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# Woodbrook Road Dump

*South Plainfield, New Jersey*

*EPA Facility ID: NJSFN0204260*

*Basin: Raritan*

*HUC: 02030105*

## Executive Summary

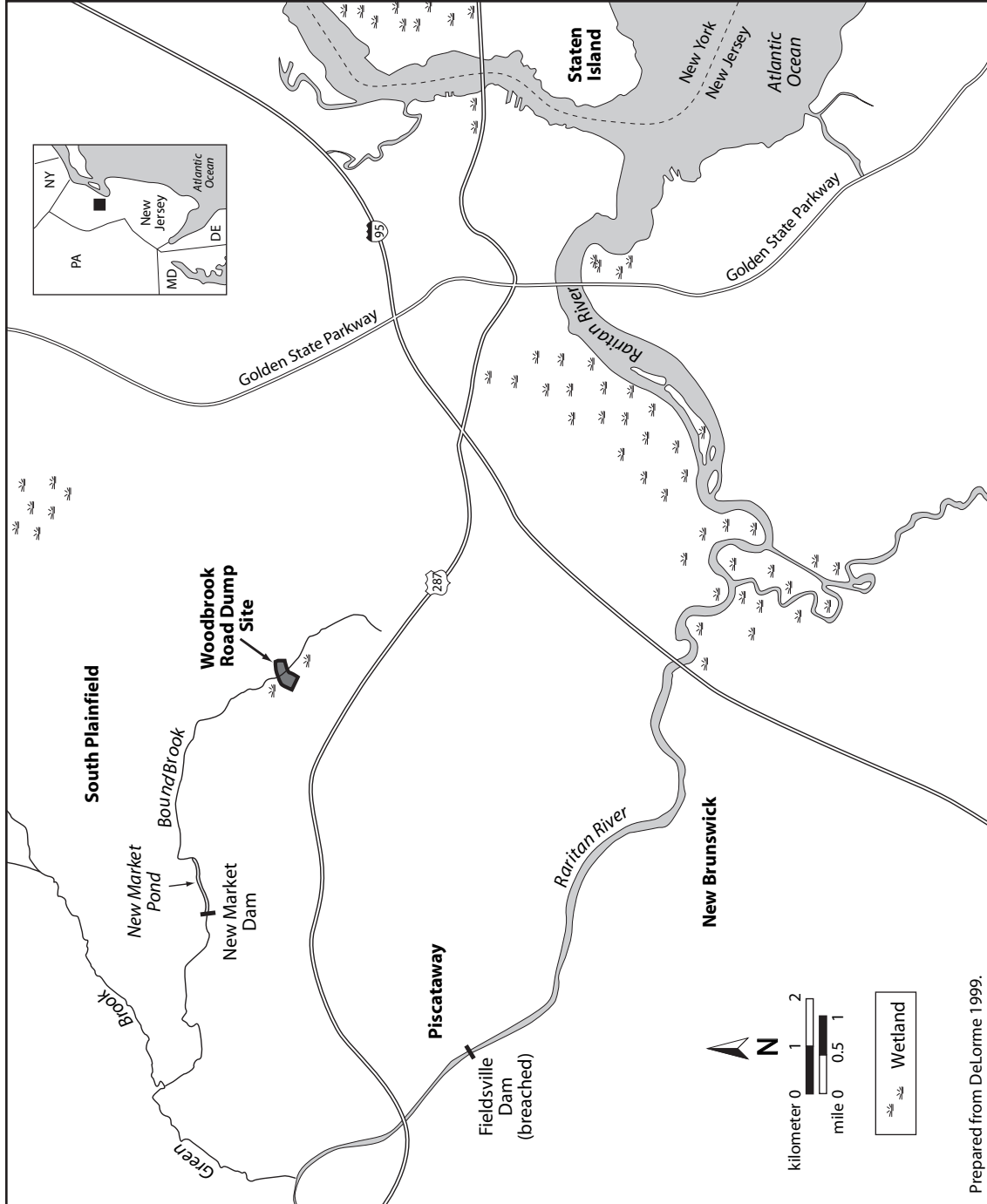
The Woodbrook Road Dump site, also known as the Dismal Swamp site, spans two heavily wooded properties in the Dismal Swamp wetland in Middlesex County, New Jersey. The site was a household and industrial waste dump during the 1940s and 1950s. Metals, PAHs, and PCBs are the primary contaminants of concern to NOAA at the site. The U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency have designated the Dismal Swamp as “priority wetlands.” This area serves as key habitat for fish and wildlife and provides flood control for Bound Brook, which bisects the site. The habitat of primary concern to NOAA is Bound Brook. The catadromous American eel has been observed throughout Bound Brook and is present in the vicinity of the site. Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources. Groundwater is another pathway of contaminant migration from the site.

## Site Background

The Woodbrook Road Dump (Woodbrook) site, also known as the Dismal Swamp site, is in a mixed residential and industrial area in South Plainfield, Middlesex County, New Jersey (Figure 1). The site is approximately 28 ha (70 acres) in area and encompasses two heavily wooded properties northwest of Woodbrook Road. The site is bisected by Bound Brook and is situated within the Dismal Swamp wetland (Figure 2). The Dismal Swamp provides flood control for Bound Brook (Charters et al. 2001).

The Woodbrook site operated as a non-permitted dump during the 1940s and 1950s, accepting household and industrial wastes until it was closed in 1958. Potential sources of contamination found during site investigations included leaking capacitors, automotive parts, household refuse, building debris, and large quantities of bottles.

During September 1999, members of the Edison Wetlands Association discovered leaking capacitors in the Dismal Swamp wetlands. Some of the capacitors were partially buried and had leaked what was later determined to be polychlorinated biphenyls (PCBs) into the surrounding soil. In October 1999, the U.S. Environmental Protection Agency (USEPA) further investigated the leaking capacitors and found that they were in a swampy meadow area adjacent to a small, unnamed stream in the northwest corner of the site (USEPA 2001). The location of the unnamed stream could not be determined from the documents reviewed to prepare this report. In April and March 2000, the capacitors containing the PCBs were removed from the site, and fencing was installed around the areas where they had been. During an integrated assessment (IA) conducted by the USEPA in July 2000, additional buried capacitors and their associated parts were discovered at the site. The capacitors were removed during the IA (Charters et al. 2001).



Prepared from DeLorme 1999.

Figure 1. Location of Woodbrook Road Dump site, South Plainfield, New Jersey.

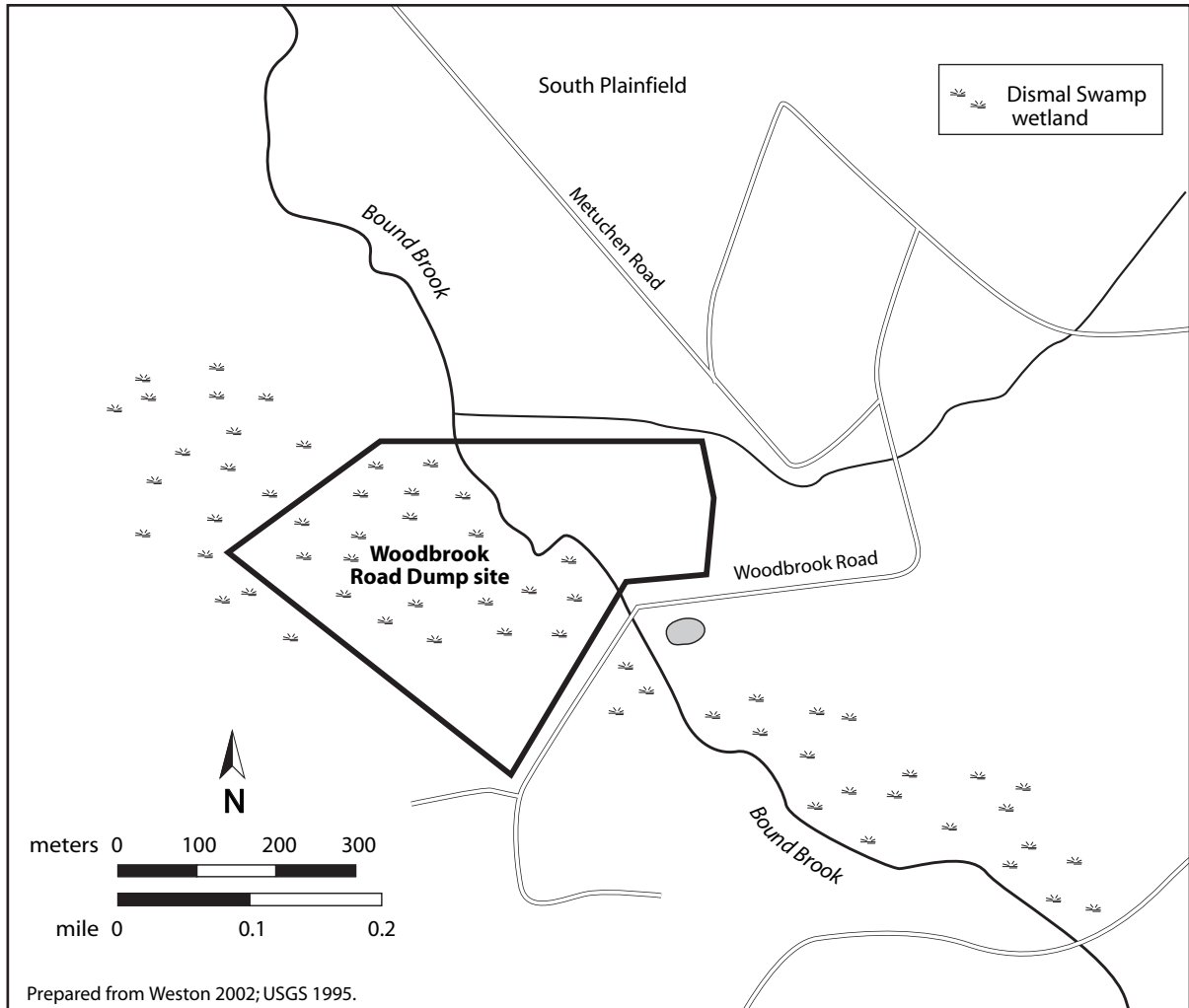


Figure 2. Detail of Woodbrook Road Dump property.

A Hazard Ranking System Package was completed for the Woodbrook site on September 10, 2001. In April 2003, the site was placed on the National Priorities List (USEPA 2004). A remedial investigation (RI) was scheduled to begin in the summer of 2004. Proposed activities for the RI include soil, sediment, and groundwater sampling (USEPA 2004). Information regarding the status of the RI was not available at the time of this report.

Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources. The surface water pathway includes the Dismal Swamp wetland, which connects to Bound Brook, a secondary tributary to the Raritan River. Groundwater is another pathway for the migration of contaminants from the site. Groundwater is encountered at approximately 0.9 to 1.5 m (3 to 5 ft) below ground surface at the site. Areas in Dismal Swamp are considered recharge zones for groundwater (USACE 1993).

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### NOAA Trust Resources

The habitats of primary concern to NOAA are the surface water and sediments of Bound Brook. Contaminated wetlands within Dismal Swamp discharge into a small, unnamed stream approximately 290 m (950 ft) from where the leaking capacitors were found. The unnamed stream flows approximately 0.8 km (0.5 mi) before emptying into Bound Brook. The location of the unnamed stream could not be determined from the documents reviewed to prepare this report. Bound Brook flows approximately 12 km (7.5 mi) before converging with Green Brook, which continues to flow approximately 4.7 km (2.9 mi) to the Raritan River. The Raritan River flows approximately 32 km (20 mi) before discharging into the Atlantic Ocean (Figure 1).

The Dismal Swamp wetland is designated as “priority wetlands” by the U.S. Fish and Wildlife Service and the USEPA. In addition, the wetland represents a “highly valued resource,” because it is one of the few wetland ecosystems remaining in the highly urbanized area of northern Middlesex County, and it is the largest natural wildlife refuge in this area (USEPA 2001).

Bound Brook is a low-gradient stream that supports a variety of warm water resident fish. Bass, bluegill, brown bullhead, goldfish, pumpkinseed, redbreast sunfish, shiner, tessellated darter, and white sucker are all commonly found in Bound Brook (Barno 2002). The New Market Dam on Bound Brook forms New Market Pond (Figure 1). The dam is approximately 6 km (3.7 mi) downstream of the Woodbrook site. New Market Dam lacks fish passage facilities and so is impassable to anadromous fish. Bound Brook and the small, unnamed stream are suitable habitats for alewife and blueback herring runs, but the New Market Dam impedes their migration (Barno 2002). During September 1999, Tropical Storm Floyd, and the floodwaters brought on by the storm, caused damage to the New Market Dam. The Township of Piscataway was awarded a grant for rehabilitation of the dam; however, it is currently unknown whether this rehabilitation will include installing fish passage facilities (Ritchey 2003). The catadromous American eel is able to traverse the dam and has been documented throughout Bound Brook (Barno 2002). The Fieldsville Dam on the Raritan River near the Township of Piscataway has been breached so Bound Brook, Green Brook, and the Raritan River now flow freely below the New Market Dam.

Although there are no plans to restore Bound Brook for use by anadromous fish species, active restoration is occurring in the Raritan River. NOAA trust resources in the Raritan River basin are listed in Table 1. American shad from the Delaware River basin have been transplanted to the Raritan River in efforts to reestablish a spawning population. Historically, anadromous alewife and blueback herring have also used the Raritan River basin. These species are not being actively restored, but it is possible with continued water quality improvement that they will reestablish themselves (Barno 2002). The American eel is found in Bound Brook and the Raritan River.

Recreational fishing of freshwater species takes place in Bound Brook, especially at New Market Pond. Recreational fishing of American shad and striped bass occurs in sections of the Raritan River downstream of the site. No commercial fishing takes place within the Raritan River (Barno 2002).

Table 1. NOAA trust resources found in the Raritan River Basin (Barno 2002). The migration of anadromous fish into Bound Brook is impeded by the New Market Dam.

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
<b>ANADROMOUS FISH</b>						
Alewife	<i>Alosa pseudoharengus</i>	◆	◆			
American shad	<i>Alosa sapidissima</i>	◆	◆			◆
Blueback herring	<i>Alosa aestivalis</i>	◆	◆			
Striped bass	<i>Morone saxatilis</i>	◆	◆			◆
<b>CATADROMOUS FISH</b>						
American eel	<i>Anguilla rostrata</i>			◆		

A fish consumption advisory is in effect for the entire length of Bound Brook, including New Market Pond, because of elevated levels of PCBs and dioxins detected in fish tissue. The New Jersey Department of Environmental Protection (NJDEP) recommends that people not eat fish taken from Bound Brook (NJDEP 2004). A fish-consumption advisory is also in effect for American eel, American lobster, blue crab, bluefish, striped bass, white catfish, and white perch within the lower portion of the Raritan River, downstream of New Brunswick (Figure 1). The advisory is in place because of elevated levels of PCBs and dioxins in fish tissues. The NJDEP further recommends:

- that the general public consume no more than one meal of American eel per year and that high-risk populations avoid consuming American eel from the lower portion of the Raritan River;
- that the general public consume no more than four meals of white perch and white catfish per year and that high-risk populations avoid consuming white perch and white catfish;
- that the general public consume no more than four meals per year of bluefish over 2.7 kg/61 cm (6 lb/24 in) and no more than one meal per month of bluefish under 2.7 kg/61 cm (6 lb/24 in) and that high-risk populations avoid consuming bluefish of any size;
- that the general public consume no more than one meal per month of striped bass and that high-risk populations avoid consuming striped bass;
- that the general public consume no more than six blue crabs per week and that high-risk populations consume no more than three blue crabs per month; and
- that all populations avoid consuming the hepatopancreas of blue crab and discard the cooking liquid and that all populations avoid consuming the hepatopancreas of American lobster (NJDEP 2004).

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### Site-Related Contamination

During July and August 2000, the USEPA Region II Superfund Technical Assistance and Response Team (START) collected surface water, sediment, groundwater, and soil samples from the Woodbrook site. The samples were analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), pesticides, and PCBs (Charters et al. 2001). Based on the results of these analyses, the primary contaminants of concern to NOAA are metals, PAHs, and PCBs. Surface water and sediment samples were taken from the wetland, Bound Brook, and the small, unnamed stream near the area where the leaking capacitors were found. Groundwater samples were taken from temporary monitoring wells throughout the site and from off-site domestic water spigots. Soil samples were taken from throughout the site. Table 2 summarizes the maximum concentrations of contaminants of concern to NOAA and compares them to relevant screening guidelines. Only concentrations that exceeded the screening guidelines are discussed below. Site-specific or regionally specific screening guidelines are always used when available. In the absence of such guidance, the screening guidelines for soil are the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efrogmson et al. 1997). The screening guidelines for surface water and groundwater are the ambient water quality criteria (AWQC; USEPA 2002). The screening guidelines for sediment are the threshold effects concentrations (TECs; MacDonald et al. 2000). Exceptions to these screening guidelines are noted in Table 2.

#### Surface Water

Metals, pesticides, and PCBs were detected in surface water samples taken from Bound Brook and the small, unnamed stream. The maximum concentration of cadmium was detected in a sample taken from Bound Brook downstream of the site, while the maximum concentrations of copper and lead were detected in samples taken from the small, unnamed stream. Cadmium and lead maximum concentrations exceeded the AWQC by one order of magnitude (Table 2). Copper concentrations exceeded the AWQC by a factor of two.

The PCB Aroclor 1254 was detected in a sample taken from the small stream and exceeded the AWQC by one order of magnitude (Table 2). The pesticide 4,4'-DDT was detected in a sample taken from Bound Brook downstream of the site at a concentration that exceeded the AWQC by a factor of three.

#### Sediment

Metals, PAHs, pesticides, and PCBs were detected in sediment samples taken from Bound Brook and the small, unnamed stream. The maximum concentration of cadmium was detected in a sample taken from Bound Brook downstream of the site. Arsenic, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc were detected at maximum concentrations in samples taken from the small, unnamed stream. Cadmium, lead, and mercury concentrations exceeded the TECs by one order of magnitude (Table 2). Concentrations of copper, zinc, nickel, and chromium exceeded the TECs by factors of approximately nine, six, two, and 1.5, respectively. Concentrations of arsenic and silver slightly exceeded the TECs. No TEC is available for comparison to the maximum concentration of selenium found in the sediment samples.

Maximum concentrations of PAHs detected in sediment samples ranged from 0.3 mg/kg to 5.4 mg/kg (Table 2). The maximum concentrations of seven of the eight detected PAHs (Table 2) exceeded the TECs by one order of magnitude. The maximum concentration of one PAH (fluorene) exceeded the TEC by a factor of four.

Table 2. Maximum concentrations of contaminants of concern to NOAA detected at the Woodbrook Road Dump site, South Plainfield, New Jersey (Charters et al. 2001; Weston 2002). Contaminant values in bold exceeded screening guidelines.

Contaminant	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
	Soil	ORNL-PRG <sup>a</sup>	Surface Water	Ground Water	AWQC <sup>b</sup>	Sediment	TEC <sup>c</sup>
<b>METALS/INORGANICS</b>							
Arsenic	<b>110</b>	9.9	7.8	34	150	<b>17</b>	9.79
Cadmium	<b>230</b>	0.38 <sup>d</sup>	<b>6.8</b>	ND	0.25 <sup>e</sup>	<b>16</b>	0.99
Chromium <sup>f</sup>	<b>550</b>	0.4	6.3	<b>42</b>	11	<b>70</b>	43.4
Copper	<b>6,400</b>	60	<b>23</b>	<b>62</b>	9 <sup>e</sup>	<b>310</b>	31.6
Lead	<b>3,800</b>	40.5	<b>33</b>	<b>153</b>	2.5 <sup>e</sup>	<b>570</b>	35.8
Mercury	<b>5.7</b>	0.00051	0.14	ND	0.77 <sup>g</sup>	<b>2</b>	0.18
Nickel	<b>140</b>	30	7.5	42	52 <sup>e</sup>	<b>57</b>	22.7
Selenium	<b>31</b>	0.21	ND	<b>7</b>	5.0 <sup>h</sup>	11	NA
Silver	<b>67</b>	2	ND	<b>4</b>	3.2 <sup>ei</sup>	<b>7</b>	4.5 <sup>j</sup>
Zinc	<b>6,000</b>	8.5	20	<b>144</b>	120 <sup>e</sup>	<b>840</b>	121
<b>PAHs</b>							
Anthracene	0.24	NA	ND	ND	NA	<b>0.81</b>	0.0572
Benz(a)anthracene	<b>1.4</b>	0.1 <sup>k</sup>	ND	ND	NA	<b>1.8</b>	0.108
Chrysene	1.5	NA	ND	ND	NA	<b>1.9</b>	0.166
Dibenz(a,h)anthracene	<b>0.43</b>	0.1 <sup>k</sup>	ND	ND	NA	<b>0.48</b>	0.033
Fluoranthene	2.2	NA	ND	ND	NA	<b>4.3</b>	0.423
Fluorene	0.1	NA	ND	ND	NA	<b>0.3</b>	0.0774
Phenanthrene	<b>1.1</b>	0.1 <sup>k</sup>	ND	ND	NA	<b>3.4</b>	0.204
Pyrene	<b>2.3</b>	0.1 <sup>k</sup>	ND	ND	NA	<b>5.4</b>	0.195
<b>PESTICIDES/PCBs</b>							
4,4'-DDE	0.6	NA	0.0013	ND	1,050 <sup>ij</sup>	<b>0.16</b>	0.00316
4,4'-DDT	0.17	NA	<b>0.0038</b>	ND	0.001 <sup>m</sup>	<b>0.59</b>	0.00416
Dieldrin	<b>0.0089</b>	0.000032 <sup>d</sup>	0.022	ND	0.056	<b>0.013</b>	0.0019
Endrin	ND	NA	ND	ND	0.036	<b>0.009</b>	0.00222
Aroclor 1242 <sup>n</sup>	<b>19,000</b>	0.371	ND	ND	NA	ND	0.0598
Aroclor 1248 <sup>n</sup>	<b>980</b>	0.371	ND	ND	NA	ND	0.0598
Aroclor 1254 <sup>n</sup>	<b>250</b>	0.371	<b>1.2</b>	<b>1.2</b>	0.014	<b>1.9</b>	0.0598
Aroclor 1260 <sup>n</sup>	<b>55</b>	0.371	ND	ND	NA	<b>6.2</b>	0.0598

a: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymsen et al. 1997).

b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 2002). Freshwater chronic criteria presented.

c: Threshold Effects Concentration (TEC). Concentration below which harmful effects are unlikely to be observed (MacDonald et al. 2000).

d: Ecological soil screening guidelines (USEPA 2005).

e: Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L CaCO<sub>3</sub>.

f: Screening guidelines represent concentrations for Cr<sup>+6</sup>.

g: Derived from inorganic, but applied to total mercury.

h: Criterion expressed as total recoverable metal.

i: Chronic criterion not available; acute criterion presented.

j: Freshwater upper effects threshold (UET) for bioassays. The UET represents the concentration above which adverse biological impacts would be expected.

k: Soil screening guidelines for protection of agricultural land uses (CCME 2003).

l: Lowest observable effects level (LOEL) (USEPA 1986).

m: Expressed as total DDT.

n: Screening guidelines expressed as Total PCBs for Aroclors.

NA: Screening guidelines not available.

N/A: Contaminant not analyzed for.

ND: Not detected

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The maximum concentrations of pesticides 4,4'-DDE and 4,4'-DDT and PCB Aroclors 1254 and 1260 were detected in samples taken from the small, unnamed stream. Concentrations of 4,4'-DDT and PCB Aroclor 1260 exceeded the TECs by two orders of magnitude; concentrations of 4,4'-DDE and PCB Aroclor 1254 exceeded the TECs by one order of magnitude. The maximum concentrations of dieldrin and endrin were detected in samples taken from Bound Brook downstream of the site and exceeded the TECs by factors of six and four, respectively.

### Groundwater

Metals and PCBs were detected in groundwater samples taken from temporary monitoring wells throughout the site. The maximum concentration of lead was detected in a sample taken in the northwest portion of the site just east of Bound Brook, and exceeded the AWQC by one order of magnitude. Copper and chromium were detected in samples taken from the wetlands in the northwest portion of the site at concentrations that exceeded the AWQC by factors of seven and four, respectively. Maximum concentrations of selenium, silver, and zinc were detected in samples taken from the wetlands in the northwest portion of the site and slightly exceeded the AWQC.

The maximum concentration of PCB Aroclor 1254 was detected in a sample taken from the wetlands in the northwest portion of the site and exceeded the AWQC by one order of magnitude.

### Soil

Metals, PAHs, pesticides, and PCBs were detected in soil samples taken from the site. Mercury was detected in a sample taken from the southeast portion of the site at a concentration that exceeded the ORNL-PRG by four orders of magnitude. Chromium was detected in a sample taken from the wetlands in the center of the site at a concentration that exceeded the ORNL-PRG by three orders of magnitude. The maximum concentrations of cadmium, copper, selenium, and zinc were detected in samples taken from the southeast corner of the site, the southwest portion of the site, the center portion of the site east of Bound Brook, and the northwest portion of the site just east of Bound Brook, respectively. The maximum concentration of cadmium exceeded the soil screening guideline by two orders of magnitude (Table 2). Concentrations of copper, selenium, and zinc exceeded the ORNL-PRGs by two orders of magnitude. The maximum concentrations of arsenic, lead, and silver were detected in samples taken from the southeast portion of site, the wetlands in the southwest corner of the site, and the center of the site just west of Bound Brook, respectively. Maximum concentrations of arsenic, lead, and silver exceeded the ORNL-PRGs by one order of magnitude. The maximum concentration of nickel, which exceeded the ORNL-PRG by a factor of four, was detected in a sample taken from the wetlands in the northwest portion of the site just west of Bound Brook.

PAHs were detected in soil samples taken throughout the site at maximum concentrations that ranged from 0.1 mg/kg to 2.3 mg/kg. Maximum concentrations of benz(a)anthracene, phenanthrene, and pyrene exceeded the CCME screening guidelines by one order of magnitude. The maximum concentration of dibenz(a,h)anthracene exceeded the CCME by a factor of four. There are no ORNL-PRGs, USEPA ecological soil screening guidelines, or CCME screening guidelines available for comparison to the maximum concentrations of four of the eight detected PAHs.

The maximum concentrations of PCB Aroclors 1242, 1248, and 1254 were detected in soil samples taken from the wetlands in the northwest portion of the site, while the maximum concentration of Aroclor 1260 was detected in a sample taken from the wetlands near the center of the site west of Bound Brook. Maximum concentrations of PCB Aroclors 1242 and 1248 exceeded the ORNL-PRGs by four and three orders of magnitude, respectively. The maximum concentrations of PCB Aroclors 1254 and 1260 exceeded the ORNL-PRGs by two orders of magnitude. The maximum concentration of dieldrin, which exceeded the USEPA ecological soil screening guideline by one order of



magnitude, was detected in a sample taken from the southeast portion of the site west of Bound Brook. The pesticides 4,4'-DDE and 4,4'-DDT were detected at maximum concentrations in samples taken from the northwest portion of the site. No ORNL-PRGs, USEPA ecological soil screening guidelines, or CCME screening guidelines are available for comparison to the maximum concentrations of 4,4'-DDE and 4,4'-DDT.

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