FISH AND WILDLIFE IMPACT ANALYSIS FOR:

NEW YORK STATE SUPERFUND STANDBY CONTRACT
SOUTH HILL DUMP SITE
Cortlandville, Cortland County

WORK ASSIGNMENT NO. D002478-45
SITE NO. 7-12-009

PREPARED FOR:

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PARSONS

DECEMBER 1998

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DIVISION OF HAZARDOUS WASTE REMEDIATION
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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SUMMARY

This report presents the results from a Fish and Wildlife Analysis (FWIA) conducted as part of a remedial investigation (RI) of the South Hill Dump site (NYSDEC Site No. 712009). The scope of the FWIA was limited to Steps I (Site Description) and IIA (Pathway Analysis) described in the New York State Department of Environmental Conservation (NYSDEC) guidance document "Fish and Wild Life Impact Analysis for Inactive Hazardous Waste Sites", dated October 1994. The information used to prepare the FWIA was obtained from a literature review, file search, telephone interviews, and a site visit.

The South Hill Dump site is a 2.5-acre landfill located in Cortlandville Township, Cortland County, New York. Data obtained during the RI confirmed the presence of benzene, toluene, ethylbenzene, xylenes, chlorinated solvents and derivatives, polynuclear aromatic hydrocarbons (PAHs), phthalates, PCBs, and metals through much of the landfill area. Concentrations of TCE slightly exceeded TCLP regulatory limits (560 ug/L vs. 500 ug/L) in a liquid sample recovered from a test pit (TP-40) excavated on the southeast side of the landfill. TCE was also detected in groundwater, subsurface soil, surface water, and sediment samples collected downgradient of the landfill area.

The site is located in steep terrain on the south-southeast slope of South Hill. South Hill attains an elevation of approximately 1,900 feet above mean sea level (amsl) and terminates to the south in Hoxie Gorge at an approximate elevation of 1,080 feet amsl. The primary cover type within ½ mile of the site is forest. Northern hardwoods (maple and beech, with black cherry, white ash, basswood, and hemlock) predominate. Secondary cover types include orchard, farmland, and meadow. State and federal wetlands maps indicate that jurisdictional wetlands do not exist within a ½-mile radius of the site; however, based on the observed presence of cattails and potential presence of hydric-type soils, a drainage swale located in the northeast portion of the site property might qualify as a federally-protected wetland under the authority of the U.S. Army Corps of Engineers.

Field observations indicate that onsite surface water runoff generally flows toward an unnamed Class C stream located approximately 1,000 feet south of the site. Some of this flow is intercepted by a drainage swale located near the northeast corner of the site before discharging to the stream via a drainage ditch located adjacent to the east property line. Some of the flow is intercepted by the drainage ditch, and some flow may move directly to the stream over the ground surface. The unnamed stream discharges to Hoxie Gorge Creek approximately 1 mile downstream of the site. Hoxie Gorge Creek discharges to the Tioughnioga River approximately 1½ miles downstream of the site. The Tioughnioga River is the principal water body in the site vicinity.

The ecological values of the site and vicinity appear to be numerous and diverse. Field observations indicate the site and vicinity are habitat for transient species (e.g., song birds), frequent occupants (e.g., white-tailed deer), and permanent residents (e.g., eastern moles).

Wildlife directly or indirectly observed during the site visit at various locations within a ½-mile radius of the site included woodchuck, cottontail rabbit, white-tailed deer, wild turkey, rough grouse, and eastern mole. Birds observed in the vicinity included black-capped chickadee, scarlet tanager, American redstart, blue jay, brown-headed cowbird, song sparrow, and downy woodpecker. While not directly observed, the presence of small mammals such as deer mice, white-footed mice, meadow voles, and other rodents is very likely. Field observations also indicate that habitat conditions are suitable for many of the significant wildlife species that occur in New York State. However, the vicinity does not appear to provide a unique or exceptionally valuable wildlife habitat, and no state or federal listed species or communities were identified in the vicinity.

Fish and wildlife usage within a 2-mile radius of the site likely includes fishing and small and big game hunting and trapping. The Hoxie Gorge Research Area, located approximately 1 mile south of the site, is used by the State University of New York in Cortland for research and field study activities, and includes a recreational nature trail. Minimal resource utilization values involving non-consumptive outdoor recreation and wildlife observation likely exist for the site and immediate vicinity.

Field observations and analytical results from environmental samples indicate that groundwater, surface soil, surface water, and sediment are potential complete exposure pathways for wildlife located on and downgradient of the site. Chemicals disposed onsite were detected in leachate (groundwater), surface water, and sediment samples collected from locations which are directly accessible to wildlife. The presence of chemicals in surface soil is indicated by the presence of stained soil adjacent to leachate seeps. However, field observations and sample results indicate that ecologically significant migration of chemicals in surface water and sediment to the unnamed stream south of the site is unlikely. Concentrations in downgradient groundwater, surface water, and sediment samples collected near the site property line (approximately 500 feet from the landfill area) were near or below analytical detection limits. Furthermore, little aquatic vegetation was observed in the stream during the site visit, and the bottom sediment consists mostly of a mixture of rock and gravel with very little organic content.

FISH AND WILDLIFE IMPACT ANALYSIS

PURPOSE

This report presents the results from a Fish and Wildlife Impact Analysis (FWIA) conducted as part of a remedial investigation of the South Hill Dump site (NYSDEC Site No. 712009). The FWIA was performed for the New York State Department of Environmental Conservation (NYSDEC) by Parsons Engineering Science, Inc. (Parsons ES) under Superfund Standby Contract Work Assignment No. D002478-45. The purpose of the FWIA was to characterize fish and wildlife resources onsite and in the site vicinity, and to evaluate potential exposure pathways.

SCOPE OF ANALYSIS

The scope of the FWIA was limited to Steps I (Site Description) and IIA (Pathway Analysis) described in the NYSDEC guidance document "Fish and Wild Life Impact Analysis for Inactive Hazardous Waste Sites", dated October 1994. Thus, this report includes a description of vegetative cover types; a description terrestrial, aquatic, and wetland habitats; a description and evaluation of fish and wildlife resources (FWIA Step I); and an evaluation of exposure pathways (FWIA Step IIA). The FWIA did not include a criteria-specific analysis or toxic effect analysis (e.g., FWIA Steps IIB and IIC).

Information presented in this report was obtained from a literature review, file searches, telephone interviews, and a site visit. Information was obtained from various departments of the NYSDEC, including the Wildlife Resource Center in Delmar, the Toxic Substances Monitoring Program Unit in Albany, the Environmental Disturbance Investigation Unit in Avon, the Region 7 sub-office in Cortland, the Watershed Assessment and Research Unit in Albany, and the Wildlife Resources Center Information Service in Latham. Information was also obtained from the New York State Department of Health (NYSDOH) in Albany and the U. S. Fish and Wildlife Service (USFWS) in Cortland. Regional information was obtained from the U.S. Geological Survey (USGS) 7-1/2 minute McGraw, N.Y. topographic map, New York State Article 24 Freshwater Wetlands maps, USFWS National Wetlands Inventory maps, and the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service.

SITE BACKGROUND

The South Hill Dump site is an inactive, 2.5-acre landfill located in Cortlandville Township, Cortland County, New York (Figure 1). The landfill is located in steep terrain on a 10-acre parcel owned by the township. The landfill was operated by the township from the early 1960s to closure in 1972. During that time, municipal and industrial wastes from the Village of McGraw, Cortlandville Township, and Solon Township were disposed at the site. Reportedly, wastes from several local commercial and manufacturing operations and local carting companies were also disposed at the site. Background information indicates that nearby residents disposed of domestic wastes at the site beginning as early as 1949.

Wastes known to be disposed at the site include 55-gallon drums containing industrial chemicals, road construction debris, landscape waste, white metal, and automobiles. These

wastes were deposited on three levels which are separated by steep, unstable embankments. Background information indicates that a waste oil pit existed on the uppermost level. Junked automobiles and white metal were disposed on the lower level and in adjacent woods.

In 1990 and 1991, NYSDEC removed six drums containing trichloroethene (TCE) and other organic chemicals from the site. Chlorinated solvents, polychlorinated biphenyls (PCBs), DDT, cyanide, and several metals were detected in soil, surface water, and sediment samples collected in 1994 during a preliminary NYSDEC investigation. A remedial investigation (RI) was undertaken by NYSDEC in 1996. The RI included excavation and sampling of 50 test pits, recovery of 17 buried or partially buried 55-gallon drums, sampling of 10 drums, installation and sampling of nine monitoring wells, and collection and analysis of six surface water samples and seven sediment samples. The RI sample results confirmed the presence of benzene, toluene, ethylbenzene, xylenes, chlorinated solvents and derivatives, polynuclear aromatic hydrocarbons (PAHs), phthalates, PCBs, and metals through much of the landfill area. Concentrations of TCE slightly exceeded TCLP regulatory limits (560 ug/L vs. 500 ug/L) in a liquid sample recovered from a test pit (TP-40) excavated on the southeast side of the landfill. TCE was also detected in subsurface soil, groundwater, surface water, and sediment samples collected downgradient of the landfill area.

SITE HABITAT CHARACTERIZATION

Introduction

Field observations and information obtained during the literature review and file search were used to characterize habitats on and near the site. The characterization was limited to the area located within 2 miles of the site, with the assumption that interactions between elements of the local environment and site-related constituents, if any, would be confined to this range. The evaluation of ecological resources and habitats was further focused on areas of potential exposure, rather than on arbitrary distances or boundaries that lack a biological justification (USEPA, 1989). The site visit was conducted to evaluate the habitat conditions within a ½-mile radius of the site. Observations and assessments were concentrated on undeveloped areas, waterways, and wetlands in the vicinity of the site. A general evaluation of ecological resources and land use patterns within a 2-mile radius was also conducted during the site visit.

Regional Climate

The cool, humid, continental climate common to most of New York State prevails in the site vicinity (USDA, 1961). Winters are long and cold; summers are warm with occasional short periods of high temperature. The average winter, spring, summer, and fall temperatures in Cortland County are 24.2 degrees Fahrenheit (° F), 43.4° F, 66.4° F, and 48.6° F, respectively. The average growing season in Cortland County is approximately 142 days. Average annual precipitation is approximately 40 inches. The average winter, spring, summer, and fall precipitation is 7.76 inches, 9.63 inches, 12.38 inches, and 10.03 inches, respectively. Average annual snowfall is 50 inches, but frequent thaws tend to keep accumulation low.

Terrestrial Physical Environment

The site is located in the Appalachian Plateau physiographic province (USDA, 1961). This region is characterized by gently rolling countryside with high steep-sided hills and deep flat-bottomed valleys. The site is located on the south-southeast slope of South Hill, which attains an elevation of approximately 1,900 feet above mean sea level (amsl) and terminates to the south in Hoxie Gorge at an approximate elevation of 1,080 feet amsl (Figure 1).

The area surrounding the site includes of wooded areas, orchards, and active and former farm fields. A mix of forested areas and apple orchards are located east of the site. The topography in this area slopes to the east, toward an unnamed stream located approximately ¼ mile east of the site. Most of the area southeast, south, and southwest of the site contains second and third generation forest. Steep slopes are located adjacent to the unnamed stream in this area. Hoxie Gorge Field Station, a 169-acre parcel owned and used by the State University of New York in Cortland (SUNY-Cortland) for biological field studies, is located approximately 1 mile southeast of the site. Two residential parcels are located along the south side of South Hill Road, less than ¼ mile southwest of the site. The area west and north of the site consists primarily of active farm land. A former apple orchard is located farther west. A mix of meadow, farm land, apple orchards, and forested areas are located northeast of the site. A residence consisting of a house and several barns is located within ½ mile north of the site. The Tioughnioga River is located southwest of the site within 2 miles. The unnamed stream located south and east of the site discharges to the Tioughnioga River via Hoxie Gorge Creek.

The landfill area occupies the north and central portions of the site property (Figure 2). Generally, the ground surface on the landfill area is grass-covered with disturbed soils in some locations. General refuse is present on the ground throughout the landfill area and protruding from the ground surface at some locations. Several piles of drums and stained soil areas are also present on the landfill area. An oil-like sheen was noted in several areas of standing water located adjacent to leachate seeps on the southeast side of the landfill. Metal debris, including automobiles, machinery, and appliances, is present on the ground surface of the southeast portion of the site property. A drainage swale is located on the north side of the site property adjacent to South Hill Road. Standing water was observed in the swale during the site visit. The west, south, and east portions of the site property are generally wooded and appear to be relatively undisturbed by past site activities. A small drainage ditch is located adjacent to the east site property line.

Land Use and Vegetative Cover

The site is located in a sparsely developed area of Cortland County. Approximately 75 per cent of the land area in the county is used for agricultural purposes (SUNY, 1963). The City of Cortland, located approximately 5 miles northwest of the site, is the largest industrial center in the county. Forests cover about one-third of the county, and are characteristically scattered in farm woodlot patterns. The site is located in the northern hardwood vegetation zone, which is characterized by a mixture of hardwoods (sugar maple [*Acer saccharum*], beech [*Fagus grandifolia*], and white ash [*Fraxinus americana*]) on the northern slopes, oaks (*Quercus* spp.) on the southern slopes, and hemlock (*Tsuga canadensis*) in the ravines (SUNY, 1963). Soils are

generally of medium texture with fair to poor drainage. Northern hardwoods (maple and beech, with black cherry (*Prunus serotina*), white ash, basswood (*Tilia americana*), and hemlock) predominate in the site vicinity. Several reforestation areas are located over 1 mile south and east of the site.

Figure 3 shows cover-types within ½ mile of the site. The forested areas east of the site property consist of successional northern hardwood species, including white ash, maples, and beech. Hemlock and oak trees exist in greater numbers adjacent to the unnamed stream. In addition to overgrown apple trees, the orchard area to the east includes of a number of early successional plant species, including goldenrod (*Solidago spp.*) and a variety of vetch *(Vicia spp.*) species. Stinging nettles (*Urtica dioica*), raspberry (*Rubus spp.*), and *dogwood (Cornus spp.*) were also observed in this area. The eastern portion of the apple orchard abruptly changes to a more edge type habitat with bigger dogwood clumps and overgrown raspberry.

Areas south and further east of the site are relatively undisturbed, upland environments which support deciduous forest overstory and intermediate successional cover types. Dense overstory, dominated by sugar maple, beech, and white ash, with increasing numbers of hemlock and oak exist in the vicinity of the unnamed stream and Hoxie Gorge. In addition to species identified above, plant species listings for the Hoxie Gorge area include staghorn sumac, witchhazel (*Hamamelis virginiana*), ferns (*Asplenium* spp.), basswood, ironwood (*Ostrya virginana*), black cherry, and haircap moss (*Polytrichium juniperum*) (SUNY, 1998).

North of the site, farm fields are located west of South Hill Road, and a mix of open meadow habitat, farm fields, and forested areas are located east of South Hill Road. The orchard and open meadow areas include a number of different early successional plant species, including goldenrod and a variety of vetch species. Stinging nettles, raspberry, and dogwood were also observed in this area. The farmland west and north of the site appears to be active and was planted with winter crops of alfalfa and clover at the time of the FWIA site visit. The former apple orchard north of South Hill Road is comprised of overgrown apple trees and a number of early successional plant species, including goldenrod and various vetch species. Stinging nettles, raspberry, and dogwood were also observed in this area. The residential parcels include mowed lawn areas. Successional-type species consisting of white ash, maple, and black locust (*Robinia pseudoacacia*) are located along South Hill Road. Wild grape (*Vitis* spp.) vines were also observed along the road.

Approximately one-third of the site property has been disturbed by landfill operations. Vegetation in the landfill area is sparse; most of the area is covered with grasses and devoid of tree or shrub strata. The remaining vegetative cover consists of small areas of shrubs, saplings, and trees concentrated at the landfill periphery. Aerial photos indicate these conditions have existed since at least 1960. Trees and shrubs cover approximately 50 percent of the site property, mainly in the west, south, and northeast portions. These areas contain an edge-type habitat with larger successional plants and small trees. Common cattail (*Typha latifolia*) in the swale area was the only aquatic vegetation observed on the site property. Most of the southern third of the site property is forested. White ash is the predominant species; other observed species include oaks, maples, and beech. The understory consists mainly of saplings of these species with some

buckthorn (*Rhamnus caroliniana*), honeysuckle (*Lonicera japonica*), and staghorn sumac (*Rhus typhina*). Several species of fern, including sensitive fern (*Asplenium spp.*) and Christmas fern (*Polystichum acrostichoides*) were also observed in this area.

Wetlands

State and federal wetland maps indicate that jurisdictional wetlands do not exist on the site property, and the NYSDEC Article 24 wetland map does not include any regulated wetlands within a 2-mile radius of the site (NYSDEC, 1974). The USFWS National Wetlands Inventory map for the McGraw Quadrangle does not show any federally-regulated wetlands within a ½-mile radius of the site (USFWS, 1995); however, several wetlands were identified within a ½- to 2-mile radius of the site (Figure 1). The wetlands downstream of the site are primarily located within the floodplain of the Tioughnioga River, south of Hoxie Gorge Creek discharge point. These wetlands include Lower Perennial Riverine wetlands (unconsolidated bottom class), and Palustrine wetlands (scrub-shrub, forested, unconsolidated bottom, and emergent classes).

Though state and federal maps did not indicate the presence of jurisdictional wetlands on the site property, the swale area in the northeast portion of the site property appears to have potential for qualifying as a federally-protected wetland under the authority of the U.S. Army Corps of Engineers. This conclusion is based on the observed presence of cattails, a common wetland-associated plant species, and potential presence of hydric-type soils. Leachate seeps from the landfill area apparently discharge to this area.

Wildlife Resources

Wildlife directly or indirectly observed during the site visit at various locations within a ½-mile radius of the site included woodchuck, cottontail rabbit, white-tailed deer, wild turkey, rough grouse, and eastern mole. Birds observed in the vicinity included black-capped chickadee, scarlet tanager, American redstart, blue jay, brown-headed cowbird, song sparrow, and downy woodpecker. Wildlife mortality data indicate a red fox (with sarcoptic mange) and a raccoon (with canine distemper) were examined within 5 km of the site. While not directly observed, the presence of small mammals such as deer mice, white-footed mice, meadow voles, and other rodents is very likely. NYSDEC-Region 7 staff have indicated that additional wildlife resources information may be available in the Cortland sub-office; however, due to other pressing commitments, this information has not yet been forwarded to Parsons ES.

Aquatic Environments

Figures 2 and 4 show drainage patterns within ½ mile of the site. Aquatic features on the site property are limited to small areas of standing water which appear to be seasonal. Upgradient surface water runoff is collected in open drainage ditches adjacent to South Hill Road. A portion of this flow is diverted through a culvert into the drainage swale located on the north side of the site property. Standing water 8 to 10 inches deep was observed in the swale during the site visit. Field observations indicate that this is the maximum water depth in the swale area. Apparently, surface runoff overflows the swale area and flows across the southern portions of the site during rainfall events, collecting in the ditch located adjacent to the east site property line, and discharging to the unnamed stream located approximately 1,000 feet south of

the site. Similarly, surface water runoff from other parts of the site property flows toward the unnamed stream either directly as overland flow or via the drainage ditch located adjacent to the east property line. Little to no aquatic vegetation was observed in the stream during the site visit. Bottom sediment was consisted rocks and gravel with very little organic deposits. The unnamed stream discharges to Hoxie Gorge Creek approximately 1 mile downstream of the site (Figure 1). Hoxie Gorge Creek discharges to the Tioughnioga River approximately 1½ miles downstream of the site.

The Tioughnioga River is the principal water body in the site vicinity. The east and west branches of the Tioughnioga River spring from DeRuyter Reservoir, located northeast of the site, and Tully Lake to the north, and join in Cortland approximately 5 miles northwest of the site. Data obtained for the NYSDEC Ambient Surface Water Monitoring program indicate the portion of Tioughnioga River located downstream of the City of Cortland wastewater discharge point and extending to a monitoring station at Blodgett Mills, located approximately 2¼ miles upstream of the discharge point for the stream located adjacent to the site, is listed on the NYSDEC Priority Water Pollution List.

Water column data from this area showed iron and lead at levels of concern and four volatile halogenated organic compounds (chloroform, TCE, 1,1,1-trichloroethane, and tetrachloroethene) were detected slightly above detection limits, but below assessment criteria. Significant reproductive impairment was identified during toxicity testing (bioassay with *Ceriodaphnia dubia)* and appeared to be attributable to the elevated metals. Iron, nickel, and zinc were identified as parameters of concern in bottom sediments. Low levels of PCBs and DDE were also detected in the sediments. Fishing in the area is reportedly impaired because of petroleum odor and foul taste, and laboratory results from 1990 fish samples showed the presence of organic compounds.

Mixed results were obtained from macroinvertebrate studies conducted in this area during in 1991 and 1992. Facultative midges were numerous in both years, but mayflies and caddisflies were scarce or absent. The macroinvertebrate community showed impairment, but not in a pattern for either toxic or conventional impact. However, the 1991 study, which included data obtained from points extending from Homer (north of Cortland) to Lisle (south of Hoxie Gorge Creek) indicated recovery at Hoxie Gorge Creek, and non-impacted water quality was found downstream of Hoxie Gorge. Thus, the data obtained during the FWIA did not reveal any potential site-attributable impacts to the Tioughnioga River.

Aquatic Resources

The unnamed stream located south of the site is a Class C(t) stream (SR 44-14-49). The best usage of Class C surface water is fishing. Class C waters are also regulated to be suitable for fish propagation and survival (including trout as indicated by the "(t)" designation).

No designated public river uses were identified for the portion of the Tioughnioga River located within a 4-mile radius of the site; however, background information indicates the river is likely used for various recreational purposes, including boating, swimming, and fishing. Fish common to the river include largemouth bass, smallmouth bass, northern pike, and walleye

(DeLorme, 1993). The Tioughnioga River is classified as a Class B(t) water body. The best usages of Class B waters are primary and secondary contact recreation and fishing. In addition, Class B waters are regulated to be suitable for fish propagation and survival (including trout as indicated by the "(t)" designation).

Endangered Species and Significant Habitats

Personnel with the USFWS and the NYSDEC Wildlife Resources Center indicated that no listed or proposed endangered species are located onsite or in the vicinity (NYSDEC, 1997a and USFWS, 1998). In addition, no New York State-recognized threatened or special concern wildlife species, rare plants or natural community occurrences, or other significant habitats were identified in the site vicinity. Records in the NYSDEC Natural Heritage Program Biological and Conservation Data System did not cite any occurrences of threatened or endangered plant or animal species within a 2-mile radius of the site.

HABITAT VALUES

The ecological values of the site and vicinity appear to be numerous and diverse. The site property and vicinity contain undeveloped lands that offer diverse cover types, including successional forested areas, open meadows, former apple orchards, farm land, and streams. Field observations indicate the site and vicinity are habitat for transient species (e.g., song birds), frequent occupants (e.g., white-tailed deer), and permanent residents (e.g., eastern moles). Field observations also indicate that habitat conditions are suitable for many of the significant wildlife species that occur in New York State. However, the vicinity does not appear to provide a unique or exceptionally valuable wildlife habitat, and no state or federal listed species or communities were identified in the vicinity.

The information obtained during the FWIA indicates that usage within a 2-mile radius of the site likely includes fishing and small and big game hunting and trapping. The Hoxie Gorge Research Area, located approximately 1 mile south of the site, is used by SUNY-Cortland for research and field study activities, and includes a recreational nature trail. Minimal other resource utilization values involving non-consumptive outdoor recreation and wildlife observation likely exist for the site and immediate vicinity.

APPLICABLE FISH AND WILDLIFE REGULATORY CRITERIA

Chemical-specific and site-specific standards, criteria, and guidelines (SCGs) established for the protection of fish and wildlife resources were identified using state and federal regulations and guidelines. Chemical-specific SCGs include NYSDEC Ambient Water Quality Standards and Guidelines for surface water, NYSDEC sediment criteria, U.S. Environmental Protection Agency (USEPA) water quality criteria, and others, as noted below. Site-specific SCGs include applicable state and federal regulations enacted to protect sensitive environments such as wetlands, streams, and navigable water bodies.

Surface Water SCGs

NYSDEC Ambient Water Quality Standards and Guidance Values and the USEPA fresh water chronic criteria for the protection of aquatic life provide SCGs that can be used to assess impacts to surface water in the unnamed stream. In particular, the use of NYSDEC Class C surface water standards or guidance values would be appropriate because NYSDEC has designated the unnamed stream a Class C stream.

Sediment SCGs

The NYSDEC equilibrium partitioning (EP) method-derived criteria for non-polar organic chemicals and the NYSDEC sediment effects level criteria for metals provide SCGs that can be used to assess impacts to sediments. The benthic aquatic life chronic toxicity criteria should be used to screen organic chemicals, and the Effects Range-Low level and the Effects Range-Severe level should be used for screening inorganic compound concentrations. Wildlife bioaccumulation values are designed to protect piscivorous wildlife from toxic effects resulting from bioaccumulation of chemicals.

The derivation of sediment criteria using the EP method for non-polar organic chemicals is a function of the ambient water quality criterion, the octanol-water partitioning coefficient (K_{ow}) for a given chemical, and the fraction of organic carbon in the sediment (foc). This relationship is expressed as follows:

$$\text{Sediment Criterion} = \text{Water Quality Criterion} \times K_{ow} \times \text{foc}$$

The sediment criteria applied in the data screening should be derived using the measured mean organic carbon content of site sediments. The USEPA Science Advisory Board (SAB) recommends that EP-based sediment criteria be developed for sediments with organic carbon content between 0.2 and 12 percent. Outside of this range, it has been observed that other factors, which are not accounted for by the EP method, may influence chemical partitioning (NYSDEC, 1993b). The SAB specifically limits application of the EP method to a screening level evaluation only. An uncertainty factor of five is to be applied to the concentration determined using the EP method. A concentration falling within the range of five times to one-fifth the derived concentration exists in a "gray area" where effects may or may not occur.

The screening criteria for inorganic compounds should be the NYSDEC Effects Level (EL) screening concentrations. NYSDEC establishes two levels of risk for metals in sediment: the Lowest Effect Level and the Severe Effect Level. If only the lowest criterion is exceeded, the impact is considered moderate. If both criteria are exceeded, the impact is considered severe (NYSDEC, 1993b).

Soil SCGs

NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046: "Determination of Soil Cleanup Objectives and Cleanup Levels", provides SCGs that can be used to assess impacts to soils. Additionally, levels reported as phytotoxic or plant protective soil guidelines can also be used as soil SCGs to determine potential risk to plants growing in

impacted soil. For those constituents where no soil cleanup objectives are listed, soil concentrations can be compared to literature toxic effect levels for rats or other small mammals.

Biological SCGs

Promulgated standards are available for only limited sectors of the biological environment. Federal and state standards, based on the Clean Water Act and reflecting acute and chronic aquatic life criteria, are generally applied to establish requirements protective of aquatic organisms. Risks to the remaining, terrestrial biological groups are evaluated by comparing site concentrations to toxicological response data derived from laboratory and field testing as reported in the scientific literature. In some situations, USEPA and a few states issue advisories or guidance addressing acceptable concentrations of chemicals in specific physical media. These recommendations are generally intended as interim planning or evaluation guidelines for avoiding or minimizing potential adverse effects resulting from food chain biomagnification, bioaccumulation, or chronic exposures. Such recommendations are usually chemical-specific.

There are no promulgated or established New York State or federal standards or criteria relating specific chemical concentrations in soils, sediment, or surface water directly to toxic effects on wildlife species. There are abundant toxicological testing data that relate known chemical dosages in either food or water to acute and chronic effects on specific species. These dosage values are important reference points. However, dosage values cannot be used as absolute measurements of risk to wildlife species because of species-to-species extrapolations that are required to interpret laboratory species data for effects on wild species, and because of the lack of sophisticated measurements required to credibly apply the dosage data (e.g., proportion of a species diet which is derived from the site) involving analyses of bioenergetics and food chain dynamics that are beyond the scope of this assessment.

PATHWAY ANALYSIS

Introduction

The pathway analysis describes the physical media which pose potential adverse risks to biological resources, identifies general categories of receptors, and identifies exposure routes. For the purposes of this analysis, the following definitions of bioconcentration, bioaccumulation, and biomagnification were used. Bioconcentration is a process by which toxic substances are absorbed by organisms directly from the surrounding physical environment (e.g., fish absorbing constituents from water) across the skin or gill membranes. Bioaccumulation results from the intake of constituents via consumption of food sources and directly from the surrounding media. Biomagnification refers to the process by which tissue concentrations of bioaccumulated toxic substances increase as the substances pass up through two or more trophic levels.

Exposure pathways consist of four components: (1) source and mechanism of constituent release, (2) transport medium, (3) potential receptors, and (4) exposure route. These components were evaluated during this assessment. Ecological exposure pathways for biota may be direct or indirect. Direct exposure pathways include dermal contact, absorption, inhalation, and ingestion. Examples of direct exposure include animals incidentally ingesting impacted soil, sediment, or surface water (e.g., during burrowing or dust-bathing activities); plants absorbing constituents by

uptake from impacted water, sediment, or soil; and dermal contact of aquatic organisms with impacted surface water. Indirect exposure pathways for biota can occur when terrestrial or aquatic fauna consume previously-impacted biota. Examples of indirect exposure include higher-order animals consuming plants or animals that bioaccumulate constituents.

Chemical bioavailability is an important characteristic that regulates a receptor's reaction to exposure. Bioavailable chemicals are in a form that a receptor can accumulate and react to. Bioavailability, which is regulated by several physical and chemical environmental factors, is a concern with many inorganic chemicals, especially metals. Equilibrium partitioning models are used to determine the bioavailability of non-polar organic compounds which sorb to organic carbon. If either bioavailability or the exposure pathway between impacted media and the receptors is not complete, then constituents in those media do not constitute an environmental risk at the site.

Groundwater Exposure Pathway

Analytical results indicate that leachate (groundwater) containing chemicals disposed onsite is exposed in seeps along the southeast side of the landfill area which are accessible to wildlife. Thus, groundwater is a potential complete exposure pathway. In addition, sample results and surface drainage patterns indicate that impacted leachate enters surface waters on the site property. Thus, groundwater is a potential transport medium for chemicals disposed onsite.

Surface Soil Exposure Pathway

Potential constituent sources for surface soil include buried waste, deposition of airborne constituents, and impacted surface water and groundwater. The release mechanisms include surface water infiltration and runoff and fugitive dust generation, and deposition. Exposure routes include dermal contact by birds, mammals, and invertebrates; uptake by plants; and incidental ingestion or inhalation by birds and mammals while foraging and grooming. Consumption of impacted biota by higher-order predators in the food chain can provide an indirect exposure pathway for some soil constituents. Plants are directly exposed to constituents in soil by absorption and assimilation of soluble chemical forms through the root system. Constituents may be accumulated in different plant tissues, at different rates, or not at all depending on the specific chemical and plant species involved and prevailing soil chemical and physical conditions. In addition, environmental conditions such as soil moisture, soil pH, and cation exchange capacity significantly influence whether soil constituents remain bound in the soil matrix or whether they can be mobilized to pore water (in a bioavailable form) and released for plant absorption. Soil exposure pathways are potentially important for terrestrial plants and wildlife in the site vicinity.

The presence of impacted subsurface soil, leachate (groundwater), surface water, and sediment on the site property indicates that potentially impacted surface soil is accessible to wildlife; consequently, surface soil is a potential complete exposure pathway.

Surface Water Exposure Pathway

Potential constituent sources for surface water include impacted groundwater and soil. The release mechanisms include surface runoff, leaching, and groundwater seepage. Aquatic organisms and terrestrial wildlife may be exposed to constituents in surface water. Fish and other aquatic animals may be exposed through respiration, ingestion, and dermal/gill membrane contact with affected surface water. Terrestrial wildlife may be exposed primarily through ingestion. Consumption of other plants or animals in which constituents have bioaccumulated or bioconcentrated constitutes a potential indirect exposure pathway for faunal receptors.

Analytical results indicate that surface water on the east side of the site property has been impacted by chemicals disposed onsite. Wildlife and fish could be exposed to impacted surface water in the drainage swale and the drainage ditch located adjacent to the east property line. Thus, surface water is a potential complete exposure pathway. However, field observations and sample results indicate that ecologically significant migration of chemicals in surface water to the unnamed stream south of the site is unlikely. Concentrations in downgradient surface water and sediment samples collected near the site property line (approximately 500 feet from the landfill area) were near or below analytical detection limits.

Sediment Exposure Pathway

Sediment consists of materials precipitated or settled out of suspension in surface water. . Potential constituent sources for sediment include impacted surface water, groundwater, and soil. The release mechanisms include surface water run-off, airborne deposition, and groundwater discharge. Aquatic organisms such as fish and macroinvertebrates may be exposed to stream sediment through dermal contact and ingestion of sediments. Aquatic plants may take up sediment constituents that partition to interstitial pore water. Indirect exposure pathways for sediment include exposure to constituents dissolved from sediment into interstitial pore water, and consumption by other consumers in the food chain of plants or animals in which constituents have bioaccumulated. Chemical bioavailability of many nonpolar organic compounds decreases with increasing concentration of total organic carbon in the sediment.

Analytical results indicate that sediment on the east side of the site property has been impacted by chemicals disposed onsite. Wildlife and fish could be exposed to impacted sediment in the drainage swale and the drainage ditch located adjacent to the east property line. Thus, sediment is a potential complete exposure pathway. However, sample results and field observations indicate the potential for ecologically significant migration of chemicals in sediment to the unnamed stream south of the site is unlikely. Though the stream receives runoff from the site, concentrations in downgradient surface water and sediment samples collected near the site property line (approximately 500 feet from the landfill area) were near or below analytical detection limits. Furthermore, little aquatic vegetation was observed in the stream during the site visit, and the bottom sediment consists mostly of a mixture of rock and gravel with very little organic content.

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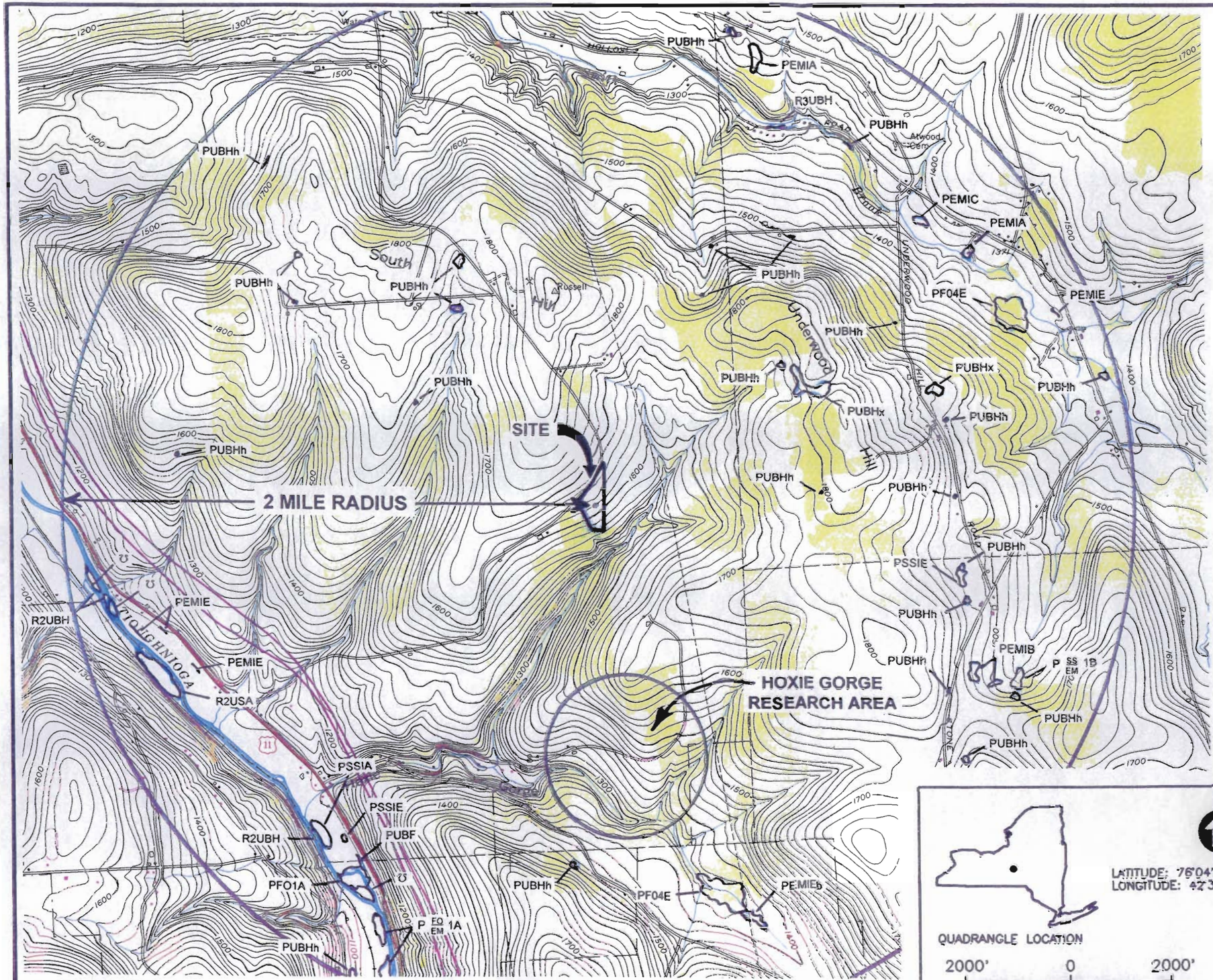

LEGEND

SURFACE WATER

PUBHh FEDERAL WETLAND

NOTE:

NO SIGNIFICANT HABITATS; HABITATS SUPPORTING ENDANGERED, THREATENED, OR RARE SPECIES, OR SPECIES OF SPECIAL CONCERN; STATE REGULATED WETLANDS, OR SIGNIFICANT COSTAL ZONE ZONE AREAS WERE IDENTIFIED WITHIN A 2 MILE RADIUS OF THE SITE.

QUADRANGLE LOCATION

LATITUDE: 76°04'40"
LONGITUDE: 42°34'00"

2000' 0 2000'

Approximate Scale in Feet

FIGURE 1

SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP, MC GRAW, NEW YORK (1955, PHOTOREVISED 1979).

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SOUTH HILL DUMP SITE
NYSDEC SITE No. 712009
CORTLANDVILLE, NEW YORK
FISH AND WILDLIFE ANALYSIS
TOPOGRAPHIC MAP

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING

DATE: 01/14/98 (GTC)
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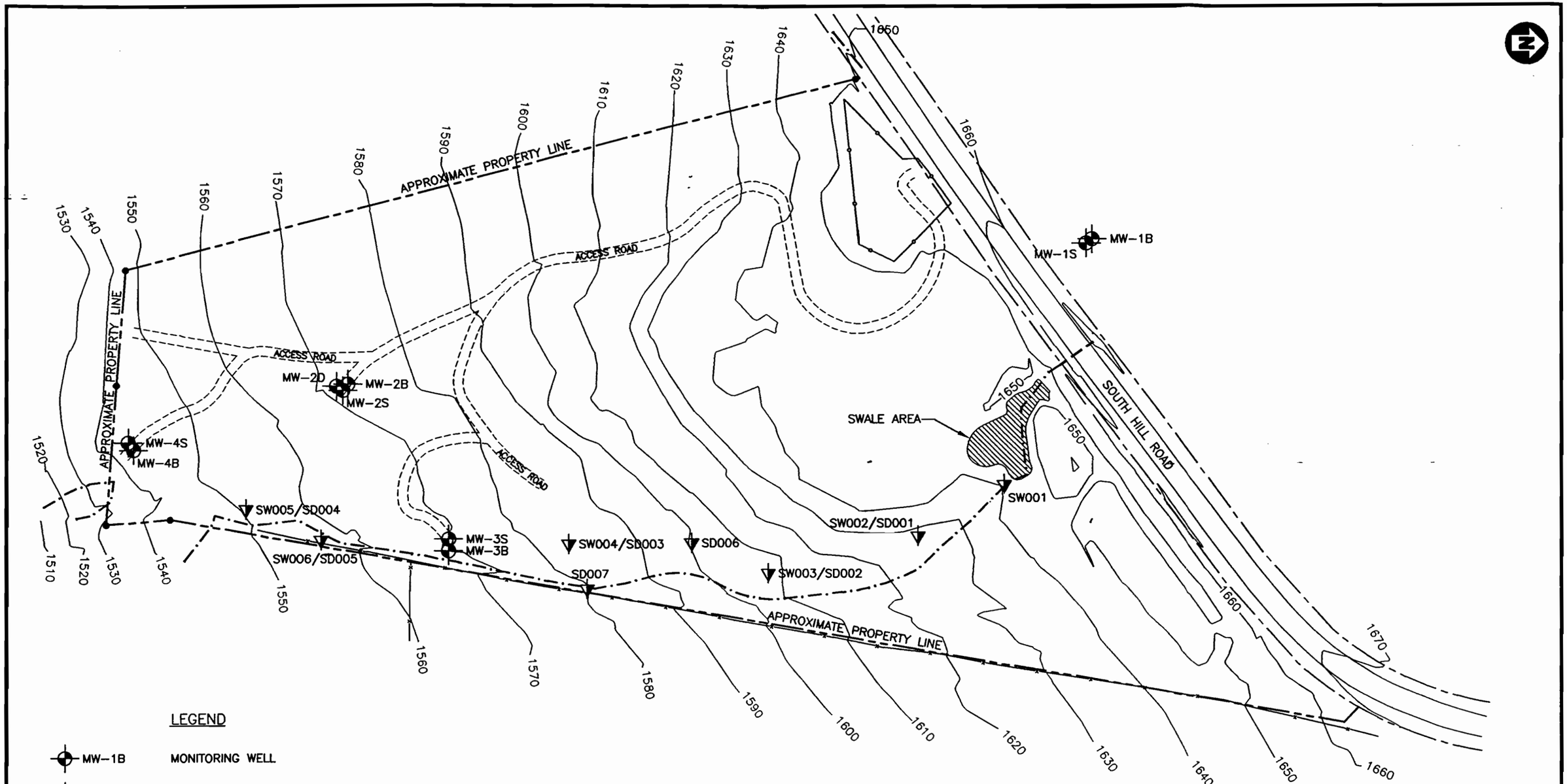

FIGURE 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SOUTH HILL DUMP SITE
NYSDEC SITE No. 712009
CORTLANDVILLE, NEW YORK

SITE MAP

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DESIGN ▪ RESEARCH ▪ PLANNING
290 ELWOOD DAVIS ROAD ▪ SUITE 312 ▪ LIVERPOOL, N.Y. 13088 ▪ 315/451-9560
OFFICES IN PRINCIPAL CITIES

DATE: 02/12/98 (JHG)
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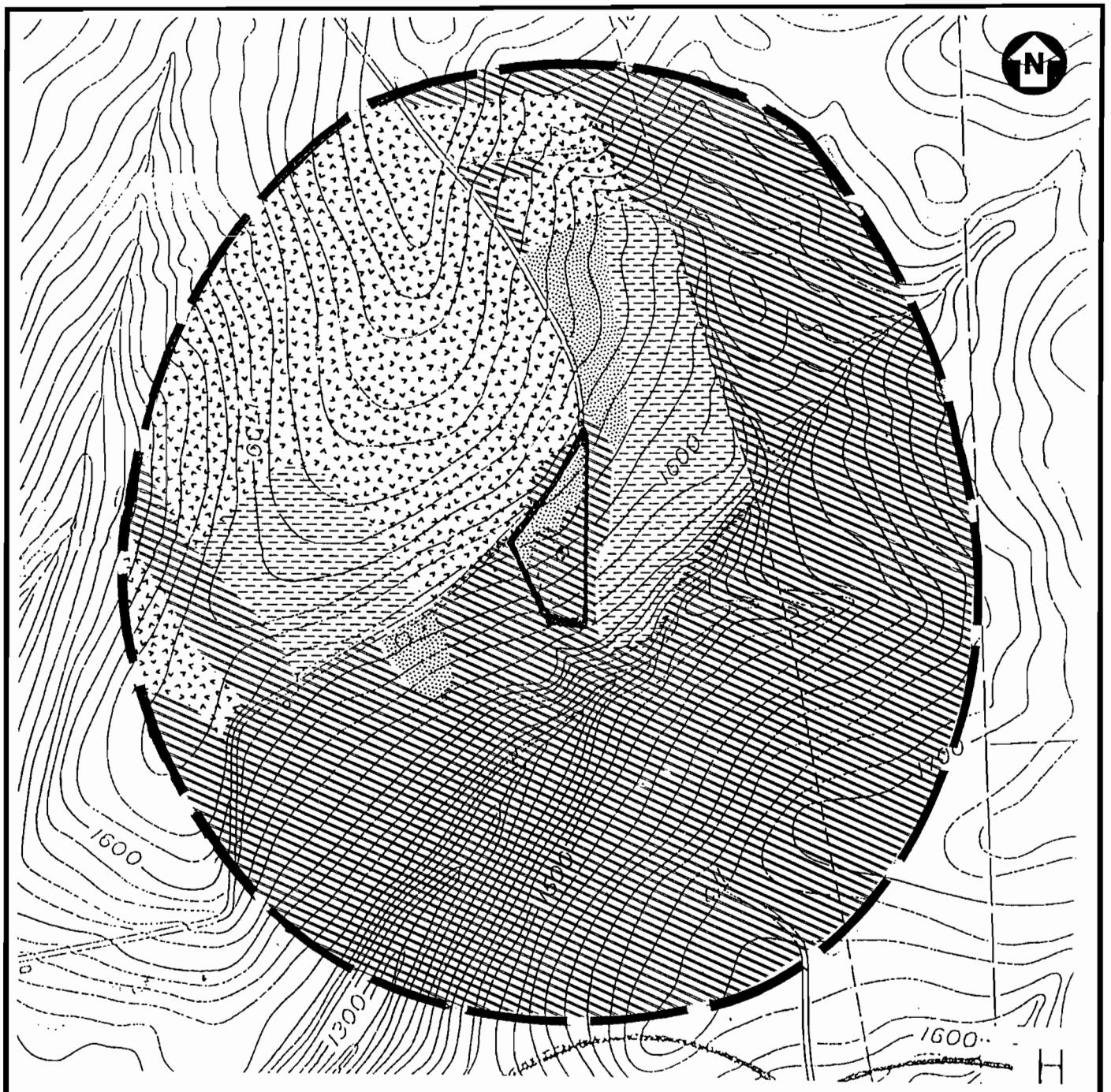

LEGEND

- 0.5 MILE RADIUS
- FARM FIELD
- FORESTED (SUCCESIONAL NORTHERN HARDWOODS)
- MEADOW
- ORCHARD (APPLE)

NOT TO SCALE

FIGURE 3

SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP, MC GRAW, NEW YORK (1955, PHOTOREVISED 1979).

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SOUTH HILL DUMP SITE
NYSDEC SITE No. 712009
CORTLANDVILLE, NEW YORK

COVER TYPE MAP

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LAYER: TTL-FIG2
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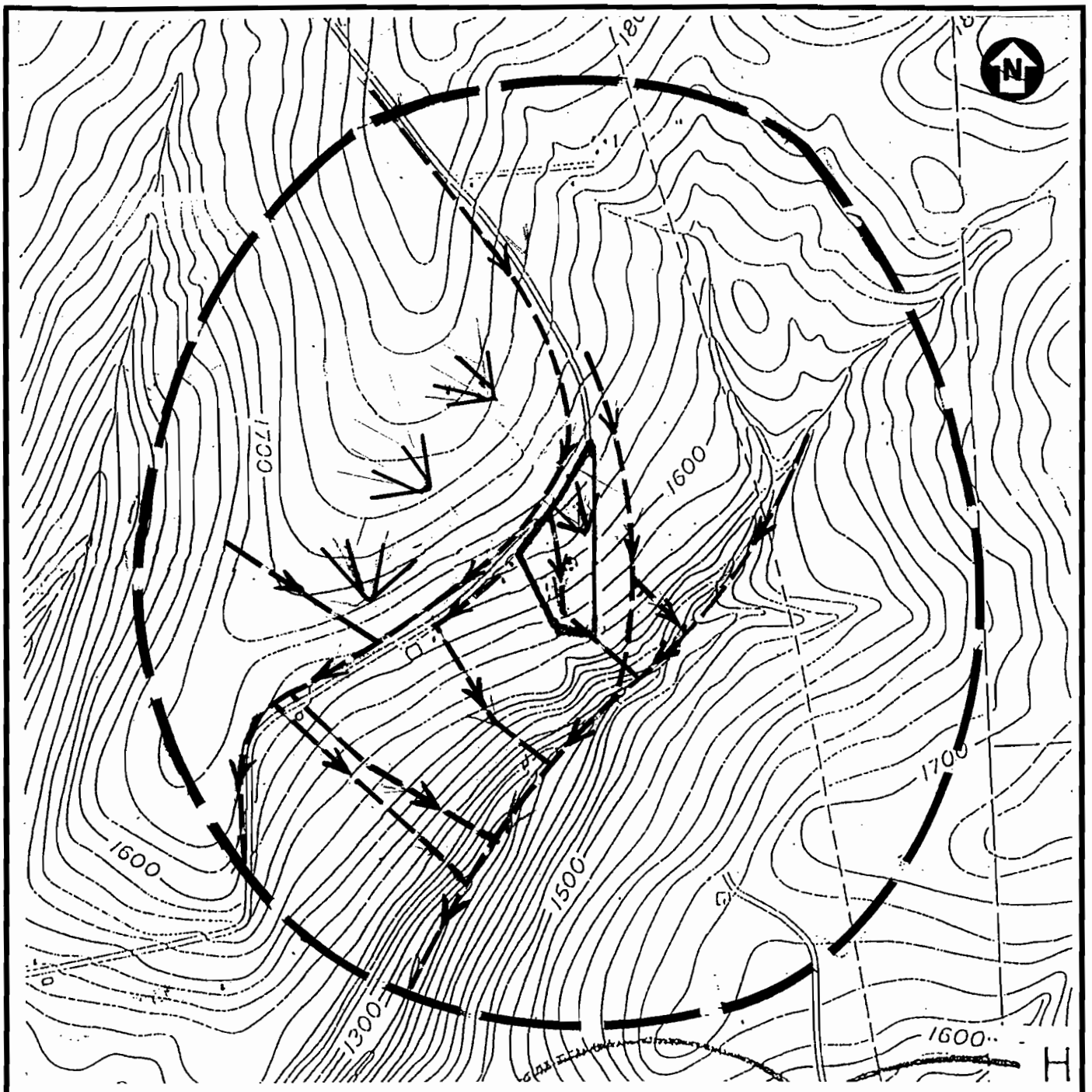

NOT TO SCALE

LEGEND

0.5 MILE RADIUS

DRAINAGE FLOW PATH AND DIRECTION

SHEET FLOW DIRECTION

FIGURE 4

SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP, MC GRAW, NEW YORK (1955, PHOTOREVISED 1979).

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SOUTH HILL DUMP SITE
NYSDEC SITE No. 712009
CORTLANDVILLE, NEW YORK

DRAINAGE MAP

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DATE: 01/21/98 (GTC)
LAYER: TTL-FIG3
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