
Rolling Knolls LF

Green Village, New Jersey

EPA Facility ID: NJD980505192

Basin: Hackensack-Passaic

HUC: 02030103

Executive Summary

The Rolling Knolls LF site is an inactive landfill in Green Village, Morris County, New Jersey. From the early 1930s through 1968, the landfill received municipal solid waste, construction and demolition debris, residential septic tank waste, and industrial waste. Pesticides, herbicides, and oil were applied to the landfill property for pest, weed, and dust control. Pesticides, polycyclic aromatic hydrocarbons (PAHs), and metals have been detected in soil, groundwater, surface water, and sediment samples collected at the site and are the primary contaminants of concern to NOAA. Sediment, surface water runoff, and groundwater transport are the primary pathways for the migration of contaminants from the site to NOAA trust resources. The habitats of primary concern to NOAA are Loantaka Brook, Great Brook, and Black Brook, which all flow through the Great Swamp National Wildlife Refuge, also a habitat of concern. These streams ultimately discharge to the Passaic River and Newark Harbor. Passage of NOAA trust resources to the upper Passaic River is blocked by Great Falls and Dundee Dam downstream; however, a fish passage project is planned. Adding fish passage to the dam will allow NOAA trust resources to migrate to the base of Great Falls, but further migration will be impeded by the falls.

Site Background

The Rolling Knolls LF site (Rolling Knolls) is an inactive, unlined municipal landfill in Green Village, Morris County, New Jersey (Figure 1). The 80-ha (200-acre) site is bounded by the Great Swamp National Wildlife Refuge on the east, south, and southwest sides; by Loantaka Brook on the west, and by private residential property on the north and northwest sides (Figure 2) (Foster Wheeler 2000). On its south and east sides, the Rolling Knolls property extends into the Great Swamp National Wildlife Refuge. Loantaka Brook is approximately 0.3 km (0.2 mi) west of the facility. Loantaka Brook flows into Great Brook, which then converges with Black Brook. Both Great Brook and Black Brook are within 1.6 km (1 mi) of the property; each discharges into the Passaic River and ultimately to Newark Harbor (Figure 1).

From the early 1930s through 1968, the landfill received municipal solid waste, construction and demolition debris, residential septic tank waste, and industrial waste. Pesticides and herbicides were used at the landfill for rodent, insect, and weed control. Oil was applied to the landfill's roads to control dust.

Several environmental investigations are currently underway at the Rolling Knolls site: a remedial investigation/feasibility study (RI/FS) began in September 2005, and a removal assessment, which began in August 2004. The most recent environmental investigations completed at the Rolling Knolls site were a field investigation of soil and sediment samples,

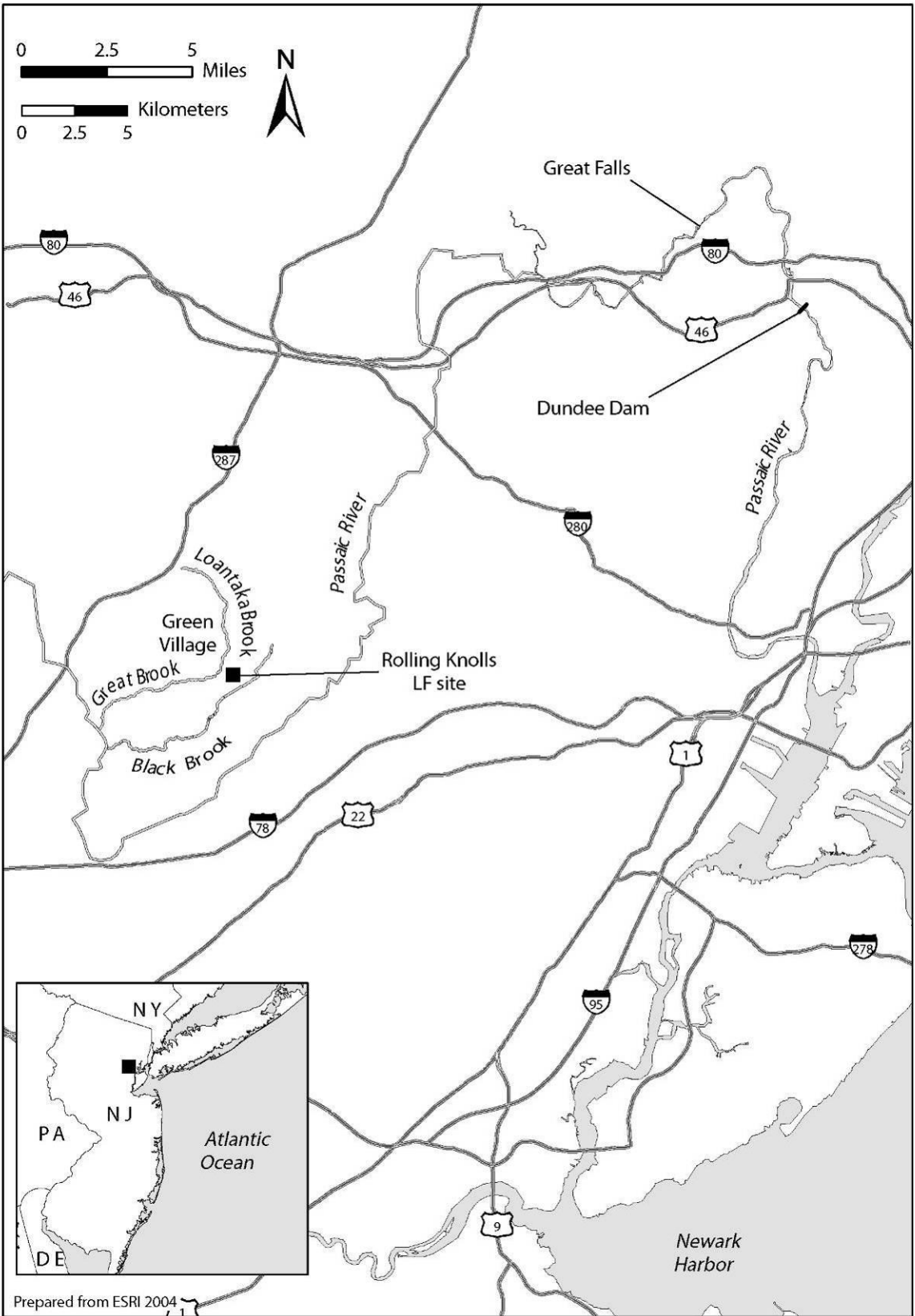


Figure 1. Location of the Rolling Knolls LF site in Green Village, New Jersey.

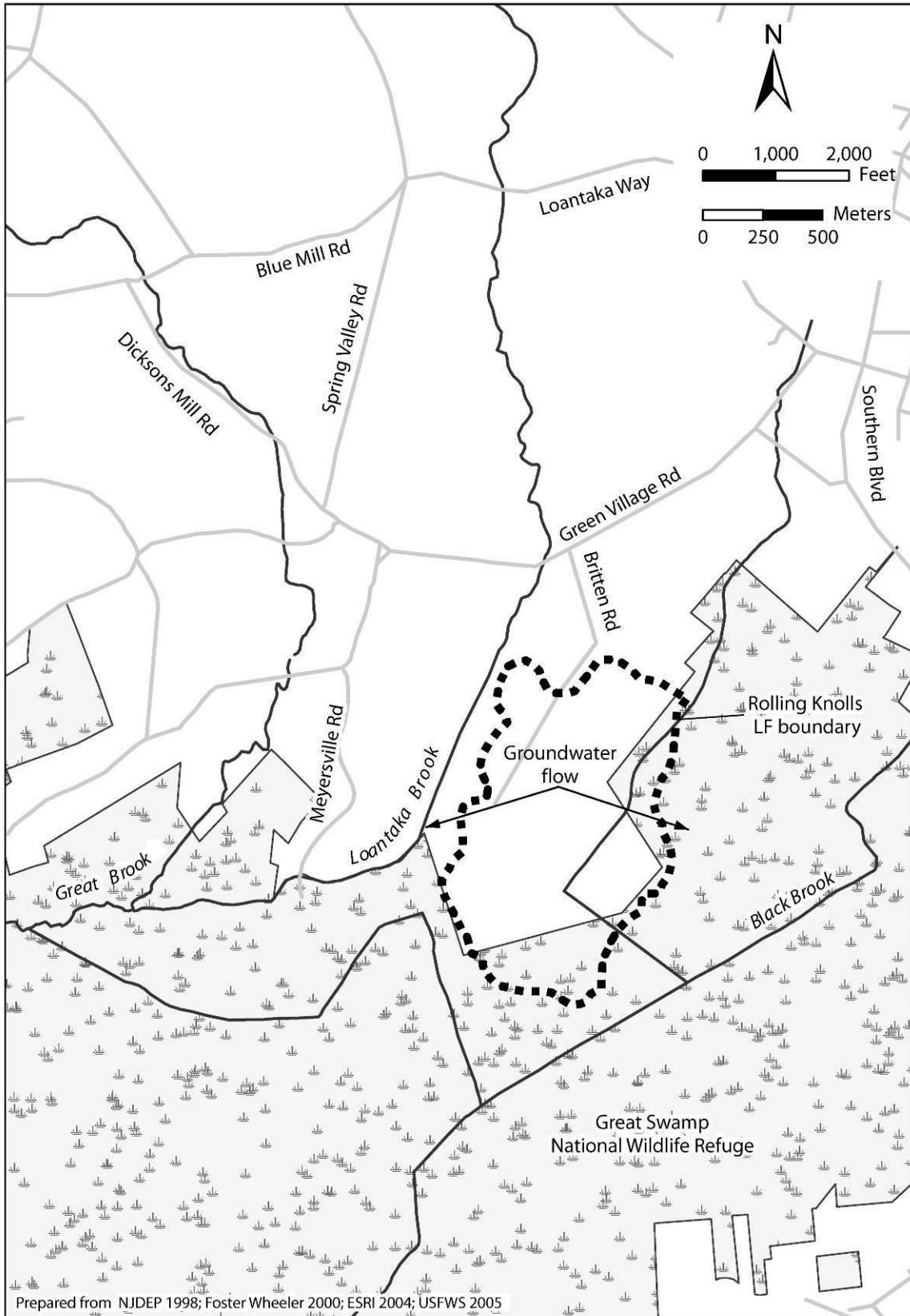


Figure 2. Detail of the Rolling Knolls LF property.

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which was completed in April 2003, and an expanded site inspection was completed in 2000. The site was proposed to the National Priorities List (NPL) on April 30, 2003, and was placed on the NPL on September 29, 2003 (USEPA 2003).

Sediment, surface water runoff, and groundwater transport are the primary pathways for the migration of contaminants from the site to NOAA trust resources. Groundwater beneath the site is thought to flow from the eastern aspect of the landfill southeast to the Black Brook watershed, and from the western aspect of the landfill southwest to Loantaka Brook (Foster Wheeler 2000). Surface flow on the site is multidirectional and generally channeled by drainage ditches east and south of the Rolling Knolls property into Loantaka Brook and Black Brook (Figure 2). The soil beneath the landfill waste consists of stratified drift or swamp peat deposits underlain by glacial lake clay and silt (Foster Wheeler 2000).

NOAA Trust Resources

The habitats of primary concern to NOAA are Loantaka Brook, Great Brook, and Black Brook, which all flow through the Great Swamp National Wildlife Refuge, also a habitat of concern (Figures 1 and 2). Drainage from the site flows into Loantaka Brook, which in turn connects to Great Brook and Black Brook. These perennial streams ultimately discharge into the Passaic River and Newark Harbor (Figure 1).

The migration of anadromous and catadromous fish into the upper Passaic River is blocked by Great Falls, which is 24 m (79 ft) in height, and Dundee Dam, which is 6 m (20 ft) in height (Figure 1). No NOAA trust resources are able to migrate past the dam and falls. Although historical information indicates that American eel were once transported to the upper reaches of the Passaic River by fishermen, recent information shows that there are no American eel or other NOAA trust resources in the reach of the Passaic River near the site or in Loantaka, Great, or Black Brooks (Papson 2006). However, a fish passage project is planned for Dundee Dam (Harbor Estuary Program 2006). Adding fish passage to the dam will allow NOAA trust resources to migrate to the base of Great Falls, but further migration will be impeded by the falls.

Site-Related Contamination

Surface water, sediment, groundwater, and soil samples were collected from the Rolling Knolls site during a 1999 site investigation (Foster Wheeler 2000). The surface water samples were collected from a former swimming pool on the north end of the landfill property, as well as from Loantaka Brook and Black Brook. The sediment samples were collected from the landfill area, drainage ditches, Loantaka Brook, the Great Swamp National Wildlife Refuge, and Black Brook. The groundwater samples were collected from two monitoring wells and two residential wells on Meyersville Road (Figure 2). The soil samples were collected from throughout the site, including the Great Swamp National Wildlife Refuge. The primary contaminants of concern to NOAA are pesticides, polycyclic aromatic hydrocarbons (PAHs), and metals.

Table 1 summarizes the maximum concentrations of contaminants of concern to NOAA detected during the site investigations and compares them to relevant screening guidelines. Site-specific or regionally specific screening guidelines are always used when appropriate. In the absence of such guidance, the screening guidelines for groundwater and surface water are the ambient water quality criteria (AWQC; USEPA 2006); the screening guidelines

Table 1. Maximum concentrations of contaminants of concern to NOAA at the Rolling Knolls LF site (Foster Wheeler 2000). Contaminant values in bold exceed or are equal to screening guidelines.

Contaminant	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
	Soil	ORNL-PRG ^a	Ground-water	Surface Water	AWQC ^b	Sediment	TEC ^c
METALS/ INORGANICS							
Arsenic	7.9	9.9	11	42	150	30	9.79
Cadmium	37	0.36 ^d	3.8	ND	0.25 ^e	43	0.99
Chromium ^f	120	0.4	57	45	11	89	43.4
Copper	9,100	60	19	410	9 ^e	1,600	31.6
Lead	2,900	40.5	ND	420	2.5 ^e	1,400	35.8
Mercury	8.8	0.00051	ND	2.5	0.77 ^g	6	0.18
Nickel	190	30	52	66	52 ^e	80	22.7
Selenium	4.2	0.21	ND	29	5.0 ^h	6.6	NA
Silver	6.9	2	1.6	3	3.2 ^{e,i}	10	4.5 ^j
Zinc	5,600	8.5	55	540	120 ^e	1,600	121
PAHs							
Acenaphthene	ND	20	ND	ND	520 ^k	0.1	0.290 ^j
Benz(a)anthracene	0.2	0.1 ^l	ND	ND	NA	2.6	0.108
Benzo(a)pyrene	0.1	0.1 ^l	ND	ND	NA	2.4	0.15
Benzo(b)fluoranthene	0.2	0.1 ^l	ND	ND	NA	6	NA
Benzo(k)fluoranthene	0.06	0.1 ^l	ND	ND	NA	1.8	13.4 ^j
Chrysene	0.1	NA	ND	ND	NA	3.5	0.166
Dibenz(a,h)anthracene	ND	0.1 ^l	ND	ND	NA	0.7	0.033
Fluoranthene	0.4	NA	ND	ND	NA	6.2	0.423
Fluorene	ND	NA	ND	ND	NA	0.2	0.0774
Indeno(1,2,3-cd)pyrene	0.1	0.1 ^l	ND	ND	NA	2.6	0.330 ^j
Phenanthrene	0.2	0.1 ^l	ND	ND	NA	3.8	0.204
Pyrene	0.2	0.1 ^l	ND	ND	NA	5.3	0.195
PESTICIDES/PCBs							
Aldrin	ND	NA	ND	0.007	3.0 ^j	ND	0.040 ^j
4,4'-DDD	0.1	NA	ND	ND	0.6 ^{i,k}	0.02	0.00488
4,4'-DDE	0.03	NA	ND	ND	1050 ^{i,k}	0.02	0.00316
4,4'-DDT	0.01	0.7 ^l	0.0022	ND	0.001 ^m	0.02	0.00416
Dieldrin	0.02	0.000032 ^d	ND	0.01	0.056	0.01	0.0019
Endrin	ND	NA	ND	0.008	0.036	0.001	0.00222
Gamma-BHC (Lindane)	ND	0.1 ^l	ND	0.006	0.95 ⁱ	0.0004	0.00237
Heptachlor	ND	NA	ND	0.015	0.0038	0.0002	0.010 ^j
Heptachlor Epoxide	ND	NA	ND	ND	0.0038	0.004	0.00247

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

Table 1 continued on next page

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Table 1, *cont.*

b:	Ambient water quality criteria for the protection of aquatic organisms (USEPA 2006). 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 2008).
e:	Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L CaCO ₃ .
f:	Screening guidelines represent concentrations for Cr. ⁺⁶
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:	Lowest observable effects level (LOEL) (USEPA 1986).
l:	Canadian Council of Ministers of the Environment (CCME) environmental quality guidelines for agricultural land uses (CCME 2006).
m:	Expressed as total DDT.
NA:	Screening guidelines not available.
ND:	Not detected.

for sediment in a freshwater environment are the threshold effects concentrations (TECs; MacDonald et al. 2000); and the screening guidelines for soil are the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efrogmson et al. 1997) and the Canadian Council of Ministers of the Environment (CCME) environmental quality guidelines for agricultural land uses (CCME 2006). Exceptions to these screening guidelines, if any, are noted on Table 1. Only maximum concentrations that meet or exceed the relevant screening guidelines, or for which there are no screening guidelines are currently available, are discussed below. When known, the general sampling locations are also provided.

Surface Water

Seven metals were detected in surface water samples taken from the Rolling Knolls site at maximum concentrations that exceeded the AWQC (Table 1). The maximum concentrations of chromium, copper, lead, mercury, nickel, and selenium were detected in samples collected from the southwest corner of the property. The maximum concentration of lead exceeded the AWQC by two orders of magnitude. The maximum concentration of copper exceeded the AWQC by one order of magnitude. The maximum concentrations of selenium and chromium exceeded the AWQC by factors of six and four, respectively. The maximum concentration of mercury exceeded the AWQC by a factor of three, while the maximum concentration of nickel slightly exceeded the AWQC. The maximum concentration of zinc, which was detected in a sample collected from the west side of the property, exceeded the AWQC by a factor of 4.5.

Sediment

Nine metals were detected in sediment samples taken from the Rolling Knolls site at maximum concentrations that exceeded screening guidelines, and one metal was also detected for which no screening guideline is currently available (Table 1). The maximum concentrations of cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc were detected in samples collected from the east edge of the property bordering the Great Swamp National Wildlife Refuge. The maximum concentrations of cadmium, copper, lead, mercury, and zinc exceeded the TECs by one order of magnitude. The maximum

concentration of nickel exceeded the TEC by a factor of 3.5, while the maximum concentrations of chromium and silver exceeded the TECs by a factor of two. The maximum concentrations of arsenic and selenium were detected in samples collected from the northeast edge of the Great Swamp National Wildlife Refuge, approximately 670 m (2,200 ft) from Southern Boulevard (Figure 2). The maximum concentration of arsenic exceeded the TEC by a factor of three. No screening guideline is currently available for comparison to the maximum concentration of selenium detected in the sediment samples.

Nine PAHs were detected in sediment samples taken from the Rolling Knolls site at maximum concentrations that exceeded screening guidelines, and one PAH was also detected for which no screening guideline is currently available (Table 1). The maximum concentrations of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were detected in a sample collected approximately 275 m (900 ft) southeast of Green Village Road (Figure 2). The maximum concentrations of benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, phenanthrene, and pyrene exceeded the TECs by one order of magnitude. The maximum concentration of indeno(1,2,3-cd)pyrene exceeded the relevant screening guideline (see Table 1) by a factor of seven, while the maximum concentration of fluorene exceeded the TEC by a factor of 2.5. No screening guideline is currently available for comparison to the maximum concentration of benzo(b)fluoranthene detected in the sediment samples.

Five pesticides were detected in sediment samples taken from the Rolling Knolls site at maximum concentrations that exceeded TECs (Table 1). The maximum concentrations of 4,4'-DDT and dieldrin were detected in samples taken from the southeast portion of the property. The maximum concentration of dieldrin and 4,4'-DDT each exceeded the TEC by a factor of five. The maximum concentrations of 4,4'-DDD and 4,4'-DDE, which were detected in a sample taken from the northeast portion of the property, exceeded the TECs by factors of four and six, respectively. The maximum concentration of heptachlor epoxide, which was detected in a sample taken south of the property in the Great Swamp National Wildlife Refuge, exceeded the TEC by a factor of 1.5.

Groundwater

Four metals were detected in groundwater samples taken from the Rolling Knolls site at maximum concentrations that equaled or exceeded the AWQC (Table 1). The maximum concentration of cadmium, which was detected in a sample taken from the eastern edge of the property, exceeded the AWQC by one order of magnitude. The maximum concentrations of chromium and nickel were detected in samples taken from the north side of the property. The maximum concentration of chromium exceeded the AWQC by a factor of five, while the maximum concentration of nickel equaled the AWQC. The maximum concentration of copper, which was detected in a sample taken on Meyersville Road approximately 760 m (2,500 ft) south of Green Village Road (Figure 2), exceeded the AWQC by a factor of two.

One pesticide was detected in groundwater samples taken from the Rolling Knolls site at a maximum concentration that exceeded the AWQC (Table 1). The maximum concentration of 4,4'-DDT, which was detected in a sample collected on Meyersville Road approximately 760 m (2,500 ft) south of Green Village Road (Figure 2), exceeded the AWQC by a factor of two.

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Soil

Nine metals were detected in soil samples collected from the Rolling Knolls site at maximum concentrations that exceeded screening guidelines (Table 1). The maximum concentrations of cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc were detected in samples collected from the east side of the property in the Great Swamp National Wildlife Refuge. The maximum concentration of mercury exceeded the ORNL-PRG by four orders of magnitude. The maximum concentrations of chromium, copper, lead, and zinc exceeded the ORNL-PRGs by two orders of magnitude, while the maximum concentration of cadmium exceeded the relevant screening guideline (see Table 1) by two orders of magnitude. The maximum concentration of selenium exceeded the ORNL-PRGs by one order of magnitude. The maximum concentrations of nickel and silver exceeded the ORNL-PRGs by factors of six and 3.5, respectively.

Six PAHs were detected in soil samples collected from the Rolling Knolls site at maximum concentrations that equaled or exceeded screening guidelines, and two PAHs were also detected for which no screening guidelines are currently available (Table 1). The maximum concentrations of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected in samples collected from the east side of the property in the Great Swamp National Wildlife Refuge. The maximum concentrations of benz(a)anthracene and benzo(b)fluoranthene exceeded the CCME soil guidelines by a factor of two. The maximum concentrations of benzo(a)pyrene and indeno(1,2,3-cd)pyrene equaled the CCME soil guidelines. The maximum concentrations of phenanthrene and pyrene, which were detected in samples collected from the southwest edge of the property, exceeded the CCME soil guidelines by a factor of two. The maximum concentrations of chrysene and fluoranthene were detected in samples collected from the east side of the property in the Great Swamp National Wildlife Refuge. No screening guidelines are currently available for comparison to the maximum concentrations of chrysene and fluoranthene detected in the soil samples.

One pesticide was detected in soil samples at a maximum concentration that exceeded the screening guideline, and two pesticides were also detected for which no screening guidelines are currently available (Table 1). The maximum concentration of dieldrin, which was detected in a sample collected from the west edge of the property, exceeded the relevant screening guideline (see Table 1) by three orders of magnitude. The maximum concentrations of 4,4'-DDD and 4,4'-DDE were detected in samples collected from the east side of the property in the Great Swamp National Wildlife Refuge. No screening guidelines are currently available for comparison to the maximum concentrations of 4,4'-DDD and 4,4'-DDE detected in the soil samples.

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