PROPOSED REMEDIAL ACTION PLAN
Amenia Town Landfill Site
Town of Amenia, Dutchess County, New York
Site No. 3-14-006

January 2006

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Amenia Town Landfill. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, historic landfilling operations have resulted in the disposal of hazardous wastes, including polychlorinated biphenyls (PCBs), petroleum hydrocarbons and heavy metals (zinc, copper, lead, mercury and nickel). These wastes have contaminated the landfill soil, aquatic sediment of the adjacent wetland/pond and groundwater at the site, and have resulted in:

- a significant threat to public health associated with potential exposure to landfill waste, surficial soil and on-site groundwater; and

- a significant environmental threat associated with the impacts of contaminants to biota in the wetland/pond bordering the west side of the landfill.

To eliminate or mitigate these threats, the NYSDEC proposes the following remedy:

- Excavation of sediments contaminated with PCBs and heavy metals (zinc, copper, lead, mercury and nickel) from the wetland/pond adjacent to the landfill and placement on the landfill;

- Restoration of the excavated area of the wetland/pond meeting the substantive requirements of 6 NYCRR Part 663 to provide appropriate habitat for indigenous aquatic flora and fauna;

- Construction of a low-permeability cap meeting the substantive requirements of Part 360 over the landfill to eliminate potential exposures to waste and contaminated surface soils on the landfill and to reduce infiltration into the waste mass;

- Development of a site management plan to address residual contamination and any use restrictions, including a two-year, annual surface water and sediment post-construction monitoring program for East Stream downgradient of the landfill to determine if wetland/pond sediments that may be resuspended during construction activities result in increased downstream contaminants;

- Imposition of an environmental easement; and

- Periodic certification of the institutional and engineering controls.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The NYSDEC will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The NYSDEC has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the November 2003 "Remedial Investigation (RI) Report," the April 2005 "Feasibility Study Report" (FS), and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Amenia Free Library
Ms. Miriam Devine, Director
3309 Route 343
Amenia, NY
845-373-8273
Call for library hours

Sharon Town Hall
Ms. Linda Amerighi, Town Clerk
63 Main Street
Sharon, CT
860-364-5224
Call for office hours

Amenia Town Hall
Ms. Gail Hermosilla, Town Clerk
36 Mechanic Street
Amenia, NY
845-373-8860
Call for office hours

NYSDEC Region 3 Office
21 S. Putt Corners Rd.
New Paltz, NY 12561
(845) 256-3154
Hours: 8:30 am - 4:45 pm
Call Mike Knipfing for an appointment

NYSDEC
625 Broadway, 11th Floor
Albany, NY 12233-7014
(518) 402-9662
Hours: 7:30 am - 3:45 pm
Call Karen Maiurano, Project Manager

The NYSDEC seeks input from the community on all PRAPs. A public comment period has been set from February 1, 2006 through March 3, 2006 to provide an opportunity for public participation

in the remedy selection process. A public meeting is scheduled for Monday, February 13, 2006 at the Amenia Town Hall, 36 Mechanic Street, Amenia, New York beginning at 7:00 p.m.

At the meeting, the results of the RI/FS will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Ms. Maiurano at the above address through March 3, 2006.

The NYSDEC may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the NYSDEC's final selection of the remedy for this site.

SECTION 2: SITE LOCATION AND DESCRIPTION

The ten acre Amenia Town Landfill is located in rural Dutchess County, approximately 1.5 miles south of the hamlet of Amenia on the west side of Route 22 (see Figure 1). The surface of the northern half of the landfill is generally flat and covered with grasses and shrubs. Approximately two acres at the northern end are occupied by Sharon Oil, a fenced, active propane storage facility, presently consisting of one aboveground propane storage tank and several smaller tanks. Four additional fuel storage tanks have been emptied, closed and left within the fenced area. A concrete helicopter pad, located southeast of the propane facility, is in disrepair and appears to be rarely used.

The southern part of the landfill area is about 15 feet higher than the northern end, and also covered with grasses and shrubs. The southern edge of waste terminates at the base of a steep, wooded hill.

The western edge of the landfill slopes down steeply into a wetland/pond that drains through a north-flowing stream along the northwest corner of the landfill. This unnamed stream turns east and flows through a wetland just beyond the northern end of the landfill. The stream is channeled through a culvert beneath Route 22 and empties into Amenia Stream east of the landfill. The wetland is a Class II wetland regulated by NYS under Environmental Conservation Law Article 24: Freshwater Wetlands; and 6 NYCRR Part 663: Freshwater Wetlands Permit Requirements. Figure 2 shows the site layout.

The Harlem Valley Landfill, a permitted solid waste landfill that was closed in 1999, is located south of the Amenia Town Landfill. No homes are located within 1/4 mile of the site.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

1940-1968: Operated as a municipal disposal area by the Town of Amenia; on leased land
1969-1971: Owned and operated by Mr. Salvatore Surico

1971-1972: Owned and operated by Tri-Town Landfill Corporation
1972-1976: Operated by the Town of Amenia under a succession of owners

Municipal and household waste was brought to the landfill throughout its operation from the Towns of Amenia, New York and Sharon, Connecticut. Industrial waste from many sources, including drummed waste, also was reported to have been disposed of at the landfill. The landfill was closed in 1976 and covered with six inches to three feet of soil.

3.2: Remedial History

In 1983, the NYSDEC first listed the site as a Class 2a site in the Registry of Inactive Hazardous Waste Disposal Sites in New York (the Registry). Class 2a is a temporary classification assigned to a site that has inadequate and/or insufficient data for inclusion in any of the other classifications. A Phase 1 investigation was performed for the site in 1986, and a Phase 2 investigation was completed in 1993. Based on the results of these investigations, the NYSDEC listed the site as a Class 2 site in the Registry in 1992, due to the presence of PCBs in landfill soil and wetland/pond sediment. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

Based on historic aerial photos and recommendations in the Phase 2 Investigation Report, the NYSDEC conducted a test pit investigation in September 1998 to verify the presence of buried drums in the landfill. A total of fourteen test pits were excavated across the ten acre landfill. Six of the test pits were excavated just south of the Sharon Oil enclosure where elevated soil vapor concentrations had been identified. Typical municipal waste (white goods, garbage, plastic bags, newspapers, glass, metal, etc) was encountered, as well as occasional crushed and empty drums. Three test pits were located in the southern end of the landfill. The landfill waste was similar to that seen in test pits in the north end of the landfill. All test pits were backfilled and revegetated.

The remaining five test pits were excavated at the far southwestern corner of the landfill, in a swale between the steep hill south of the landfill and a wooded area next to the wetland/pond. Numerous leaking drums and containers, containing various liquid, powdery and solid substances were encountered. Drums with leaking, liquid product were overpacked into secure containers and reburied until arrangements could be made for a full-scale drum removal. The results of the test pit investigation are contained in the October 1998 “Test Pit Installation Report.”

At the request of the NYSDEC, the USEPA conducted an emergency drum removal action in late 1998. Details of this action are reported in the December 1998 “Drum Removal Report.” A total of 175 drums were removed, sampled, overpacked and secured, and approximately 150 cubic yards of contaminated soil were staged for off-site disposal. All drums and contaminated soil were removed from the site in December 1999 and disposed of at an approved off-site facility.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The

NYSDEC identified 36 PRPs for the Amenia Town Landfill. The NYSDEC and 10 of the PRPs entered into a Consent Order on October 4, 2001. The participating PRPs are:

Alastair B. Martin	Metal Improvement Company, Inc.
Ashland Inc.	Syngenta Crop Protection, Inc.
BP America, Inc.	Town of Amenia, New York
Curtiss-Wright Corp.	Town of Sharon, Connecticut
Estate of Edith Park Martin	Unisys Corp.

The Order obligates the responsible parties to implement a remedial investigation and feasibility study (RI/FS). After the remedy is selected, the NYSDEC will approach the PRPs to implement the selected remedy under an Order on Consent.

SECTION 5: SITE CONTAMINATION

An RI/FS has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between October 2001 and June 2002, with additional investigations in 2003 and 2004. The field activities and findings of the investigation are described in the RI Report and the October 2004 "Off-site Groundwater Investigation Report."

The following activities were conducted during the RI and the Off-site Groundwater Investigation:

- Research of historical information;
- Installation of 12 soil borings and 12 monitoring wells for analysis of surface and subsurface soils and groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of 12 monitoring wells to determine the nature and extent of groundwater contamination;
- Installation of four piezometers to evaluate groundwater flow properties;
- Collection of six off-site groundwater samples using a direct push technique;
- Collection of 33 surface soil samples to determine background conditions and evaluate potential risks to public health and the environment from soil at the landfill;
- Collection of eight surface water samples to evaluate surface water quality upstream, downstream and next to the landfill;

- Installation of eight staff gauges in the wetland/pond and streams to evaluate the relationship between groundwater and surface water flow;

- Collection of 71 aquatic sediment samples to evaluate aquatic sediment quality upstream, downstream and next to the landfill; and

- Collection of 52 soil vapor samples at the landfill to evaluate subsurface organic vapors originating from landfill waste.

Following completion of the RI, a Test Pit Investigation was implemented in October 2003 to identify the edge of waste. These results are contained in Appendix A of the FS Report. Eleven test pits were excavated around the perimeter of the landfill.

To determine whether the soil, groundwater, surface water and sediment contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels."

- Sediment SCGs are based on the NYSDEC "Technical Guidance for Screening Contaminated Sediments."

- Background soil and upgradient sediment samples were taken from locations believed to be unaffected by historic landfill operations. The samples were analyzed for semi volatile organic compounds (SVOCs), PCBs and inorganic compounds. The results of the analysis were compared to data from the RI (Table 1) to aid in determining appropriate site remediation goals.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI report.

5.1.1: Site Geology and Hydrogeology

Native overburden material at the site consists of sand and gravel and varies from 10 to 20 feet thick. A silt unit interbedded with clay lies beneath the sand and gravel and also varies from 10 to 20 feet thick. Another sand and gravel unit of varying thickness lies beneath the silt and clay across part of the site, but in some locations the silt/clay unit lies directly on bedrock. Total depth to bedrock, a gray marble, ranges from 20 to 70 feet below ground surface.

Shallow groundwater at the site was encountered in the overburden material, between 20 and 50 feet below ground surface. Data from watertable elevations in overburden monitoring wells and staff

gauges installed in surface water adjacent to the site show that shallow groundwater beneath the landfill is recharged by the wetland/pond west of the landfill and discharges into the streams east of Route 22 (see Figure 3).

Deep bedrock groundwater is confined by the overlying overburden units and shows an upward gradient toward shallow groundwater.

5.1.2: Nature of Contamination

As described in the RI report, many soil, groundwater, soil vapor, surface water and sediment samples were collected to characterize the nature and extent of contamination. As summarized in Tables 1 and 2, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and inorganics (metals).

The VOCs that most often exceeded their SCGs were benzene, trichloroethene and trichloroethene breakdown products. Two PCBs were identified, Aroclor 1242 and Aroclor 1254. The inorganics that most often exceeded the SCGs were iron, manganese, copper, nickel and zinc.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (ppm) for waste, soil, and sediment, and micrograms per cubic meter ($\mu g/m^3$) for air samples. For comparison purposes, where applicable, SCGs are provided for each medium.

Tables 1 and 2 summarize the degree of contamination for the contaminants of concern and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Waste Materials

A total of fourteen test pits were excavated into waste in September 1998. Typical municipal waste (white goods, garbage, plastic bags, newspapers, glass, metal, etc) was encountered, as well as occasional crushed and empty drums.

Surface Soil

Thirty surface soil samples (0-6 inches) were collected from the existing landfill cover and the north and west slopes of the landfill next to the wetland/pond. PCBs were detected in eighteen of the samples up to 33.9 ppm, exceeding the SCG of 1 ppm. Several inorganics were detected above SCGs, including chromium (up to 83.5 ppm), copper (up to 609 ppm), iron (up to 273,000 ppm), lead (up to 89.7 ppm), manganese (up to 1,530 ppm), nickel (up to 88.6 ppm) and zinc (up to 3,010 ppm). The SCGs for these inorganics are shown on Table 1.

Subsurface Soil

Nine subsurface soil samples were collected from depths of ten to twelve feet below ground surface in the far southwest corner of the landfill, at the area of the 1998 drum removal action. No VOCs and only one SVOC, phenol, were detected above SCGs. Phenol was detected at 0.084 ppm, which exceeded the SCG of 0.03 ppm. Five inorganics were detected above SCGs: arsenic (9.0 ppm), copper (up to 57.8 ppm), iron (up to 34,300 ppm), manganese (up to 2,400 ppm) and nickel (up to 46.8 ppm). The SCGs for these inorganics are shown on Table 1. Test pits excavated within the fenced area at the north end of the landfill identified isolated areas of petroleum contamination on top of the watertable.

Background Soil

Three background soil samples were collected from locations unimpacted by landfilling activities to aid in determining appropriate clean up levels for some inorganic compounds (see Table 3) at the landfill. The highest of the three values was used to determine cleanup levels for lead and manganese. The concentrations of other inorganics were below TAGM 4046 SCGs and therefore TAGM values were used as cleanup levels.

Groundwater

Twelve groundwater monitoring wells were installed during the RI: nine shallow wells in overburden and three deep wells in bedrock (see Figure 3). Two rounds of groundwater sampling were conducted, in January 2002 and April 2002. Several organic compounds were detected above SCGs in five shallow overburden wells (see Table 1). These exceedences occurred in wells installed at the edge of landfill waste. No exceedences were detected in bedrock wells. Following completion of the landfill RI, an off-site shallow groundwater investigation was conducted with temporary probes to determine if low-level shallow groundwater contamination at the eastern edge of waste was migrating off-site. No organic compounds were detected in groundwater collected from the off-site locations. Inorganic compounds exceeding SCGs were detected in many of the groundwater wells, including arsenic, iron and manganese (see Table 1). These results show that although the waste has impacted shallow groundwater, contamination is not migrating off-site or down into the bedrock.

Surface Water

Eight surface water samples were collected: two from upgradient streams, one from the wetland/pond, and five from the downgradient streams. No volatile, semi-volatile or PCB compounds were detected. Three pesticides, alpha-chlordane, delta-BHC (benzene hexachloride), and gamma-chlordane, were detected above SCGs (see Table 1). Pesticides were not observed in surface or subsurface soil samples collected at the landfill and their presence in surface water is likely associated with other historic or existing land uses. Aluminum and iron were the only inorganics detected above SCGs, and the levels were highest in Amenia Stream upstream from the landfill. The results suggest that surface water has not been impacted by landfill waste.

Sediments

Seventy-one aquatic sediment samples were collected from the wetland/pond and streams: upgradient, downstream and in the wetland/pond next to the landfill. For clarity of discussion in this document, the stream that flows into the wetland/pond from the west (upstream) is called "West Stream." The stream that flows out of the wetland/pond is called "West Pond Tributary." After West Pond Tributary crosses beneath Route 22, it is called "East Stream." East Stream then flows into Amenia Stream.

Upgradient: No volatile organic compounds or PCBs were detected in the six sediment samples collected upgradient of the landfill from West Stream and Amenia Stream upgradient of the confluence with East Stream. Several inorganics (arsenic, copper, iron, manganese, nickel and zinc) exceeded sediment SCGs (see Table 1) in these samples, and are considered either background concentrations for the area (arsenic, copper and manganese) or indicators of an upgradient source in West Stream (iron, nickel and zinc).

Adjacent wetland/pond: Forty eight aquatic sediment samples were collected in the wetland/pond next to the landfill and analyzed for PCBs and/or inorganics. Aroclor 1242 and Aroclor 1254 (PCBs) were detected in many of the locations at concentrations up to 15.1 mg/kg (see Table 2 for concentrations and SCGs). Several inorganic compounds exceeded sediment SCGs: arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, silver and zinc (see Table 1 for concentrations and SCGs). Concentrations of iron and nickel were higher in sediment samples from West Stream than in the adjacent wetland/pond. Concentrations of PCBs and the heavy metals were greatest next to the landfill and decreased away from the landfill towards the center of the wetland/pond.

Downstream: Aquatic sediment samples were collected from West Pond Tributary, East Stream and Amenia Stream, downstream of the landfill. PCBs were the only organic compounds detected. The PCBs were identified up to concentrations of 0.636 mg/kg, at generally decreasing levels downstream from the wetland/pond. The concentrations of inorganics that exceeded SCGs in the downstream samples were not consistently higher or lower than concentrations from either West Stream (upgradient) or the wetland/pond. Background (or upgradient) sediment concentrations of zinc and nickel also exceeded the SEL, suggesting sources of inorganics other then the landfill to the stream environments. (See Tables 1 and 2 for all sediment results and SCGs.)

Based on groundwater flow (from the wetland/pond eastward beneath the landfill) and quality (lack of PCB contamination in site groundwater), the probable source of PCBs in wetland/pond sediment is due to erosion of PCB-contaminated soil and waste from the landfill into the wetland/pond. The aquatic sediment results indicate impacts to the wetland/pond from the landfill, particularly PCB and heavy metal contamination in excess of sediment criteria. These areas will require remediation.

The remedial goal of 1.4 µgPCB/g of organic carbon in sediment for PCBs in the wetland/pond is based on the sediment criterion for the protection of wildlife from PCB bioaccumulation. Due to the high organic content of sediment in this area [ranging from 63 to 421 grams per kilogram (g/kg) of organic carbon with an average of 212 g/kg], the site specific criteria for PCBs in the wetland/pond is 0.3 mg/kg. Given the practical difficulties of achieving low levels of PCB concentrations during sediment excavation, a PCB concentration of less than 1.0 mg/kg (1.0 ppm) in sediment

approximates the site specific criteria and will be used as the cleanup objective for sediment in the wetland/pond at the Amenia Landfill site.

A remedial goal of 19.3 µg PCB/g of organic carbon in sediment for PCBs was chosen for the downgradient stream sediments based on the protection of benthic aquatic life because significant bioaccumulation of PCBs is not anticipated in the stream as the stream is small and the section with detectable PCBs in not great. Given the average organic carbon content of the stream sediments of 85 g/kg, the site specific criteria for PCB in the downgradient streams is 1.64 mg/kg. The remedial investigation indicated that sediment concentrations of PCBs in the downgradient streams did not exceed the criteria of 1.64 mg/kg and therefore, remediation of the downgradient streams is not necessary at this time.

Soil Vapor

Fifty two soil vapor samples were collected from the landfill to evaluate the subsurface occurrence of potential areas of concern within the waste. Several VOCs were detected, primarily benzene, toluene, ethylbenzene, xylenes and chlorobenzene, and the highest levels were concentrated near the propane and fuel storage area at the north end of the landfill. See Table 1 for results.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS. In 1998, an emergency drum removal action was conducted by the USEPA at the far southwest corner of the landfill (see section 3.2). Confirmatory soil sampling indicated that the removal action remediated the area to levels below SCGs. There were no additional IRMs performed at this site during the RI/FS.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 6 of the RI report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Analytical results obtained for the Remedial Investigation indicate that, based on the level and frequency of exceeding recommended cleanup objectives, VOCs, PCBs and inorganics (metals) are the primary contaminants of concern in Site groundwater and soil, and surface and sediments of the adjacent wetland/ponds.

Current and reasonable anticipated potential future exposures were evaluated for Site visitor/trespasser/hunter, off-site recreational user and off-site resident from contaminants in groundwater, surface water, soil, and sediment. The following discussion addresses the current/potential exposure pathways present at the Site:

Groundwater:

On-site monitoring well data indicates that site groundwater has been impacted with low level volatile organic compounds. An evaluation of off-site groundwater does not indicate that a contaminated groundwater plume has moved off-site. Private water supply wells were identified within 1/4 mile radius of the site. Exposure to contaminants in drinking water is not expected as results of groundwater samples collected from these water supplies did not indicate that the wells have been impacted by site contaminants. There are no groundwater production wells on the Site. It is unlikely that casual visitors or trespassers to the site will be exposed to contaminated groundwater through direct contact, incidental ingestion or inhalation of contaminated vapors that could volatilize off of the groundwater. It is not expected that construction workers would be exposed to contaminants in groundwater through direct contact, incidental ingestion or inhalation of vapors during excavation activities since groundwater is found at depth (greater than 20 feet below ground surface).

Surface Water:

Surface water data does not indicate that the pond and streams adjacent to the Site have been impacted by Site contaminants. The detection of three low level pesticides and two metals above SCGs do not appear to be Site related as they were either not detected in the landfill itself or were also detected at an upgradient location. It is not expected that individuals engaged in recreational activities in adjacent surface waters would be exposed to levels of contaminants that would represent a concern.

Soil and Sediment:

Areas of on-site soil contamination and adjacent wetland/pond sediment contamination have been identified. Although the Site and adjacent wetland/ponds are privately owned, the site is not fenced and therefore access to the areas of contamination is not restricted. Exposure to contaminated Site soils could occur through direct contact, incidental ingestion, or inhalation of contaminated dust particulates by individuals engaging in recreational activities at the Site. During construction activities, where soils are disturbed or removed, construction workers could be exposed to contaminated soils through incidental ingestion, inhalation or dermal contact.

Recreational visitors to the wetland adjacent to the Site could be exposed to contaminated sediments through direct contact or incidental ingestion. Construction workers could be exposed to contaminants in sediments through direct contact, incidental ingestion or through inhalation of contaminated dust particulates should sediments be allowed to dry out during remedial activities.

Results of an ecological field survey indicate that the wetland/pond waters do not support a viable fish population suitable for consumption. Exposure to site contaminants through ingestion of wetland/pond biota is not likely.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetland/ponds.

The Ecological Risk Evaluation, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors. The following environmental exposure pathways and ecological risks have been identified:

- Sediments in the wetland/pond next to the landfill contained levels of heavy metals and PCBs that are predicted to affect the growth and survival of benthic organisms and to bioaccumulate in fish and terrestrial animals. This results in the potential for reduced availability of food for forage species and in reproductive effects in fish, terrestrial wildlife and birds.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at the site to VOC- contaminated groundwater, landfill surface soils, and wetland/pond and downstream sediment contaminated with PCBs and landfill waste;

- environmental exposures of wildlife to PCB, zinc, copper, lead, mercury and nickel contamination in aquatic sediments; and

- the release of contaminants from landfill waste and PCB-contaminated landfill surface soil into adjacent water bodies.

Further, the remediation goals for the site include attaining to the extent practicable:

- surface water, freshwater wetland and aquatic sediment SCGs.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Recognizing that there are a limited number of remedial technologies applicable to closed municipal landfills, the USEPA has developed a policy to streamline the selection of remedial actions. The USEPA directive, based on nationwide experience, establishes containment as the presumptive remedy for these sites. Potential remedial alternatives for the landfill waste at the Amenia Town Landfill Site are based on the presumptive remedy approach for municipal landfills were identified, screened and evaluated in the FS report which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated aquatic sediment in the wetland/pond next to the landfill, contaminated soil on the existing cover and landfill waste. Results of the subsurface soil sampling in the former drum disposal area (addressed by the EPA emergency drum removal action in 1998, see Section 3.2) demonstrate that that area requires no additional remediation.

Alternative 1: No Action

Present Worth: . . . . . *$ 0*
Capital Cost: . . . . . *$ 0*
Annual OM&M: . . . . . *$ 0*

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It allows the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2: Limited Action

Present Worth: . . . . . *$ 503,260*
Capital Cost: . . . . . *$ 190,400*
Annual OM&M: . . . . . *$ 20,352*

Alternative 2 consists of installing a fence around the landfill to restrict access to the site by trespassers, thereby reducing the potential for exposures to contaminated surface soil. A site management plan (SMP) would be developed that would include long term groundwater monitoring, short term surface water and sediment monitoring in the stream downgradient of the landfill, an exclusion against future residential use, and a prohibition against the use of groundwater as a source of potable or process water without necessary water quality treatment. In addition, an environmental easement would be required for the property to restrict use of the site and groundwater as well as to require compliance with the SMP.

Alternative 3: In-Place Capping of Wetland/Pond Sediment and Landfill Cap

Present Worth: . . . . . *$ 5,719,292*
Capital Cost: . . . . . *$ 5,239,702*
Annual OM&M: . . . . . *$ 31,198*

Alternative 3 would cap in place wetland/pond sediment contaminated with PCBs greater than 1 ppm and heavy metals (copper, lead, and mercury) that are associated with the PCBs or that exceed upstream concentrations (nickel and zinc). A low-permeability engineered cap would be constructed over the landfill waste to prevent contact with, and migration of, the waste mass and contaminated surface soil. The cap would also minimize infiltration and migration of landfill contaminants to groundwater. A SMP would be developed that would include operation, maintenance and monitoring of the wetland/pond sediment and landfill caps, long term groundwater monitoring, short term surface water and sediment monitoring in the stream downgradient of the landfill, an exclusion against future residential use, and a prohibition against the use of groundwater as a source of potable or process water without necessary water quality treatment. In addition, an environmental easement would be required for the property to restrict use of the site and groundwater as well as to require compliance with the SMP.

Alternative 4: Wetland/Pond Sediment Excavation and Placement below Landfill Cap

Present Worth: . . . . . *$ 5,459,762*
Capital Cost: . . . . . *$ 4,980,172*
Annual OM&M: . . . . . *$ 31,198*

Alternative 4 would excavate wetland/pond sediment contaminated with PCBs greater than 1 ppm, and heavy metals (copper, lead, and mercury) that are associated with the PCBs or that exceed upstream concentrations (nickel and zinc). The excavated sediments would be placed under a low-permeability engineered cap, which would be constructed over the landfill waste to prevent contact with, and migration of, the waste mass and contaminated surface soil. A SMP would be developed that would include operation, maintenance and monitoring of the landfill cap, long term groundwater monitoring, short term surface water and sediment monitoring in the stream downgradient of the landfill, a restriction against future residential use, and a prohibition against the use of groundwater as a source of potable or process water without necessary water quality treatment. A two-year, annual surface water and sediment post-construction monitoring program would be implemented for East Stream downgradient of the landfill to determine if wetland/pond sediments that may be resuspended during construction activities result in increased contaminant levels in this area. In

addition, an environmental easement would be required for the property to restrict use of the site and groundwater as well as to require compliance with the SMP.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other

criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 4.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the NYSDEC will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The NYSDEC is proposing Alternative 4, Wetland/Pond Sediment Excavation and Placement below Landfill Cap, as the remedy for this site. The elements of this remedy are described at the end of this section. The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS.

Alternative 1 was rejected because leaving the landfill in its current state would not meet the threshold criteria. Alternative 2 was also rejected because it would fail to meet SCGs, and PCBs and inorganic contaminated aquatic sediment would continue to impact fish and wildlife resources.

Alternative 4 is proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the PCB- and heavy metal-contaminated sediment from the wetland/pond that presents the most significant threat to public health and the environment. Alternative 4 would prevent exposures to contaminated surface soil on the landfill and to waste in the landfill, and it would minimize precipitation infiltration into the landfill waste mass. It would also prevent migration of PCB contaminated soil and landfill wastes into the wetland/pond or groundwater, and eliminate the potential for surface water transport of PCBs from the landfill to wetland/pond sediment. Figure 4 shows the area of wetland/pond sediment excavation and approximate extent of the landfill cap.

Alternative 3 would also prevent exposures to contaminated surface soil on the landfill and to waste in the landfill, as well as minimize infiltration of precipitation into the landfill waste mass. Alternative 3 would not remove contaminated sediment from the wetland/pond, but capping the sediment in place would reduce the potential for exposures. Filling would eliminate wetland habitat for fish and wildlife and could potentially alter the watertable and groundwater flow patterns. Under Alternative 4, excavated sediment would be replaced with similar substrate and revegetated.

Alternatives 3 (landfill and sediment cap) and 4 (landfill cap and sediment excavation) both would have short-term impacts that could be addressed with proper engineering controls. The time needed to achieve the remediation goals would be similar for Alternatives 3 and 4.

The sediment cap of Alternative 3 and landfill caps of Alternatives 3 and 4 would require monitoring to ensure their long-term effectiveness. Periodic maintenance of any cap would be required. Alternative 4 would have the highest long-term effectiveness as a result of excavation and removal of the contaminated wetland/pond sediment.

Both Alternatives 3 and 4 would require dewatering a portion of the wetland/pond to cap (Alternative 3) or excavate (Alternative 4) contaminated sediment. Alternatives 3 and 4 would also include construction of a low-permeability cap over the landfill. Alternative 3 includes capping of contaminated sediments in the wetland. To conduct work in a Freshwater Wetland, the proposed activity must minimize degradation to, or loss of, any part of the wetland and minimize any adverse impacts. Since there is a reasonable and practicable alternative to sediment capping (Alternative 4: sediment excavation and wetland restoration), Alternative 3 is not considered as protective of fish and wildlife habitat, as it would alter the present functioning of the wetland.

Alternative 3 would potentially reduce the mobility of PCBs and heavy metals in the wetland/pond but this reduction is dependent upon effectiveness and long-term maintenance of the sediment cap. Alternative 3 would reduce the mobility of contaminated wetland/pond sediments by isolation beneath a sediment cap. Alternative 4 would reduce the volume of waste in the wetland/pond by excavating PCB- and heavy metal- contaminated sediment, and placing the sediment beneath the landfill cap would reduce toxicity and mobility of the contaminants.

The costs of the alternatives vary from no cost for Alternative 1, to about $500,000 for Alternative 2, to $5.7 million for Alternative 3, and $5.4 million for Alternative 4.

Alternatives 1 and 2 would be least protective of public health and the environment and do not meet the threshold criteria. Alternative 4 would provide the best protection to public health and the environment by removing contaminated sediment from the wetland/pond adjacent to the landfill and placing it beneath an engineered low permeability cap. The cap would be monitored regularly and maintained as required. The SMP would ensure that any post-construction activities that take place at the landfill are compatible with the proposed remedy. The operation, maintenance and monitoring program to be developed in the SMP would also provide for routine groundwater monitoring to evaluate effectiveness of the remedy.

The estimated present worth cost to implement the proposed remedy is $ 5,459,762. The cost to construct the remedy is estimated to be $ 4,980,172 and the estimated average annual operation, maintenance, and monitoring costs for 30 years is $ 31,198.

The elements of the proposed remedy are as follows:

- A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedy.

- Sediment within the area marked on figure 4 contaminated with PCBs and heavy metals (zinc, copper, lead, mercury and nickel) would be excavated from the wetland/pond adjacent to the landfill and placed on the landfill to eliminate the threat to fish and wildlife resources, as shown on Figure 4.

- The excavated area of the wetland/pond would be restored, meeting the substantive requirements of 6 NYCRR Part 663 to provide appropriate habitat for indigenous aquatic flora and fauna.

- An engineered low permeability cap meeting the substantive requirements of 6 NYCRR Part 360 (Solid Waste Management Facilities) would be constructed over the landfill waste mass and excavated sediment to prevent exposure to contaminated soils, landfill waste and contaminated sediment. The cap would consist of a gas venting layer, overlain by a geomembrane barrier and covered with a protective soil barrier layer. The total cover system would be a minimum of 24 inches. The top six inches of soil would be of sufficient quality to support vegetation.

- Development of a site management plan (SMP) to: (a) address residual contaminated soils that may be excavated from the site during future redevelopment. The plan would require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (c) identify use restrictions noted below; and (d) provide for the operation and maintenance of the components of the remedy. A two-year, annual surface water and sediment post-construction monitoring program would be implemented for the stream downgradient of the landfill between Route 22 and Amenia Stream. The SMP, institutional controls and the periodic review would cover the area of the closed landfill (approx. 10 acres) and the area of the EPA drum removal (approx. 1 acre).

- Imposition of an institutional control in the form of an environmental easement that would (a) require compliance with the approved site management plan; (b) limit the use and development of the property to commercial, industrial or recreational uses only; (c) restrict the use of groundwater as a source of potable water, without necessary water quality treatment as determined by NYSDOH; and (d) require the property owner to complete and submit to the NYSDEC a periodic certification.

- The property owner would provide a periodic certification, prepared and submitted by a professional engineer or such other expert acceptable to the NYSDEC, until the NYSDEC notifies the property owner in writing that this certification is no longer needed. This submittal would contain certification that the institutional controls and engineering controls are still in place, would allow the NYSDEC access to the site, and would certify that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan.

TABLE 1
Nature and Extent of Contamination
Amenia Town Landfill, Site No. 3-14-006

SURFACE SOIL Nov 2001 0 - 6"	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds	phenol	ND[d] - 4.1	0.03	1 of 9
PCBs	Total Aroclors	ND - 63.6	1	10 of 30
Inorganics	chromium	4.2 - 83.5	50	2 of 30
	copper	23.8 - 609	25	28 of 30
	iron	17,000 - 273,000	2,000	30 of 30
	lead	17.6 - 89.7	47 (SB[e])	7 of 15*
	manganese	346 - 1530	1030 (SB)	15 of 30
	nickel	17.9 - 88.6	13	30 of 30
	zinc	45.3 - 3010	20	30 of 30

Surface soil: 21 samples analyzed for PCBs and inorganics
9 samples analyzed for SVOCs, PCBs and inorganics
*15 sample results for lead rejected due to QA/QC problems

SUBSURFACE SOIL Nov 2001 10' - 12' bgs	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds	phenol	ND - 0.084	0.03	1 of 9
Pesticides/PCBs	none			
Inorganics	arsenic	1.9 - 9.0	7.5	1 of 9
	copper	25.9 - 57.8	25	9 of 9
	iron	19,600 - 34,300	2,000	9 of 9
	manganese	481 - 2,400	1030 (SB)	6 of 9
	nickel	22.1 - 46.8	13	9 of 9

Subsurface soil samples collected from drum removal area (after excavation)

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds	acetone	ND - 85.4	50	1 of 30
	1,1-dichloroethane	ND - 8.67	5	6 of 30
	1,1-dichloroethene	ND - 11.5	5	1 of 30
	1,2-dichloroethane	ND - 3.5	0.6	2 of 30
	1,3-dichlorobenzene	ND - 3.2	3	1 of 30
	1,4-dichlorobenzene	ND - 6.4	3	3 of 30
	benzene	ND - 45.7	1	8 of 30
	chlorobenzene	ND - 16.8	5	2 of 30
	chloroethane	ND - 8.9	5	4 of 30
	cis-1,2-dichloroethene	ND - 104	5	5 of 30
	trans-1,2-dichloroethene	ND - 23.8	5	2 of 30
	trichloroethene	ND - 22	5	6 of 30
	vinyl chloride	ND - 15.3	2	5 of 30
Semivolatile Organic Compounds	4-chloro-3-methylphenol	ND - 2.8	1	1 of 24
Pesticides	beta-BHC	ND - 0.966	0.04	1 of 24
Inorganic Compounds	antimony	ND - 51.8	3	20 of 32
	arsenic	ND - 58.9	25	12 of 32
	iron	72.7 - 566,000	300	26 of 32
	manganese	5.9 - 24,800	300	21 of 32
	thallium	ND - 47.7	0.5	13 of 32

Sampling events: Round 1 - Jan 2002 - 12 wells analyzed for VOCs, SVOCs, PCBs/Pesticides, inorganics
Round 2 - April 2002 - 12 wells analyzed for VOCs, SVOCs, PCBs/Pesticides, inorganics
Off-site Investigation - June 2004 - 6 wells/probes analyzed for VOCs and inorganics
2 probes for inorganics only

SURFACE WATER May 2002	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Pesticides	alpha-Chlordane	ND - 0.01	2×10^{-5}	1 of 8
	delta-BHC	ND - 0.00897	0.008	1 of 8
	gamma-Chlordane	ND - 0.011	2×10^{-5}	1 of 8
Inorganics	aluminum	ND - 1020	100	5 of 8
	iron	835 - 2100	300	3 of 3*

* 5 sample results for iron rejected during data validation

SEDIMENT Background May 2002	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Inorganic Compounds	arsenic	4.9 - 8.4	LEL[c] - 6	4 of 6
			SEL[c] - 33	
	copper	20.1 - 28.7	LEL - 16	6 of 6
			SEL - 110	
	iron	2.2% - 7.7%	LEL - 2%	3 of 6
			SEL - 4%	3 of 6
	manganese	663 - 1630	LEL - 460	2 of 6
			SEL - 1100	4 of 6

Background Sediment: 3 samples from West Stream analyzed for PCBs, inorganics
3 samples from Amenia Stream analyzed for VOCs, PCBs, inorganics

SEDIMENT Wetland/Pond May 2002	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Inorganic Compounds	Arsenic	2.9 - 14.4	LEL[c] - 6	27 of 48
			SEL[c] - 33	
	Cadmium	ND - 3.8	LEL - 0.6	14 of 48
			SEL - 9	
	Copper	10 - 180	LEL - 16	39 of 48
			SEL - 110	2 of 48
	Iron	0.8% - 4.2 %	LEL - 2%	28 of 48
			SEL - 4%	2 of 48
	Lead	22.1 - 205	LEL - 31	33 of 48
			SEL - 110	3 of 48
	Manganese	101 - 1740	LEL - 460	25 of 48
			SEL - 1100	4 of 48
	Mercury	0.057 - 2.5	LEL - 0.15	21 of 48
			SEL - 1.3	2 of 48
	Nickel	6.5 - 50.4	LEL - 16	34 of 48
			SEL - 50	1 of 48
	Silver	ND - 7.3	LEL - 1	3 of 48
			SEL - 2.2	3 of 48
	Zinc	49.6 - 977	LEL - 120	22 of 48
			SEL - 270	6 of 48

Wetland/pond Sediment: 39 samples analyzed for PCBs and inorganics; 9 samples analyzed for inorganics only. See Table 2 for PCB data.

SEDIMENT Downstream May 2002	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Inorganics	Arsenic	6.0 - 26.9	LEL - 6	15 of 17
			SEL - 33	
	Copper	8.1 - 36.4	LEL - 16	9 of 17
			SEL - 110	
	Iron	2.1% - 11.2%	LEL - 2%	4 of 17
			SEL - 4%	13 of 17
	Lead	1.9 - 62.7	LEL - 31	5 of 17
			SEL - 110	
	Manganese	321 - 5070	LEL - 460	2 of 17
			SEL - 1100	12 of 17
	Nickel	24.1 - 142	LEL - 16	9 of 17
			SEL - 50	8 of 17
	Zinc	65.5 - 350	LEL - 120	12 of 17
			SEL - 270	1 of 17

Downgradient Sediment: 10 samples from West Pond Tributary analyzed for PCBs, inorganics
7 samples from East Stream analyzed for VOCs, PCBs, inorganics

See Table 2 for PCB data.

SOIL VAPOR Dec 2001	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Number of Detections
Volatile Organic	vinyl chloride	ND - 3,600	no SCGs for	17
Compounds	methylene chloride	ND - 6,500	soil vapor	4
	1,1-dichloroethane	ND - 5,300		5
	cis-1,2-dichloroethene	ND - 1,400		6
	trichloroethene	ND - 600		3
	tetrachloroethene	ND - 1,000		7
	benzene	ND - 19,000		20
	toluene	ND - 26,000		20
	chlorobenzene	ND - 1,600		10
	ethylbenzene	ND - 26,000		35
	xylenes	ND - 123,000		34

52 samples collected; methylene chloride, toluene also detected in blank

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
ug/m^3 = micrograms per cubic meter, in soil vapor;
[b] SCG = standards, criteria, and guidance values;
[c] LEL = Lowest Effects Level and SEL = Severe Effects Level: A sediment is considered to be contaminated if either of these criteria is exceeded. If both criteria are exceeded, the sediment is severely impacted. If only the LEL is exceeded, the impact is considered to be moderate.
[d] ND = none detected
[e] SB = site background

TABLE 2

Sediment PCB Contamination

Amenia Town Landfill, Site No. 3-14-006

SEDIMENT PCBs May 2002	Contaminant of Concern	Concentration Range Detected (µg/kg)[a]	SCG (µg/gOC)[b]	Sediment Organic Carbon (OC) Content (g/kg)[c]	Screening Criteria (mg/kg)[d]	Frequency Exceeding Screening Criteria
Wetland/Pond	Total Aroclors	ND - 25,100	1.4[e]	213	0.3	16 of 31
West Pond Tributary	Total Aroclors	ND - 555	19.3[f]	85	1.6	0 of 14
East Stream	Total Aroclors	ND - 636	19.3	85	1.6	0 of 14

[a] µg/kg: micrograms per kilogram

[b] µg/gOC: micrograms per gram organic carbon.

[c] Sediment Organic Carbon (OC) Content (g/kg): Average organic carbon content of wetland/pond sediment and of West Pond Tributary, calculated separately, in grams per kilogram

[d] Screening Criteria: Calculated from the SCG and sediment organic carbon content, milligrams per kilogram

[e] 1.4 µg/gOC: Wildlife Bioaccumulation factor for wetland sediment. Criterion applies to the sum of Aroclors.

[f] 19.3 µg/gOC: Benthic Aquatic Life Chronic Toxicity factor for West Pond Tributary. Criterion applies to the sum of Aroclors.

TABLE 3

Background Soil and Sediment Samples

Amenia Town Landfill, Site No. 3-14-006

SOIL	Background Range (ppm)	Cleanup Objective (ppm)
Lead	24.0 - 47.3	47.3
Manganese	541 - 1,030	1,030
SEDIMENT		
Nickel	59.2-78.5	78.5
Zinc	170-225	225

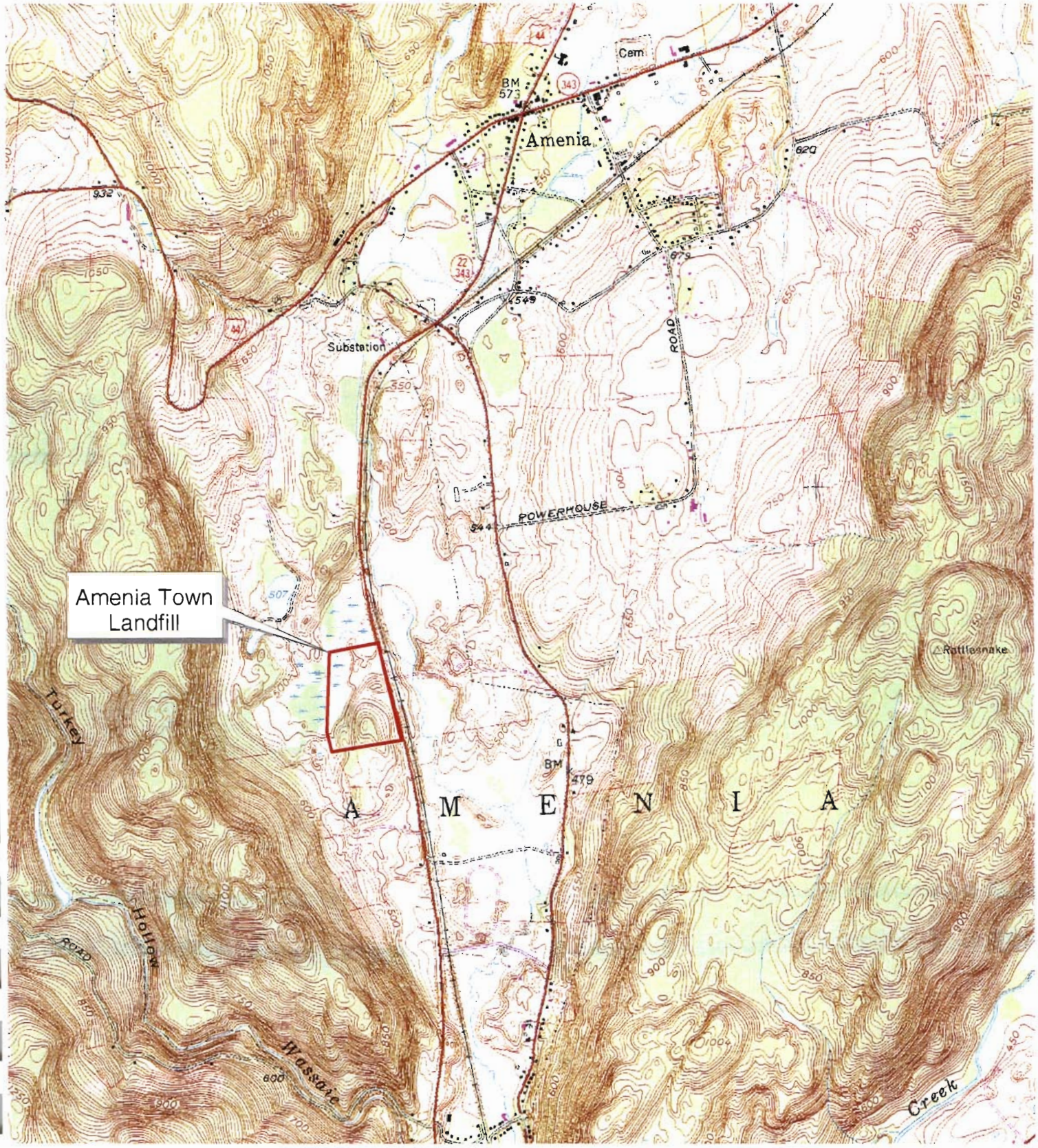
Three background soil samples were collected off the landfill
Two upgradient sediment samples were collected from West Stream

TABLE 4

Remedial Alternative Costs

Amenia Town Landfill, Site No. 3-14-006

Remedial Alternative	Capital Cost	Annual OM&M	Total Present Worth
Alternative 1: No Action	$ 0	$ 0	$ 0
Alternative 2: Limited Action	$ 190,400	$ 20,352	$ 503,260
Alternative 3: In-Place Capping of Wetland/Pond Sediment and Landfill Cap	$ 5,239,702	$ 31,198	$ 5,719,292
Alternative 4: Wetland/Pond Sediment Excavation and Placement below Landfill Cap	$ 4,980,172	$ 31,198	$ 5,459,762



0 1000 2000 3000 4000 Feet

Map Source: USGS 7.5 Minute Series Quadrangle
Amenia, NY-CT, 1958
Photorevised 1984

N

Site Location Map
Amenia Town Landfill
Amenia, New York

URS
Wayne, New Jersey

Scale 1:24000	Proj. No. 19683595	
Date: March 2004		Figure 1

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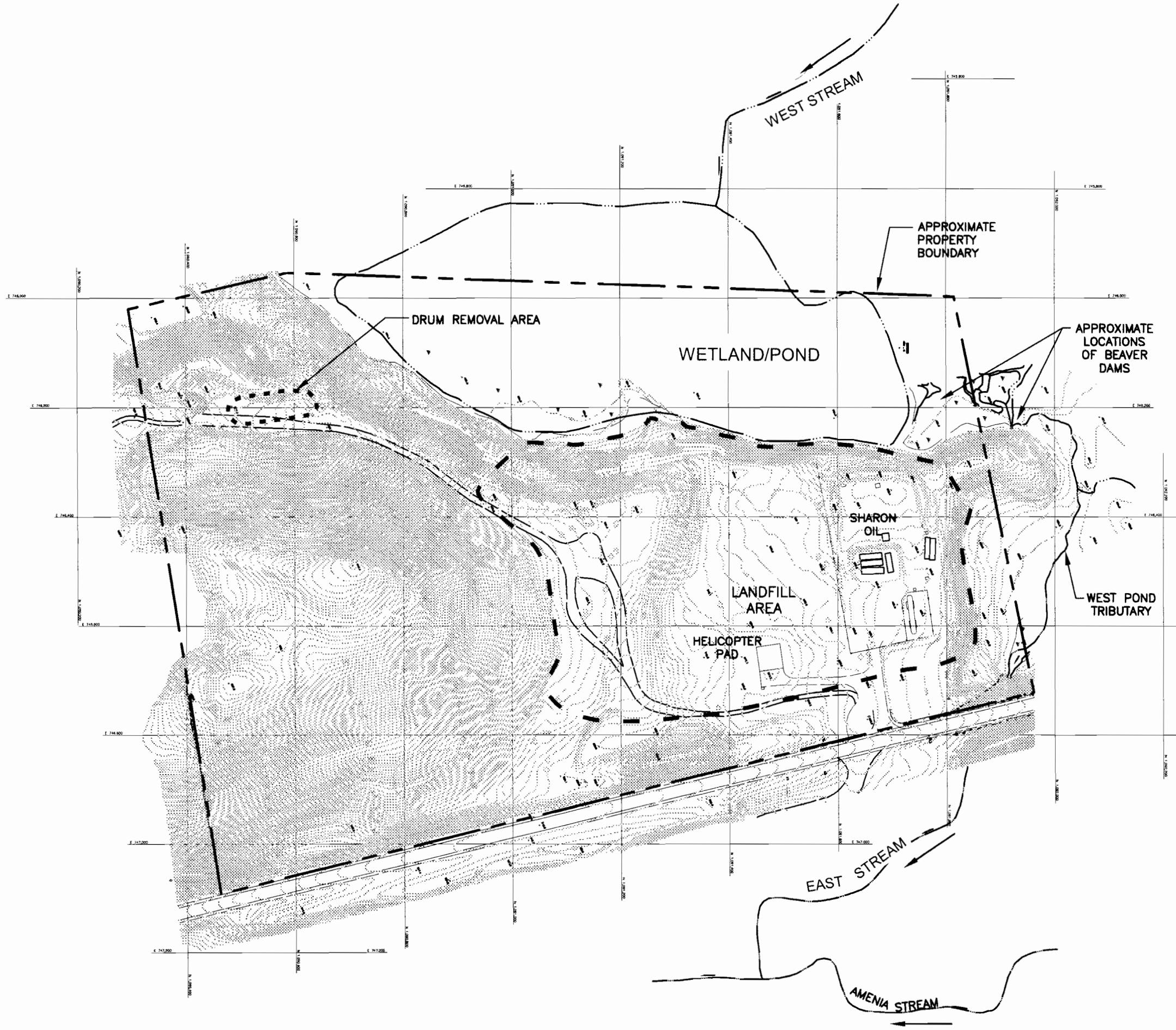


LEGEND:

- SITE BOUNDARY
- APPROXIMATE LIMITS OF WASTE

NOTES:

1. WATER BODY BOUNDARIES ARE APPROXIMATE AND BASED ON 1990 AERIAL PHOTOGRAPH
2. PROPERTY BOUNDARY IS APPROXIMATE AND BASED ON AMENIA TOWN ASSESSOR'S 7066-00 TAX MAP, 1999.

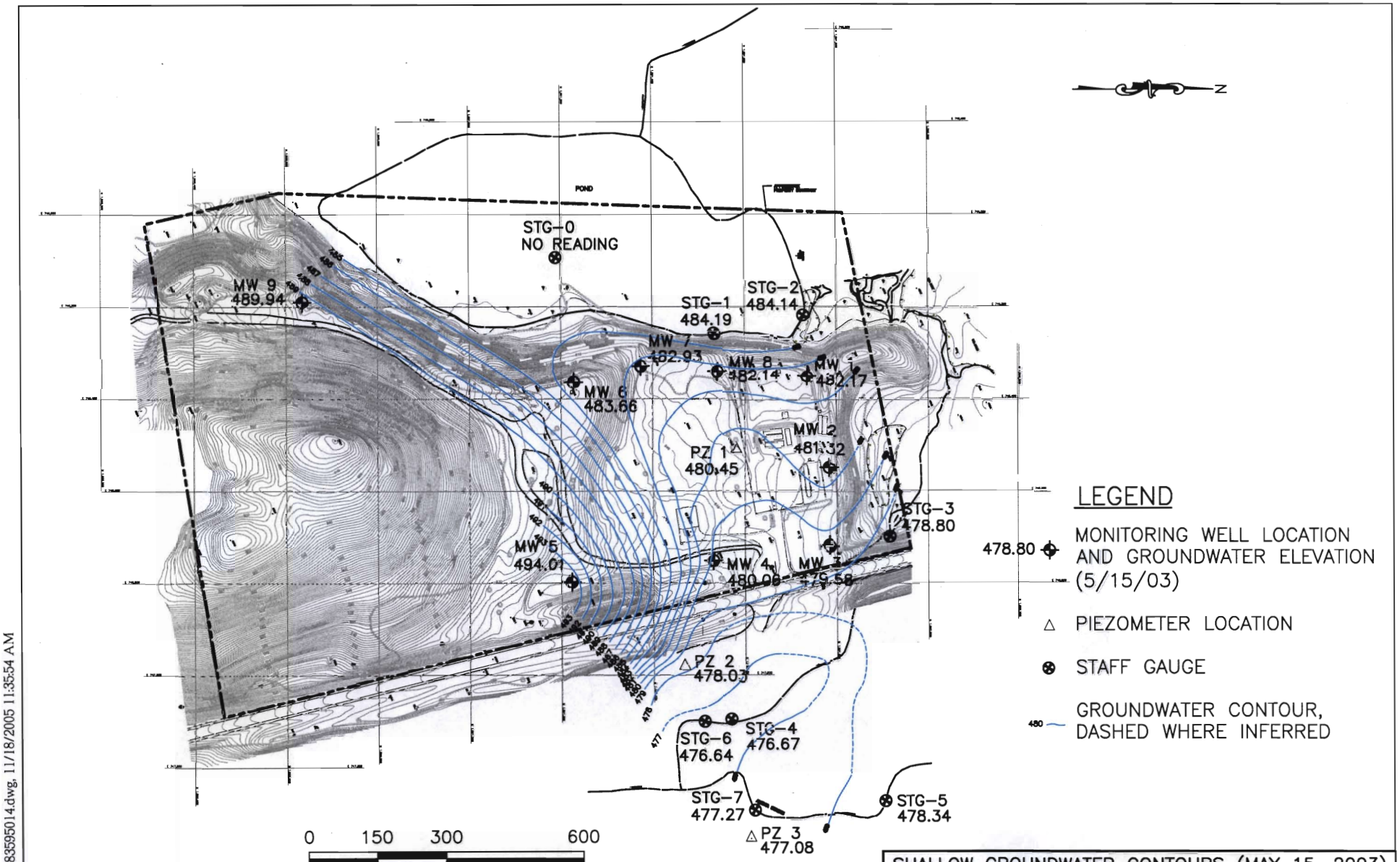
0 100 200 400

SCALE (FEET)

SITE LAYOUT
AMENIA, TOWN LANDFILL
AMENIA, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	KM	SCALE	AS SHOWN	DWG. NO. 83595015	PROJ. NO. 196835
CK'D. BY	PN	DATE	MAY 4, 2004	FIG. NO. 2	



SHALLOW GROUNDWATER CONTOURS (MAY 15, 2003)
AMENIA TOWN LANDFILL
AMENIA, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	KM	SCALE	AS SHOWN	DWG. NO. 83595014	PROJ. NO. 1E04141
CK'D. BY	PN	DATE	MAY 4, 2004	FIG. NO. 3	

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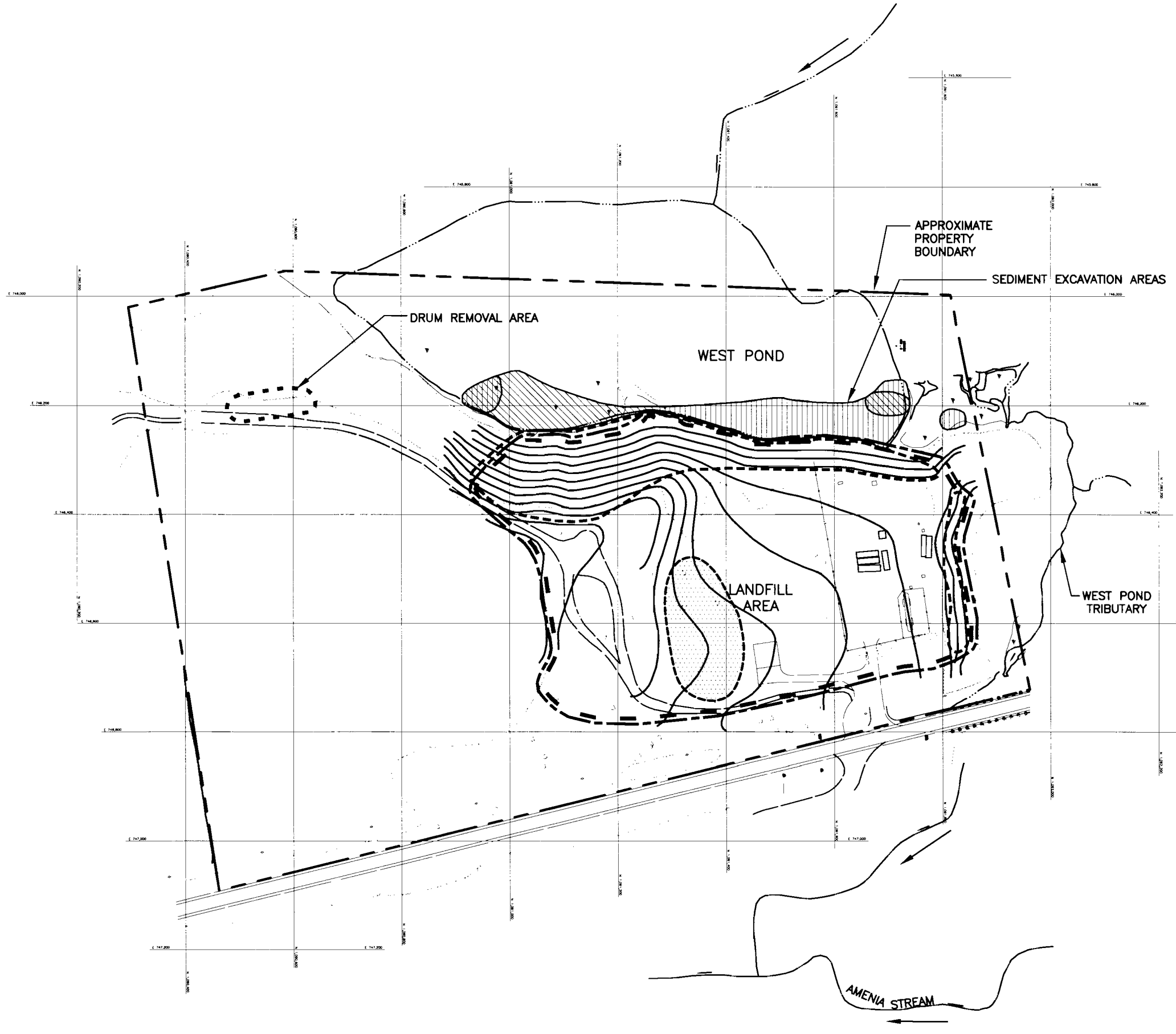

LEGEND:

- SITE BOUNDARY
- APPROXIMATE LIMITS OF WASTE
- 5FT. FINAL GRADES OF FINAL COVER
- LIMIT OF GEOCOMPOSITE DRAINAGE LAYER
- APPROXIMATE LIMITS OF LANDFILL CAP AREA
- SEDIMENT PLACEMENT AREA
- AREA REQUIRING INORGANICS CLEANUP
- AREA REQUIRING PCB CLEANUP

NOTES:

1. WATER BODY BOUNDARIES ARE APPROXIMATE AND BASED ON 1990 AERIAL PHOTOGRAPH
2. PROPERTY BOUNDARY IS APPROXIMATE AND BASED ON AMENIA TOWN ASSESSOR'S 7066–00 TAX MAP, 1999.

0 100 200 400

SCALE (FEET)

PROPOSED AREAL EXTENT OF LANDFILL CAP
AMENIA, TOWN LANDFILL
AMENIA, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	KM	SCALE	AS SHOWN	DWG. NO. 83595022	PROJ. NO. 1E04141
CK'D. BY	MC	DATE	APRIL 12, 2005	FIG. NO. 4	

K:\Cadd\1E04141(AMENIA)\83595022-FIG_5-1-NO.TOPO.dwg, Layout1, 1/11/2006 3:12:39 PM