at 707 South Market Street. The site has been in commercial industrial use since the 1960s as an auto salvage and repair facility. Prior to its current use, the subject property was used as a beef slaughterhouse since the 1930s. In 2006 it was certified as a Brownfield.

In 2004 Tetra Tech performed a Phase I ESA and observed probable surficial soil contamination, a possible UST, and several known or potential pollution sources. Tetra Tech also performed a Phase II ESA in 2004 and found that concentrations of metals in shallow and deep soil as well as groundwater exceeded DNREC URS unrestricted use criteria. Organic contaminants were also detected in soil and groundwater but at unknown concentrations. Possible sources of contamination identified during the site investigation included more than 100 drums, tanks, vessels, and batteries, many of which were observed to be damaged. In 2006 three USTs onsite were removed and cleaned. Post-UST removal samples were collected and the UST excavation was backfilled. Contaminated soil generated from the removal of the USTs was staged onsite and disposed of in July 2007. Solid and hazardous wastes were removed from 5 acres of the site. Additional hazardous and non-hazardous wastes still remained onsite. In 2007 Advanced Geological Services performed a geophysical investigation and found three anomalies, none of which were believed to be USTs. At this time, Tetra Tech also advanced eight soil borings and two samples collected from near one of the anomalies had TPH-GRO, benzene, and total BTEX levels higher than the Tier 0 levels. In July 2007, 238.75 tons of soil that were removed with the USTs were disposed offsite and DNREC issued a no further action letter. In 2012, LandmarkJCM performed a Brownfield Investigation. Analyses detected concentrations above the URS for metals, SVOCs, one pesticide, and one PCB in soil samples and for metals and one VOC in groundwater samples. In August 2013, BrightFields performed a PCB Delineation and PCBs were below the DNREC 2013 screening level in all samples analyzed. All samples were screened for lead and select samples were sent for confirmatory analysis, some of which exceeded the DNREC 2013 screening level, the DNREC URS for restricted use, and/or the hazardous waste regulatory criteria (for Toxicity Characteristic Leaching Procedure (TCLP) lead). The report was submitted to DNREC in April 2014.

2.2.6 Industraplate Corporation

Industraplate Corporation is located at 5 James Court. The property is currently owned by Robert H Wahl Revocable Trust and is bordered by the Jablow Property to the north, James Court and Bald LLC property to the east, James Court Associates, LLC Property to the south and the Christina River to the west. A precision electroplating business currently operates on this property.

In 1984 Stablex-Reutter Inc. completed a Baseline Monitoring Report with information regarding sampling and analyses of Industraplate's wastewater discharge to the Wilmington publicly-owned treatment works. Samples were analyzed for cyanide, cadmium, lead, and pH. In 1986, DNREC inspected the facility, which performs specialty precision electroplating. They had plating baths of aluminum, nickel, cadmium, copper, zinc, and chromium as well as an anodizing bath. There were two hazardous waste streams (Chromium Waste Stream and Stripping Process Waste Stream) that were generated on a regular basis. A Small Quantity Generator (SQG) Waste Evaluation in 1992 summarized the processes and recorded two violations due to lacking land disposal restriction notification forms and accumulation time for drums exceeding the 180 day time frame. The Waste Evaluation also stated that the facility was clean and there were no signs of spillage at the plating operations area. In August 1992 DNREC Hazardous Waste Management Branch issued a Notice of Violation to Industraplate for the two violations noted in the Hazardous Waste Evaluation Report.

2.2.7 733 S. Market Street (DE-1502) (3-000454)

733 S. Market Street (DE-15020 (3-000454) (formerly known as Tire Sales & Service and Bentley Truck Services, Inc. and formerly owned by First State Enterprises and Gene Associates C/O Eastern States Leasing LLC, respectively) is bordered by James Court to the north, South Market Street to the east, several commercial/industrial properties to the south and Cobra Machine & Fabrication property to the west. The property is currently owned by Dun-Rite Tires Plus Wheels, Inc., who operates a rim and tire sales business.

Between 1994 and 1995, a 2,000-gallon UST was removed from the site and in 1995 the DNREC UST Branch completed a Tank Removal Report. BTEX and TPH were detected in soil samples collected from the former tank area, with contamination increasing downward in the tank pit. In 1996, First State Enterprises informed DNREC that a 1,000-gallon heating oil tank was in use at the facility. Laboratory analysis indicated that there had been a release so J&M Industries emptied and properly removed the tank. In 1996, DNREC reviewed the analytical data for samples

collected from around the former 2,000-gallon gasoline UST and issued a no further action letter. In addition, J&M proposed a plan for an oil recovery system which DNREC approved. Samples collected from around the former 1,000-gallon heating oil UST showed detections of diesel range petroleum hydrocarbons (DRPH) and DNREC required additional investigation to determine the extent of contamination. In October 1996, Duffield submitted a Hydrogeologic Report and Proposed Corrective Action Work Plan which proposed a Product Collection System and summarized the subsurface evaluation at the facility. Free phase petroleum was observed floating in all of the test pits but the fill layer acted as a trap and kept the water and product perched. As a result, Duffield did not perform the Geoprobe borings or groundwater samples. In 1997, Duffield submitted a Product Collection Summary Report outlining the installation of product collection sumps and the test pit evaluation. Petroleum hydrocarbons were detected in soil samples. The product collection sumps began operating in November 1996 and showed heavy oil accumulation. By June 1998, the total volume of petroleum removed was estimated to be 56.2 gallons. In December 1998 the DNREC UST Branch issued a no further action letter. It appears that Tire Sales & Service removed the product collection sumps and backfilled the area at this time as well. In 2011 a Brownfield Investigation Report was prepared for the site. Contaminants of concern were not found in the surface or subsurface soil and were determined to be arsenic, iron, and manganese in groundwater. In May 2012 a Final Plan of Remedial Action was published requiring that soil excavation be performed in accordance with the Contaminated Materials and Water Management Work Plan (CMWMWP) and Health and Safety Plan (HASP) and the site owner to record an EC. The Site is currently awaiting redevelopment and remedial actions.

2.2.8 Hessler Property (DE-1169 and DE-1203)

The Hessler Property (DE-1169 and DE-1203) is located at 401 Garasches Lane. It is approximately 8.5 acres and is surrounded by commercial and light industrial properties. The DE-1169 site became a Certified Brownfield in 2001 and the owner entered into the Voluntary Cleanup Program in 2003. The DE-1203 site became a Certified Brownfield in September 2002. In December 2014, DNREC closed the Hessler Property Site DE-1169 and began classifying the property as Hessler Property Site DE-1203.

DNREC completed a Brownfield Preliminary Assessment II in April 2001 which revealed fill and debris across the site and petroleum-like odors in several test pit excavations. Elevated concentrations of metals (arsenic and lead), PAHs, PCBs, and pesticides were detected in soil samples. In addition, contaminants related to petroleum were detected in many of the soil samples. In groundwater samples, iron and arsenic exceeded benchmark levels.

The Hessler Property Site was entered into a Brownfield Development Agreement by Cornerstone West Community Development Corporation in February 2015. BrightFields conducted a Brownfield Investigation on the Site in January 2015 and submitted the final BI report to DNREC in June 2015. The final Brownfield Investigation report was approved by DNREC in July 2015. Metals (antimony, arsenic, total chromium, chromium VI, copper, iron, lead, and zinc), PAHs, and total PCBs were detected in the surface soil above DNREC January 2015 screening levels. Metals (aluminum, antimony, arsenic, barium, cadmium, total chromium, chromium VI, cobalt, copper, lead, mercury, nickel, silver, and zinc), PAHs, and total PCBs were detected in the subsurface soil above DNREC January 2015 screening levels. TCLP lead was detected in soil above RCRA hazardous waste criteria. Metals (arsenic, barium, chromium, iron, lead, and manganese), SVOCs (benzo[a]pyrene and benzo[b]fluoranthene), and VOCs (TCE and vinyl chloride) were detected in the Site dissolved groundwater above DNREC January 2015 screening levels. Metals (aluminum, arsenic, barium, cadmium, copper, iron, lead, manganese, mercury, and zinc) and organics (benz[a]anthracene, benzo[a]pyrene, pyrene, and 4,4'DDE) were detected above DNREC January 2015 screening levels in surface water. Metals (antimony, arsenic, cadmium, total chromium, copper, iron, lead, manganese, mercury, nickel, silver, and zinc), cyanide, and PAHs were detected in sediment above DNREC January 2015 screening levels. A supplemental Investigation to delineate the extent of elevated arsenic, lead, and ACM previously identified on the Site was performed in June 2015.

A Focused Feasibility Study (FFS) was completed in September 2015. The study evaluated several different remedial actions to address remediation of site COCs. The recommended remedial actions include a phased approach which will be incorporated with the development of the property and provide for evaluation of each action before implementing additional remedial actions. The first recommended remedial action is to place an institutional control on the site to prevent disturbance of buried ACM on the central portion of the site and to prohibit the withdrawal of groundwater. In conjunction with the development of the property an impervious cover will be placed on the entire site and monitoring wells installed. The monitoring wells will be sampled to evaluate if groundwater contamination is naturally attenuating or if additional remedial measures are necessary. If additional remedial actions are required to address the groundwater contamination, a permeable reactive barrier along the ditch on the eastern boundary of the property may be installed. If additional remedial actions are required to address surface water contamination, reactive core mats may be installed on the western side and bottom of the ditch along the eastern property line. A Proposed Plan of Remedial Action (PPRA) for the site currently is being drafted by DNREC. DNREC has requested an area approximately 20 feet wide

be preserved between the ditch and the planned future road to allow for installation of the groundwater treatment system, if determined to be necessary.

2.2.9 Shuster Auto Salvage (DE-1178)

Shuster Auto Salvage (DE-1178) is located at 601 South Market Street. Historically, the site was a salvage yard including a storage area and a car crusher.

The property was included in the South Wilmington Environmental Assessment, Quadrants 3 & 4 completed by DNREC in 1996. Elevated concentrations of arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, zinc, and bis(2-ethylhexyl) phthalate were detected in soil samples. A monitoring well installed on the northern portion of the property revealed elevated levels of arsenic, iron, and manganese in both filtered and unfiltered samples. In 2001 Environmental Alliance completed the South Wilmington Salvage Yards Remedial Investigation which indicated TPH-DRO and arsenic in soil samples above HSCA levels and dissolved iron in the groundwater sample above HSCA levels. In 2009, Environmental Alliance performed a Remedial Investigation and found that the chemicals of concern in soil and groundwater include metals, VOCs, SVOCs, and TPH. The files on the DNREC Environmental Navigator do not show any record of a Proposed Plan of Remedial Action for the property.

2.2.10 524 A & B South Walnut Street (DE-1235)

The 524 A & B South Walnut Street property (DE-1235) is located between Garasches Lane and C Street. Historically, the site was used as a junkyard from the 1930s through the early 1960s and the eastern portion of the site was owned by railroad companies through 1988.

Geotechnical investigations in 1973, 1974, and 1987 showed significant filling throughout the site from 0 to 15 feet below grade including rocks, broken concrete, trash, cinders, slag, incinerated rubbish, rags, wood, glass, plastic, and coal. In December 1997 and December 2000 Tetra Tech performed Phase I Environmental Site Assessments. Tetra Tech was contracted to perform a remedial investigation (RI) in September 2001. The RI reported elevated concentrations of arsenic, lead, PAHs, PCBs, and SVOCs (benzo[a]pyrene and dibenz[a,h]anthracene) in the soil. Concentrations of metals (mainly arsenic), SVOCs, PCBs, and pesticides exceeded their respective DNREC URS values in shallow groundwater samples. Since the majority of the site was covered with a building and a parking lot, in the 2002 Final Plan of Remedial Action DNREC required that a deed restriction be placed on the property and that the pavement and landscaped areas be kept in good condition through an O&M Plan.

2.2.11 American Tank Cleaning Company (DE-1180) (7-000200) (3-001515)

American Tank Trailer (DE-1180) (7-000200) (3-001515) is located at 535 South Market Street. The tank trailer cleaning business has operated since 1980. Tanks containing both hazardous and non-hazardous wastes have been cleaned by the company. There were three USTs onsite; two were removed in 1987 and the last tank was removed in 1994.

The site was investigated as a part of the 1996 South Wilmington Environmental Assessment, Quadrants 3 & 4 by DNREC and some PCBs were detected in the soil. In 2001 Environmental Alliance completed the South Wilmington Salvage Yards Remedial Investigation which reported iron and manganese in groundwater samples collected from the western portion of the site and lead in soil samples. In May 2012 a Remedial Investigation Work Plan was submitted to DNREC. The files on the DNREC Environmental Navigator do not show any record of a Proposed Plan of Remedial Action for the property. The site is currently under a Consent Decree with DNREC, which requires completion of a RI.

2.2.12 Lamplugh Property (DE-1319) (3-001029)

The Lamplugh Property (also known as B&M Auto) property (DE-1319) (3-001029) is a 4.29 acre property located at 525 S. Market Street. Based on previous investigations, this site may have been used as a gas station. Three USTs were removed in the 1980s. Based on the soil sample results from the removal, DNREC recommended a Hydrogeologic Investigation be performed on the property. Based on the Brownfield Investigation, which included a Hydrogeologic Investigation, performed by BrightFields in 2004, it was concluded that lead, PAHs, and arsenic are contaminants that may be found in the soil near this property. Metals, SVOCs, and PCBs were detected in sediment samples from previous investigations at concentrations exceeding their respective URS. Arsenic and naphthalene may be encountered in the groundwater in the vicinity of this property. The files on the DNREC Environmental Navigator do not show any record of a Proposed Plan of Remedial Action for the property.

2.2.13 M&N Property (DE-1496)

The M&N Property (DE-1496) is located at 516 South Market Street. Past uses include a skate board park, an auto sales yard, and a wire shelving supply house. Soil and groundwater contamination is believed to be associated with historical fill deposited prior to commercial uses. It became a certified Brownfield site in 2010.

Environmental Alliance performed a Brownfield Investigation in 2011. Surface soil is generally clean while the subsurface soil contains arsenic, lead, and SVOCs such as PAHs. Groundwater contains dissolved iron, manganese, arsenic, aluminum, and antimony. A Final Plan of Remedial Action was issued in August 2011 stating that an EC would be recorded limiting the site to light industrial or commercial use and groundwater well installation and disturbance of soil will be prohibited unless prior written approval from DNREC was obtained, a Long Term Stewardship (LTS) Plan would be developed and implemented, and a Contaminated Materials Management Plan would be developed and implemented. These items were completed and DNREC issued a Certificate of Completion of Remedy (COCR) in late 2011.

2.2.14 International Petroleum Corporation (DE-1278) (3-000001)

The International Petroleum Corporation (IPC) property (DE-1278) (3-000001) is located at 505 S. Market Street. Historic uses for this property include: a petroleum recycling facility since early 1900's, a fuel oil distributor, and a home heating oil company. The current name of the company occupying this property is FCC Environmental.

In 1991, WIK Associates investigated the site and found VOCs and SVOCs in the soil and groundwater. In 2001, Environmental Resources Management (ERM) sampled across the site and found TPH and methyl tertiary butyl ether (MTBE) in soil samples and VOCs and SVOCs in groundwater samples. Based on the November 2003 ERM Remedial Investigation Report, previous soil samples contained PCBs (Aroclor 1260), pesticides, and metals (notably arsenic, lead, and iron). The ERM RI report also indicated that four tanks; (2) 6,000, (1) 5,000, and (1) 550-gallon were removed in 1992 from the eastern side of the site that was formerly a gas station. BTEX and TPH-GRO were detected in the site soil around the USTs. The contaminants that may be encountered in the soil in the vicinity of this property are PCBs, pesticides, metals (notably arsenic, lead, and mercury), VOCs, SVOCs, and TPH-GRO. BTEX, MTBE, naphthalene, PAHs, and free product may be encountered in groundwater in the vicinity of this property. In May 2005 a Final Plan of Remedial Action was prepared for the site to continue including the site in the City of Wilmington GMZ, place a deed of restriction on the property, require preparation and submittal of an O&M Plan, and to require monitoring of the status of the phytoremediation and wetland restoration effort along the waterfront. The interim action for groundwater as a part of the Final Plan included the continued monitoring, recovery, and removal of free-product petroleum from the on-site product recovery wells as well as a current evaluation of groundwater contamination. In addition, numerous inspections have taken place at the facility. The most recent inspection took place on February 2, 2015 and no violations were found at the site.

2.2.15 Christina Landing Retail Center (DE-1401) (3-002400)

The Christina Landing Retail Center (DE-1401) (3-002400), also known as the Howard Street Commercial Development, is located at 310 South Market Street. The property is located at the northern extent of the project area on the east side of the Christina River, therefore only the southern portion of the site will be encountered during construction activities. Historically the site was used as a metals salvage yard to process scrap metal from the 1950s through 2005. Operations included crushing metal objects and equipment which could have resulted in the release of PCBs onto the property.

Various investigations have been performed at the site, indicating PCBs, arsenic, lead, and some PAHs to be the main contaminants of concern in soil, sediment, and groundwater on the property. In 2005 Duffield Associates performed a Modified Phase I ESA with Limited Sampling and found concentrations of benzo[a]pyrene, dibenz[a,h]anthracene, PCBs, arsenic, and lead exceeding URS standards in soil samples. Duffield Associates collected additional samples for the 2005 Preliminary Supplemental Remedial Evaluation to investigate a possible PCB "hotspot" and fill in other data gaps. PCB concentrations ranged from 9.6 mg/kg to 5,300 mg/kg and manganese and iron were detected in groundwater samples exceeding the DNREC groundwater quality standards. A 2007 Remedial Investigation/Feasibility Study (RI/FS) summarized all non-PCB data and compared different remedial actions. A Self-implementing On-Site Cleanup and Disposal of PCB Remediation Waste/Risk Based Disposal Approval Plan (Hybrid Plan) was submitted to DNREC and USEPA Region 3 in October 2007. In January 2008, contaminated soil was excavated and sampled for disposal. In April 2008 PCB contaminated soil was excavated and a low-permeability clay cap was installed over the residual contamination, which was later covered with a parking lot. At this time two gasoline USTs were discovered and removed from the site. A Final Plan of Remedial Action issued in January 2009 outlined the cleanup of PCB contaminated soil and the placement of marker fabric and an asphalt cap. In addition, the Final Plan required the implementation of an environmental oversight program during redevelopment, the institution of ECs, and restriction of groundwater through the City of Wilmington GMZ. These remedial actions were completed and the COCR was recorded on February 4, 2010.

3.0 CONTRACTOR RESPONSIBILITIES

The following list of items will be carried out *prior* to any intrusive activities:

1. The Contractor shall not begin intrusive subsurface work until the Contractor has read, understood, and signed the CMWMWP and HASP.

2. The Contractor will notify and coordinate with DNREC's designated HSCA-certified environmental consultant 5 days prior to any intrusive work in the Project area. This notification will include the type of activity being performed (i.e. excavation, dewatering, silt/sludge removal) and the area within the site where the activity will occur.

3. Contractor shall submit to DNREC's designated HSCA-certified environmental consultant, the quantity (truckloads) of soil to be excavated.

4. Contractor must notify DNREC's designated HSCA-certified environmental consultant, of any off-site fill source one month prior to bringing on site. Any soil used as fill, obtained from an off-site source, shall be sampled by DNREC or DNREC's designated HSCA-certified environmental consultant, prior to bringing on site. DNREC or DNREC's designated HSCA-certified environmental consultant, will evaluate the analytical results and determine whether it is an acceptable source of fill material. DNREC must approve of all soil from a Delaware HSCA site (surface or subsurface) to be used as fill. The information to be submitted to DNREC for accepting soil from a HSCA site will include a comparison of the analytical data of the fill soil and the onsite soil and be consistent with DNREC's May 2010 Soil Re-Use Policy (Attachment 1).

5. The Contractor shall be prepared to provide appropriate personnel, equipment, and supplies to comply with methodology described and to meet the objectives of this CMWMWP and the site specific HASP, including all necessary personal protective equipment (PPE).

6. Contractor will be responsible for pumping from the excavation into the groundwater discharge pretreatment system as described in Section 4.5.

7. The Site Safety and Health Officer (SSHO) will conduct a health and safety briefing as described in the HASP. The contractor shall conduct pre-construction safety meetings

with all personnel involved in the excavation activities within the project area. All personnel working on the project will review and sign the HASP.

The following list of items will be carried out *during* intrusive activities:

1. In the event that suspicious soil or other materials are encountered during excavation activities, the contractor shall prepare a temporary soil stockpile area as specified in Section 4.0 of this CMWMWP. Soil and other materials (i.e. timbers) shall not be removed or placed within the stockpile area without the approval and oversight of DNREC's designated HSCA-certified environmental consultant. The location of the temporary stockpile may change due to the needs of the project (e.g., consolidation, shifting, and screening). The Contractor is responsible for maintaining erosion and sediment control measures around the stockpile as required.

2. The contactor shall cover the contaminated stockpiles with 8-mil plastic at the end of each work day.

3. DNREC's designated HSCA-certified environmental consultant will maintain copies of completed non-hazardous and hazardous (if necessary) waste manifests for soil, contaminated water, and oil transported to an approved disposal location as specified by RK&K and/or DelDOT.

4. The contractor shall maintain all perimeter sediment controls in working condition to prevent sediment loss from the soil stockpile area. The contractor shall keep all roadways entering and leaving the stockpile area free from soil. If necessary a tracking pad or street sweeper will be used to prevent and clean any soil tracked on roadways from trucks leaving the site.

5. Contractor will be responsible for transportation and disposal of all concrete, asphalt, metal, and untreated wood. Oily concrete, or other debris, if it is encountered, shall be pressure-washed at the site by DNREC's designated HSCA-certified environmental consultant prior to loading into trucks for off-site recycling or disposal by the Contractor, unless the recycling or disposal facility agrees with the Contractor to accept the material as is. Water (i.e., washwater) is to be collected and treated prior to discharge. Non-oily debris shall be shaken to remove the majority of attached soil, if any, prior to offsite disposal.

6. The Contractor will notify and coordinate with DNREC's designated HSCA-certified environmental consultant at least 2 weeks prior to any dewatering activities within the Project area. Contractor shall submit to DNREC's designated HSCA-certified environmental consultant a summary of the daily volume of water to be discharged to the sanitary sewer or storm sewer, as approved, if necessary. If water treatment is required, DNREC or DNREC's designated HSCA-certified environmental consultant will supply and maintain the pretreatment system and will install a totalizing flow meter on the water treatment system outlet as described in Section 4.5. Discharging to the sanitary sewer or storm sewer during rain events will be prohibited, as required by the City of Wilmington discharge permit (Attachment 2).

7. The Contractor shall be responsible for the security of the construction area and equipment throughout the project. The Contractor shall provide adequate security measures to prevent public exposure to possible contamination.

8. The Contractor shall perform work to insure minimum interference with vehicular traffic and other site activities.

9. The Contractor shall maintain emergency and fire routes from the project area.

10. The Contractor must supply adequate water to control dust during all on-site activities. Dust suppression activities will be coordinated between the Contractor and the SSHO.

11. In the event that petroleum contaminated materials or USTs are encountered during construction, the USTs will be properly removed by a Delaware certified tank removal contractor, and the recovered petroleum and the soil will be sampled and managed according to the Delaware Regulations Governing Underground Storage Tank Systems.

The following list of items will be carried out *after* intrusive work is completed:

1. Contractor shall properly decontaminate equipment as needed.

4.0 EXCAVATION, HANDLING, AND MANAGEMENT OF CONTAMINATED MATERIALS

4.1 Soil Remedial Approach

A summary of contaminants associated with sites located within and adjacent to the Christina River Bridge and Approach Roads project limits is included in Table 1. Potential areas of concern for construction are shown on Figure 3 and on Figure 3A. Since construction for the Christina River Bridge and Approach Roads will be performed in different stages, a separate CMWMWP will be prepared for the Approach Roads to appropriately manage soil and groundwater generated during construction.

If excavated soil cannot be reused as backfill in the excavation because of environmental and/or structural reasons, it shall be stockpiled in the designated stockpile area, sampled, if necessary, and disposed off site at an approved disposal facility. DNREC's designated HSCA-certified environmental consultant personnel will direct the Contractor as to which stockpile to place the excavated material. Waste characterization data will be used to determine whether the material is hazardous or non-hazardous waste and aid in the selection of an appropriately licensed disposal facility.

4.1.1 Non-Hazardous Soil

The Contractor shall use materials and equipment that are standard for excavation and removal activities and that comply with specification requirements. Environmentally and structurally suitable soil will be reused wherever possible within the project area.

Soil is environmentally unsuitable if PID readings on the soil are consistently greater than 25 ppm, if there is unusual or potent olfactory evidence of contamination, or if soil is visually suspect (i.e., unusually colored soil, evidence of obvious hydrocarbon product mixed with soil).

As additional construction bid packages are released, addendums will be prepared to show specific areas of contamination where work will be performed. If soil within the Project area cannot be reused as backfill due to evidence of contamination, those locations will be noted to ensure proper handling and disposal. If these areas are encountered during intrusive activities, the soil should be stockpiled separately and disposed off-site at a designated disposal facility.

It is the goal of this project to dispose of all contaminated soil off site as soon as possible after it is excavated. If soil cannot be reused, soil will be loaded directly into trucks, if warranted, for transport to a DNREC-approved location for disposal as specified by the owner. The Contractor shall coordinate with the Engineer and DNREC's designated HSCA-certified environmental consultant to schedule trucks for soil disposal in advance of soil excavation. The SSHO will conduct photo-ionization detector (PID) and dust monitoring during soil excavation activities.

The Contractor shall comply with the following procedure for stockpiling:

- Polyethylene Sheeting: At the designated stockpile staging area, the contractor shall use 8 mil thick polyethylene sheeting (clear or black) to stockpile contaminated soils. Three layers of the sheeting will be placed on the ground surface and the soil stockpiled on top of the poly sheeting. The soil pile will be covered with the polysheeting at the end of each work day and will be secured and weighted to prevent wind damage to the staging area.

- Stockpile Maintenance: Contractor shall shape and lap the cover edge of the polysheeting to shed water and cover the pile at the end of each work day. The Contractor shall promptly replace degraded or torn cover material. The Contractor shall install silt fencing around the stockpile area, install a construction entrance and provide inlet protection, as specified in the project erosion and sediment control plans.

The contractor shall prevent, to the greatest extent possible, the infiltration of surface water into the excavated areas.

The intrusive activities shall be conducted under modified Level D OSHA PPE within the project area by OSHA 24-hour HAZWOPER trained workers. In the event that a PPE upgrade to Level C is necessary, intrusive activities shall be conducted by OSHA 40-hour HAZWOPER trained workers. A description of the PPE required is provided in the HASP. Also included in the HASP are PPE upgrade action levels and requirements for the donning of Level C PPE.

In the event that any visual, olfactory or instrumental evidence of contamination is found, and in conjunction with recent soil analytical results, DNREC's designated HSCA-certified environmental contractor will instruct the contractor which stockpile to use for staging soil until the appropriate disposal facility has been approved. The contractor cannot take any soil off site unless approved by DNREC or DNREC's HSCA-certified environmental consultant.

4.1.2 Hazardous Soil

Due to the potential for encountering hazardous soil, all contractors performing intrusive activities on the property shall have or obtain prior to Notice of Proceed OSHA 24-hour HAZWOPER training with current 8-hour update. Training to be provided by Contractor. Soil with Toxicity Characteristic Leaching Procedure (TCLP) test results that fail Hazardous Waste Criteria is considered hazardous. Hazardous soil and environmentally unsuitable soil cannot be reused.

According to the sampling information available, hazardous lead was identified at three areas on the Jablow property. If these areas are encountered during intrusive activities the soil will either be live loaded directly into trucks for transportation to an approved hazardous waste disposal facility or stockpiled in the "hazardous lead" stockpile for disposal within 90 days of stockpiling. Any other excavated soils determined to be RCRA hazardous will also be managed following the RCRA generator, transportation, and disposal requirements.

Depending on site conditions, a marker barrier may be placed at the bottom and sides of the excavation to act as a "witness liner" between clean fill and existing contaminated material for the purpose of visually identifying the boundary between clean backfill and potentially contaminated existing soil. This "witness liner" is to alert future workers.

4.2 Debris Materials

All debris materials (i.e., timbers, treated wood, railroad ties and/or concrete) encountered during excavation activities will be segregated from excavated soil and stockpiled on 8-mil polyethylene sheeting. Treated wood and/or railroad ties encountered during excavation activities will be segregated from excavated soil and stockpiled on 8 mil poly sheeting in the designated stockpile area. It is the responsibility of the contractor to cut all railroad tie material into three foot sections before loading into disposal trucks or roll offs for transport to the appropriate disposal/recycling facility (if necessary).

If debris material is determined to be hazardous, it will be managed following RCRA generator, transportation, and disposal requirements.

4.3 USTs, ASTs, and Piping

If USTs, ASTs, or associated piping are encountered during any of the intrusive activities in the project area, the Contractor will immediately stop work and notify DNREC's HSCA-certified environmental consultant. USTs, ASTs, or associated piping will be properly drained of liquids,

removed, decontaminated, and disposed off site in accordance with the Delaware Regulations Governing Underground Storage Tank Systems. If residual non-aqueous phase liquid (NAPL) is present in the ground it will be handled through the dewatering treatment system or excavated, as appropriate, in accordance with DNREC regulations.

4.4 Sludge/Silt

If necessary, the Contractor shall provide labor, material, and equipment for removing all sludge and silt material generated. The material will be stockpiled in the designated stockpile area.

4.5 Groundwater

As described in Figure 3, there are potential areas of concern in groundwater throughout the Project area. All groundwater that will be dewatered from excavations and discharged into the City of Wilmington sanitary sewer system will require treatment. A copy of the discharge permit will be included as Attachment 2, once received from the City of Wilmington. If volume of pumped water is greater than 50,000 gallons per day a DNREC Water Allocation permit may be required. Other DNREC permits may also be applicable for portions of the project.

Initial pretreatment may include a sedimentation tank to reduce the suspended solids, an arsenic removal filtration unit, a carbon unit, and an oil/water separator (when necessary) before discharging into the sewer system. Water pumped from the excavation shall be treated, as necessary, to meet the discharge concentrations specified by the wastewater discharge permit issued by the City of Wilmington. If initial discharge limits are exceeded, to meet the permit requirements, DNREC or DNREC's HSCA-certified environmental consultant shall notify the Contractor that additional pretreatment will be required. DNREC or DNREC's designated HSCA-certified environmental consultant shall install, maintain, and operate the pretreatment system with an optional carbon filtration system and/or oil-water separator and/or arsenic removal filtration unit and/or cyanide resin unit (depending on discharge exceedances). After pretreatment, all dewatering fluids shall be routed into one of the designated sanitary sewer manholes approved by the City of Wilmington in accordance with the Wastewater Discharge Permit (to be included as Attachment 2, once received from the City of Wilmington). The typical allowable discharge levels for the City permit are presented in Table 2.

DNREC's designated HSCA-certified environmental consultant shall take samples during the dewatering activities to ensure that water criteria limits have not been exceeded. DNREC's designated HSCA-certified environmental consultant will collect an initial sample of discharge

water during the first day of dewatering. Some analytical results will be available within 24 hours. Because of the time it takes to process these samples for certain analytical requirements, a faster turn-around time may not be possible. All analytical results will be obtained within two weeks from the date the sample is taken to the lab and will be reported to the appropriate agency. Based on the results, DNREC or DNREC's designated HSCA-certified environmental consultant may have to modify treatment methods to meet the permit's requirements for discharge.

DNREC's designated HSCA-certified environmental consultant shall meter the instantaneous discharge rate and the cumulative discharge volume for all water discharged. DNREC's designated HSCA-certified environmental consultant shall maintain a log detailing the dates and hours of discharge, the rate of discharge in gallons per hour, and the cumulative gallons discharged.

If an oil/water separator is necessary, then the recovered oil shall be removed from the oil storage area of the oil/water separator and properly disposed. DNREC or DNREC's designated HSCA-certified environmental consultant will subcontract the oil removal to a DNREC approved waste disposal facility.

If a carbon unit and/or arsenic removal filtration unit is necessary, it will be provided by DNREC's designated HSCA-certified environmental consultant. The units must be of a design which can handle the anticipated discharge flow and remove solvents or elevated arsenic concentrations. The type of system that is anticipated is an appropriately sized carbon unit and/or arsenic removal filtration unit. Depending on the size of the system and the initial VOC or arsenic concentrations, frequent changing of the system, shall be properly maintained and monitored for breakthrough of contaminants. If carbon (black globules) is observed on the discharged water, a breakthrough has occurred. Depending on which type of arsenic removal system is used, there are different ways to know if a breakthrough has occurred. At the conclusion of the project or as needed, the contaminated portion of the units shall be properly disposed according to the manufacturer's specifications.

5.0 TRANSPORTATION OF CONTAMINATED MATERIALS

This section describes the procedures to be followed during the loading and transportation of the contaminated material (soil, oil if present, railroad ties, debris, and sludge/silt) to the respective off-site recycling/disposal facilities.

5.1 Soil Disposal

A. Contaminated soil and or structurally unsuitable soil that is excavated from the project areas will be live loaded or temporarily stockpiled in preparation for loading into dump trucks or trailers by the Contractor, as coordinated and approved by DNREC or DNREC's designated HSCA-certified environmental consultant. BrightFields or designated HSCA-certified environmental consultant will monitor the loading and stockpiling of soil. The soil will be transported to a DNREC-approved disposal location, as specified by DNREC's designated HSCA-certified environmental consultant.

B. The trucks shall be loaded so that the solids are at least six (6) inches below the top of the trailer bed.

C. The trucks shall be covered during transport.

D. DNREC's designated HSCA-certified environmental consultant will monitor the release of dust, vapor emissions, and wet soil from the trucks leaving the site.

E. The contractor shall keep all roadways entering and leaving the project location free from soil. If necessary, a tracking pad or street sweeper will be used to prevent and clean any soil tracked on roadways from trucks leaving the site.

F. DNREC's designated HSCA-certified environmental consultant shall prepare and provide the facility with completed required waste manifests.

G. All manifests shall be signed by the owner's representative or agent, prior to vehicles leaving the site.

5.2 Other Fill Materials

A. All railroad ties and treated wood shall be loaded into trucks or roll offs, which are to be covered during transport to the approved disposal facility

B. Contractors will be responsible for transportation and disposal of all concrete, asphalt, metal and untreated wood.

5.3 Sludge/Silt Removal (if applicable)

A. Contaminated sludge/silt shall be sampled by DNREC's designated HSCA-certified environmental consultant prior to being loaded into dump trucks or VAC trucks.

B. The trucks shall be loaded so that the solids are at least six (6) inches below the top of the trailer bed and then transported to an approved disposal location as specified by the owner.

C. The trucks shall be covered during transport.

D. DNREC's designated HSCA-certified environmental consultant will monitor the release of dust, vapor emissions, and any wet soil from the trucks leaving the site.

E. The contractor shall remove accumulated material from the truck tires prior to the trucks leaving the construction site and or the sludge management area. DNREC's designated HSCA-certified environmental consultant, will monitor for excess water from washing of truck tires, as well as prevent excess water leaking from trucks while moving any soil offsite.

F. The contractor shall keep all roadways entering and leaving the project location free from soil. If necessary a tracking pad or street sweeper will be used to prevent and clean any soil tracked on roadways from trucks leaving the site.

5.4 Petroleum Contaminated Water and Oil (if encountered)

A. Petroleum contaminated water will be pumped into holding tanks, sampled, and transported to a designated facility.

B. The transporter for any recovered oil will be a DNREC approved waste disposal facility that is fully licensed, insured, and permitted to transport petroleum contaminated liquids in the State of Delaware.

C. DNREC's designated HSCA-certified environmental consultant will provide the driver with completed non-hazardous waste manifests and maintain and submit all manifest documentation to necessary parties.

D. All manifests shall be signed by the owner's representative or agent, prior to vehicles leaving the site.

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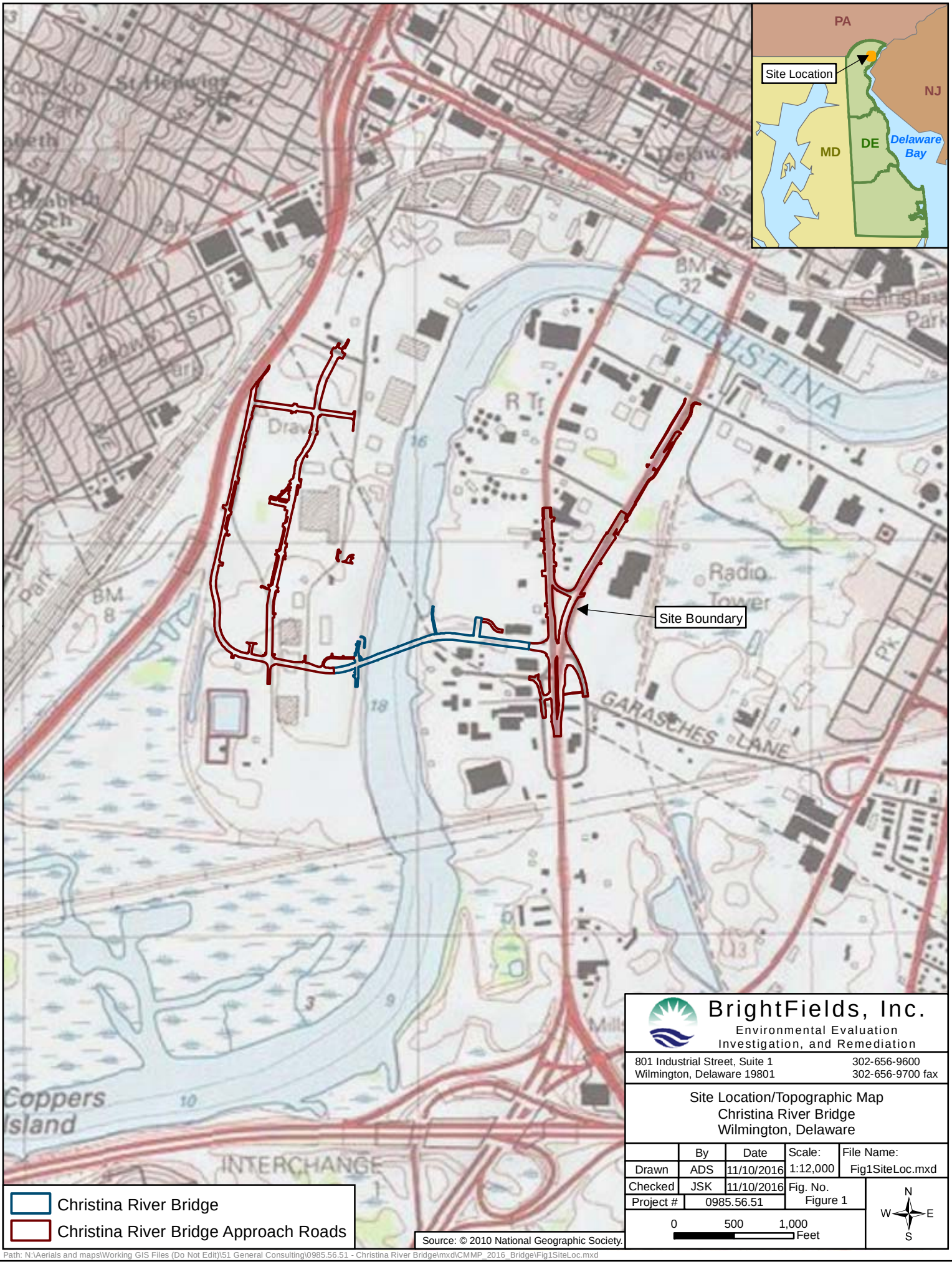
FIGURES



BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation

801 Industrial Street, Suite 1
Wilmington, Delaware 19801

302-656-9600
302-656-9700 fax

Site Location/Topographic Map
Christina River Bridge
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/10/2016	1:12,000	Fig1SiteLoc.mxd
Checked	JSK	11/10/2016	Fig. No. Figure 1	
Project #	0985.56.51			

0 500 1,000 Feet

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WILMINGTON COAL GAS SITE - SOUTH (DE-0114)
0704030001, 2604900002
DELMARVA POWER & LIGHT CO
601 S MADISON ST, 787 S MADISON ST
9.6 AC

STADIUM SITE (DE-1004)
2604900019
DELAWARE STADIUM CORP.
801 SHIPYARD DR
4.45 AC

STADIUM SITE (DE-1004)
2604900018
DELAWARE STADIUM CORP.
801 SHIPYARD DR
6.2 AC

DRAVO SHIPYARD (DE-1096)
2604900022
RED BRICK BUILDING LLC
740 SHIPYARD DR
3.1 AC

DRAVO SHIPYARD (DE-1096)
2604900016
RIVERFRONT DEVELOPMENT CORP.
821 JUSTISON ST
4.85 AC

STADIUM SITE (DE-1004)
2604900020
DELAWARE STADIUM CORP.
801 SHIPYARD DR
9.09 AC

RIVERFRONT HOTEL (DE-1518)
2604900037
WILMINGTON RIVERFRONT OWNER, LLC
818 SHIPYARD DR
0.73 AC

DRAVO SHIPYARD (DE-1096)
2604900021
RIDGE ROAD EXCHANGE LLC
0 SHIPYARD DR
3.2 AC

DRAVO SHIPYARD (DE-1096)
2605600010, 2605600007, 2605600016
SHIPYARD CENTER LLC
0, 1001, 1000-1052 JUSTISON ST
9.91 AC

DRAVO SHIPYARD (DE-1096)
2605600011
RIVERFRONT DEVELOPMENT CORP.
1001 RIVERWALK
0.66 AC

0704410001
DELMARVA POWER & LIGHT CO
800 DELMARVA LA
27 AC

DRAVO SHIPYARD (DE-1096)
2605600012
RIVERFRONT DEVELOPMENT CORP.
1101 RIVERWALK
0.98 AC

DRAVO SHIPYARD (DE-1096)
2605600008, 2605600009
CHRISTINA RIVER PROPERTIES LLC
1100, 1200 JUSTISON ST
7.31 AC

DRAVO SHIPYARD (DE-1096)
2605600006
CHRISTINA RIVER PROPERTIES LLC
1201 JUSTISON ST
6.62 AC

0704410004
DELMARVA POWER & LIGHT CO
1300 DELMARVA LA
14.32 AC

INTERNATIONAL PETROLEUM CORP. (DE-1278)
2604900011
FCC ENVIRONMENTAL LLC
505 S MARKET ST
6.03 AC

2604900012
COLLINS JAMES T
519 S MARKET ST
2.28 AC

LAMPLUGH PROPERTY (DE-1319)
2604900013
RIVERFRONT DEVELOPMENT CORP.
525 S MARKET ST
4.29 AC

DRAVO SHIPYARD (DE-1096, DE-1092)
2604900032
RIVERFRONT DEVELOPMENT CORP.
850 PETTINARO PARK BL
1.57 AC

AMERICAN TANK CLEANING COMPANY (DE-1180)
2604900014
GPX INC
535 S MARKET ST
5.18 AC

SHUSTER AUTO SALVAGE (DE-1178)
2605700001
SHUSTER CHARLES F JR
601 S MARKET ST
3.89 AC

SHUSTER AUTO SALVAGE (DE-1178)
2605700048
SHUSTER CHARLES F JR
603 S MARKET ST
2 AC

JABLOW (DE-1329)
2605700003
DELDOT
707 S MARKET ST
6.23 AC

2605700002
MEDORI ENTERPRISES
701 S MARKET ST
1.2 AC

INDUSTRIAL PLATE CORPORATION
1000100062, 2605600002
ORR H DAVID, IRMGARD M
5 JAMES CT
1.97 AC

1000100063
2605600005
BALD LLC
0 & 15 JAMES CT
0.49 AC

2605600004
WILLIS INVESTMENT
3 JAMES CT
0.89 AC

2605600003
BALD LLC
11 JAMES CT
0.49 AC

2605700043
GLASS DR HOLDINGS LLC
1 JAMES CT, 727 S MARKET ST
1.03 AC

1000100061
JAMES COURT ASSOCIATES LLC
4 JAMES CT
1.93 AC

1000100059, 1000100060, 2605600001
SANCO PROPERTIES LLC
0, 2 & 2B JAMES CT
1.75 AC

733 S. MARKET ST (DE-1502)
2605700004, 1000100001
DUN RITE ENTERPRISES LLC
733 S MARKET ST
0.95 AC

DON WILSON'S AUTO PARTS (DE-0368)
2605700006, 2605700007
1000100015, 1000100016
WILSON DONALD W, SHIRLEY M
800 S MARKET ST
1.01 AC

HOWARD STREET (DE-1401)
2605000069
BPG CENTER PARTNERS I LLC
S. MARKET, S. WALNUT ST
9.77 AC

M & N PROPERTY (DE-1496)
2605000064
RIVERFRONT DEVELOPMENT CORP.
516 S MARKET ST
1.24 AC

2605000083
RIVERFRONT DEVELOPMENT CORP.
220 A ST
2.09 AC

524 A, B S. WALNUT ST (DE-1235)
2605000031
520 VENTURE CORP.
520, 522, 524 (A & B) S WALNUT ST
4.96 AC

HESSLER PROPERTY (DE-1169, DE-1203)
2605700011, 2605700005
RIVERFRONT DEVELOPMENT CORP.
401 GARASCHES LA, 610 S MARKET ST
8.75 AC

Christina River Bridge
Christina River Bridge Approach Roads
Proposed Parking Striping
Limit of Construction
Tax Parcels

Source: DEMAC - Aerial 2013; Delaware DataMIL - Tax Parcels;
Bridge Alignment and Boring coordinates provided by RK&K - 4/11/2016.

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Project Location Map
Christina River Bridge
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	By	Date	Scale:	File Name:
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Checked	JSK	11/10/2016	Fig. No. Figure 2	
Project #	0985.56.51			

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4 JAMES CT
1.93 AC

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9.77 AC

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RIVERFRONT DEVELOPMENT CORP.
516 S MARKET ST
1.24 AC

2605000030
RAN REALTY LLC
516 A S MARKET ST
0.17 AC

2605000068
RENO FRANK C SR, DORIS E
518 S MARKET ST
0.24 AC

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SHUSTER BARBARA A
520 S MARKET ST
0.43 AC

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KRUZINSKI FRANCIS J, DENISE K
522 S MARKET ST
0.38 AC

2605000083
RIVERFRONT DEVELOPMENT CORP.
220 A ST
2.09 AC

524 A, B S. WALNUT ST (DE-1235)
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520, 522, 524 (A & B) S WALNUT ST
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2605700006, 2605700007,
1000100015, 1000100016
WILSON DONALD W, SHIRLEY M
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1.01 AC

Christina River

BS 501
BN 501
HIGHSPEED WY
NORFOLK SOUTHERN RR
SHIPYARD DR
RIVERWALK
DELMARVA LA
JUSTISON ST
S MARKET ST
S WALNUT ST
JAMES CT
GARASCHES LA
LOWER BEECH ST
HOLLINGSWORTH AV
A ST
WRIGHT ST
LOWER OAK ST
AMTRAK RR
BROWNTOWN TRUCK RT

Parcel Information includes the following
DNREC Site ID (if applicable)
Tax Parcel Number(s)
Site Owner Name
Site Address(es)
Site Acreage

Groundwater Notes:
1. MTBE was present in groundwater across 707 Market Street (Jablow Property). The extent of impact is unknown.
2. PAHs, BTEX, and Cyanide were present in groundwater on the Wilmington Coal Gas Site - South. The extent of impacts are unknown.
3. Metals, Petroleum hydrocarbons, and SVOCs were present in groundwater on the Stadium Site. The extent of impacts are unknown.
4. Metals, VOCs, SVOCs, and TPH were present in the groundwater on the 601 S Market Street (Shusters Auto Salvage) Property. The extent of impacts are unknown.
5. VOCs, SVOCs, and petroleum hydrocarbons were found on the 505 S Market Street Site (International Petroleum Corp). The extent of impacts are unknown.
6. PCBs were identified in the groundwater on the 301 S Market Street Site (Howard Street).
7. Arsenic is present in groundwater across the entire construction area east of the Christina River.

Soil Notes:
1. Potential areas of concern in soil are only shown on properties within limit of construction.
2. PAHs are contaminants of concern throughout the project area.

Sources:
1. Proposed Alignment as of April 2016, provided by RK&K.
2. Proposed Limit of Construction as of April 2016, provided by RK&K
3. Delaware DataMIL - Tax Parcels.

- Christina River Bridge
- Christina River Bridge Approach Roads
- Approximate Extent of Arsenic Contamination in Soil (>30 mg/kg)
- Approximate Extent of Hazardous Lead Contamination in Soil (TCLP >5 mg/L)
- Approximate Extent of Lead Contamination in Soil (>1,000 mg/kg)
- Approximate Extent of PCB Contamination in Surface Soil (> 1 mg/kg)
- Approximate Extent of Petroleum and/or VOC Contamination in Soil
- ISS Treated Areas
- MGP Impacted Areas
- MGP Excavation Areas
- Gas Holder Foundation
- Completed in April 2014
- Limit of Construction
- Surface Water
- Tax Parcels

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Investigation, and Remediation
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Potential Areas of Concern for Construction Contaminated Material and Water Management Work Plan
Christina River Bridge
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/10/2016	1:2,160	Fig3PotAOC.mxd
Checked	JSK	11/10/2016	Fig. No.	
Project #	0985.56.51		Figure 3	

0 90 180 Feet

N W E S

Path: N:\Aerials and maps\Working GIS Files (Do Not Edit!)\51 General Consulting\0985.56.51 - Christina River Bridge\mxd\CMMP_2016_Bridge\Fig3PotAOC.mxd

Christina River

Horizontal Alignment
Christina River Bridge
Christina River Bridge Approach Roads
Limit of Construction
Tax Parcels
Approximate Extent of Arsenic Contamination in Soil (>30 mg/kg)
Approximate Extent of Lead Contamination in Soil (>1,000 mg/kg)
Approximate Extent of Hazardous Lead Contamination in Soil (TCLP >5 mg/L)
Approximate Extent of PCB Contamination in Surface Soil (> 1 mg/kg)
Approximate Extent of Petroleum and/or VOC Contamination in Soil

Source: Delaware DataMIL - Tax Parcels.

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Areas of Concern with Station Numbers
Christina River Bridge
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/10/2016	1:1,800	Fig3aBridge.mxd
Checked	JSK	11/10/2016	Fig. No. Figure 3a	
Project #	0985.56.51			

0 75 150 Feet

N W E S

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TABLES

Table 1 – Summary of Known and Possible Contaminants

Christina River Bridge Project Area				
Site	**DNREC ID(s)**	**Soil**	**Groundwater**	**Other**
Dravo Shipyard – Harbor Associates	DE-1096	Metals (arsenic, lead, & zinc), PCBs, SVOCs (benzo[a]pyrene & PAHs), TPH	Metals (aluminum, iron, & manganese)	Metals (arsenic, chromium, lead, & zinc), SVOCs (benzo[a]pyrene & PAHs), & VOCs in sediment; Metals (aluminum, iron, lead, & manganese) in surface water
Jablow	DE-1329	Metals, SVOCs, pesticides, PCBs	Metals, VOCs	BTEX (benzene) & TPH-GRO around a former UST but soil was excavated and removed; various debris throughout site
Industraplate		Possibly metals	Possibly metals	Previous electroplating facility

Christina River Bridge Approach Roads Project Area				
Site	**DNREC ID(s)**	**Soil**	**Groundwater**	**Other**
Wilmington Coal Gas Site – South	DE-0114	BTEX, cyanide, metals (arsenic, iron, lead, copper, & zinc), PAHs, TPH	BTEX, cyanide, metals (arsenic & lead), naphthalene, SVOCs (PAHs)	Coal tar NAPL; historic land filling activities
Stadium Site	DE-1004	Metals (arsenic, cadmium, chromium, & lead), petroleum hydrocarbons, SVOCs (PAHs), TPH	Metals (arsenic, cadmium, chromium, & lead), petroleum hydrocarbons, SVOCs	Coal tar NAPL; petroleum product in surbsurface soil; historic fill
Dravo Shipyard – Harbor Associates	DE-1096	Metals (arsenic, lead, & zinc), PCBs, SVOCs (benzo[a]pyrene & PAHs), TPH	Metals (aluminum, iron, & manganese)	Metals (arsenic, chromium, lead, & zinc), SVOCs (benzo[a]pyrene & PAHs), & VOCs in sediment; Metals (aluminum, iron, lead, & manganese) in surface water
Riverfront Hotel	DE-1518	Arsenic, benzo[a]pyrene	Metals (arsenic), VOCs	Benzene in soil gas
Jablow	DE-1329	Metals, SVOCs, pesticides, PCBs	Metals, VOCs	BTEX (benzene) & TPH-GRO around a former UST but soil was excavated and removed; various debris throughout site

Christina River Bridge Approach Roads Project Area				
Site	**DNREC ID(s)**	**Soil**	**Groundwater**	**Other**
733 S Market Street	DE-1502	Metals (arsenic & lead)	Metals (arsenic, iron, & manganese)	Free product; historic fill; BTEX, DRPH, & TPH detected around former UST locations
Hessler Property	DE-1169 and DE-1203	Metals (aluminum, arsenic, barium, calcium, chromium, chromium VI, cobalt, copper, lead, manganese, nickel, silver, & zinc), PCBs, SVOCs (PAHs)	Metals (arsenic, barium, chromium, iron, lead, manganese), SVOCs (PAHs), TCE, vinyl chloride	Fill; petroleum-like odor; asbestos hotspot found in TP06; isolated areas of hazardous lead
Shuster Auto Salvage	DE-1178	Bis(2-ethylhexyl)phthalate, metals (aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, vanadium, & zinc), SVOCs (PAHs), TPH, VOCs	Metals (arsenic, barium, iron, & manganese), SVOCs, VOCs, TPH	DRO detected; Metals (chromium, copper, mercury, nickel, & zinc), SVOCs (PAHs) in sediment
524 A &B S Walnut St	DE-1235	Metals (arsenic & lead), PCBs, SVOCs (benzo[a]pyrene, dibenz[a,h]anthracene, & PAHs)	Metals (arsenic, barium, iron, & manganese), PCBs, pesticides, SVOCs	Significant fill across the site
American Tank Cleaning Company	DE-1180	Metals (lead), PCBs, SVOCs (PAHs), TPH	Metals (iron & manganese)	Possible USTs
Lamplugh Property	DE-1319	Metals (arsenic, iron, & lead), PCBs, SVOCs (PAHs)	Arsenic, naphthalene	Metals, PCBs, & SVOCs (PAHs) in sediment
M&N Property	DE-1496	Metals (arsenic & lead) & SVOCs (PAHs) in subsurface; fairly clean surface soil	Metals (aluminum, antimony, arsenic, iron, & manganese)	
International Petroleum Corporation	DE-1278	Metals (notably arsenic, iron, lead, & mercury), PCBs, pesticides, SVOCs (benzo[a]pyrene), TPH-GRO, VOCs	Bis(2-ethylhexyl)phthalate, BTEX, metals (arsenic, iron, lead, & manganese), MTBE, 2-methyl naphthalene, naphthalene, SVOCs (PAHs)	BTEX & TPH-GRO detected around former USTs; possible free product; benzo[a]pyrene, metals (arsenic & lead), PAHs, & phenanthrene in sediment
Howard Street Property	DE-1401	Metals (arsenic & lead), PCBs, SVOCs (PAHs)	Metals (arsenic & lead), PCBs, SVOCs (PAHs)	Metals (arsenic & lead), PCBs, SVOCs (PAHs); historic fill

TABLE 2
Typical City of Wilmington Allowable Discharge Limits

Analyte	Laboratory Method	City of Wilmington POTW Standards (Typical) mg/L
Arsenic	EPA 200.7	0.09
Cadmium	EPA 200.7	0.07
Total Chromium	EPA 200.7	4
Copper	EPA 200.7	0.91
Lead	EPA 200.7	1.94
Mercury	EPA 245.1	0.0057
Nickel	EPA 200.7	1
Selenium	EPA 200.7	0.65
Zinc	EPA 200.7	3.49
Cyanide	EPA 335.3	0.49
VOCs	EPA 624	10
Total PCB Congeners	EPA 1668A	n/a
BOD	SM18-5210B	500
Total Suspended Solids (TSS)	EPA 160.2	500
pH	EPA 150.1	6-9 su
MTBE	SW846 8082	4.9

The City of Wilmington POTW Standards are the maximum allowable concentrations for discharge into the Sanitary Sewer system.

n/a - not available

ATTACHMENTS

BrightFields, Inc.

ATTACHMENT 1

DNREC May 2010 Soil/Material Re-use Policy at HSCA Regulated Sites

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT
SITE INVESTIGATION & RESTORATION BRANCH

MEMORANDUM

TO: Kathleen Stiller, SIRB Branch Manager 5/25/10

THROUGH: Paul Will, Program Manager I, SIRB 5/24/10
Qazi Salahuddin, Program Manager I, SIRB 5/24/10
Timothy Ratsep, Program Manager I, SIRB 5/25/10

FROM: Todd Keyser, Project Officer - SIRB
John Cargill, Project Officer - SIRB
Rick Galloway, Project Officer - SIRB
Lindsay Hall, Project Officer - SIRB
Steve Johnson, Project Officer - SIRB
Krystal Stanley, Project Officers - SIRB

DATE: May 19, 2010

RE: **Policy Soil/ Material Re-use Policy at HSCA Regulated Sites**

The Department of Natural Resources and Environmental Control – Division of Air and Waste Management – Site Investigation and Restoration Branch (DNREC-SIRB) adopts this Policy to guide the re-use of soil/material from regulated (HSCA, RCRA) sites (sites) and non-regulated properties (properties) at HSCA regulated sites. The intent of this policy is to provide a mechanism for the safe and efficient re-use of suitable soils/materials that does not create an unacceptable risk to human health or the environment. Soil/material eligible for re-use under this policy is soil/material that will be removed from a regulated site or non-regulated property and transported to a HSCA-regulated site for use as a fill material (surface and/or subsurface applications). This policy specifically *excludes* soil/material excavated at a HSCA-site that is re-used at the *same* HSCA site as part of a DNREC-SIRB approved remedial action.

As mentioned above, this policy will address two (2) categories of re-use:

A) Soil/material removed from a regulated site for use at a HSCA regulated site either as surface or sub-surface material. Regulated refers to HSCA or other State or Federally regulated environmental program or guidance.

B) Soil/material removed from a non-regulated property for re-use at a HSCA regulated site as surface or subsurface material. Non-regulated properties may be commercial borrow pits, construction sites, or any other property not currently regulated under the HSCA program.

The soil/material that will be considered may come from several different types of sources. The following list is based upon current practice but any source may be considered, if it meets the requirements of this soil/material re-use policy.

Types of Sources and Data Availability:

1) Undisturbed property with no previous operational use and no Phase I,

2) Property with past operational use but Phase I investigation shows no likely environmental impact,

3) Developed property with potential for contamination based on Phase I investigation,

4) Site as defined by a DAWM program (SIRB, TMB, SHWMB) with confirmed environmental impact and data that meets the Soil Re-Use Policy volume and constituent criteria or a Beneficial Use Determination (BUD) from the SHWMB, or

5) Site as defined above with recently completed and approved Remedial Investigation (RI) Report.

Appropriate re-use will be based upon current data. Impacted soil/material is defined as having a compound present that exceeds the applicable Uniform Risk-Based Standard (URS) or equivalent standard as determined by SIRB for the intended re-use of soil/material. For example, if the soil/material is to be used as a surface cap at a site under an unrestricted (residential) use scenario, then the material will be compared to the unrestricted use URS value(s) to determine if it is an appropriate reuse.

Soil/Material Sampling

Soil/material may be found in multiple types of locations and dispositions. This policy provides the applicant with acceptable options for characterizing the soil/material where and how it is located. Soil/material may be re-used when it is found in-situ and when it has been excavated and staged, provided that it is adequately sampled. Samples will be tested for Target Analyte List and Target Compound List (TAL/TCL) contaminants in all cases. Composite sampling will not be considered appropriate for volatile sampling. Discrete sampling must occur for volatiles at the frequency listed for each situation listed below. The sampling frequency options are listed below.

Composite Sampling Composite sampling is most often used in locations where soil is easily accessed such as a stockpile or borrow pit.

Stockpiles- 1 (one) 30-point composite sample per 1,000 cubic yards and 5 volatile discrete sample. A typical residential lot is 0.25 acre. 1,000 cubic yards is equivalent to 1 sample per ¼ acre residential lot 2 feet deep.

In-situ Soil (Non-regulated properties) including Borrow Pits-1 (one) 20-point composite per 4,000 cubic yards and 4 volatile discrete samples with Phase I or DNREC determined comparable documentation indicates no evidence of potential impact. 4,000 cubic yards is equivalent to 1 sample per acre 2 feet deep.

Regulated Site - DNREC Project officers will evaluate if the soil is sufficiently characterized to use on another site. If additional sampling is judged to be necessary, one (1) 10 point composite per 8,000 cubic yards and 3 discrete volatile samples may be required to further characterize the site,8,000 cubic yards is equivalent to 1 sample per 2 acres, 2 feet deep.

Composite sampling criteria is based upon Hewitt, et al, *Validation of Sampling Protocol and the Promulgation of Method Modifications for the Characterization of Energetic Residues on Military Testing and Training Ranges*, June 2009 (ERDC/CRREL TR-09-6).

Discrete (Default) Sampling - Discrete sampling may be used in multiple situations but is most often used when soil/material is located in-situ at a site. Discrete or grab sampling is what a typical remedial investigation uses. The number of discrete samples to be taken should follow the table below.

Discrete Sampling Table

Volume of soils (Yd^3)	Sampling Frequency	Total # of Samples
0-500	1 sample per 100 yd^3.	1-5
501-5,000	5 samples plus 1 sample per 250 yd^3 >500.	5-23
>5,000	23 samples plus 1 sample per 500 yd^3 >5,000.	>23

Depending upon the source and potential re-use of the soil/material, different criteria may need to be met. The evaluation criteria are the minimum conditions that must be met in order to obtain approval from DNREC-SIRB. The evaluation criteria are presented below. Following the evaluation criteria listed below are the specific scenarios and the required evaluation criteria for each.

Section 1- Criteria Used to Evaluate the Suitability of Soil/Material for Re-use at a HSCA-regulated site

1) ***Consistent with Final Plan***: The re-use of the soil/material from the source site at the destination site is consistent with any Final (or Interim) Plan of Remedial Action that may exist for each site.

2) ***No Hazardous Waste***: The soil/material is not a hazardous waste as defined by the Delaware Regulations Governing Hazardous Waste, Part 261,

3) ***No Solid Waste***: The soil/material does not contain asphalt, trash, solid waste or yard-type waste,

4) ***Contaminant Type and Concentration Specific Evaluation*** : The source soil/material meets **one** of the conditions listed below:

    a) The soil/material contaminant concentration (95% UCL or mean) does not exceed background conditions as listed in the **Remediation Standards Guidance** or current SIRB guidance at the destination site,

b) The contaminant concentrations are less than the 95% upper confidence limit of contaminants that already exist on the destination site, and the cumulative risk of the contaminants is below the 1*10-5,

c) A quantitative risk assessment consistent with the current SIRB guidance shows that reuse of the proposed soil/material does not create an unacceptable risk (above 1*10-5 or HI above 1) at the destination site or,

d) The contaminant concentrations are less than what already exist onsite. Compare mean concentrations of source soil to mean soil concentrations for the destination site. A 95% UCL comparison of source and destination site soil may also be conducted in lieu of the mean.

5) ***No Groundwater Risk***: The soil/material does not contribute to groundwater contamination or increases groundwater risk at the destination site.

6) ***Letters to DNREC-SIRB:*** The owners of both sites will acknowledge in writing to DNREC-SIRB that they are aware of the quality of the soil/material proposed for re-use and are responsible for any potential future liability.

Section 2- Potential Reuse Scenarios and Appropriate Criteria

Scenario 1: Soil/ Material from a Regulated Site to HSCA Site

Soil shall meet Criteria:

#1) Consistent with Final Plan

#2) No Hazardous Waste

#3) No Solid Waste

#4) Contaminant Type and Concentration Specific Evaluation

#5) No Groundwater Risk

#6) Letters to DNREC-SIRB

Scenario 2a: Contaminant Impacted Soil/Material from a non-regulated property to HSCA site

#1) Consistent with Final Plan

#2) No Hazardous Waste

#3) No Solid Waste

#4) Contaminant Type and Concentration Specific Evaluation

#5) No Groundwater Risk

Scenario 2b: Non-impacted Soil/Material from a non-regulated property to HSCA site

#1) Consistent with Final Plan

#3) No Solid Waste

In all cases, the party proposing the soil re-use is responsible for presenting analytical data that shows the re-use meets all of the appropriate conditions for the scenario proposed **prior to transport**. The re-use proposal will be submitted to DNREC-SIRB at least two weeks prior to the intended date for transporting the soil/material. DNREC-SIRB will respond via email and in writing with an approval once the proposal is approved. Data obtained in the investigation may be adequate or may be supplemented with additional samples. In lieu of a site specific sampling plan, the individuals proposing the reuse may elect to use the default sampling frequency shown in the Discrete Sampling table or Composite Sampling description.

Material with BUD (Beneficial Use Determination) - Obtain a copy of BUD determination from Solid and Hazardous Waste Management Branch and review for potential contaminant issues for your site.

Other Material Debris -This scenario should be considered only if a BUD has not been obtained for the material but there appears to be a possible beneficial use of a recovered resource. For material other than that covered in a SHWMB-BUD, the process shall be the same as Scenario 1.

"Other" Material Reuse Determination

DNREC will evaluate on a case-by-case basis, any material that does not fit into the above criteria.

An approval granted by DNREC-SIRB for soil/material reuse is not to be construed as a substitute for any other permit or permission required by other agencies for the activity. Soil/Material reuse policy approval applies directly and only to the environmental (contaminants) suitability of the proposed soil/material. After soil from a source site has been approved, at the discretion of the DNREC-SIRB project officer, it may not need to be re-sampled in the future to determine if it is appropriate to use as a continued source.

This policy replaces "Policy for Presumptive Soil Re-use" dated September 21, 2004 and May 4, 2006.

TAK:vdc
TAK10017.doc
AD003 I A 1

ATTACHMENT 2

City of Wilmington Discharge Permit
(to be included once permit has been issued)