BrightFields, Inc.

Appendix 3

1620 BOWERS STREET

(PURE GREEN INDUSTRIES, INC.)

WILMINGTON, DELAWARE

SIRS ID: DE-1054

GENERAL SITE INFORMATION

Site Name: 1620 Bowers Street (Pure Green Industries, Inc.)

SIRS ID Number: DE-1054

Site Location and Description:

The Pure Green Industries, Inc. site (Site) is located at 1620 Bowers Street in Wilmington, Delaware (Figure 1). The site is approximately 2.3 acres in size and is comprised of one tax parcel (#2603700010). The property is bounded to the north by a vacant lot, to the east by the AMTRAK rail maintenance yards, to the south by Design Contracting, Inc., and to the west by Diamond State Recycling Corporation. The surrounding land is generally industrial.

The Site is part of a larger property that was divided into four separate parcels. A 1994 Preliminary Assessment states that three separate individuals owned the different parcels. At the time, Joseph Swarter of Custom Iron Shop, Inc. owned the Site, Parcel 1B. Currently, the property is owned by Pure Green Industries, Inc.

The 1994 Preliminary Assessment (PA) states that runoff from 1620 Bowers Street (Pure Green Industries, Inc.) drains onto the 0 Bowers Street property. The combined runoff flows into the unnamed tributary of the Brandywine Creek bordering the eastern edge of the 0 Bowers Street property. The Brandywine Creek discharges to the Christina River and ultimately to the Delaware River (approximately 1.3 miles from the Site).

Previous Site Uses:

From 1887 to 1987 the site was owned by Philadelphia, Baltimore, and Washington Railroad and used for unknown purposes. Then it was owned by Penn Central Railroad and used for unknown purposes until 1988. In 1988, it was acquired by Atlas Sanitation and used for refuse disposal until 1990. At that point, J. & I. Swarter purchased the property and but reportedly did not use it for anything. Between 2003 and 2008 the site was acquired by Mark Holden of Wilmington Asphalt, LLC, which later became Richard's Pavement, Inc.

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 Assessment (USEPA, 1994)

The 1994 Preliminary Assessment (PA) was not available for review at the time of this report. However, the 1995 Evaluation and Feasibility Study Work Plan by Duffield Associates briefly summarizes the PA, which was performed in March 1994 over all four parcels, a 20 acre area. The PA occurred after test pits were excavated in preparation for a septic system and found debris from a municipal landfill. Each parcel was examined and described in detail in the report. After reviewing the PA, the EPA decided that the site did not pose any significant threats and they stated that no further action was required.

Facility Evaluation of 1620 Bowers Street (Duffield Associates, 1996)

The evaluation included excavation of six test pits, soil borings, installation and sampling of temporary groundwater monitoring wells, air monitoring, and soil and groundwater sampling. Low levels of PCBs were detected in the soil samples but none of them had PCB concentrations exceeding the 1995 USEPA Region III Risk-Based Concentrations (RBC) Tables for industrial soils. In one groundwater sample, C-2, PCBs (Aroclor 1260) exceeded the RBC levels for Tap Water at a concentration of 1.3 µg/L. Additional groundwater samples had low levels of PCBs. Duffield Associates recommended covering the waste to minimize infiltration and risk of direct exposure.

Site Investigation Report of 1620 Bowers Street (Duffield Associates, 1996)

During excavation of six test pits, Duffield Associates, Inc. observed different types of refuse at varying depths below the ground surface, depending on the region of the site. The northern region had 5 to 10 feet of soil and construction debris covering the refuse while the eastern region had 1.5 to 2 feet of soil. In TP-5, in the southern region, very little refuse was found throughout the 11.2 feet between the ground surface and the native soil. Duffield Associates concluded that the site had been used as a solid waste fill before 1990 and is a part of a larger 10-acre site with similar past uses.

Soil samples were only collected from three of the test pits due to the inability to safely collect samples. Samples were tested for TAL Inorganics, TCL Volatile Organic Compounds (VOCs), TCL Semi-Volatile Organic Compounds (SVOCs), and TCL Pesticides/Polychlorinated Biphenyls (PCBs). Analysis revealed that only Beryllium had concentrations above the 1995

USEPA Region III Risk Based Concentrations (RBC) Tables for industrial soils. Low concentrations of the other compounds were detected across all of the samples.

Three temporary groundwater monitoring wells were installed on-site. Samples were collected and analyzed for TCL VOCs, TCL SVOCs, TCL Pesticides/PCBs, and TAL Inorganics. Five different analytes exceeded the 1995 USEPA Region III RDC Tables for Tap Water, including Aroclor 1260 at a concentration of 1.3 µg/L. However, Duffield Associates concluded that the risk was less significant considering the age of the fill and its proximity to groundwater.

Current Regulatory Status:

In November 1995 Pure Green Industries entered into a Voluntary Cleanup Agreement with DNREC and proposed a cap as a remedial action. After the 1996 Facility Evaluation (FE), DNREC agreed that a cap was the correct action to protect public health, welfare, and the environment. A deed restriction was also placed on the property. According to documents reviewed on the DNREC Environmental Navigator, the site was issued a Certificate of Completion of Remedy by DNREC in 1998 and regular Operations and Maintenance (O&M) inspections have been performed as recently as May 2013 to document that the cap remains protective.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

PCBs were detected in two saturated subsurface soil samples, TP2-5 (11.5 feet below ground surface (bgs)) and TP2-3 (9 feet bgs), at concentrations of 0.019 mg/kg and 0.057 mg/kg, respectively. No surface soil samples or unsaturated subsurface samples were collected or analyzed for PCBs.

Due to the fact that there was only one detection in the subsurface saturated soil, this detected value was used in the calculations instead of calculating the 95% upper confidence limit (UCL) of the mean across the site. PCBs were detected in one groundwater sample, C2-A (well screen depth of 1 foot to 11 feet), at a concentration of 1.3 µg/L.

Concentrations of PCBs on Site			
Sample Matrix	**Corresponding Figure**	**Analytical Methods**	**Range of Total PCBs**
Surface Soil	Figure 2	Not Analyzed	Not Analyzed
Subsurface Soil (unsaturated)	Figure 3	Not Analyzed	Not Analyzed
Subsurface Soil (saturated)	Figure 4	Method 8082	Not detected to 0.057 mg/kg
Groundwater	Figure 5	Method 8082	Not detected to 1.3 µg/L

A summary of all samples collected for PCB analyses are presented in Table 1 and 2.

Acreage where PCBs detected:

According to the information available and reviewed by BrightFields, no surface soil or subsurface unsaturated soil samples were analyzed for PCBs so the respective areas impacted by PCBs cannot be determined. Therefore, no overland flow loading estimates were prepared for the site. The estimated subsurface saturated soil area impacted by PCBs is 1.8 acres (Figure 4). For groundwater, the estimated impacted area is 0.61 acres (Figure 5).

PCB Remediation Status:

In 1995 a cap was placed on the site and regular O&M inspections have been performed since 1998.

PCB MASS LOADING SUMMARY

Because there is a cap over the site, overland flow is not a likely mechanism of transport of PCB contamination at the Pure Green Industries, Inc. site. The PCB mass loading rate to surface water via groundwater transport was estimated for 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:

No overland flow analysis was performed for this site.

Overland Groundwater Discharge Analysis:

Groundwater discharge is based on the hydraulic conductivity of the soil, the groundwater gradient, and the cross-sectional area of the aquifer. A breakdown of the individual factors used in the Darcy equation is presented below. A groundwater discharge map is included as Figure 6.

Because PCBs were detected in groundwater, the concentration of PCBs was used to calculate the mass loading.

The calculations are presented in Table B in the groundwater transport calculations attachment.

Input Factors:

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

1620 Bowers Street

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.28	5.7	Drilling logs from Geoprobe® borings and test pits were used to evaluate the lithology beneath the site. Groundwater being monitored is within the fill zone. The fill unit ranges in composition from silt to fine-to coarse-grained sand. Silt seems to be predominant. The hydraulic conductivity for coarse sandy silt ranges from approximately 1×10^{-4} to 2×10^{-3} cm/sec (Cernica, 1995).
I = Horizontal Groundwater Gradient	0.01	0.01	Estimated by Duffield from temporary wells and listed as < 1 foot in 100 feet flowing east

Saturated Thickness (ft)	5	8	Based on the borings and test pit logs from Duffield, groundwater was generally encountered at between 6 to 9 feet bgs. A clay unit was encountered at 14 feet bgs.
Lateral Discharge Distance (ft)	180	330	The lateral discharge distance was estimated to be equal to the length of the PCB-impacted groundwater measured north to south.
A= Cross-Sectional Area (ft2)	1,000	1,600	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (µg/L)	1.3	1.3	The concentration detected in the groundwater (1.3 µg/L) was used to determine the estimated concentration in groundwater.
Distance to Discharge point	900 feet East		Approximate distance from property boundary to closest surface water location.

Mass Loading Via Groundwater Transport Result:

The groundwater discharge is 79 to 2,600 L/day (see attached Table A). The maximum detected PCB concentration (1.3 µg/L) was used to calculate the groundwater concentrations for the loading estimate (Table B). The estimated minimum and maximum contaminant mass loading contributions are shown in Table C assumes that there are no contaminant losses due to degradation, dispersion, sorption, volatilization, etc.

The total PCB loading via groundwater discharge is estimated to be between **0.04** and **1.2 grams per year** (Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for 1620 Bowers Street

	Groundwater PCB Concentration	**Sampling Density**	**Hydraulic Conductivity**	**Horizontal Groundwater Gradient**	**Saturated Thickness**	**Lateral Discharge Distance**	**Distance to Discharge Point**
Site Specific Information	Groundwater contained a measured amount of PCBs	1.3 samples/ acre, possible data gaps	Based on detailed site logs Conductivity difficult to assess due to amounts of debris and variable grain size	Estimated from temporary wells with no measurement presented	Good quality logs	Based on PCB detection and assumed flow direction	Approximately 900 feet
Degree of Uncertainty	Moderate	Moderate	Moderate to High	High	Moderate	Moderate	Moderate

Based on this evaluation the level of uncertainty associated with groundwater transport PCB mass loading from the 1620 Bowers Street Property is **Moderate to High.**

Site References:

Delaware Department of Natural Resources and Environmental Control (DNREC), 1996, Pure Green Industries, Inc., Proposed Plan of Remedial Action, July 1996.

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

Duffield Associates, Inc., 1995, Evaluation and Feasibility Study Work Plan for the Swarter Property, November 1995.

Duffield Associates, Inc., 1996(a), Facility Evaluation Report, 1620 Bowers Street, February 1996, Revised June 1996.

Duffield Associates, Inc., 1996(b), Site Investigation Report, 1620 Bowers Street, February 1996.

Richards Paving Inc. to DNREC, Certification of Completion of Remedy, June 1999.

Figures

Soil Sample
Groundwater Sample
Other
1620 Bowers St Site Boundary (2.27 acres)
Tax Parcels

Source:
Delaware DataMIL - Aerial 2012, Tax Parcels.

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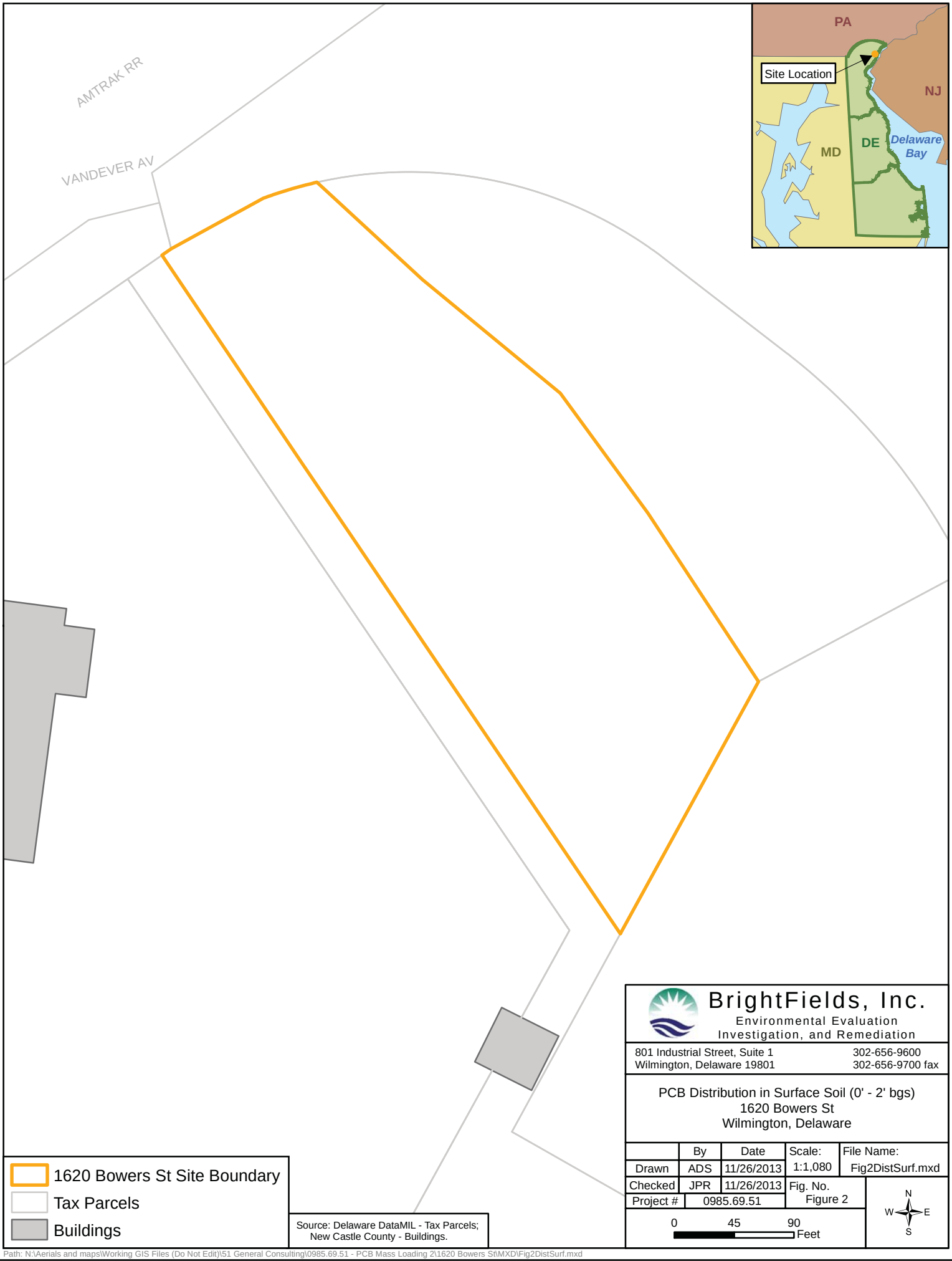
Historic Sample Locations
and Aerial Photograph (2012)
1620 Bowers St
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	12/3/2013	1:1,080	Fig1SiteLoc.mxd
Checked	JPR	12/3/2013	Fig. No. Figure 1	
Project #	0985.69.51			

0 45 90 Feet

N W E S

Path: N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.69.51 - PCB Mass Loading 2\1620 Bowers St\MXD\Fig1SiteLoc.mxd



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PCB Distribution in Surface Soil (0' - 2' bgs)
1620 Bowers St
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/26/2013	1:1,080	Fig2DistSurf.mxd
Checked	JPR	11/26/2013	Fig. No. Figure 2	
Project #	0985.69.51			

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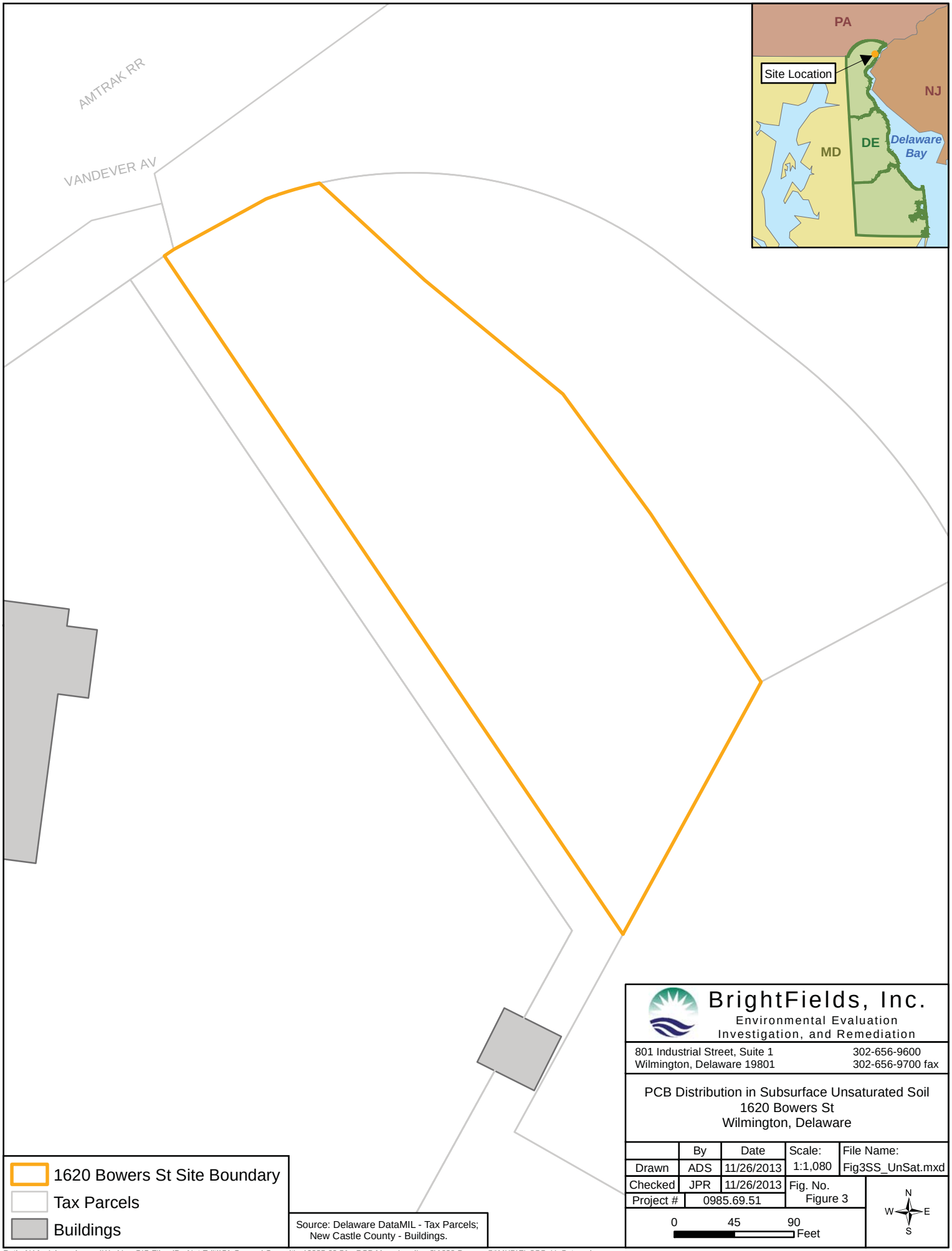

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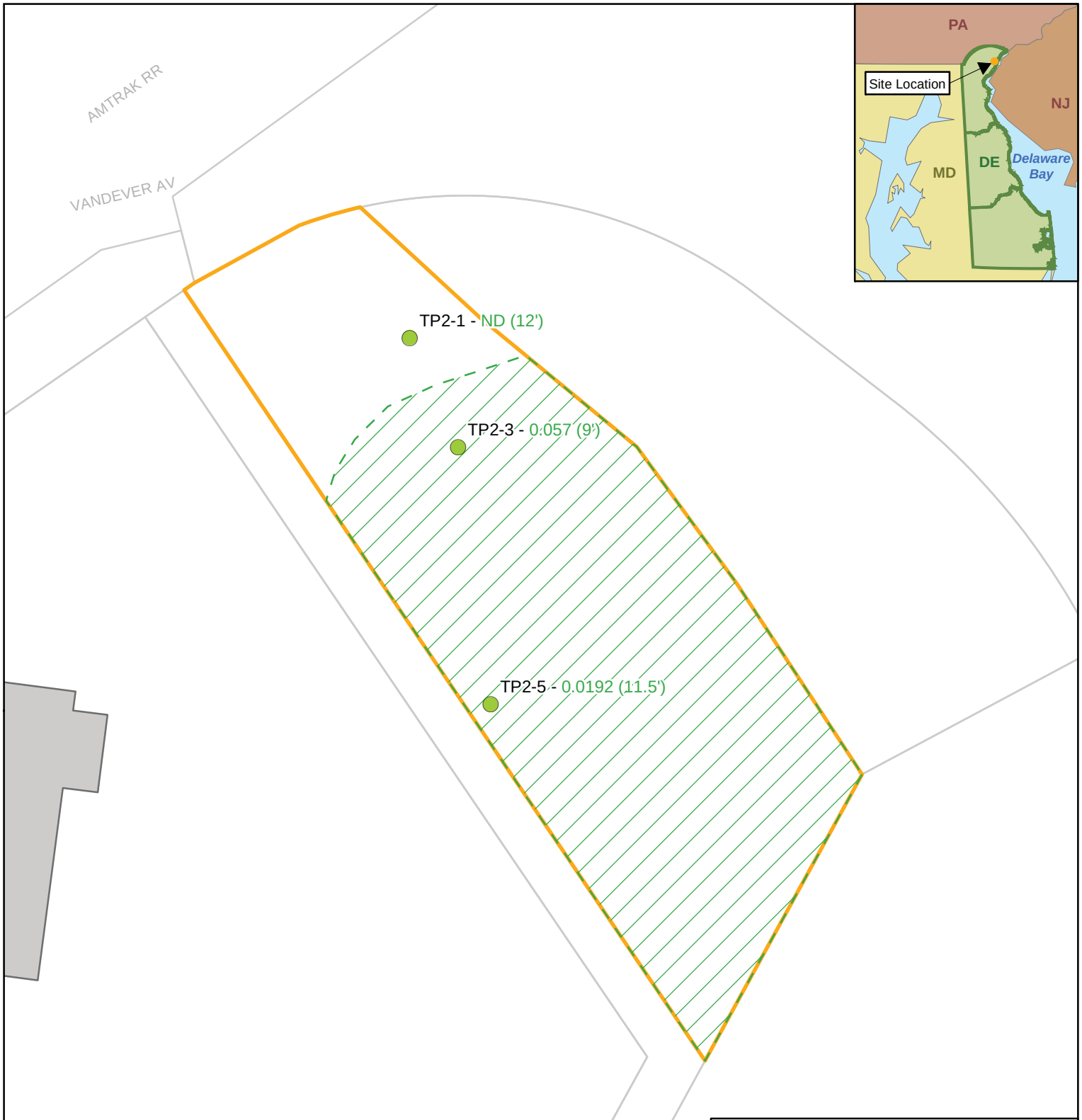

Soil Sample
Estimated PCB Distribution
1620 Bowers St Site Boundary
Tax Parcels
Buildings

Notes:
0.057 (0') - Total PCB Concentration (mg/kg) and Sample Depth.
ND - Not Detected

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

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PCB Distribution in Subsurface Saturated Soil
1620 Bowers St
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/26/2013	1:1,080	Fig4SS_Sat.mxd
Checked	JPR	11/26/2013	Fig. No. Figure 4	
Project #	0985.69.51			

0 45 90 Feet

N W E S

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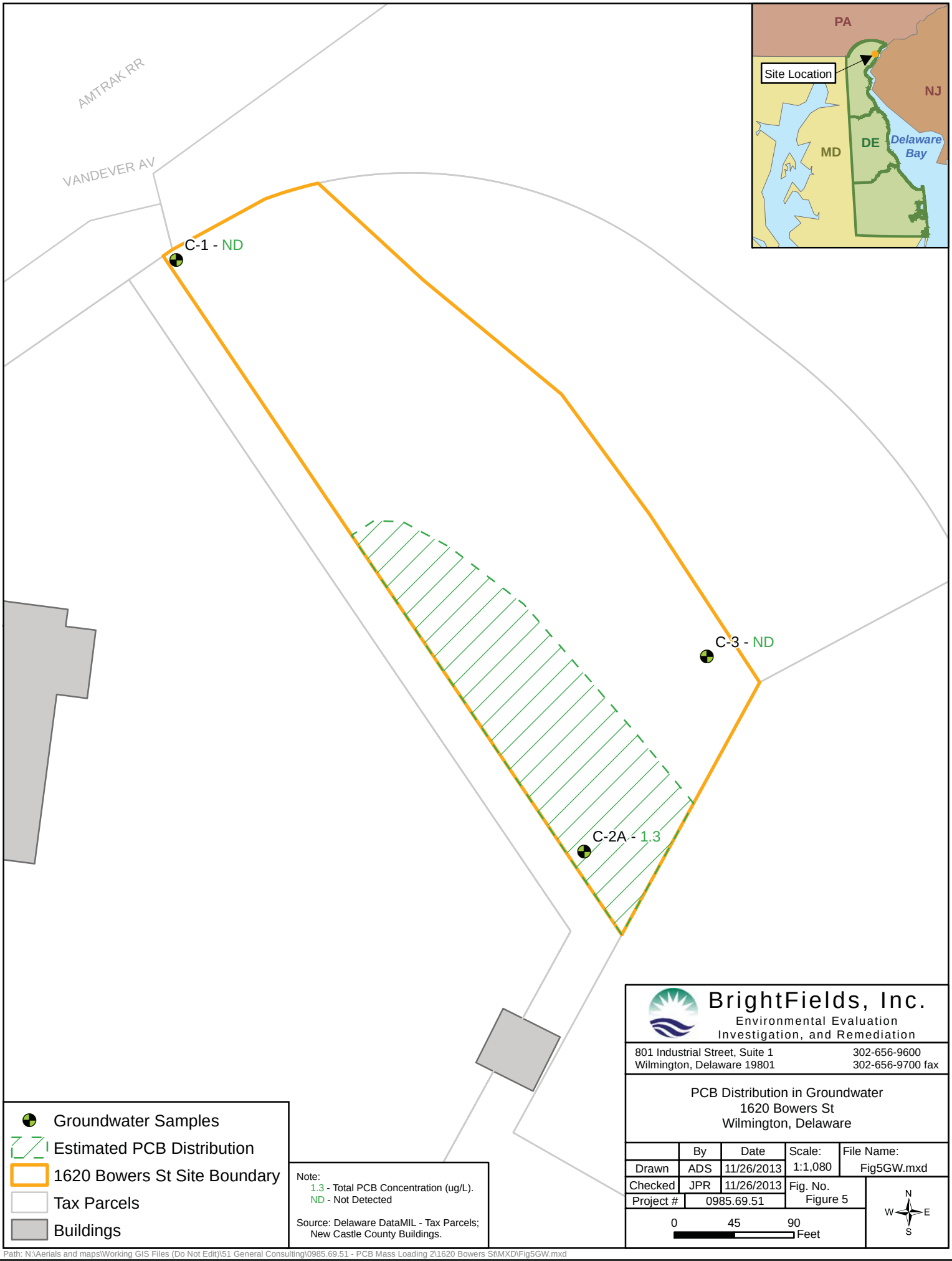

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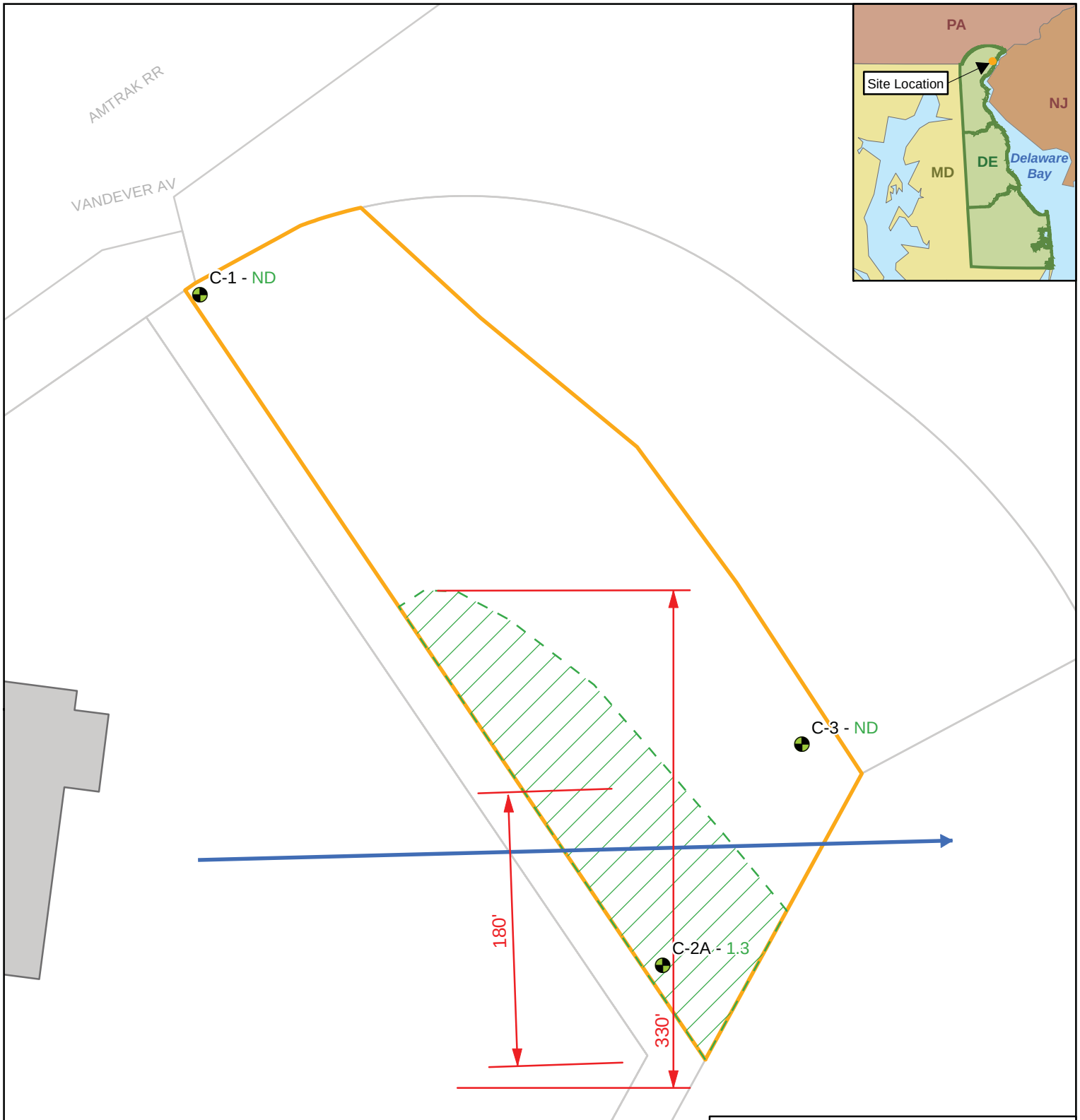

Groundwater Samples
Groundwater Discharge Distance (feet)
Groundwater Discharge Limit
Groundwater Flow Direction
Estimated PCB Distribution
1620 Bowers St Site Boundary
Tax Parcels
Buildings

Note:
180 - Groundwater Discharge Distance in feet
1.3 - Total PCB Concentration (ug/L).
ND - Not Detected

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

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Groundwater Discharge Map
1620 Bowers St
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	ADS	11/26/2013	1:1,080	Fig6Discharge.mxd
Checked	JPR	11/26/2013	Fig. No. Figure 6	
Project #	0985.69.51			

0 45 90 Feet

N W E S

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Tables

Table 1
PCB Analytical Results For Soil
1620 Bowers Street (DE-1054)
Wilmington, DE

Sample Identification	Sample Depth (feet bgs)	Sampling Company	Report Name	Report Date	Aroclor-1016		Aroclor-1221		Aroclor-1232		Aroclor-1242		Aroclor-1248		Aroclor-1254		Aroclor-1260	
					DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.39		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.14		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.14		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.22		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.22		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.11		DNREC-SIRS Screening Level (January 2013) (mg/kg) 0.22	
TP2-1	12'	Duffield Associates	Site Investigation Report	Feb-96	0.033	U	0.067	U	0.033	U	0.033	U	0.033	U	0.033	U	0.033	U
TP2-3	9'	Duffield Associates	Site Investigation Report	Feb-96	0.033	U	0.067	U	0.033	U	0.033	U	0.033	U	0.033	U	0.057	
TP2-5	11.5'	Duffield Associates	Site Investigation Report	Feb-96	0.033	U	0.067	U	0.033	U	0.033	U	0.033	U	0.033	U	0.019	J

Note: All results reported in mg/kg.

Qualifiers:
bgs - Below ground surface
U - Sample not detected above the laboratory method detection limit
J - Estimated value

Table 2
PCB Analytical Results For Groundwater
1620 Bowers Street (DE-1054)
Wilmington, DE

Sample Identification	Screen Depth (feet bgs)	Sampling Company	Report Name	Report Date	Aroclor-1016		Aroclor-1221		Aroclor-1232		Aroclor-1242		Aroclor-1248		Aroclor-1254		Aroclor-1260	
					DNREC-SIRS Screening Level (January 2014) (ug/L) 0.11		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.004*		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.004*		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.034*		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.034*		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.031*		DNREC-SIRS Screening Level (January 2014) (ug/L) 0.034*	
C-1	4' - 14'	Duffield Associates	Site Investigation Report	Feb-96	1.3	U	2.5	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
C-2A	1' - 11'	Duffield Associates	Site Investigation Report	Feb-96	1.3	U	2.5	U	1.3	U	1.3	U	1.3	U	1.3	U	**1.3**	
C-3	4' - 9'	Duffield Associates	Site Investigation Report	Feb-96	1.3	U	2.5	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U

Note: All results reported in ug/L.

Qualifiers:
bgs - Below ground surface
* - Screening level likely below the routine method detection limit
U - Sample not detected above the laboratory method detection limit
Bold and shaded - Exceeds DNREC-SIRS January 2014 Screening Levels

Site Photographs

View from the northwestern portion of the site.

View from the northwestern portion of the site.

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Overland Flow Calculations

(Not Applicable)

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Groundwater Transport Calculations

PCB Loading Calculations - Groundwater Discharge to Surface Water
1620 Bowers Street (DE-1054)
Wilmington, DE

TABLE A
Groundwater Discharge Calculations

	Hydraulic Conductivity (K) (ft/day)	Horizontal Gradient (i) (ft/ft)	Cross-sectional Area (A) (ft2)	Groundwater Discharge*	
				Liters/day	Gallons/ day
Minimum	0.28	0.01	1,000	79	21
Maximum	5.70	0.01	1,600	2,600	680

* - Groundwater Discharge (Q) = KiA

TABLE B
Groundwater PCB Concentrations

Detected Groundwater PCB Concentrations (µg/L)	
Maximum	Minimum
1.3	1.3

TABLE C
Estimated Mass Loadings of PCBs in Groundwater to the Western Boundary Water Body

Maximum Detected Groundwater Concentration (µg/L)	Estimated PCB Mass Loading (g/yr)	
	Minimum	Maximum
1.3	0.04	1.2