

PCB Mass Loading Phase II  
1610/0 Bowers Street  
SIRS ID: DE-1440  
Wilmington, Delaware



**BrightFields, Inc.**

## **Appendix 2**

**1610/0 BOWERS STREET  
(DIFFLEY PROPERTY)  
WILMINGTON, DELAWARE**

**SIRS ID: DE-1440**

## **GENERAL SITE INFORMATION**

**Site Name: 1610/0 Bowers Street (Diffley Property)**

**SIRS ID Number: DE-1440**

**Site Location and Description:**

The 1610/0 Bowers Street Site (site) is a portion of the former Atlas Sanitation site, known as the Diffley Property. It was used as a landfill from approximately 1937 until the 1970s and reportedly operated for one year as a solid waste landfill. From the 1970s to 1990 the site was undeveloped and vegetated. The former Atlas Sanitation property is now divided into four parcels of land and includes four DNREC sites. The other three sites are 1620 Bowers Street, also known as Pure Green Industries (DE-1054), the Wilmington Asphalt Plant (DE-1448), and 1600 Bowers Street (DE-0280) owned by Diamond State Recycling. One additional parcel, also owned by the Diffleys is not currently a DNREC site.

The site is located at 0 and 1610 Bowers Street in Wilmington, Delaware (Figure 1). The site is approximately 10.3 acres in size and is comprised of two tax parcels (#2603700006, and #2603700012), located southeast of the intersection of Bowers Street and Vandever Avenue in Wilmington. The property is bounded generally to the northwest by an asphalt plant (Pure Green Industries, Inc. DE-1054 and Wilmington Asphalt Plant DE-1448), to the west by a metal recycling plant (former Atlas Sanitation DE-0280); to the south by the Howard R. Young Correctional Facility (also known as Gander Hill Prison), and to the north and east by the Amtrak Refueling Facility (DE-0266).

There are two unnamed tributaries located along the eastern and southern edges of the Property. Southeast of the Site, the tributaries join and flow into the Brandywine Creek, which discharges to the Christina River and ultimately to the Delaware River (approximately 1.3 miles from the Site). The 1994 Preliminary Assessment (PA) states that runoff from the 0 Bowers Street property flows into the unnamed tributary of the Brandywine Creek bordering the eastern edge of the Property. Due to uneven filling of the 1610 Bowers Street property, the PA states that runoff in the northern portion pools and drains to the eastern tributary while runoff in the southern portion drains to the southern tributary.

The site is currently operated as an equipment lay-down yard and construction debris disposal site by Design Contracting, Inc. No permanent structures are listed as being present on the property. The majority of the property is bare, disturbed soil. The current use of the property as a lay down yard and disposal site began between 1990 and 1992. Prior to the 1990's, the site was maintained as vacant land and intermittently used for disposal of construction debris, municipal waste, and potentially industrial waste.

### **Previous Site Uses:**

The site previously was maintained as an illegal storage area for solid waste. Previous environmental investigations suggested that the site was also used as a municipal landfill, which was later filled and covered with construction debris. Excavations on the adjacent properties indicate the potential for industrial waste to also be present on the site.

Historical records reviewed during previous investigations indicate the following: Between the 1800s and 1980's, the property was owned by various railroad companies that eventually consolidated to form the Penn Central Corporation. The property was subsequently sold to Atlas Sanitation in 1988, during which time solid waste was illegally stored on the property. The larger parcel that comprises the property (Parcel 1A) was then purchased by Andrew and Nancy Diffley in 1990. The balance of the property (Parcel 1C), was purchased from Atlas Sanitation in 1992. A note on the property deed during the period of Penn Central's ownership indicated the lease of a portion of the land to the City of Wilmington. It is believed that the City utilized this property as a municipal landfill during a period between 1940 and 1970. A review of historic aerial photos indicates that trenching was occurring on the property in 1962. By 1968, the site appeared backfilled and vegetated.

### **Site Regulatory Status:**

This section briefly summarizes previous investigations performed on the site through the SIRS program. A current SIRS regulatory status is also included.

#### ***Preliminary Environmental Site Assessment (Duffield Associates, 1990)***

In April 1990, Duffield Associates (Duffield) prepared a Preliminary Environmental Site Assessment for the property for a prospective purchaser. A records search, site visit, and limited soil and groundwater sampling were performed to assess the environmental liabilities of the site.

During the site visit, Duffield indicated that there was evidence of former use as a landfill. Abandoned trucks were noted on adjacent parcels, and a drainage ditch running along the east side of the property had an oily sheen. An above-ground storage tank with secondary containment was noted on the northern edge of the property. It was suspected that the tank was associated with a remedial project on the adjacent Amtrak property.

On March 9, 1990, Duffield excavated seven test pits and collected four soil samples. During the excavation of the test pits, miscellaneous fill (cinders, bricks, glass, scrap metal) was encountered. Also encountered was a crushed drum and mixed rubber hoses. Due to heavy vegetation on the smaller, northern parcel (Parcel 1C), all sampling activities occurred on Parcel 1A. Of the four soil samples, two samples were laboratory-screened for PCBs.

Based on the results of the laboratory analysis, PCBs were detected in shallow soil (0.5 feet to 1.5 feet below ground surface) in one sample (LPSSTP-5) at a concentration of 1.4 mg/kg.

Concurrent with test-pitting activities, four groundwater samples were collected from the saturated zone of four test pits. Samples were submitted for laboratory analysis of total petroleum hydrocarbons and purgeable organic halogens.

Based on the lack of state regulatory standards related to PCBs, Duffield did not recommend remediation for the site. The prospective purchaser of the property anticipated filling the site with additional clean soil, which Duffield supported on the basis that it would limit contact with soil metals and organic compounds. It was suggested that health and safety precautions be taken if current site soils were to be disturbed, to prevent exposure to potentially contaminated dust.

#### **Preliminary Assessment (DNREC, 1994)**

In March 1994, DNREC completed a PA of the full extent of the Atlas Sanitation property, including the additional 1610/0 Bowers Street Property parcels now listed under a separate DE number. The assessment was prompted by the discovery of an apparent landfill on an adjoining parcel while excavating test pits for a proposed septic system. In addition, the environmental assessment of the subject property and adjacent properties gave cause for concern that environmental impacts existed across most of the former Atlas Sanitation property.

Based on the results of previous investigations and their own research, DNREC theorized that the overland flow and groundwater passing under the site were contaminating adjacent tributaries. DNREC agreed with prior investigations that the site appeared to be historically

filled. DNREC recommended that the former Atlas Sanitation site be subject to a Site Investigation, to fully characterize conditions across the site.

**RE: Diffley Property Parcel "1A" (Ten Bears Environmental, 2008)**

In July 2008, Ten Bears Environmental contacted DNREC regarding the 1610/0 Bowers Street site. The letter indicates that review of the data collected during the Preliminary Environmental Site Assessment conducted by Duffield in 1990 demonstrated the following: (1) The site is not a source of adverse impacts to sediment quality via erosion or overland flow of shallow soils, (2) the site is not a source of oily sheen or heavy petroleum hydrocarbons to surface water from the discharge of groundwater, and (3) the site does not represent an unacceptable risk to humans that may come into contact with shallow site soil. Therefore, based on the data review, Ten Bears concluded that the contaminants impacting the sediment and surface water in the drainage ways surrounding the site must have originated from an offsite source.

**Current Regulatory Status:**

The 1610/0 Bowers Street Property is currently occupied by Design Contracting Inc. No remedial action to address PCB contamination has been required.

## SUMMARY OF SITE PCB INFORMATION

### Site Investigation PCB Findings:

PCBs were detected in the surface soil at one location, LPSSTP-5 (0.5 to 1.5 feet below ground surface (bgs)), at a concentration of 1.4 mg/kg. No soil samples from the subsurface unsaturated or saturated zones were analyzed for PCBs.

Due to the fact that there was only one detection in the surface soil, this detected value (1.4 mg/kg) was used in the calculations instead of 95% upper confidence limit (UCL) of the mean across the site. No groundwater samples were analyzed for PCBs.

<b>Concentrations of PCBs on Site</b>			
<b>Sample Matrix</b>	<b>Corresponding Figure</b>	<b>Analytical Methods</b>	<b>Range of Total PCBs</b>
Surface Soil	Figure 2	Screening Data	Not detected to 1.4 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Not Analyzed	Not Analyzed
Subsurface Soil (saturated)	Figure 4	Not Analyzed	Not Analyzed
Groundwater	Figure 5	Not Analyzed	Not Analyzed

A summary of all samples collected for PCB analyses are presented in Table 1.

### Acreage where PCBs detected:

The estimated surface soil area impacted by PCBs is 0.85 acres in the vicinity of LPSSTP-5 (Figure 2). According to the information available and reviewed by BrightFields, no subsurface saturated soil, subsurface unsaturated soil, or groundwater samples were analyzed for PCBs so the respective areas impacted by PCBs cannot be determined. Therefore, no groundwater loading estimates were prepared for the site.

### PCB Remediation Status:

Formal remediation has not been performed at the site. Additional fill may have been added to the site following the purchase of the property from Atlas Sanitation.

## **PCB MASS LOADING SUMMARY**

The PCB mass loading rate to surface water via overland flow was estimated for the 1610/0 Bowers Street Property. There were no reported concentrations of PCBs in the subsurface saturated zone or in the groundwater; therefore, groundwater transport cannot be evaluated as a mechanism of transport for PCBs at the Property. A summary of the results is included below and the details of the calculations are included as attachments to this Appendix.

### **Overland Flow:**

Overland flow has been determined on this site by using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE predicts the long term average annual rate of erosion on an area based on rainfall patterns, soil type, topography, cover/canopy factors and support management practices. These specific factors are site specific and rely on local information of the site. A breakdown of the individual factors is presented below with a brief explanation of their choice.

#### **Ground Cover and Canopy:**

The surface cover and flow paths were assessed through aerial photography and available contour mapping (Delaware Data Mil, 2013). The cover/management factor (C) assigned to the erodible area and associated flow paths was 1, which corresponds to completely bare areas without a vegetative cover.

#### **Site Sediment and Erosion Control Practices:**

Based on the aerial photography evaluation and review of site documents it does not appear that any sediment and erosion control practices are being implemented on Site.

#### **Input Factors and Results:**

A breakdown of the individual factors is presented below with a brief explanation of their choice.

**1610/0 Bowers Street**

<b>RUSLE Factors</b>	<b>Values Provided</b>	<b>Explanation of choice</b>
R = rainfall-runoff erosivity index (10 <sup>2</sup> ft-tonf-in/ac-hr-yr)	175	An appropriate value for R for the Site was determined using the Isoerodent Map of the Eastern U.S. from the Stormwater Phase II Final Rule Construction Rainfall Erosivity Waiver (USEPA, 2012).
K = soil erodibility (0.01 ton-ac-hr/ac-ft-tonf-in)	0.23	The soil erodibility factors were selected from the National Resource Conservation Soil Survey Geographic Database (SSURGO) and a raster was generated using the values 0.37 and 0.2, with a weighted average of 0.23.
ls = topographic factor (dimensionless)	0.61	The topographic factor was derived based on the slope and flow accumulation grids created in ArcGIS. An output LS grid was created and the average value for the grid is provided.
C = cover/management factor (dimensionless)	1	The cover/management factor C assigned to the erodible area was 1, which corresponds to bare ground with no vegetative cover.
P = support practice factor (dimensionless)	1	No documentation was provided indicating that any sediment and erosion controls are in place.
A = average annual soil loss estimate (ton/ac-yr)	24	The average soil loss estimate was generated by ArcGIS using the input factors listed above.
Erodible Area (acres)	0.85	The erodible area was calculated based on the pervious surfaces within the area of concern polygon for surface soil (Figure 6).

For factors that were not consistent across the site, rasters were used to characterize the variations. Due to the methodology utilized to derive the soil loss estimate, the numbers listed above cannot simply be multiplied.

The total estimated PCB loading via overland flow for the 1610/0 Bowers Street Property is **26 grams per year**. Please see attached table for specific variables.

**Uncertainty Analysis Associated with Overland Flow:**

**Specific Areas and Degree of Uncertainty for 1610/0 Bowers Street**

	<b>Samples Per Acre (site)</b>	<b>Chemical Data Quality*</b>	<b>Soil Type</b>	<b>Site Coverage</b>	<b>Map Quality</b>	<b>Distance to Discharge Points</b>
<b>Site Specific Information</b>	0.39	Screening Data	Soil Database	Based on a site assessment	Scaled Map	Directly Adjacent
<b>Degree of Uncertainty</b>	High	High	Low	Moderate	Low to Moderate	Low

\* Primary analysis used in the historical samples

Sources of uncertainty for the 1610/0 Bowers Street Property include: The spatial distribution of samples across the property is under represented since no samples were collected from the 0 Bowers Street property. In addition, all of the data was Immunoassay screening data and none of the samples were sent for confirmatory analysis. Based on this evaluation the level of uncertainty associated with overland flow PCB mass loading from the 1610/0 Bowers Street Property is **Moderate**.

**Groundwater Discharge Analysis:**

No groundwater discharge analysis was performed for this site.

**Site References:**

Duffield Associates, Inc., 1990, Landlith Property, Wilmington, DE, Preliminary Environmental Site Assessment, April 1990.

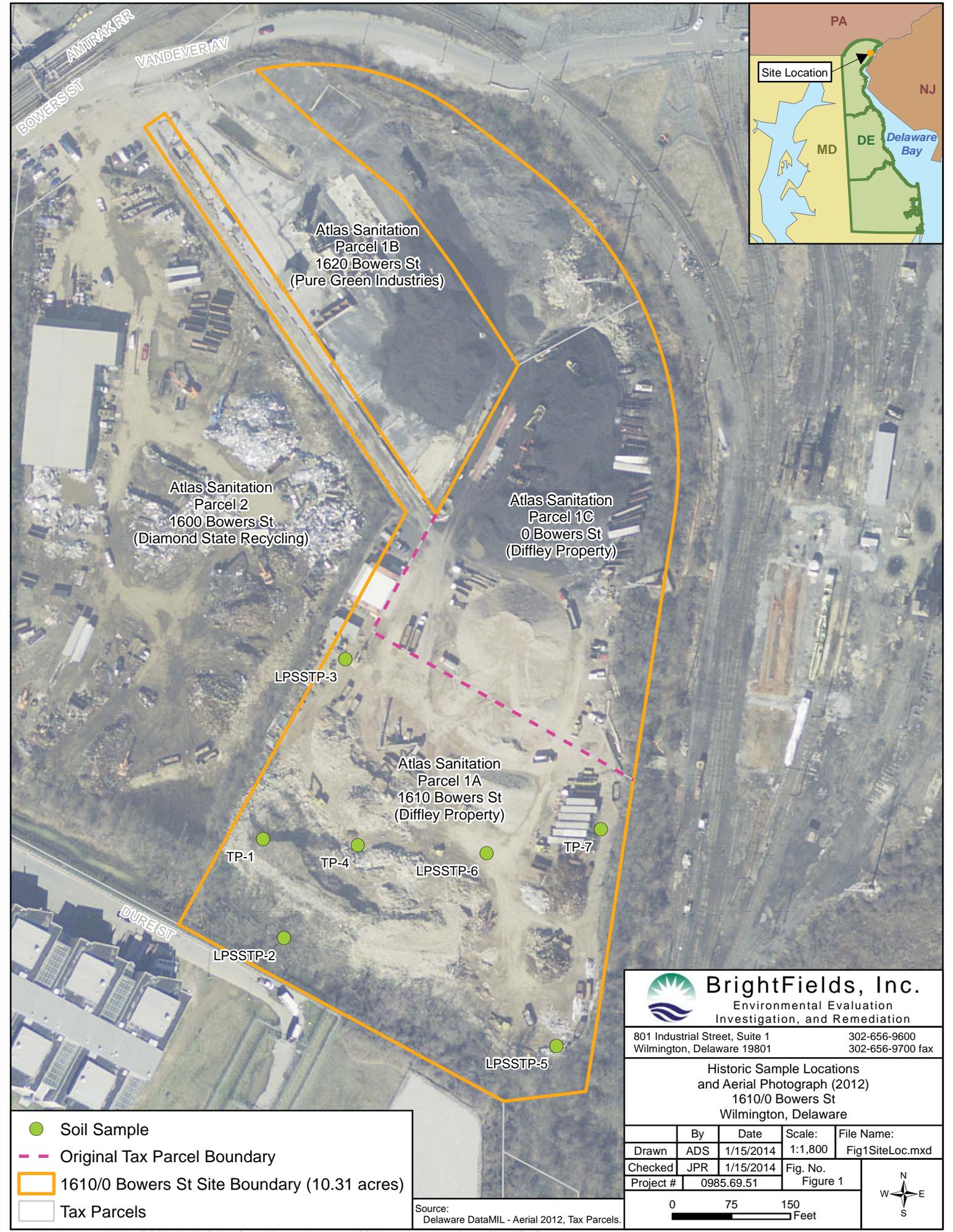
Delaware Department of Natural Resources and Environmental Control (DNREC), 1994, Preliminary Assessment of Atlas Sanitation Company Subdivision, March 1994.

Delaware Geological Survey, 2013, Delaware Data Mil, <<http://datamil.delaware.gov/geonetwork/srv/en/main.home>>, May 2013.

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# Figures



Atlas Sanitation  
Parcel 1B  
1620 Bowers St  
(Pure Green Industries)

Atlas Sanitation  
Parcel 2  
1600 Bowers St  
(Diamond State Recycling)

Atlas Sanitation  
Parcel 1C  
0 Bowers St  
(Diffley Property)

Atlas Sanitation  
Parcel 1A  
1610 Bowers St  
(Diffley Property)

LPSSTP-3

TP-1

TP-4

LPSSTP-6

TP-7

LPSSTP-2

LPSSTP-5



- Soil Sample
- - - Original Tax Parcel Boundary
- 1610/0 Bowers St Site Boundary (10.31 acres)
- Tax Parcels

Source:  
Delaware DataMIL - Aerial 2012, Tax Parcels.

**BrightFields, Inc.**  
Environmental Evaluation  
Investigation, and Remediation

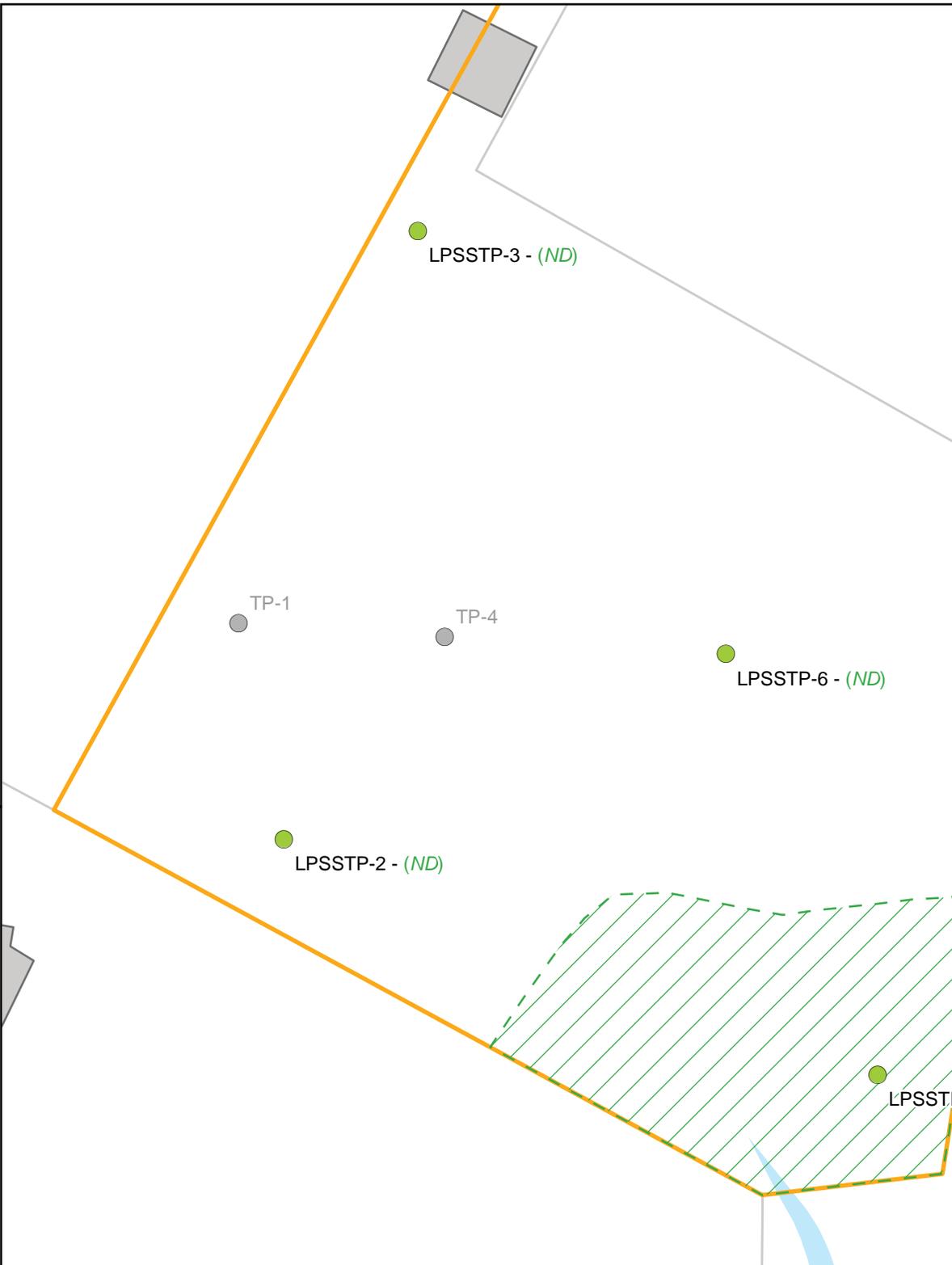
801 Industrial Street, Suite 1      302-656-9600  
Wilmington, Delaware 19801      302-656-9700 fax

Historic Sample Locations  
and Aerial Photograph (2012)  
1610/0 Bowers St  
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	1/15/2014	1:1,800	Fig1SiteLoc.mxd
Checked	JPR	1/15/2014	Fig. No.	
Project #	0985.69.51		Figure 1	

0      75      150

Feet



- Soil Sample, No PCB data available
- Soil Sample
- Estimated PCB Distribution
- 1610/0 Bowers St Site Boundary
- Tax Parcels
- Buildings
- Surface Water

Notes:  
 ND - Not Detected  
 (1.4) - Screening data shown in mg/kg.  
 Source: Delaware DataMIL - Tax Parcels;  
 New Castle County - Buildings.

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PCB Distribution in Surface Soil (0' - 2' bgs)  
 1610/0 Bowers St  
 Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	1/15/2014	1:1,080	Fig2DistSurf.mxd
Checked	JPR	1/15/2014	Fig. No.	
Project #	0985.69.51		Figure 2	

0      45      90

Feet



DURE ST

-  1610/0 Bowers St Site Boundary
-  Tax Parcels
-  Buildings
-  Surface Water

Source: Delaware DataMIL - Tax Parcels;  
New Castle County Buildings.

 <b>BrightFields, Inc.</b> Environmental Evaluation Investigation, and Remediation				
801 Industrial Street, Suite 1 Wilmington, Delaware 19801			302-656-9600 302-656-9700 fax	
<b>PCB Distribution in Subsurface Unsaturated Soil</b> <b>1610/0 Bowers St</b> <b>Wilmington, Delaware</b>				
	By	Date	Scale:	File Name:
Drawn	ADS	1/15/2014	1:1,080	Fig3SS_UnSat.mxd
Checked	JPR	1/15/2014	Fig. No.	
Project #	0985.69.51		Figure 3	
				



DURE ST

-  1610/0 Bowers St Site Boundary
-  Tax Parcels
-  Buildings
-  Surface Water

Source: Delaware DataMIL - Tax Parcels;  
New Castle County Buildings.



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Environmental Evaluation  
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**PCB Distribution in Subsurface Saturated Soil**  
1610/0 Bowers St  
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	1/15/2014	1:1,080	Fig4SS_Sat.mxd
Checked	JPR	1/15/2014	Fig. No.	
Project #	0985.69.51		Figure 4	

0      45      90

Feet



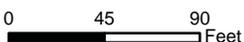




DURE ST

-  1610/0 Bowers St Site Boundary
-  Tax Parcels
-  Buildings
-  Surface Water

Note: No Groundwater data available.  
 Source: Delaware DataMIL - Tax Parcels;  
 New Castle County Buildings.

 <b>BrightFields, Inc.</b> Environmental Evaluation Investigation, and Remediation				
<b>PCB Distribution in Groundwater</b> <b>1610/0 Bowers St</b> <b>Wilmington, Delaware</b>				
	By	Date	Scale:	File Name:
Drawn	ADS	1/15/2014	1:1,080	Fig5GW.mxd
Checked	JPR	1/15/2014	Fig. No.	
Project #	0985.69.51		Figure 5	
				
				



Overland Flow  
 1610/0 Bowers St Site Boundary  
 Tax Parcels  
 Tons/Year/Acre of Soil Loss Estimated  
 High : 587  
 Low : 0

Source: Delaware DataML - Aerial 2012, Tax Parcels.



### BrightFields, Inc.

Environmental Evaluation  
Investigation, and Remediation

801 Industrial Street, Suite 1 Wilmington, Delaware 19801		302-656-9600 302-656-9700 fax		
Soil Loss Estimates 1610/0 Bowers St Wilmington, Delaware				
Drawn	By	Date	Scale:	File Name:
Checked	KEP	6/18/2014	1:1,080	Fig6SoilLoss.mxd
Project #	0985.69.51		Figure 6	



0      45      90  
Feet

PCB Mass Loading Phase II  
1610/0 Bowers Street  
SIRS ID: DE-1440  
Wilmington, Delaware



# Table

**Table 1  
PCB Screening Results For Soil  
1610/0 Bowers Street (DE-1440)  
Wilmington, DE**

Sample Identification	Sample Depth (feet bgs)	Sampling Company	Report Name	Report Date	Total PCBs
					DNREC-SIRS Screening Level (January 2014) (mg/kg) NCA
LPSSTP-2	0.5' - 1'	Duffield Associates	Preliminary Environmental Site Assessment	Apr-90	ND
LPSSTP-3	1' - 1.5'	Duffield Associates	Preliminary Environmental Site Assessment	Apr-90	ND
LPSSTP-5	0.5' - 1.5'	Duffield Associates	Preliminary Environmental Site Assessment	Apr-90	1.4
LPSSTP-6	0.5' - 1'	Duffield Associates	Preliminary Environmental Site Assessment	Apr-90	ND

**Note: All results reported in mg/kg.**

Qualifiers:

- bgs - Below ground surface
- NCA - No criteria available
- ND - Not detected

PCB Mass Loading Phase II  
1610/0 Bowers Street  
SIRS ID: DE-1440  
Wilmington, Delaware



# Site Photographs



The northern most part of the site.



The access road from Bowers Street.

PCB Mass Loading Phase II  
1610/0 Bowers Street  
SIRS ID: DE-1440  
Wilmington, Delaware



# Overland Flow Calculations

**PCB Loading Calculations from the Revised Universal Soil Loss Equation (RUSLE)  
 1610/0 Bowers Street (DE-1440)  
 Wilmington, DE**

Surface PCB Concentration 1.4 mg/kg

<b>Symbol</b>	<b>Factor</b>	<b>Value</b>	<b>Units</b>
R	Rainfall/Runoff Erosivity Index	175	10 <sup>2</sup> ft-tonf-in/ac-hr-yr
K	Soil Erodibility	0.23	0.01 ton-ac-hr/ ac-ft-tonf-in
	Erodible Area	0.85	Acres
LS	Topographic Factor	0.61	Dimensionless
C	Cover and Management Factor	1	Dimensionless
P	Support Practice Factor	1	Dimensionless
A	Average Annual Soil Loss	24	ton/ac-yr

**PCB Loading via Overland  
 Flow** 26 **grams/year - PCBs**

PCB Mass Loading Phase II  
1610/0 Bowers Street  
SIRS ID: DE-1440  
Wilmington, Delaware



# **Groundwater Transport Calculations (Not Applicable)**