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ROSE VALLEY LANDFILL

Town of Russia, Herkimer County, New York
Site No. 6-22-017

PROPOSED REMEDIAL ACTION PLAN

JANUARY 19, 2001

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

PROPOSED REMEDIAL ACTION PLAN

ROSE VALLEY LANDFILL

Town of Russia, Herkimer County, New York
Site No. 6-22-017
December (sometime), 2000

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 is proposing a remedy to address the significant threat to human health and/or the environment created by the presence of hazardous waste at the Rose Valley Landfill, a class 2 inactive hazardous waste disposal site. As more fully described in Sections 3 and 4 of this document, permit violations during the landfill's operation have resulted in the disposal of a number of hazardous wastes, including chlorinated solvents and poly aromatic hydrocarbons (PAHs) at the site, of which there is no evidence of off-site migration with the exception of one private drinking water well (servicing a residence directly adjacent to the landfill entrance). See Figure 3 entitled Onsite Groundwater Contamination. These disposal activities have resulted in the following significant threats to the public health and/or the environment.

- a significant threat to human health associated with contaminated drinking water with 8-21 parts per billion (ppb) of 1,1-diclhoroethane (DCA) and 12-62 ppb of 1,1,1-trichloroethane (TCA).
- potential health and environmental threats associated with contaminated surface soils with seven(7) semi-volatile contaminants (dichorobenzene, chloroaniline, benz(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene and phenol) found in the older septage disposal pit located on the plateau above the sand bank.

In order to eliminate or mitigate the potential threats to the public health and the environment that the hazardous wastes disposed at the Rose Valley Landfill have caused, the following remedy is proposed:

- Excavation and disposal of contaminated surface soils in a landfill;
- Installation of an alternative drinking water supply for the impacted well and long-term monitoring of the western

groundwater plume containing low levels of DCA and TCA;

- Long-term monitoring of the treatment of the wetland groundwater plume by natural attenuation;

- Installation of a single layer Part 360 cap over the eight(8) acres of major fill area encircled by a six foot high chain link fence

The proposed remedy, discussed in detail in Section 7 of this document, is intended to attain the remediation goals selected for this site in Section 6 of this Proposed Remedial Action Plan (PRAP), in conformity with applicable standards, criteria, and guidance (SCGs).

This 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 6 NYCRR Part 375. This document is a summary of the information that can be found in greater detail in the Remedial Investigation (RI), Feasibility Study (FS) and other relevant reports and documents, available at the document repositories.

To better understand the site and the investigations conducted, the public is

Hours: Tuesday and Thursday 1-5 and 7-8:30
Friday 1-5 and Saturday 10:30-2:00

Oneida-Herkimer Solid Waste Authority
1600 Genesee Street
Utica, New York 13502
(315) 733-1224
Hours: Monday-Friday 8am-5pm
encouraged to review the project documents at the following repositories:

Poland Town Library
Main Street; P.O. Box 140
Poland, New York 13431
(315) 826-3112

NYS Department of Health District Office
5665 State Route 5
Herkimer, New York 13350
Call: Greg Rys, Public Health Specialist at (315) 866-6879
Hours: Monday-Friday 8:30am-4pm

NYS Dept. of Environmental Conservation
Division of Environmental Remediation
50 Wolf Road, Room 228
Albany, New York 12233-7010
Call: Kathryn Eastman, Project Manager at (518) 457-5677

The NYSDEC seeks input from the community on all PRAPs. A public comment period has been set from January 28 ,2001 to February 28, 2001 to provide an opportunity for public participation in the remedy selection process for this site. A public meeting is scheduled for February 15 at the Poland Central School which is located at 74 Cold Brook Street in the Village of Poland beginning at 7 pm.

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 you can submit verbal or written comments on the PRAP.

The NYSDEC may modify the preferred alternative 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 responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision is the NYSDEC's final selection of the remedy for this site. Written comments may be sent to Ms. Kathryn Eastman, project manager at the above address through February 28, 2001.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Rose Valley Landfill is located in a sparsely populated area of the Town of Russia in Herkimer County. It is bounded by Rose Valley, Bromley and Military Roads and includes a segment of an unnamed tributary of Hurricane Creek. (See the site location map, Figure1). The landfill properties cover 91 acres and include a 60 foot sand embankment. The major landfill area is located on the side of a hill, and is vegetated with brush and small trees. Rust-colored leachate flows out of this area into a wetland at the toe of the landfill slope. (See the site feature map, Figure 2).

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The landfill, privately owned and operated from 1963-1984, served as a municipal landfill for the Villages of Poland and Cold Brook, and, starting in 1972, the Towns of Coxsackie, Newport, Herkimer, and Manheim. Residential, commercial, industrial and septic tank (scavenger) type wastes were accepted. NYSDEC records also indicate saturated soils were most~~ly~~ likely received from a 286-gallon pesticide spill in 1978. The last landfill owner/operator was cited for several DEC permit violations. The most notable violation was in 1979 which was the acceptance and open burning of hazardous wastes (trichloroethylene and other flammable industrial chemicals).

3.2: Remedial History

In 1982, Mr. Gerald Crouch, the last owner/operator, entered into a consent order with NYSDEC. The consent order required a hydrogeologic study of the site and an engineering plan to upgrade the landfill to comply with NYSDEC landfill regulations (6 NYCRR Part 360). NYSDEC did not accept the engineering plan, citing inadequate liner provisions.

In 1983, Mr. Crouch entered into a second consent order to close the landfill. A landfill closure plan in accordance with State regulations was submitted in 1984 and was accepted by NYSDEC. Under order, the closure plan was to be completed in 1985, but it was never implemented.

In 1988, a preliminary assessment of the existing data on the landfill was performed for the U. S. Environmental Protection Agency (EPA). The site was classified as "medium priority"; the ranking was attributed to uncontrolled leachate seeps discharging to surface water bodies at the base of the landfill. The EPA's final site assessment was concluded in August, 1995. No further action was found to be necessary by EPA which determined that the landfill did not present a great enough risk to human health or the environment to warrant a cleanup by the federal government.

The New York State Department of Health (NYSDOH) collected two well samples in 1981 and three samples in 1986 from nearby residential wells and the Newport Village water supply. Beginning in 1986, the NYSDOH has monitored private drinking water wells in the neighborhood of the landfill (in 1989, 1991, 1992, 1993, 1994, 1996, 1999 and 2000). All samples that were evaluated were considered satisfactory with the exception, in 1991, of one private drinking water well. The residential well immediately adjacent and south of the landfill entrance was found to contain lower levels of chlorinated hydrocarbons exceeding drinking water standards. Bottled water delivery was initiated for this residence; and in October, 1993, New York State Department of Environmental Conservation (DEC) installed a granular activated carbon filter (GAC) to remove the contaminants from the impacted well water by.

In 1989, NYSDOH collected and analyzed four leachate/sediment samples from the base of the major fill area at the landfill. The results indicated the presence of a variety of contaminants at relatively low levels which is indicative of mixed municipal/industrial refuse.

In 1990 and 1991, a site contamination assessment of the landfill was completed and for the DEC Division of Solid Waste. Subsequently, on March 24, 1992, the site was added to the New York State Registry of Inactive Hazardous Waste Sites as a Class 2 Site (significant threat to human health and the environment). In 1998, the Rose Valley Landfill site was referred to the State Superfund Program for action.

SECTION 4: <u>SITE CONTAMINATION</u>

To evaluate the contamination present at the site and to evaluate alternatives to address the potential threat to human health and the environment posed by the presence of hazardous waste, the NYSDEC has recently conducted a Remedial Investigation/Feasibility Study (RI/FS).

4.1: <u>Summary of the Remedial Investigation</u>

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 in 2 phases. The first phase was conducted between June, 1999 and January, 2000, and the second phase during September and October, 2000. A report entitled "Remedial Investigation Report of the Rose Valley Landfill Site, Town of Russia, New York" has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- Geophysical survey to determine extent of landfill materials.
- Installation of soil borings and monitoring wells for analysis of soils and groundwater.
- Soil gas survey.
- Surface water and sediment sampling.

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Rose Valley landfill Site are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of New York State Sanitary Code (Public Drinking Water Supply Standards). For soils, NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 provides soil cleanup guidelines for the protection of groundwater, background conditions, and health-based exposure scenarios. In addition, for soils, site specific background concentration levels can be considered for certain classes of contaminants. Guidance values for evaluating contamination in sediments are provided by the NYSDEC "Technical Guidance for Screening Contaminated Sediments".

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.

Chemical concentrations are reported in parts per billion (ppb), parts per million (ppm), For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: <u>Site Geology and Hydrogeology</u>

The site is located in Herkimer County in the Town of Russia on Rose Valley Road. The site exhibits moderate relief with an elevation change across the site of about 200 feet. The soils are a sand or loamy sand with thicknesses exceeding 100 feet. This sandy formation also includes occasional clay and silt lenses in several areas and lenses create localized areas of perched ground water. Below this sand unit is a glacial till. And below that are sedimentary rocks of Ordovician age.

The hydrogeology of the site is controlled partly by its topography, soil type and thickness. Groundwater flows radially from the site from an area centered near monitoring well MW-2. However, it does not exactly mimic the surface topography. Groundwater flow north and east of this area is to the east northeast towards Military Road. Groundwater flow west of this area is to the northwest and flow south of this area is to the south towards Rose Valley Road.

Three monitoring wells were drilled into the underlying glacial till to determine if a pathway existed for contaminant flow thru that unit and into the bedrock below. The results of the potentiometric surface measurements within the till unit suggests a substantial aquatard exists which prevents an exchange of water between the upper and lower aquifers. Therefore, any contaminants within the sand unit should not penetrate the till nor flow into the underlying bedrock. This is important because most of the private wells in the area obtain their water from the bedrock. The exception to this is the overburden well adjacent to the site (which is located in the upper aquifer), which contains Up to 18 parts per billion (ppb) DCA and up to 70 ppb TCA.

4.1.2: Nature of Contamination

As described in the RI report, many soil, groundwater, surface water and sediment samples were collected at the site to characterize the nature and extent of contamination. The main categories of contaminants which exceed their SCGs are inorganic compounds (metals), volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). The inorganic contaminants of concern are: arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, zinc, and perhaps selenium.

The VOC contaminants are; dichloroethane (DCA), dichloroethene (DCE) and trichloroethane (TCA).

The SVOC contaminants are; dichlorobenzene, chloroaniline, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and phenol.

The SVOC contaminants only exceeded SCGs in the three soil samples collected from the older septic disposal pit area.

4.1.3: Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in soil and ground water 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.

Soil

The site soils contained numerous inorganics above SCGs, and an isolated area of SVOC contaminants of concern. The SVOC contaminants exceeded SCGs in the three soil samples collected from the older septic disposal pit.

Sediments

The contaminants that exceeded SCGs in sediments were inorganic compounds with the exception of two locations which contained several semivolatile compounds. One location was SED-11 which was located downgradient of the upper main landfill area. The other location was SED -9. See Figure 3: Locations of Sediment/Surface Water Samples. The duplicate sediment sample analysis detected benzo(a)pryene above SCGs, however this compound was not detected above SCGs in the original sample from this location.

The inorganics were iron, manganese, cadmium, lead, arsenic, copper, silver, zinc and antimony. Selenium levels do not exceed SCGs, however the Fish and Wildlife Inventory Assessment (FWIA) identified selenium as a contaminant of potential concern.

Groundwater

There are three locations where the groundwater is impacted by contamination at the site. These locations are the TCA plume at the western end of the site. The trichloroethene (TCE) contamination in the area of HP-11 of the area of perched groundwater and the wetlands area at the toe of the landfill in the eastern end of the site. The western plume is a VOC plume containing TCA and DCA. It has impacted the well supplying water to the on site residence. The source area of this plume is located in the vicinity of monitoring well MW-8. This groundwater contaminant plume is small in areal extent and does not impact any off site wells. See Figure 3.

The groundwater contaminant plume at HP-11 is smaller than the western plume. The contaminant detected in HP-11 is TCE and only one of its related breakdown products (DCE) was detected in any of the adjacent monitoring wells.

The groundwater contaminant plume at the wetland area contains low levels of DCA and DCE. This plume, like the previously discussed plumes, is of limited extent and does not leave the site. There are no private wells impacted by this plume.

Surface Water

Numerous surface water samples were collected and analyzed during the RI for this site. With the exception of three locations which had levels of phthalate (a plasticizer) exceeding SCGs, the contaminants exceeding SCGs in the surface water were inorganic. Iron was the inorganic which had the most exceedances, followed by aluminum, and selenium. Other inorganic substances were lead, zinc, cadmium, copper, cobalt, silver, thallium, cyanide and vanadium in the unfiltered samples. After filtering the surface water samples to remove fine sediments, the only inorganic substances exceeding SCGs were iron, aluminum, cobalt, thallium and zinc.

4.2: 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 health risks can be found in Section **8** of the RI report.

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receiving population. These elements of an exposure pathway may be based on past, present, or future events.

Pathways which are known to or may exist at the site include:

- ingestion of contaminated groundwater
- direct contact with contaminated surface soils.

4.3: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures and ecological risks which may be presented by the site. The Fish and Wildlife Impact Assessment included in the RI presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources. The following pathways for environmental exposure and/or ecological risks have been identified:

The contaminants in the site-surface water and sediments exceed SCGs and/or have the potential to impact the wetlands on the site and migrate off site. The surface water and sediment are considered the primary potential pathways for wildlife exposure. However, additional sampling and analysis have demonstrated that the contaminants are not leaving the site via the surface drainage and therefore, have not impacted any off site areas. It appears ,from the data collected to date, that the wetlands flora have the ability to remove the contaminants from the surface waters and the contaminants are not being actively eroded and transported from the site. The wetland area is a depositional area and any contaminants which erode from the landfill are contained in the wetlands.

Therefore the environmental exposure pathway that may exist at the site is:

- The direct contact with or ingestion of contaminated sediment.

SECTION 5: 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 two Potential Responsible Parties (PRP) for the site, documented to date, include: Joyce Miller and the estate of Gerald Crouch.

The PRPs declined to implement the RI/FS at the site when requested by the NYSDEC. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the NYSDEC will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State has incurred.

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. The overall remedial goal is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. 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 goals selected for this site are:

- Eliminate, to the extent practicable, the risk of ingestion of contaminated groundwater affected in the western portion of the site.

- Eliminate, to the extent practicable, any potential risk of direct contact with contaminated surface soils in isolated areas on the plateau above the sand bank.

- Eliminate, to the extent practicable, the potential risk of direct ingestion of contaminated groundwater in the eastern portion of the site whose source is the migration of leachate from the major fill area into a small wetland.

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 laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Rose Valley Landfill site were identified, screened and evaluated in the report entitled Feasibility Study for the Rose Valley Landfill, December, 2000.

Evaluation and selection of appropriate remedial action alternatives is a function of a number of factors common to many municipal landfill sites. Therefore it is possible to focus the FS and the selection of remedy to those remedial actions employed at similar sites.

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

7.1: Description of Remedial Alternatives

The potential remedies are intended to address the contaminated surface soils, leachate and groundwater at the site. "No Action" alternatives are evaluated as a procedural requirement and as a basis for comparison. No action alternatives require continued monitoring only, allowing the site to remain in an unremediated state. This type of alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative A-1: No Action for Contaminated Surface Soils in Isolated Areas of the Plateau Above the Sand Bank

Present Worth:	*$14,900*
Capital Cost:	*$ 0*
Annual O&M:	*$1000*
Time to Implement	*None*

This alternative would only involve annual sampling of the contaminated surface soils in the older septic disposal pit.

Alternative A-2: One Foot of Deep Soil Cover Over Contaminated Surface Soils

Present Worth:	*$ 18,800*
Capital Cost:	*$14,200*
Annual O&M:	*$ 2,800*

Time to Implement *5 days*

This alternative would place a clean soil cover over 2500 square feet of contaminated surface soils found in the older septage pit. The cover would consist of six (6) inches of clean general fill soil under six (6) inches of topsoil. Both types of soils would have a lower permeability than the native soil. In order to maintain protection against exposure in the future, a fence would be installed around the capped area. The area would also be restricted from future use through deed limitations.

Alternative A-3: Excavation and Offsite Disposal for Contaminated Surface Soil

Present Worth:	*$ 45,400*
Capital Cost:	*$ 45,400*
Annual O&M:	*$ Zero*
Time to Implement	*5 days*

This alternative would excavate the contaminated soils in the older septage disposal pit and backfill with clean soil then cover with six (6) inches of topsoil and establish a grass cover to stabilize the soil. It is estimated that soils down to three feet deep would be removed and sent to an approved landfill for disposal.

Alternative B-1: No Further Action for Contaminated Drinking Water and Contaminated Groundwater in the Western Plume

Present Worth:	*$ 37,400*
Capital Cost:	*$ zero*
Annual O&M:	*$2500*
Time to Implement	*none*

This alternative would involve no further action at the western plume. The contaminant-removal system would be maintained on the private well and the nearby monitoring wells presently in place would be sampled and analyzed annually.

Alternative B-2: Installation of a New Private Drinking Water Well to Replace the Impacted Well and Long-term Monitoring of Contaminated Groundwater in the Western Plume.

Present Worth:	*$ 147,300*
Capital Cost:	*$ 42,300*
Annual O&M:	*$7500*
Time to Implement	*5 days*

The western plume of contaminated groundwater would be more fully delineated, and 14 wells would be monitored two times a year. A new, uncontaminated residential water supply would be installed for the residence with the impacted well.

Alternative B-3: Installation of a New Private Drinking Water Well to Replace the Impacted Well and the Extraction and Treatment of Contaminated Groundwater in the Western Plume Using Air Stripping

Present Worth:	*$ 747,000*
Capital Cost:	*$ 210,000*
Annual O&M:	*$ 39,000*
Time to Implement	*30 days*

Installation and operation of groundwater extraction well, air stripping treatment and surface water discharge systems.

Alternative C-1: No Action for Leachate or Contaminated Groundwater in the Wetland Plume

Present Worth:	*$ 74,800*
Capital Cost:	*$ Zero*
Annual O&M:	*$ 5000*
Time to Implement	*5 days*

This alternative would require no action except annual sampling and analysis of the existing groundwater monitoring well system.

Alternative C-2: Trench Collection of all Leachate Followed by Pumping and Treating Via Sedimentation and Air Stripping and Discharge to the Wetland

Present Worth:	*$918,900*
Capital Cost:	*$ 487,300*
Annual O&M:	*$ 72,000*
Time to Implement	*30-45 days*

Installation of a trench collection system at the base of the major fill area to collect all leachate, and construction of sedimentation and air stripping treatment systems to remove suspended materials, some metals and chlorinated hydrocarbons before disposal into surface water. See Figure 4: Alternative C-2 to Collect and Treat Leachate.

Alternative C-3: Long Term Monitoring and Documentation of the Treatment of Leachate in the Wetland By Natural Attenuation.

Present Worth:	*$ 270,500*
Capital Cost:	*$ 61,000*
Annual O&M:	*$ 15,200*
Time to Implement	*30 days*

Documentation would be assembled to document that natural attenuation is effectively dechlorinating COPCs in the leachate.

Alternative D-1: No Action To Prevent Direct Contact With Waste or To Reduce Infiltration in the Major Fill Area

Present Worth:	*$ zero*
Capital Cost:	*$ Zero*
Annual O&M:	*$ Zero*
Time to Implement	*none*

No action or monitoring would need to be taken in this alternative.

Alternative D-2: Installation of Two Feet of Final Cover At 2-33% Slope Over the Major Fill Area Including Grass Cover and Security Fence Enclosure.

Present Worth:	*$ 1,127,100*
Capital Cost:	*$ 999,200*
Annual O&M:	*$ 16,500*
Time to Implement	*30-45 days*

The landfill area would be cleared and grubbed. All slopes greater than 33% would be filled and graded. Eighteen inches of soil of lower permeability and six inches of top soil would be place over the fill area, then seeded with grass and enclosed with a six foot high security fence. Any impacts to adjacent wetlands would be mitigated.

Alternative D-3: Installation of a Soil and Geomembrane Cap Over the Major Fill Area Including Grass Cover and Security Fence Enclosure.

Present Worth:	*$ 2,109,800*

Capital Cost:	*$ 1,882,500*
Annual O&M:	*$ 16,500*
Time to Implement	*6 months - 1 year*

Alternative D-3 is identical to D-2 except for the cap components. In place of 2 feet of low permeability soil and top soil, the cap would consist of twelve inches of gas venting sand bounded by a filter medium (with eight vertical vent pipes); 60 mil high density polyethylene (HDPE) geomembrane; 24 inch thick layer of sand; six inches of top soil and vegetative seeding material.

7.2 Evaluation of Remedial Alternatives For Contaminated Surface Soil

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study.

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

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Neither A-1, the No Action Alternative, nor A-2, would comply with TAGM 4046. Only Alternative A-3, Excavation and Offsite Disposal of Contaminated Surface Soils would comply with soil guidance values in TAGM 4046.

2. 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.

A-1, the No Action Alternative would provide no protection of Human Health. The direct contact risks posed by the surface soils contaminated with seven (7) semi-volatile organic chemicals would however be mitigated by A-2, placement of a foot thick layer of clean soil and vegetation over the surface, thereby significantly reducing risk of direct contact. A-3 would permanently preclude risk of direct contact at the site.

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.

The no action alternative would have no short term effects. The other two alternatives A-2 and A-3 would involve a small amount of site clearing and truck transport whose short term effects would be minimal.

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 controls intended to limit the risk, and 3) the reliability of these controls.

No action would have no long-term effectiveness. A-2, the clean soil cover, would limit the risk of direct contact as long as the cap and its surrounding fence were consistently maintained and protected from the erosion caused by off-road vehicles. A-3, excavation and off-site disposal, would permanently eliminate the on-site risk of direct contact with contaminated surface soils.

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.

A-1 and A-2 would have no effect on toxicity, mobility or volume of wastes. A-3, permanent removal and placement in a secure landfill facility, would eliminate the toxicity, mobility and volume of 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 and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

No action would be the easiest alternative to implement. However, there are no obstacles to implementing A-2 or A-3.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

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 Proposed Remedial Action Plan are evaluated. A "Responsiveness Summary" will be prepared that describes public comments received and the manner in which the Department 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.

7.3 Evaluation of Remedial Alternatives For Contaminated Groundwater in the Western Plume

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs).

B-1, the No Action Alternative does not comply with groundwater standards or drinking water standards. Contamination would remain above Class GA standards for the foreseeable future. B-2, long-term monitoring and installation of a clean private drinking water well would comply with drinking water standards but not with groundwater standards. B-3, extraction and treatment of the western plume via air stripping and installation of a clean well, would also comply with drinking water standards and may comply with groundwater standards after a number of years.

2. Protection of Human Health and the Environment.

The western plume presents no present risk to human health and the environment., since a carbon filter has been installed on the one contaminated private drinking water well. The plume does however present a future potential risk of direct ingestion of contaminated drinking water. B-1, the No Further Action Alternative, does nothing to mitigate this potential future risk.

B-2, long-term monitoring and the permanent replacement of the contaminated well, mitigates this potential risk by providing clean drinking water well to the impacted property and by monitoring the extent of the plume for the next 30 years. B-3 would go a step farther by actively reducing the contaminant loading of the plume with extraction wells and a pump and treat system.

3. Short-term Effectiveness.

B-1 would create no short term impacts. B-2, installation of a well, would create insignificant impacts and B-3, installation of extraction wells and treatment system would create minor disruption.

4. Long-term Effectiveness and Permanence.

B-1, the No Further Action alternative presents no risks for ingestion of contaminated groundwater as long as the carbon filter is properly maintained on the private well, and no further wells are installed in the contaminated aquifer of the western plume. There is a small potential future risk that a hole in the confining layer will allow the low level (dilute) plume to migrate into the deeper aquifer (which is presently clean) and contaminate another existing private drinking water well near the site.

B-2 would provide a long-term effective solution to the present contaminated well by installing a new well in the deeper aquifer. B-2 would also reduce the risk of future ingestion of contaminated groundwater on other adjacent properties by establishing a long-term monitoring program to track the concentration and physical extent of the western plume.

B-3 would not be significantly more effective than B-2 for the long-term. B-3 would install a pump and treat system to reduce the plume's limited contaminant loading even further.

5. Reduction of Toxicity, Mobility or Volume.

B-1 does reduces the toxicity of the contaminated drinking water well with a short-term solution, a carbon filtering system. B-2 and B-3 reduces the toxicity of the drinking water over the long-term by replacing the well. To a small extent, B-3 will reduce the low-level toxicity and volume of contaminated groundwater by installing a pump and treat system in the western plume. To a smaller extent, B-1 and B-2 will also reduce toxicity of the plume via naturally-occurring subsurface processes of biodegradation, dispersion and volatilization.

6. Implementability.

There are no obstacles to implementing any of the alternatives.

7. Cost. The costs for each alternative are presented in Table 2.

7.4 Evaluation of Remedial Alternatives For Leachate and Contaminated Groundwater in the Wetland Plume

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs).

The landfill leachate is a weak source of contamination for the eastern, wetland plume. Concentrations in the plume, contravene Class GA (groundwater) standards. None of the C-leachate alternatives would completely mitigate this condition in the groundwater below the wetland. C-2, leachate collection and treatment, would decrease the plume contamination thereby the extent of GA standard violations. However C-2 would require construction in the wetland and therefore must (require a permit from the Army Corps of Engineers), comply with "Nationwide Permit No. 38 issued under the Clean Water Act (CWA) Section 404", and with New York State requirements in Article 24 of Environmental Conservation Law (ECL).

C-2 would comply by applying for a permit from the Army Corps of Engineers and by designing the system to mitigate or at least minimize impacts to wetlands. C-1 (no action) and C-3 (long term monitoring and documentation of natural attenuation) would have no impact on the wetland and therefore would not require a Army Corps Permit or compliance with New York State wetland regulations.

2. Protection of Human Health and the Environment.

There are no uses of groundwater in the wetland plume. Organic contaminants appear to be degraded before discharging to surface water in the wetland. And, because of the age of the Rose Valley Landfill, it is probable that the contaminant loading and concentration of the leachate stream (or the risk) ~~would~~ will decreasein the future.

Therefore, all three alternatives would provide equal protection of human health. Potential future risks to human health would only occur if groundwater in this area was used for drinking water. In that case, the active alternatives would offer less future risk than the no action alternative.

While currently, the wetland plume poses no significant risks to human health, adverse impacts to representative species could not be ruled out based on the available information. Metals have accumulated in the wetland sediments which exceed sediment screening criteria. These exceedances were evaluated in the Fish and Wildlife Impact Analysis potential adverse risk was calculated based on conservative estimates. However, potential impacts are likely to be overestimated because conservative assumptions were likely to overestimate ecological risks to the environment.

Therefore, C-3 would be expected to present acceptable risks to the environment. As part of the alternative, acceptable risk from contaminated sediment would be confirmed and documented through actual sampling of biota and other testing.

3. Short-term Effectiveness.

C-1 and C-3, the no action alternative and the natural attenuation and long-term monitoring alternative would have no short term impacts. C-2, the active leachate collection and treatment alternative, would have several major short term impacts, since this alternative would involve construction of a collection trench, access road and the treatment system in the wetland habitat.

4. Long-term Effectiveness and Permanence.

Even if surface infiltration over the eight acre major fill area is reduced dramatically, leachate will continue to be generated. Therefore, none of the three alternatives would be effective over the long term at attaining groundwater standards at the base of the landfill. C-2 and C-3 would both permanently treat the leachate. C-2, the treatment and collection system would be more effective as long as it was maintained and operated.

5. Reduction of Toxicity, Mobility or Volume.

Alternatives C-1 and C-3 would reduce toxicity, mobility and volume through treatment. This is due to the remedial investigation which documented evidence of natural attenuation processes that are degrading (organic) the low levels of chlorinated solvents into relatively innocuous ethane and ethene (reduced toxicity). The low levels of inorganic contaminants are getting bound up in the sediments (reduced mobility).

Alternative C-2 would probably reduce toxicity and mobility to a greater extent. The first step of the two step treatment operation, sedimentation, would transfer the inorganic contaminant loading in the groundwater into a non-toxic, non-mobile sludge. Sedimentation/site removal would eliminate the potential risk (in C-1 and C-3) for toxic levels of metals to bioaccumulate in wetland species.

C-2's second treatment step, air stripping, would effectively eliminate the organic contamination in the groundwater and would convert it to a gaseous product that would be readily reduced by photodegradation.

6. Implementability.

There are no obstacles to implementing C-1 and C-3. However, C-2 would be technically difficult to implement because a collection trench, treatment system and access road would have to be constructed in the wetland or in the steep boundary between the landfill and the wetland. In addition, the sedimentation treatment equipment would require either a full-time operator or a considerable amount of remote supervision that would be difficult to provide at this remote location.

C-2 would also be more administratively difficult to implement than C-1 and C-3. ~~since a~~ A permit to disturb a wetland would need to be obtained from the Army Corps of Engineers (ACOE). It is likely that ACOE would require replacement of any lost areas of wetland habitat.

7. Cost. The costs for each alternative are presented in Table 2.

7.5 Evaluation of Remedial Alternatives To Prevent Direct Contact With Waste and to Reduce Infiltration in the Major Fill Area

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs).

6NYCRRPart 360, soil waste regulations, are an action-specific requirement for landfills. Specifically, for the Rose Valley Landfill whose DEC landfill permit was suspended in 1985, the Part 360 regulations that were effective on March 9, 1982 have been identified the appropriate standard. D-1, the no action alternative, would not meet the requirement for closure of a landfill under Part 360. The other alternatives, D-2 and D-3, would comply with these regulations.

However, installation of the required landfill cap in Alternatives D-2 and D-3 would in some places be within the wetland itself and would require compliance with wetland location-specific requirements that include a permit to construct in a wetland from the Army Corps of Engineers and the New York State laws that require that impacts to wetlands be minimized and mitigated.

2. Protection of Human Health and the Environment.

The landfill does not present a direct contact threat to human health and the environment, therefore all the alternatives (including D-1, no action) may essentially be equally protective of human health and the environment. Impacts from the landfill are limited to those caused by the leachate/contaminated groundwater.

There are no human uses of groundwater in the wetland plume, and the plume poses no significant risks to human health or to the environment. Organic contaminants appear to be degraded before discharging to surface water in the wetland. Metals have accumulated in the wetland sediments which exceed sediment screening criteria. However, these exceedances were evaluated in the Fish and Wildlife Impact Analysis and found to have no adverse impact. In addition, because Rose Valley Landfill has been closed for more than 15 years, it is not likely that the contaminant loading of the leachate stream (or its potential risk) would increase in the future.

3. Short-term Effectiveness.

D-1, the no action alternative would have no short term effects. D-2 and D-3 would have short term impacts during construction of the cap. The present vegetation would have to be cleared and some of the steeper slopes near the wetlands would have to be graded to less than a 33% slope. Erosion control measures would be employed to mitigate the migration of sediment into the wetland during grading and cap construction. There would still be the potential for severe weather to overwhelm erosion control measures. In addition, truck traffic would increase during delivery of the top soil needed for a cap in D-2 and D-3. D-3 will take longer to construct than D-2.

4. Long-term Effectiveness and Permanence.

D-1, no action, would have no long-term reduction of leachate generation. D-2 and D-3 would reduce leachate generation over the long-term with proper maintenance of the cap. Proper maintenance of D-2 and D-3 would involve mowing and erosion repair. D-3 would reduce infiltration to the greatest extent and therefore probably limit leachate generation most effectively.

The landfill property is remote and heavily used by ATVs in summer and winter. With thick tree growth present in D-1, ATVs have access to the major fill area. However, a graded, Part 360 cap would provide an attractive area for ATVs, even though fencing would temporarily discourage use.

5. Reduction of Toxicity, Mobility or Volume.
No action would have no reductions. The D-2 and D-3 alternatives would reduce the toxicity, mobility and volume of contamination to same extent as they reduce leachate generation.

6. Implementability.

All three alternatives would be implementable.

7. Cost. The costs for each alternative are presented in Table 2.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is proposing Alternatives A-3, B-2, C-3 and D-3 as the remedy for this site. The remedy includes:

- excavation and offsite disposal of contaminated surface soil in the older septic disposal pit;
- installation of an alternative water supply to replace the impacted private

well and long-term monitoring of the western groundwater plume;

- long term monitoring/documentation, and of the treatment of leachate by natural attenuation in the wetland; and

- installation of two feet of final cover at 2-33% slope over the major fill area.

This selection of remedy is based on the evaluation of the five alternatives developed for this site. With the exception of the No Action alternatives, each of the alternatives would comply with the threshold criteria.

Surface Soils

The recommended alternative for contaminated surface soils is Alternative A-3: Excavation and Off-Site Disposal. Only Alternative A-3 provides complete compliance with the TAGM 4046 guidance values. Although Alternative A-2 would prevent risks by eliminating the route of exposure, it would require ongoing maintenance to maintain this protection, and thus does not represent a permanent remedy. The increase in cost of about $32,000 between Alternatives A-3 and A-2 would not be significant in the context of the overall costs of remediating this site. Therefore, Alternative A-3 is recommended.

Western Groundwater Plume

The recommended alternative for the western plume is Alternative B-2: Alternative water supply, long-term monitoring. There are currently no unaddressed risks posed by this plume, and replacement of the current wellhead treatment system with an installation of a new well in the uncontaminated aquifer below the grey clay layer will ensure that prevention of future exposures are not dependant on the operation of the wellhead treatment system.

Alternative B-3 provides more active remediation but little additional reduction in risk of human exposure. It would take a system of extraction wells at least 15 years to remove 5 plume volumes., This length of time would probably not even be sufficient to meet maximum contaminant levels (MCLs), especially if additional contamination is introduced(from the presumed area of the original spill near MW-08). More likely, more than 10 plume volumes or thirty years of treatment would be required to meet MCLs.

During this treatment period, risks equivalent to those posed by Alternative B-2 (if new wells were installed in the plume, would still be posed by Alternative B-3. Because there is little additional reduction in risks provided by Alternative B-3, the additional estimated $584,000 in present worth costs does not justify the cost to implement B-3 rather than B-2.

Wetland Groundwater Plume

The recommended alternative for the Wetland Plume is Alternative C-3: Long Term Monitoring and Documentation of Natural Attenuation. Comparison of concentrations in groundwater before and after passing through the wetland area indicate that natural degradation processes are occurring. The mechanisms through which wetland sediments decontaminate groundwater have been well documented, and include biological reductive dechlorination as a primary mechanism. The removal of contaminants through this system demonstrates the effectiveness of this treatment process in this wetland. Since no site-related organic compounds have been detected in the wetland, Alternative C-3 would provide as effective treatment of the organic contamination in the wetland plume as would the collection and treatment mechanisms that would be employed by Alternative C-2. An evaluation of the current risks to ecological receptors in the wetland indicates that no adverse impacts could be ruled out to the representative species studied. Impacts were predicted from the actual concentrations observed in the wetland sediments and from the groundwater/leachate discharging into the wetland. However, these potential impacts are probably overestimated because ecological risks are assumed from concentrations of total metals. And the contaminants of potential concern probably occur in a chemical form that is not readily bioavailable or highly toxic. Part of the implementation of the C-2 remedy would be to confirm this through additional sampling and study. An added benefit of Alternative C-3 is that it would incur only about 20% of the cost of Alternative C-2. ~~and it~~ C-2 would also cause much less short term impact to the site during its implementation. C-3 is therefore the recommended alternative for the groundwater plume in the wetland.

Landfill

The recommended alternative for the landfill is D-2: Two Feet of Final Cover and Six Foot Fencing. All three action alternatives considered meet action-specific requirements. ~~While~~ Alternative D-3,would install for a more substantial cap than Alternative D-2 which may reduce infiltration into the landfill (and thus leachate generation) to a greater extent. The percentage decrease in infiltration ~~is~~ would not expected to be that much greater than that which would be achieved by Alternative D-2, This would be especially true considering the steep slopes over much of the landfill (which promote rapid run off). The benefits of Alternative D-3 are minor, and would not justify the added 1.2 million dollars in cost over Alternative D-2. such that it would justify the premium of 1 to 1.2 million dollars over the cost of alternatives D-2. Thus Alternative D-2 (and not D-3) was selected as the remedy for the landfill.

The total estimated present worth cost to implement the proposed remedy is $1,590,300. The cost to construct the remedy is estimated to be $1,147,000 and the estimated average annual operation and maintenance cost for 30 years is $39,200.

The elements of the proposed remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS would be resolved.

2. Excavation and offsite disposal of contaminated surface soils;

3. Installation of an alternative drinking water supply for the impacted well and long-term monitoring of the western plume;

4. Long-term monitoring of the treatment of the leachate by natural attenuation in the wetland plume;

5. Installation of a single layer Part 360 cover over the eight(8) acres of major fill area and a six foot high chain link fence.

Table 1
Nature and Extent of Contamination

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs/Background	SCG/ Bkgd. (ppb)
Groundwater	Volatile Organic Compounds (VOCs)	Trichloroethylene (TCE)	ND-14	2/58	5
		Dichloroethylene (DCE)	ND-29	3/58	5
		Trichloroethane (TCA)	ND-81	10/58	5
		1,1-Dichloroethane (DCA)	ND-19	10/58	5
Surface Soils	Semivolatile Organic Compounds (SVOCs)	1,2-Dichlorobenzene	ND-23,000	1/8	7,900
		4-Chloroaniline	ND-14,000	3/8	220
		Benz(a)anthracene	ND-1,800	3/8	224
		Benzo(a)pyrene	ND-800J	3/8	61
		Benzo(b)fluoranthene	ND-1,800J	3/8	1100
		Benzo(k)fluoranthene	ND-1,300J	2/8	1100
		Phenol	ND-1,400	1/8	30

	Inorganic Compounds (Metals)	Arsenic	1100J-27,100	1/6	7,500
		Barium	10,900J-1,230,000	2/6	300,000
		Beryllium	160J-5005	1/6	360
		Cadmium	86J-12,200	1/6	10,000
		Chromium	1900J-58,500	3/6	10,000
		Copper	5,500-1,430,000	3/6	124,000
		Lead	1200-66,900	2/6	400,000
		Mercury	ND - 4,400	2/6	330
		Nickel	3,700J-58,500	3/6	13,000
		Zinc	16.5J-2,410,000J	3/6	205,000
Sediments	Inorganic Compounds	Antimony	ND-11,900	3/18	2,000
		Arsenic	1,100J-23,600	7/18	6,000
		Cadmium	1,100J-6,000	12/18	600
		Copper	1,600J-29,500	3/18	16,000
		Iron	5,420,000-219,000,000	10/18	20,000,000
		Lead	2,400-45,300	1/18	31,000
		Manganese	66,300-9,610,000	13/18	460,000
		Selenium	3500-58,200	NA	NA
		Silver	710J-2,800	5/18	1,000
		Zinc	12,200-211,000	1/18	120,000

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
A-1: No Action for Surface Soils	0	1,000	14,900
A-2: Soil Cover over Surface Soils	14,200	200	18,800
A-3: Excavation/Off-site Disposal	45,400	0	45,400
B-1: No Further Action Western Plume	0	2,500	37,400
B-2: New Well/Long term Monitoring	42,300	7,500	147,300
B-3: New Well/Pumped Treat Plume	210,000	39,000	747,000
C-1: Trench Collection Leachate/Wetland Plume	0	5,000	74,800
C-2: Trench Collection Leachate/treat	487,300	72,000	918,900
C-3: Natural Attenuation of Wetland Plume	61,000	15,200	270,500
D-1: No Action to Cap Landfill	0	0	0
D-2: Soil Cover/Fence Over Landfill	999,200	16,500	1,127,100
D-3: Geomembrane Cap/Fence	1,882,500	16,500	2,109,800

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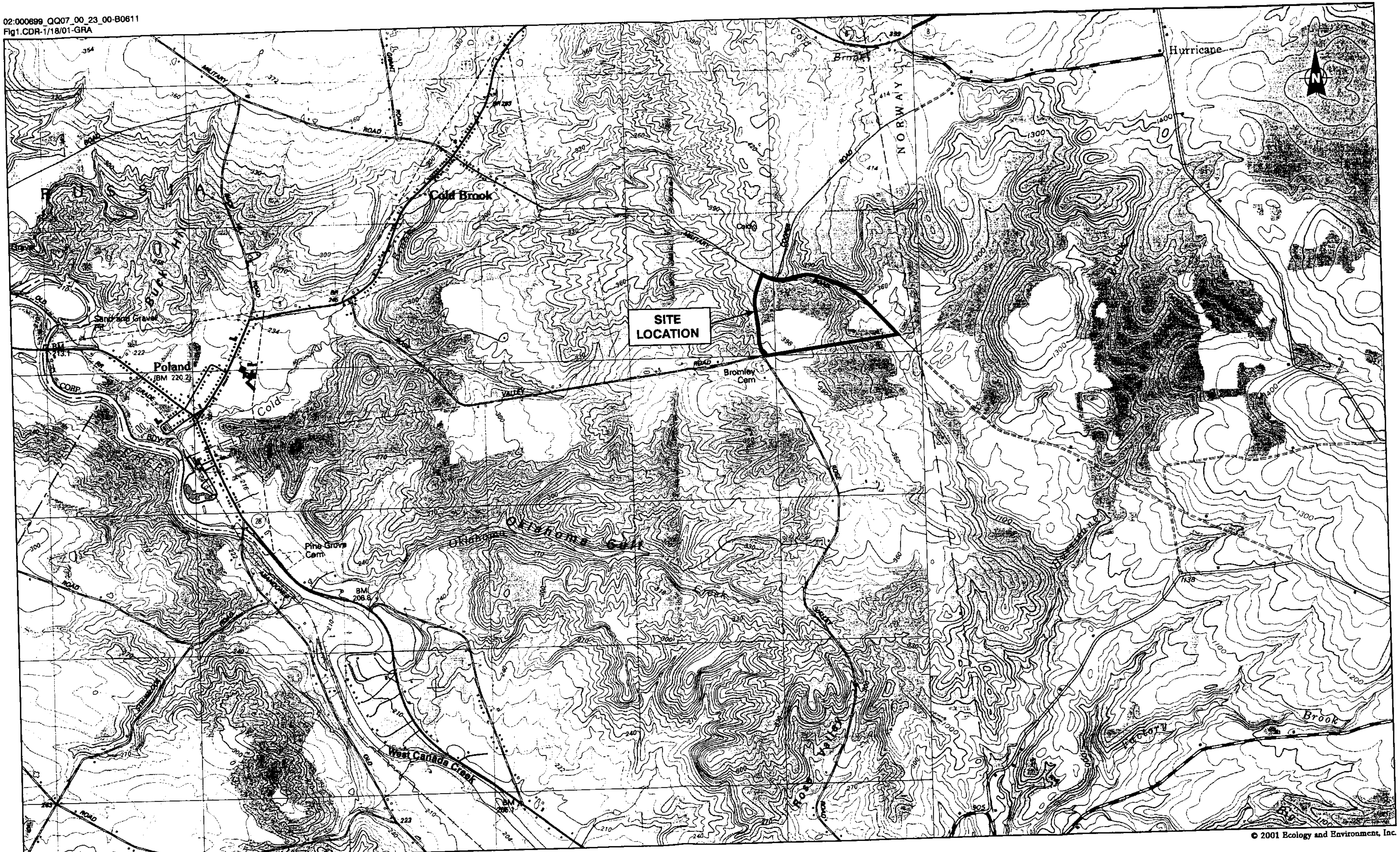


SOURCE: USGS Newport Quadrangle New York, 7.5 Minute Series 1982;
USGS Middleville Quadrangle New York, 7.5 Minute Series 1969.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

Figure 1 SITE LOCATION MAP
ROSE VALLEY LANDFILL SITE
HERKIMER COUNTY, NEW YORK

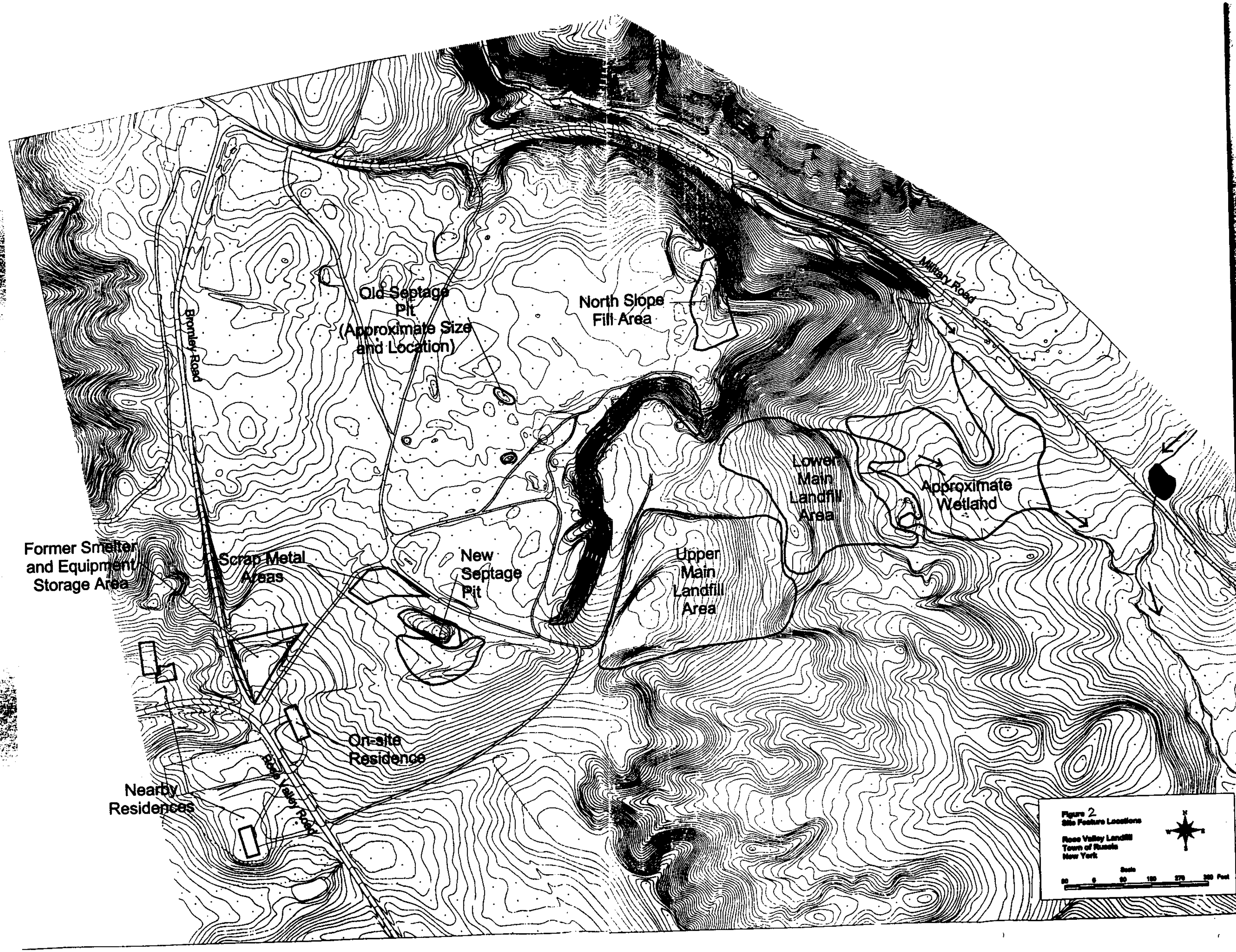


Figure 2
Site Feature Locations

Rose Valley Landfill
Town of Russia
New York

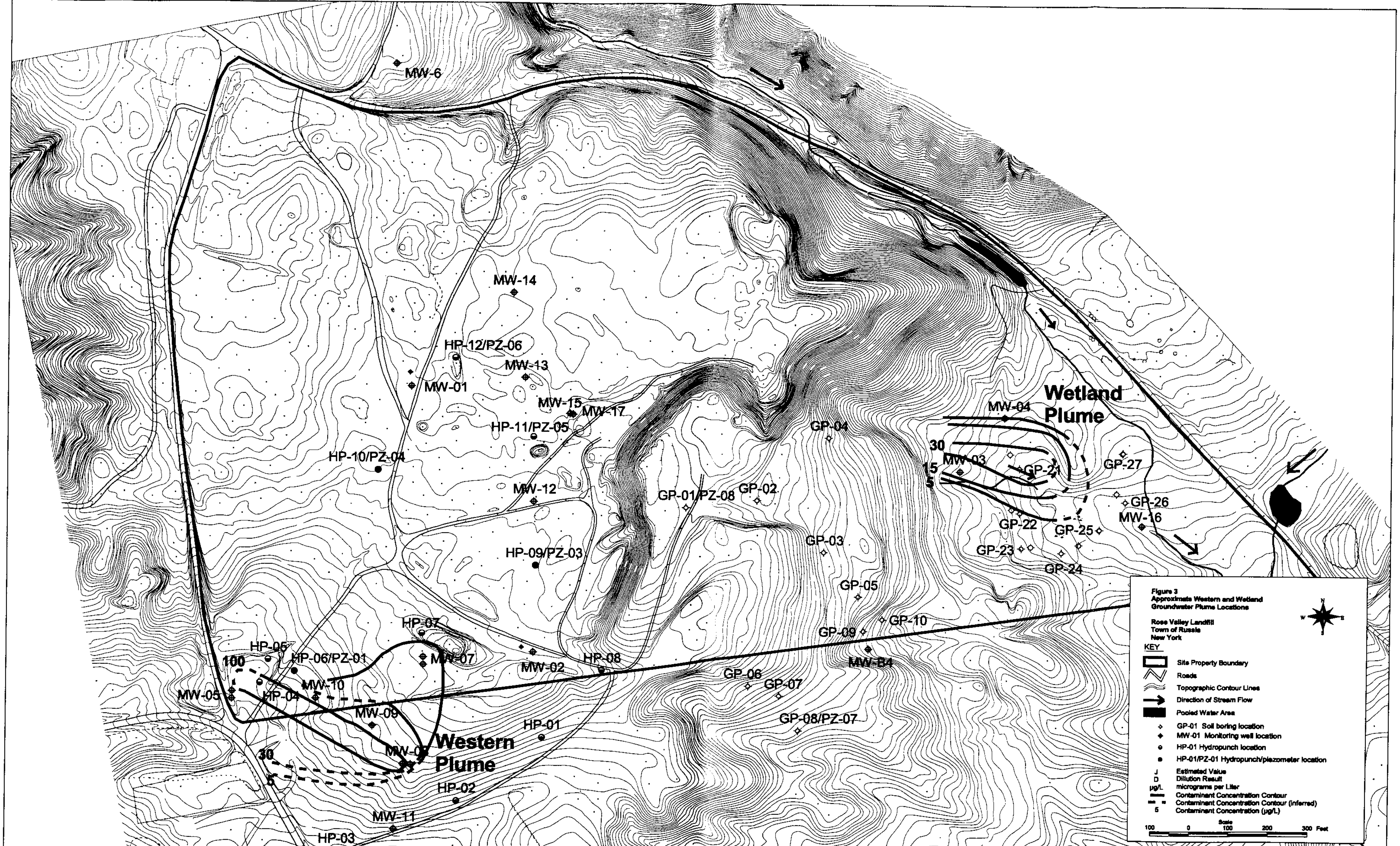


Figure 3
Approximate Western and Wetland Groundwater Plume Locations

Rose Valley Landfill
Town of Russia
New York

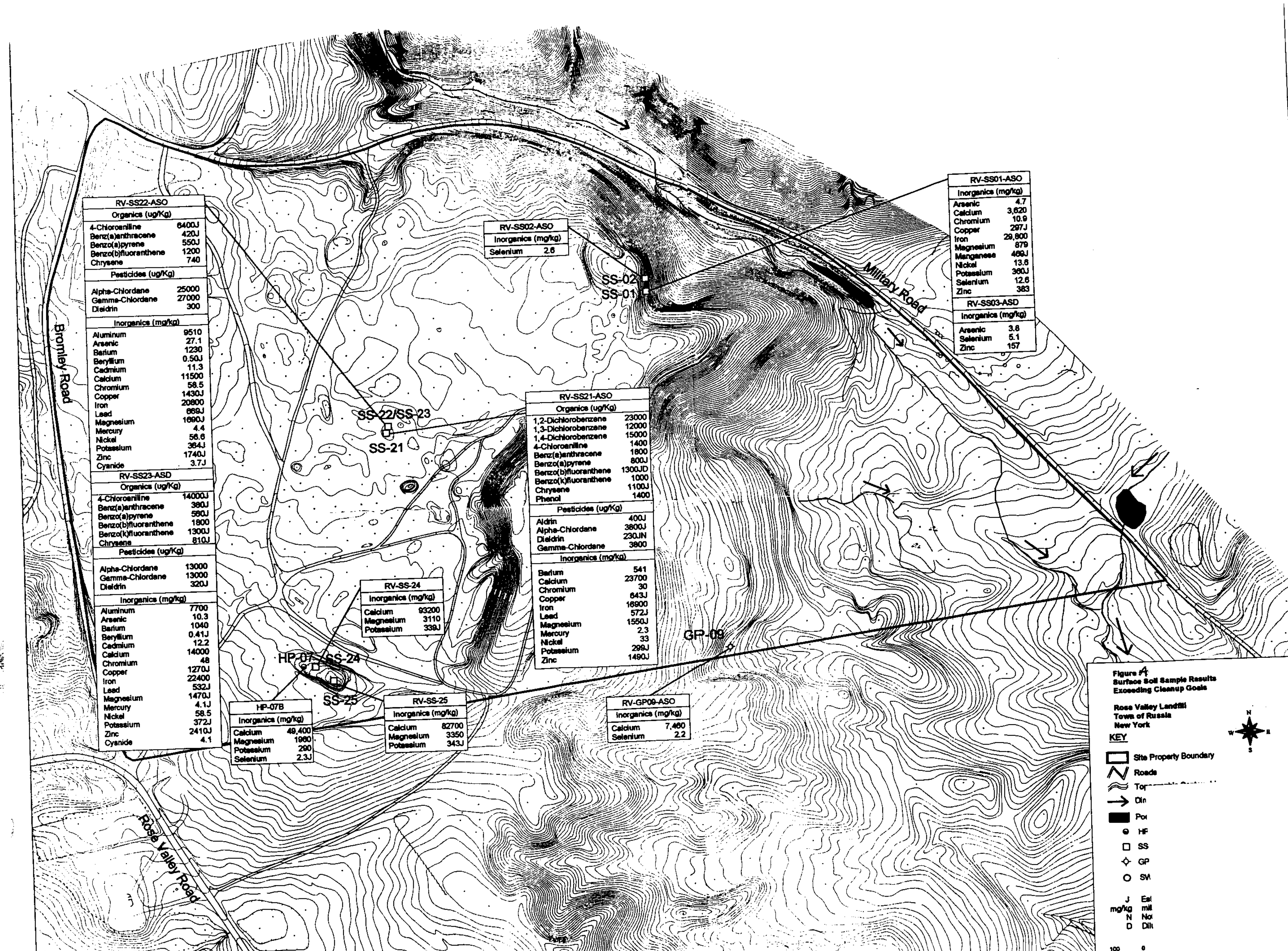
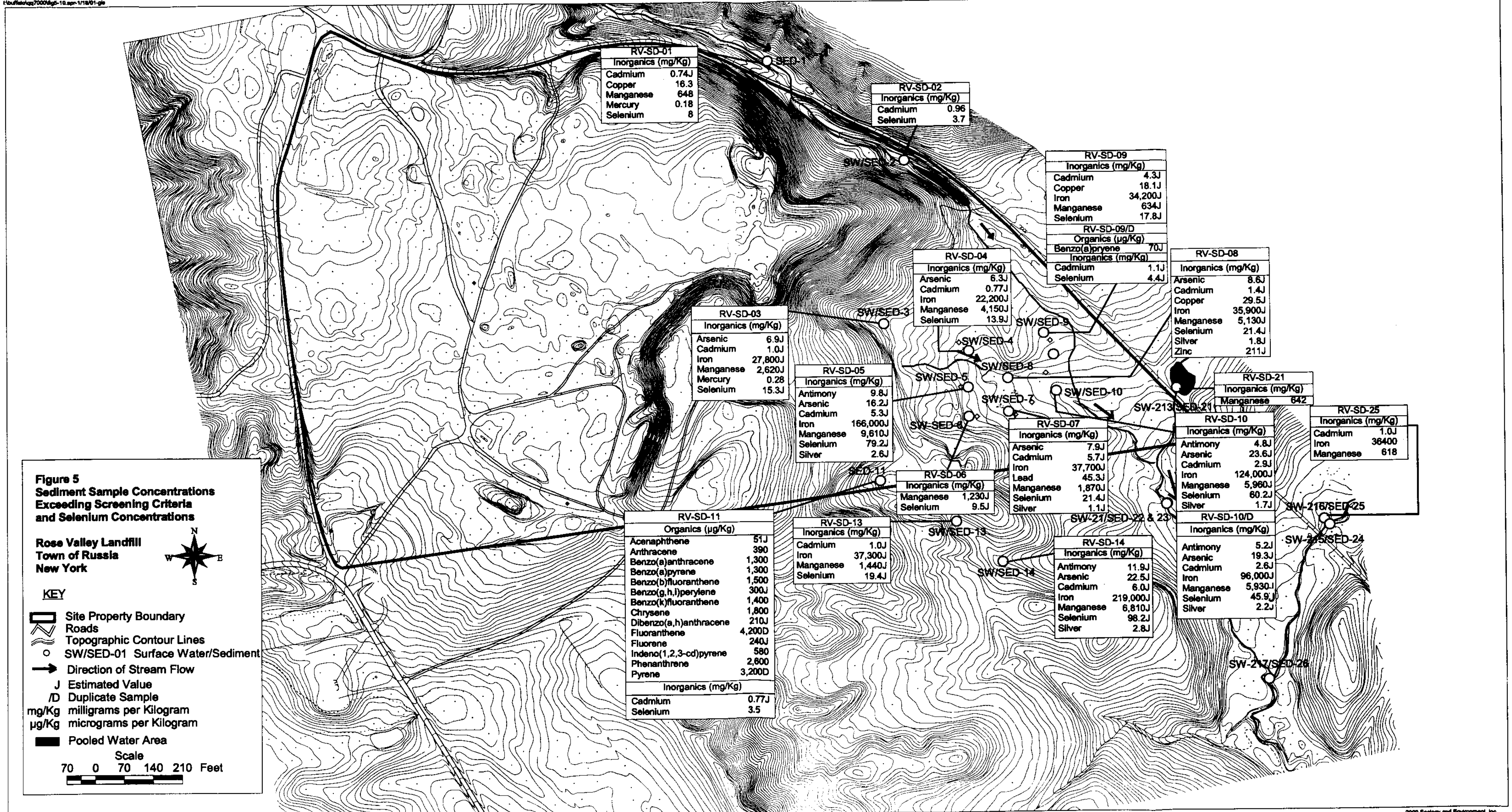


Figure 4
Surface Soil Sample Results
Exceeding Cleanup Goals
Rose Valley Landfill
Town of Russia
New York
KEY
Site Property Boundary
Roads
N
S
E
W
Military Road
Bromley Road
Rose Valley Road
SS-02
SS-01
SS-22/SS-23
SS-21
HP-07
SS-24
SS-25
GP-09
RV-SS01-ASO
Inorganics (mg/kg)
Arsenic 4.7
Calcium 3,620
Chromium 10.9
Copper 297J
Iron 29,800
Magnesium 879
Manganese 469J
Nickel 13.6
Potassium 360J
Selenium 12.6
Zinc 383
RV-SS03-ASD
Inorganics (mg/kg)
Arsenic 3.6
Selenium 5.1
Zinc 157
RV-SS02-ASO
Inorganics (mg/kg)
Selenium 2.6
RV-SS22-ASO
Organics (ug/Kg)
4-Chloroaniline 6400J
Benz(a)anthracene 420J
Benzo(a)pyrene 550J
Benzo(b)fluoranthene 1200
Chrysene 740
Pesticides (ug/Kg)
Alpha-Chlordane 25000
Gamma-Chlordane 27000
Dieldrin 300
Inorganics (mg/kg)
Aluminum 9510
Arsenic 27.1
Barium 1230
Beryllium 0.50J
Cadmium 11.3
Calcium 11500
Chromium 58.5
Copper 1430J
Iron 20800
Lead 669J
Magnesium 1690J
Mercury 4.4
Nickel 56.6
Potassium 364J
Zinc 1740J
Cyanide 3.7J
RV-SS23-ASD
Organics (ug/Kg)
4-Chloroaniline 14000J
Benz(a)anthracene 380J
Benzo(a)pyrene 560J
Benzo(b)fluoranthene 1800
Benzo(k)fluoranthene 1300J
Chrysene 810J
Pesticides (ug/Kg)
Alpha-Chlordane 13000
Gamma-Chlordane 13000
Dieldrin 320J
Inorganics (mg/kg)
Aluminum 7700
Arsenic 10.3
Barium 1040
Beryllium 0.41J
Cadmium 12.2
Calcium 14000
Chromium 48
Copper 1270J
Iron 22400
Lead 532J
Magnesium 1470J
Mercury 4.1J
Nickel 58.5
Potassium 372J
Zinc 2410J
Cyanide 4.1
RV-SS21-ASO
Organics (ug/Kg)
1,2-Dichlorobenzene 23000
1,3-Dichlorobenzene 12000
1,4-Dichlorobenzene 15000
4-Chloroaniline 1400
Benz(a)anthracene 1600
Benzo(a)pyrene 800J
Benzo(b)fluoranthene 1300JD
Benzo(k)fluoranthene 1000
Chrysene 1100J
Phenol 1400
Pesticides (ug/Kg)
Aldrin 400J
Alpha-Chlordane 3800J
Dieldrin 230JN
Gamma-Chlordane 3800
Inorganics (mg/kg)
Barium 541
Calcium 23700
Chromium 30
Copper 643J
Iron 16900
Lead 572J
Magnesium 1550J
Mercury 2.3
Nickel 33
Potassium 299J
Zinc 1490J
RV-SS-24
Inorganics (mg/kg)
Calcium 93200
Magnesium 3110
Potassium 339J
HP-07B
Inorganics (mg/kg)
Calcium 49,400
Magnesium 1960
Potassium 290
Selenium 2.3J
RV-SS-25
Inorganics (mg/kg)
Calcium 82700
Magnesium 3350
Potassium 343J
RV-GP09-ASO
Inorganics (mg/kg)
Calcium 7,460
Selenium 2.2
J
mg/kg
N
D
100
0



SOURCE: Ecology and Environment, Inc. 2000.

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Figure 6
Landfill Capping and Slope Reduction Areas
for Alternatives D2, D3, and D4

Rose Valley Landfill
Town of Russia
New York

SOURCE: Ecology and Environment, Inc. 2000.