Peter Cooper Landfill Superfund Site

Cattaraugus County, New York

EPA
Region 2

July 2005

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated soil and groundwater at the Peter Cooper Landfill Superfund site (Site), and identifies the preferred remedy with the rationale for this preference. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination at the Site and the alternatives summarized in this Proposed Plan are described in the November 2003 remedial investigation (RI) report and May 2005 feasibility study (FS) report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site.

This Proposed Plan is being provided as a supplement to the FS report to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated. EPA's preferred remedy consists of capping contaminated soils, collecting leachate and controlling landfill gas. A subsurface barrier will be used to limit lateral groundwater migration and in conjunction with the cap, the Elevated Fill Subarea will no longer be acting as a source of contamination to the groundwater and the Creek and the remaining contaminated groundwater would rely primarily on the natural mechanisms of dispersion and dilution to reduce the contamination throughout the Site. Institutional controls would also be used to prevent disturbance of the cap and limit groundwater use at the Site.

The remedy described in this Proposed Plan is the preferred remedy for the Site. Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in this Proposed Plan and in the detailed analysis section of the FS report because EPA and NYSDEC may select a remedy other than the preferred remedy.

MARK YOUR CALENDAR

July 30, 2005 - August 28, 2005: Public comment period on the Proposed Plan.

August 10, 2005 at 7:00 p.m.: Public Meeting at Gowanda Central High School, 24 Prospect Street, Gowanda, New York

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI and FS reports and this Proposed Plan have been made available to the public for a public comment period which begins on July 28, 2005 and concludes on August 26, 2005.

A public meeting will be held during the public comment period at the Gowanda Central High School on August 10, 2005 at 7:00 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedy, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

Gowanda Free Library
56 W. Main Street
Gowanda, New York 14070
(716)532-3451

Hours: Monday, Tuesday and Thursday:
2:00 p.m- 5:30 p.m.; 7:00 p.m - 9:00 p.m.;
Wednesday: 10:00 a.m. - Noon
Friday: Noon-5:30 p.m.

Seneca Nation of Indians Library
3 Thomas Indian School Drive
Irving, New York 14081
(716)532-9449

Hours: Monday, Wednesday, Thursday and Friday:
8:30 a.m- 5:00 p.m.
Tuesday: 8:30 a.m. - 8:30 p.m.

Written comments on this Proposed Plan should be addressed to:

Sherrel Henry
Remedial Project Manager
New York Remediation Branch
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866

Telefax: (212) 637-3966
Internet: henry.sherrel@epa.gov

SCOPE AND ROLE OF ACTION

The primary objectives of this action are to remediate the sources of contamination at the Site, reduce and minimize the downward migration of contaminants to the groundwater, control landfill gas and minimize any potential future health and environmental impacts.

SITE BACKGROUND

Site Description

The Peter Cooper Landfill Site (the "Site") consists of an inactive landfill area and land associated with the former Peter Cooper Corporation (PCC) glue-manufacturing plant located in Gowanda, Cattaraugus County, New York. The Site is located on approximately 26 acres of property between Palmer Street and the Cattaraugus Creek. The Site is bounded to the north by Cattaraugus Creek, to the south by Palmer Street, to the west by a former hydroelectric dam and wetland area, and to the east by residential properties.

For purposes of the RI/FS, the Site was divided into two sections. The western section of the Site, called the Inactive Landfill Area (ILA), is approximately 15.6 acres in size. A subarea within the ILA, approximately 5 acres in size and located in the northwest corner of the Site, is referred to as the Elevated Fill Subarea. The wastes from PCC's glue production were disposed of on the Elevated Fill Subarea. The western portion of the Elevated Fill Subarea is located on property owned by the New York State Electric & Gas Corporation (NYSEG) and the remainder of the Elevated Fill Subarea, as well as the remaining areas of the Site, are on property previously owned by PCC, and currently owned by JimCar Development, Inc. The Former Manufacturing Plant Area (FMPA) is located on the eastern side of the Site and measures approximately 10.4 acres. Figure 1 shows the Site area.

Site History

The Site was previously used to manufacture glue and industrial adhesives. PCC and its predecessor, Eastern Tanners Glue Company, manufactured animal glue in Gowanda from 1904 until 1972. When the animal glue product line was terminated, PCC continued to produce synthetic industrial adhesives until the plant closed in 1985. Between 1925 and October 1970, PCC used the northwest portion of the property to pile sludge remaining after the animal glue manufacturing process. These wastes, known as "cookhouse sludge" because of a cooking cycle that occurred just prior to extraction of the glue, are derived primarily from chrome-tanned hides obtained from tanneries. The waste material has been shown to contain elevated levels of chromium, arsenic, zinc, and several organic compounds. Observation of the cook-house sludge material during the RI indicated that the sludge appeared to be mixed with cinders, ash, and construction and demolition debris.

In June 1971, the New York State Supreme Court (8th J.D. Cattaraugus County) ordered PCC to remove the waste pile and terminate discharges to Cattaraugus Creek. In 1972, PCC reportedly removed approximately 38,600 tons of waste pile material and transferred it to a separate site in Markhams, New York. Between 1972 and 1975, the remaining waste pile at the Site was graded by PCC, covered with a 6-inch clay barrier layer and 18-30 inches of barrier protection soil and vegetated with grass. Stone rip-rap and concrete blocks were placed along the bank of the Creek to protect the fill material from scouring or falling into the Creek.

Previous Investigations

NYSDEC conducted preliminary site investigations in 1981 and 1983 and identified the presence of arsenic, chromium and zinc in soil and sediment samples. The results of these investigations are available in Appendices B-1 and B-2 of the 2003 RI. As a result of this investigation, NYSDEC oversaw PCC's conduct of an RI/FS for the site. PCC hired O'Brien and Gere Engineers, Inc. (OBG) to perform the RI/FS. The OBG investigation was limited to the ILA. Activities performed during the RI included collection of soil, surface water, sediments, waste material, seep and groundwater samples. The RI Report was issued in January 1989 and the results of this analysis are available in Appendix B-3 of the 2003 RI. The FS Report was submitted to NYSDEC in March 1991 and included recommendations for containment of source materials, leachate collection, access restriction through the building of a fence and deed restrictions. However, because the waste at the Site did not meet the statutory definition in effect at the time in New York State for an inactive hazardous waste disposal site, NYSDEC could not use State funds to implement a remedial program. Therefore, in 1991, NYSDEC removed the Site from its Registry of Inactive Hazardous Waste Sites. At that time, NYSDEC and the Village of Gowanda requested EPA to evaluate the Site.

In 1996, the EPA Superfund Technical and Assessment Response Team (START) collected and analyzed soil, groundwater and surface water and sediment samples from the Site. Results confirmed contamination, including the presence of arsenic, chromium and other hazardous substances from the Site.

During the site assessments, observations were made of remnants of a concrete dam at the Site which was taken out of service in 1957. The remnants of the dam in conjunction with rip-rap were being used as a retaining wall for the landfill. EPA personnel observed that the existing retaining wall was subject to severe erosion. It was determined that the retaining wall and rip-rap had to be repaired or upgraded to prevent the continued erosion of landfill materials into Cattaraugus Creek.

On October 24, 1996, EPA and NYSEG entered into an Administrative Order on Consent (AOC). Pursuant to the AOC, NYSEG installed approximately 150 feet of rip-rap revetment along the south bank of the Cattaraugus Creek and adjacent to the landfill to prevent further erosion of materials from the landfill into the Creek.

Based on the above information, the Site was added to the EPA's list of hazardous substance sites known as the Superfund National Priorities List (NPL) on April 6,1998.

EPA's negotiations with the Potentially Responsible Parties (PRPs) for their conduct of the RI/FS were unsuccessful. On March 30, 2000, EPA issued a Unilateral Administrative Order (UAO) to fourteen PRPs directing that they complete the RI/FS for the Site. The UAO became effective May 1, 2000. The RI/FS was performed by Benchmark Environmental Engineering and Science, PLLC and Geomatrix Consultants, Inc, consultants for the PRPs, subject to EPA oversight.

Site Geology

The Site is located on the southern bank of the Cattaraugus Creek. The ILA slopes on the northern side toward the edge of the Creek. The Site including the ILA and FMPA is underlain by shale bedrock of the Canadaway Formation. Shale outcrops are present in and along Cattaraugus Creek, across the northern site perimeter, and the hill slope south of Palmer Street. The elevation of the bedrock surface generally slopes in a northwesterly direction, toward the Creek. The depth to the top of the bedrock across the Site ranges from 4.5 feet to 25.4 feet. The 5-acre Elevated Fill Subarea which is located in the ILA consists of materials that appear to have been placed within an excavated area that is approximately five to 13 feet thick. Both the alluvial soil and the fill materials comprise the overburden at the Site. The fill material is characterized as cindery fill and sludge fill. The thickness of the sludge fill ranges from five to 23 feet. The sludge fill appears to extend down to the weathered bedrock surface near the Creek side of the Site.

Hydrogeology

The overburden and upper bedrock water bearing zones were investigated. Groundwater from both zones discharges to Cattaraugus Creek. Seeps are observed at the overburden/bedrock contact and the bedrock outcrop along the Creek. Groundwater elevation data indicate that the depth to groundwater varies across the Site from approximately five feet to 20 feet. This variability is largely due to topographic changes across the Site. Groundwater in the overburden generally flows toward the north/northwest, discharging into Cattaraugus Creek. The landfill creates a small mounding effect on the groundwater surface. Based on groundwater elevation data collected from the overburden, there is a horizontal hydraulic groundwater flow toward Cattaraugus Creek and a downward hydraulic potential into the upper bedrock. A localized westerly flow direction occurs in the overburden near the Elevated Fill Subarea. Groundwater flow in the bedrock is primarily along fractures and joint and bedding planes which tend to be strongly horizontally oriented toward the Creek. Although the groundwater in the area is classified as a potable water supply by NYSDEC, residents obtain their water from public water supplies that are monitored to assure they meet appropriate federal and state groundwater regulations. The public water supply well is located approximately 1-mile northeast of the Village of Gowanda and is not being affected by the Site.

RESULTS OF THE REMEDIAL INVESTIGATION

The ILA and the FMPA were the primary subjects of the RI. The ILA received wastes from the plant operations and the FMPA contained plant buildings and processing operations. Areas adjacent to the plant, including Cattaraugus Creek (north of the facility) and a wetland area to the west of the ILA and adjacent to Cattaraugus Creek, were also included in the RI.

Chemical and physical data were collected to determine the nature and extent of contamination associated with the Site. Media sampled during the RI included landfill gas, groundwater, surface water, sediment, soil, waste material, and seepage emanating from the landfill. All field activities were conducted with oversight by EPA's contractor, TAMs

Consultants, Inc., now known as Earth Tech. The RI was structured to supplement past investigations with the goal of using historical data, as well as new data collected during the RI, to evaluate current and future human health and ecological risks and develop a recommended remedial approach. The constituent concentrations detected during this RI are generally consistent with the data from the 1989 RI. The results of the RI are summarized below.

Landfill Gas Contamination

Analysis of landfill gas samples found several volatile organic compounds (VOCs) including acetone, 2- butanone, benzene, carbon disulfide, toluene, ethylbenzene, and xylenes. Several gases associated with the decomposition of organic matter in the landfill were detected including hydrogen sulfide, carbon monoxide, carbon dioxide, and methane. Oxygen levels in two of the three landfill gas samples were below normal atmospheric oxygen levels. The lower explosive limit (LEL) of a flammable gas or vapor (percent by volume in air) indicates that an explosion can occur upon ignition in a confined area if the limit is exceeded. The LEL was exceeded in two of the landfill gas wells.

Since landfill gases were not detected at the landfill surface using hand-held instruments even though waste is exposed at several locations, it appears that landfill gases are currently diffused through overlying soil materials and enter the atmosphere at lower concentrations than those found in the gas monitoring wells.

Groundwater Contamination

Groundwater samples collected from monitoring wells located in the overburden and upper bedrock water bearing zones were compared to groundwater regulatory levels including water quality standards. Data were also collected to evaluate the movement of groundwater in these areas and the extent of contamination.

Groundwater samples in the ILA indicate the presence of VOCs and metals at levels above applicable groundwater quality standards in both the overburden and bedrock aquifers. Of the 16 overburden wells samples (two rounds of samples from eight wells), four contained VOCs, including benzene, chlorobenzene, 1,2-dichlorobenzene, and toluene above groundwater standards. Benzene was detected at a maximum concentration of 1.6 micrograms/liter (ug/L), slightly above groundwater criteria of 1 ug/L. The compound detected at the highest concentration was chlorobenzene at 190 ug/L, followed by toluene (17 ug/L). The groundwater criteria for both compounds is 5 ug/L. 1,2-dichlorobenzene was detected in one sample at a concentration of 5 ug/L, which is above the groundwater criteria of 3 ug/L. Metals, including arsenic, at a maximum concentration of 196 ug/L and chromium, at a maximum concentration of 436 ug/L, were detected above groundwater quality standards of 25 ug/L and 50 ug/L, respectively. In addition, elevated concentrations of leachate parameters (e.g., dissolved solids, chloride, ammonia, alkalinity, and hardness) indicated that groundwater is being impacted by leachate from the Elevated Fill Subarea.

Of the 14 upper bedrock groundwater samples (two rounds from seven wells) analyzed for VOCs and semi-volatile organic compounds (SVOCs), only one chemical, chlorobenzene, exceeded groundwater criteria. The result was 6.8 ug/L, slightly above the groundwater criteria of 5 ug/L. Metals in the overburden aquifer were generally also found in the bedrock aquifer, but at lower concentrations slightly above the applicable groundwater standards.

Information from monitoring wells and soil borings indicates that a portion of the waste sludge in the inactive landfill is below the groundwater table. There are no natural barriers (clay layers) between the waste and the bedrock aquifer, to retard the migration of waste constituents to the bedrock aquifer. Groundwater in both the overburden and bedrock flows toward Cattaraugus Creek.

Groundwater samples in the overburden wells in the FMPA showed only one VOC, tetrachloroethene, detected at 5.5 ug/L, slightly above the groundwater criteria of 5 ug/L. No SVOCs were detected above the groundwater criteria. Metals including iron, manganese and sodium were detected above groundwater criteria.

Chemical data for six bedrock groundwater samples (two rounds from three wells) showed concentrations of VOCs and metals slightly above groundwater criteria. VOCs included acetone, benzene, cis-1,2-dichloroethene, m/p-xylene and toluene. SVOCs were not detected above groundwater criteria. The same metals detected in the overburden well were also detected in the bedrock wells at similar concentrations.

Surface Water Contamination

Surface water samples were collected from Cattaraugus Creek adjacent to the Site to characterize contamination in the creek. Sample results were compared to surface water quality criteria. One sample marginally exceeded the surface water quality criteria for ammonia. The water quality criterion for iron was exceeded in surface water samples at locations both upstream and downstream of the landfill; these levels do not appear to be attributable to the landfill. Sulfide, which was detected in seeps from the ILA at concentrations above guidance values, was not detected above guidance values in Cattaraugus Creek. Ammonia and sulfurous-type odors are frequently noted near leachate seeps. In addition, discoloration from leachate seeps were observed on the banks of the Creek and does not meet the criteria outlined in 6 NYCRR Part 703.

Sediment Contamination

Sediment samples were collected from Cattaraugus Creek and the wetland adjacent to the Site. Sample data were compared to New York State sediment quality criteria and guidance values.

Arsenic was detected above the sediment quality criterion (6 mg/kg) in Cattaraugus Creek sediment at a maximum concentration of 9.61 mg/kg. One sample result for nickel of 18.2 mg/kg exceeded the sediment quality criteria (16 mg/kg). VOCs and SVOCs were not detected in sediment samples from Cattaraugus Creek.

Sediment samples collected in the wetland area adjacent to the Site exceeded sediment quality criteria and guidance values for arsenic, chromium, and zinc. Arsenic levels of 16.3 mg/kg exceeded the New York State sediment quality criterion (12 mg/kg) in all of the wetland sediment samples. The maximum chromium concentration of 55.3 mg/kg exceeded the sediment quality criterion (40 mg/kg). The maximum concentration of zinc of 290 mg/kg exceeded the sediment quality criterion (50 mg/kg). In addition to metals, a number of VOCs including benzene, toluene, ethylbenzene, and xylenes were detected at low concentrations in all of the sediment samples. (Results are discussed in Ecological Risk Assessment section).

Soils

Surface and subsurface soil samples were collected across the ILA and the FMPA. There are currently no federal or state promulgated standards for contaminant levels in soils. In the absence of Applicable and Relevant or Appropriate Requirements (ARARs), "To Be Considered" (TBCs) values from the New York State Technical and Administrative Guidance Memorandum (TAGM)[1] were used.

Metal concentrations were compared to the TAGM values. Surface soil samples were collected from 20 locations in the ILA. Three metals, arsenic, chromium and zinc, were detected above TAGM values in both surface and subsurface soils in the ILA. No VOCs were detected at or above the guidance values.

In surface soils at the ILA, arsenic was detected at six locations above the TAGM objective (12 mg/kg) at a maximum concentration of 1,190 mg/kg in sample LFSS-6. The area around sample LFSS-6 was identified as a hot spot. Chromium was detected at nine locations above TAGM values (50 mg/kg) at a maximum concentration of 550 mg/kg. Zinc was detected at 19 of the locations sampled above TAGM values (50 mg/kg) at a maximum concentration of 165 mg/kg. Subsurface soil samples were collected from 11 locations in the ILA. Arsenic, chromium and zinc were detected at maximum concentrations of 60.5 mg/kg, 623 mg/kg and 1,390 mg/kg, respectively. Except for the high arsenic value, the concentration of the compounds detected during this RI are generally consistent with the data from the 1989 RI.

Surface soil samples were collected from 10 soil boring locations in the FMPA. The sample results indicated the presence of three VOCs above guidance values in one location in the FMPA, near MWFP-3S/D. At this location, three compounds, chloroform, carbon tetrachloride and tetrachloroethene, were detected at maximum concentrations of 5.7 mg/kg, 10 mg/kg and 54 mg/kg, respectively. The TAGM value for chloroform, carbon tetrachloride and tetrachloroethene are 0.3 mg/kg, 0.6 mg/kg and 1.4 mg/kg, respectively. The presence of these VOCs in soil near MWFP-3S/D was further investigated to determine the areal extent of the contamination. The results of the investigation indicated a hot-spot area of approximately 20 feet by 40 feet by 4 feet that contains VOC contamination. Metal concentrations also exceeded guidance values at nine locations sampled. The concentrations of arsenic, chromium, copper, mercury, lead and zinc exceeded their respective TAGM values. Arsenic was detected at five locations above the TAGM value at a maximum concentration of 168 mg/kg in sample SB-2. The area around sample SB-2 was identified as a hot spot. Chromium was detected at five locations above TAGM value (50 mg/kg) at a maximum concentration of 198 mg/kg. Copper was detected at three locations above TAGM value (50 mg/kg) at a maximum concentration of 177 mg/kg. Mercury was detected at three locations above TAGM value (0.2 mg/kg) at a maximum concentration of 3.1 mg/kg. Lead was detected at six locations above TAGM value (61 mg/kg) at a maximum concentration of 269 mg/kg. Zinc was detected at nine locations above TAGM value (50 mg/kg) at a maximum concentration of 1,390 mg/kg. Subsurface soil samples were collected from 12 soil boring locations. A total of 12 subsurface soil samples was collected from the FMPA. No VOCs were detected above the guidance values. Metals (arsenic, chromium, copper, mercury and zinc) in several FMPA samples were also detected above their respective TAGM values.

Waste Material (Sludge Fill)

Chemical analytical results of the sludge fill present in the ILA are based on three samples (GMW-1 through GMW-3) that were analyzed for VOCs and one composite sample that was analyzed for SVOCs and metals. Samples of the sludge fill contained concentrations of some VOCs. The VOCs detected at the highest concentrations are as follows: acetone, 15 mg/kg; 2-butanone, 3.2 mg/kg; and toluene, 1.7 mg/kg. The following 12 VOCs were also detected at concentrations of less than 1 mg/kg: 1,1-dichloroethane, 1,2-dichloroethane, 2-hexanone, 4-methyl-2-pentanone, benzene, carbon disulfide, chlorobenzene, ethylbenzene, xylenes, methycyclohexane, styrene and tetrachloroethene. SVOCs and metals were detected in the composite sample. The SVOCs and the concentrations at which they were detected are as follows: 4-methylphenol, 150 mg/kg; naphthalene, 22 mg/kg; phenol, 15 mg/kg; pentachlorophenol, 6.8 mg/kg; and phenanthrene, 1 mg/kg. The metals arsenic, chromium and zinc were detected at concentrations of 34.8 mg/kg, 9,280 mg/kg and 6,060 mg/kg, respectively. The sludge fill material also contained 10 percent total organic carbon.

Seep Contamination

Groundwater seeps in the ILA adjacent to Cattaraugus Creek flow into the Creek. Seeps were sampled in order to determine if contaminants in the seeps are entering surface water. Contaminants in seeps were compared to surface

1 *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.*

water standards and criteria. Ammonia and sulfur-like odors have been frequently noted near the seeps. Ammonia concentrations ranged from 381 to 891 mg/l and exceeded the surface water quality criterion of 1.3 mg/l. Sulfide concentrations ranged between less than 1 and 9 mg/land exceeded the surface water quality criterion of 2 mg/l. No VOCs or SVOCs were detected above surface water criteria in any of the samples taken from the seeps.

Chromium was found in all but one of the seep samples, at levels exceeding surface water standards. The detection of elevated levels of ammonia and sulfide in the seep samples, is consistent with reports of odors noted near the seeps.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) were conducted to estimate the current and future effects of contaminants in soils, groundwater, fish, sediment, and surface water on human health and the environment. The HHRA and SLERA provide analyses of the potential adverse human health and ecological effects caused by the release of hazardous substances from the Site. Both assessments evaluate the risks in the absence of any actions or controls to mitigate these releases under current and future land uses. Potential future uses of the ILA include a recreational park. Uses of the FMPA include a recreational park and industrial/commercial uses. Consistent with the NYSDEC GA groundwater classification, the groundwater was evaluated as a potable water supply although the site groundwater is not currently used as a drinking water source.

Human Health Risks

Detailed results of the HHRA can be found in a document titled "Baseline Risk Assessment" prepared by Geomatrix Consultants, Inc. and Benchmark Environmental Engineering and Science, PLLC, dated November 2003. The risk estimates are based on reasonable maximum exposure (RME) scenarios for current and future land uses and were developed by taking into account various default health protective assumptions about the frequency and duration of an individual's exposure to the surface and subsurface soils, groundwater, sediment, fish, and seep areas. In addition to the RME exposure scenarios, central tendency exposures (CTE) or average exposures were also evaluated and are described in the HHRA. The data used in the assessments included current data from the RI and historical data.

In determining future land uses for the site, EPA considered the "Reuse Assessment and Conceptual Plan for the Peter Cooper Gowanda Superfund Site" (Reuse Assessment and Concept Plan) developed by the Village of Gowanda in association with the University of Buffalo Center for Integrated Waste Management. The Reuse Assessment and Concept Plan was funded in part by EPA through its Superfund Redevelopment Initiative. The plan envisions a publicly available Site incorporating elements such as a walking/biking trail, fishing access, outdoor picnic areas, small boat launch and other related recreational features. Although this plan has not yet been formalized, the HHRA did consider potential uses of the property consistent with the Reuse Assessment and Concept Plan. For example, risks to a current adolescent trespasser, current/future recreational users of the Cattaraugus Creek; future recreational users of the park, and future outdoor worker and construction worker were evaluated in the HHRA as described below.

Determinations regarding further remedial action are based on the RME scenarios and exceeding EPA's risk range. Cancer risks are compared to the risk range outlined in the National Contingency Plan (NCP) that ranges from a cancer risk of one in a million (1×10^{-6}) to one in ten thousand (1×10^{-4}) and a Hazard Index of 1 for noncancer health effects.

As described in the box "WHAT IS RISK AND HOW IS IT CALCULATED?", the HHRA followed a four-step process that includes: Hazard Identification, Dose-Response, Exposure Assessment and Risk Characterization. A brief description of the results of each of these steps is provided below.

The assessment identified a number of Contaminants of Potential Concern (COPC) that were evaluated in the HHRA. Based on this analysis, the primary COPCs that exceeded the risk range and/or the HI described above included: arsenic in groundwater and soil at both the ILA and FMPA; and chloroform and carbon tetrachloride in the soil at the FMPA.

Toxicity values for inhalation, dermal and ingestion of COPCs at the ILA and the FMPA were selected based on the potential routes of exposure and available toxicity information.

The HHRA focused on current and future health effects to both children and adults. The most likely current and future receptors at the ILA and FMPA include: adult and adolescent trespassers (under current conditions and future recreational use); adult/child off-site residents exposed outdoors, construction workers; and recreational users of the Cattaraugus Creek and surrounding areas including the wetlands and seeps. Exposure routes included: incidental ingestion and dermal contact with soils and sediment; ingestion of fish; ingestion of groundwater; and inhalation of volatile organic compounds from groundwater and soils; and inhalation of landfill gas.

The HHRA evaluated exposures in the absence of remedial actions. The exposure point concentration was calculated using EPA statistical software. EPA approved models for estimating indoor air and fugitive dust emissions were also used.

Data were combined to calculate cancer risks and non-cancer health hazards expressed as an HI. The results of this analysis are provided below.

- Future outdoor park workers at the landfill area had cancer risks of 4×10^{-4} (four in 10,000) and a noncancer health HI of approximately 4 (HI = 4). The cancer risks and noncancer HI exceed the

> **WHAT IS RISK AND HOW IS IT CALCULATED?**
>
> A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.
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> *Hazard Identification:* In this step, the COPCs at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.
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> *Exposure Assessment:* In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.
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> *Toxicity Assessment:* In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.
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> *Risk Characterization:* This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

acceptable levels. The risk is primarily attributed to the ingestion of groundwater contaminated with arsenic underlying the Site.

- Future outdoor industrial workers at the FMPA had cancer risks of 4×10^{-4} (four in 10,000) and a non-cancer health HI of approximately 4 (HI = 4). Both the cancer risks and non-cancer HI exceed acceptable levels. The risk is primarily due to ingestion of arsenic in groundwater.

- Future construction workers at the landfill had potential cancer risks of 6×10^{-6} (six in 1,000,000); these risks are within the acceptable risk range. The noncancer HI of approximately 3 (HI = 3) exceeds the acceptable level with arsenic in soil being the primary contaminant contributing to this HI.

- Future construction workers at the FMPA had a cancer risk of 5×10^{-6} (five in 1,000,000) which is within the risk range and an HI = 4, which exceeds the acceptable level. Chloroform and carbon tetrachloride in soil are the primary chemicals contributing to the HI value under future conditions during construction.

The HHRA found that all other exposure scenarios for all other receptors were either within or below the risk range and are not discussed further. The assessment found potential future recreational uses of the FMPA by children, adolescents and adults under exposure scenarios identified in the HHRA, were at or within the risk range. The HHRA provides details regarding the results of these individual assessments.

Ecological Risks

A Screening Level Ecological Risk Assessment (SLERA) was prepared to evaluate the potential risks to ecological receptors from contaminants in soils, surface water, landfill seeps, and sediment. EPA evaluated potential ecological risk for a number of areas of the site including the wetland area, the landfill area, and Cattaraugus Creek. The SLERA used analytical data from samples collected during the Remedial Investigation (RI) and information on the ecological communities present at the site. The ecological risk assessment was prepared in accordance with EPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 1997).

The overall conclusions of the SLERA are summarized below:

The SLERA indicates no potential ecological risks from organic contaminants to receptor species including fish, terrestrial plants, wetland plants, benthic invertebrates, terrestrial invertebrates, birds, and mink.

With limited exceptions, benthic organisms and fish in Cattaraugus Creek show no potential ecological risks from organic chemicals in creek sediment and surface water. Where potential ecological risks to benthic organisms and fish from inorganic chemicals in creek sediment and surface water occur, the associated chemical was present in upstream samples at similar concentrations to downstream samples. This suggests that the Site is not a significant contributor to the ecological risk.

The SLERA indicates potential for ecological risk to terrestrial receptors from organic and inorganic contaminants in soils at the Site. The food web model used in the SLERA indicates potential ecological risk from exposure to semivolatile organic compounds in soil, in particular polynuclear aromatic hydrocarbons (PAHs), which are SVOCs, for terrestrial mammalian species. The SLERA also indicates potential risk to terrestrial receptors including terrestrial invertebrates and mammals from one or more inorganic chemicals in soil including arsenic, chromium, lead, and zinc.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific risk-based levels.

The following RAOs were established for the Site:

- Reduce or eliminate any direct contact threat associated with the contaminated soils/fill;
- Minimize or eliminate contaminant migration from contaminated soils to the groundwater; and
- Minimize or eliminate contaminant migration from groundwater to Cattaraugus Creek.

Soil cleanup objectives will be those established pursuant to the TAGM guidelines. These levels are the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater as specified in the TAGM. All of these levels fall within EPA's acceptable risk range.

Groundwater cleanup goals will be the more stringent of the state or federal promulgated standards.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARS, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the Site can be found in the FS report. Note that the FS report presented separate alternatives for six of the media associated with the Site (Leachate Seeps, Elevated Fill Subarea, Three Hot Spots, Elevated Fill Subarea Gas and Groundwater). However, to facilitate the presentation and evaluation of these alternatives, the FS report alternatives were reorganized to formulate the remedial alternatives discussed below.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The remedial alternatives are described below.

<u>REMEDIAL ALTERNATIVES</u>

ALTERNATIVE 1: NO ACTION

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives. Under this alternative, no action would be taken to contain wastes, reduce infiltration into the landfill, eliminate areas of exposed waste, or control and treat leachate discharging from the landfill or address groundwater. Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site conditions be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

Capital Cost:	$0
O&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	None

ALTERNATIVE 2: INSTITUTIONAL CONTROLS

This alternative would consist of deed and access restrictions. The deed restrictions would be designed to prevent direct contact with the subsurface waste material in the Elevated Fill Subarea and the three hot spot areas by limiting future Site use. The deed restrictions would also be designed to prevent groundwater use on the Site for drinking water or potable purposes. In addition to the institutional controls, access would be restricted by the construction of a fence around the Elevated Fill Subarea where insufficient cover soils and/or vegetative cover exist. Access to the Elevated Fill Subarea by authorized personnel would be through one or more lockable gates. No remedial action would be taken with regard to the leachate seep or landfill gasses. To allow subsurface construction in the hot spot area a soils management plan will be required and developed to provide guidance for workers involved in handling of soil/fill from this area (e.g., personal protective equipment requirements during underground utilities construction, methods for disposing of soil/fill removed from excavation, etc.). Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site conditions be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

Capital Cost:	$ 54,000
Annual O&M Cost:	$ 11,500
Present Worth Cost:	$190,000
Construction Time:	6 months

ALTERNATIVE 3: EXCAVATION/BANK STABILIZATION/OFF-SITE DISPOSAL

This alternative would involve excavation of a total of approximately 140 cubic yards (CY) of VOC-impacted soil (MWFP-3 Subarea) and arsenic-impacted soil (SB-2 Subarea) from the FMPA; 5,800 CY of arsenic-impacted soil/fill (LFSS-6 Subarea) from the ILA ; and, 100,000 CY of sludge fill material from the Elevated Fill Subarea with transport of excavated materials to a permitted, off-site disposal facility for treatment and/or disposal. The alternative would require bank stabilization of the Cattaraugus Creek to the 100-yr floodplain elevation after the sludge fill removal is completed. The bank stabilization would extend from the existing concrete retaining wall (sluiceway wall) to the existing riprap stabilization on the NYSEG property. The areas would then be backfilled with clean soil to match the surrounding grade, covered with topsoil, and seeded to promote vegetative growth. On-site dewatering of the sludge fill and/ or admixing with drier soils would be required during removal of saturated materials in order to eliminate free liquid. The estimated amount of material requiring disposal is 150,000 tons, assuming admixing was employed at a rate of approximately one ton dry soil to two tons of sludge fill material.

Since the waste would be removed, the Elevated Fill Subarea will no longer be acting as a source of contamination to the groundwater and the Creek. The remaining contaminated groundwater would rely primarily on the natural mechanisms of dispersion and dilution to reduce the contamination throughout the Site. The impact of the groundwater discharge to the creek would also be addressed by the removal of the waste. Because this alternative would result in contaminants remaining in the groundwater above health-based levels, CERCLA requires that the Site conditions be reviewed at least once every five years.

Capital Cost:	$12,293,000

No annual cost is associated with this alternative.

Construction Time:	9 -21[2] Months

ALTERNATIVE 4: EXCAVATION/CONSOLIDATION/ CONTAINMENT/ WITH SOIL ENHANCEMENT CAP AND A GROUNDWATER DIVERSION SYSTEM

This alternative would include the deed restrictions described in Alternative 2 above with the addition of the following remedial measures:

- Excavating of approximately 140 cubic yards (CY) of VOC-impacted soil (MWFP-3 Subarea) and arsenic-impacted soil (SB-2 Subarea) from the FMPA; and 5,800 CY of arsenic-impacted soil/fill from the ILA (LFSS-6 Subarea), and consolidating the excavated materials within the Elevated Fill Subarea. Confirmation sampling of the sidewalls and bottom of the excavation would be performed to verify that no residual soil/fill containing VOCs or arsenic above guidance levels remains. The area would then be backfilled with clean soil and seeded to promote vegetative growth.

- Containing the waste by placing a minimum of 12 inches of low permeability ($<1 \times 10^{-5}$ cm/sec) soil across the entire 5-acre Elevated Fill Subarea (this will result in a soil cap of varying depth between 12 inches [in those areas where the cap has been eroded and wastes currently are exposed] and 57 inches [across most of the Elevated Fill Subarea where existing soil cover is already present at varying thicknesses up to 45 inches]). The soil cap would then be covered with top soil and seeded to promote vegetative growth; and

- Limiting groundwater migration through the Elevated Fill Subarea via an upgradient groundwater diversion system. Typical groundwater subsurface lateral barriers such as slurry walls, compacted clay walls, grouting and sheet piling are often implemented in conjunction with a cover system and groundwater/leachate collection to reduce lateral contaminant migration. The upgradient groundwater diversion system would employ a slurry wall keyed into the upper 1-2 feet of soft shale bedrock. The slurry wall would be constructed upgradient of the perimeter of the Elevated Fill Subarea, extending from the remnants of the former hydroelectric dam on the creek bank to the southwestern site boundary. The remaining contaminated groundwater would rely primarily on the natural mechanisms of dispersion and dilution to reduce the contamination throughout the Site.

- Reviewing site conditions at least once every five years as per CERCLA, because this alternative

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[2] Nine months if work is completed in a single construction season, 21 months if a second construction season is required.

would result in contaminants remaining on-site above health-based levels; and

- Selecting one of two leachate seep collection options described below.

Option A — Bank Stabilization, Collection of Leachate Seep and discharge to the Public Owned Treatment Works (POTW) for Treatment and Disposal.

Prior to seep collection, the banks of the Cattaraugus Creek adjacent to the Elevated Fill Subarea would be stabilized to the top of the 100-year floodplain (approx. 770 feet above mean sea level) using existing bank stabilization materials and additional large rip-rap, as necessary. To collect seeps, a trench would be excavated into the surface of the weathered shale bedrock at the toe of the slope to intercept the seeps. A perforated drainage pipe and granular media would collect and transmit the seep water to one or two small packaged leachate pump stations. If the POTW requires pretreatment, the collected seeps would be treated by aeration using a fine or course bubble diffuser. From the pump station, approximately 4,300 gallons per day of leachate seep water and shallow groundwater, would be conveyed via gravity to the Village of Gowanda's sewer collection system on Palmer Street. The slope of the regraded bank would be lined with a geocomposite drainage layer, leading to the collection trench, and covered by a geomembrane liner to prevent seep breakout and surface water infiltration during high water conditions. The construction and start-up time is estimated to be nine months.

Option B — Bank Stabilization, Collection of Leachate Seep, Treatment and Discharge to Cattaraugus Creek

This option is similar to Option A, however, it would involve on-site treatment of the seep water with direct discharge of the treated effluent to Cattaraugus Creek. The treatment process would utilize biological treatment by a sequencing batch reactor (SBR). The SBR process is a sequential activated sludge process in which all major steps occur in the same tank in order. A single cycle would consist of five discrete periods: fill, react, settle, decant, and idle. The SBR system would first be filled with leachate seep water from a holding tank and aeration would begin. Depending on discharge limits, it may be necessary to post-treat the bio-treated effluent to remove inorganic compounds and/or suspended solids before discharging to the creek. The construction and start-up time is estimated to be 12 months.

Capital Cost:	4/A	$1,776,000
	4/B	$2,325,000
Annual O & M Cost:	4/A	$ 29,000[3]
	4/B	$ 86,000
Present Worth Cost:	4/A	$2,222,000
	4/B	$3,647,000
Construction Time:		17 - 20 Months

ALTERNATIVE 5: EXCAVATION/CONSOLIDATION/ CONTAINMENT WITH PART 360-EQUIVALENT DESIGN BARRIER CAP/ A GROUNDWATER DIVERSION SYSTEM/INSTITUTIONAL CONTROLS

This alternative would be identical Alternative 4 above except that the waste in the 5-acre Elevated Fill Subarea would be contained with a low permeability equivalent design barrier cap consistent with 6 New York Code Rules Regulations Part 360. Five-year reviews, and one of the two leachate seep collection, treatment, and disposal options described in Alternative 4 would be included. The cap would consist of the following components:

6-12 inches topsoil
18-24 inches protective barrier low permeability material.

Capital Cost:	5 /A	$2,055,000
	5/B	$2,625,000
O & M Cost:	5/A	$ 31,000
	5/B	$ 88,000
Present Worth Cost:	5/A	$2,571,000
	5/B	$3,971,000
Construction Time:		20-23 months

Additional Components of the Remedial Action Common to the Containment Portion of Alternatives 4 and 5

All of the containment alternatives, consistent with NYSDEC closure requirements, would require post-closure operation and maintenance to operate and maintain the vegetative cover and gas venting systems. In addition, a gas, air, and groundwater monitoring program would be required.

Current New York State landfill closure regulations require the installation of a passive gas venting system comprised of at least one gas vent riser per acre, to minimize landfill gas build-ups within the fill. If levels of VOCs or methane in landfill gases are expected to be high, then an active system would be appropriate.

In general, methane gas levels at the Elevated Fill Subarea during the RI were detected in two samples up to 31.1%. Levels of other nonmethane VOCs were detected at levels

[3] The O&M costs for Alternative 4A and 5A do not include any user fees that may be charged by the POTW for the treatment of leachate.

slightly above guideline values. It is expected that the levels of both methane and nonmethane VOCs would be reduced once a venting system is in place. Therefore, based on landfill characteristics, it is anticipated that a passive gas venting system would be the appropriate method for gas control. However, the passive system would be designed and monitored so that it could easily be converted to an active system should levels of VOCs be detected in excess of ARAR emission standards. After the installation of the final cap and venting system, two quarterly rounds of sampling of the gas vents for methane and nonmethane VOCs would be conducted. The sampling results would be utilized to determine whether the installed venting system is adequate or additional venting is necessary or whether it is necessary to convert the system to an active system with treatment of gas.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, *Overall protection of human health, and the environment, Compliance with applicable, or relevant and appropriate requirements, Long-term effectiveness and permanence, Reduction of toxicity, mobility, or volume through treatment, Short-term effectiveness, Implementability, Cost,* and *State and Community acceptance.*

The evaluation criteria are described below.

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of Federal and State environmental statutes and requirements or provide grounds for invoking a waiver.

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, that a remedy may employ.

5. Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital and operation and maintenance costs, and the present-worth costs.

8. State acceptance indicates if, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations regarding the preferred alternative.

9. Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS Reports.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

Alternative 1 (no action) and Alternative 2 (institutional controls) are not protective of human health and the environment because they do not minimize infiltration and groundwater flow into the Elevated Fill Subarea, thereby allowing further leaching of contaminants into the aquifer and the surface water; they do not provide control or treatment of the leachate seeps or landfill gases; and they do not protect terrestrial mammals from soil contamination.

Alternative 3 would be the most protective because it would permanently remove the source of contamination to the groundwater and creek, although it would not actively address residual groundwater contamination. Alternatives 4 and 5 would provide good overall protection of human health and the environment by containing waste with a landfill cap, controlling landfill gas through venting, controlling groundwater flow through the Elevated Fill Subarea with a groundwater diversion system and controlling and treating the leachate seeps. Alternative 5 is more protective than Alternative 4 because it requires a thicker cap of low permeability material to reduce infiltration, thereby reducing the generation of leachate which mobilizes contaminants into the groundwater. Options A and B for leachate seep collection, treatment, and discharge considered for Alternatives 4 and 5 are considered to be equally protective of human health and the environment.

Compliance with ARARs

There are currently no federal or state promulgated standards for contaminant levels in soils. However, EPA is utilizing New York State soil cleanup objectives as specified in the soil TAGM (which are used as "To-Be-Considered" criteria). Action-specific ARARs include 6NYCRR Part 360 requirements for closure and post-closure of municipal landfills and the NYSDEC State Pollutant Discharge Elimination System program. The Part 360 regulations require that the landfill cap promote runoff, minimize infiltration, and maintain vegetative growth for slope stability. Alternative 3 would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. Unlike Alternative 4, Alternative 5 is consistent with an equivalent cap design as specified in 6 NYCRR Part 360. The options for leachate collection, treatment and disposal considered under Alternatives 4 and 5 would be designed to ensure compliance with their associated ARARs, including SPDES limits for discharge to surface water and air emission standards for an air stripper. In addition, approvals from the NYSDEC Division of Fish and Wildlife and the US Army Corps of Engineers would be required prior to work on the creek bank and within the 100-year flood plain.

Chemical-Specific ARARs at the Site include State and Federal Maximum Contaminant Levels (MCLs). None of the groundwater alternatives would meet chemical-specific ARARs under the Elevated Fill Subarea. However, Alternatives 4 and 5 would be consistent with EPA's groundwater policy to measure the performance of the remedy at the edge of the waste management area when waste is left in place. Although none of the alternatives would restore the on-site groundwater to MCLs, Alternatives 4 and 5 would be effective in preventing and/or reducing further groundwater migration through the waste and into the Creek. By constructing a proper cap to minimize infiltration and a collection system to collect leachate seeps in conjunction with the groundwater diversion system to limit lateral groundwater migration, the Elevated Fill Subarea will no longer be acting as a source of contamination to the groundwater and the Creek. The residual contaminated groundwater would rely primarily on the natural mechanisms of dispersion and dilution to reduce the contamination throughout the Site. The impact of the groundwater discharge to the creek will also be addressed by the groundwater diversion system, in conjunction with the cap.

Long-Term Effectiveness and Permanence

Alternatives 1 and 2 would involve no active remedial measures and, therefore, would not be effective in eliminating potential exposure to contaminants in soil or groundwater. These alternatives would allow the continued migration of contaminants from the soil to the groundwater. Alternative 3 would be the most effective alternative over the long term.

A landfill cap is considered a reliable remedial measure that, when properly designed and installed, provides a high level of protection. Of the two cap alternatives considered in detail, Alternative 4 would be less reliable in protecting human health and the environment than Alternative 5 because it allows more precipitation to infiltrate through the Elevated Fill Subarea which would result in a greater degree of leaching of contaminants to groundwater. Post-closure operation and maintenance requirements would ensure the continued effectiveness of the landfill cap, landfill gas control system, and either of the two leachate system options for Alternatives 4 and 5. Options A and B for leachate seep collection, treatment, and discharge considered for Alternatives 4 and 5 would each effectively reduce the toxicity, mobility, and volume of contaminants in the leachate seeps. However, Option A provides the least risk of failure of process components, as it does not rely on site-specific treatment equipment.

Reduction in Toxicity, Mobility, or Volume

Alternatives 1 and 2 would provide no reduction in toxicity, mobility or volume.

Alternative 3 would reduce the mobility of waste in the Elevated Fill Subarea. However, admixing the sludge fill with drier soils in order to meet landfill acceptance criteria would increase the volume of sludge fill requiring disposal. Alternatives 4 and 5 would reduce the toxicity and mobility of the leachate seeps by collecting and treating the leachate. With the groundwater diversion system being utilized in Alternatives 4 and 5, leachate seep generation is expected to be reduced and/or eliminated. Compared to Alternative 4, Alternative 5 would provide greater reduction in the mobility and volume of contaminants by restricting infiltration through a thicker low permeability landfill cap, which would reduce the further leaching of contaminants to groundwater.

Short-Term Effectiveness

Alternatives 1 and 2 do not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts on property workers or the community as a result of its implementation.

There are short-term risks and the possibility of disruption of the community associated with Alternative 3. These include: an increase in traffic flow along local roads for an approximately nine-month period (21 months if a second construction season is required); noise from heavy equipment use; and strong odors. This traffic would raise dust and increase noise levels locally. However, proper construction techniques and operational procedures would minimize these impacts.

Short- term risks to workers could be increased to the extent that surficial wastes are encountered during excavation activities, but this risk would be minimized through the use of personal protection equipment. Once the surface of the Elevated Fill Subarea is completely covered or removed, these short-term impacts to the community, workers, and the environment would no longer be present.

There are short-term risks associated with Alternatives 4 and 5. These alternatives include caps, which would involve clearing, grubbing, and regrading of the Elevated Fill Subarea. Alternative 5 is more effective in the short-term than Alternative 4 because it limits leachate production to a greater extent than Alternative 4. Alternative 4 can be implemented more quickly, in 17 to 20 months, while Alternative 5 is estimated to take 20 to 23 months.

Implementability

Alternatives 1 and 2 would be the easiest soil alternatives to implement, as there are no active remedial measures to undertake.

Alternative 3 faces many implementability issues including truck traffic coordination through the residential neighborhood and Village, odor and vector control difficulties, sludge dewatering issues, and available landfill capacity at an off-site location. Alternatives 4 and 5 can be readily implemented from an engineering standpoint and utilize commercially available products and accessible technology. However, for the construction of the groundwater diversion system, a specialty contractor would be required.

The treatment of the leachate seep under Options A and B can be implemented. Discharge of the treated leachate to the Cattaraugus Creek (Option B) would require compliance with technological limitations and water quality standards for protection of the creek. Discharge of the leachate to a local POTW may require pretreatment of the leachate, consistent with the pretreatment requirements of the POTW's SPDES permit, to remove inorganics prior to discharge. In addition, administrative implementability issues related to work on the creek bank which is located within the 100-year floodplain can be expected.

Cost

The estimated capital, operation, maintenance, and monitoring (O&M), and 30-Year present-worth costs for each of the alternatives are presented below. The annual O&M cost for most of the alternatives include groundwater monitoring.

Alternative	Capital	Annual O&M	Total Present Worth
1	$0	$0	$0
2	$44,000	$9,500	$190,000
3	$12,293,000	$0	$12,293,000
4/A-B	$1,776,000- $2,325,000	$29,000- $86,000	$2,222,000- $3,647,000
5/A-B	$2,164,000- $2,734,000	$31,000- $88,000	$2,680,000- $4,080,000

Alternative 3, excavation, has the highest cost of any alternative with a capital cost of $12.3 million. Of the two containment alternatives, Alternative 4 has the lower capital and O& M costs, resulting in a net present worth ranging from $2,222,000 to $3,647,000 because it uses less cover and minimal fill. Alternative 5 has the higher cost, with a net present worth ranging from $2,680,000 to $4,080,000, because it would use an estimated 20,000 CY of fill material to create a base for the landfill cap. The costs noted above for the two containment alternatives include the costs to implement leachate Options A and B which have net present worth costs of $1.1 and $2.5 million, respectively. However, for option A the costs do not include any user fees that may be charged by the POTW for the treatment of leachate.

State Acceptance

NYSDEC concurs with the preferred alternatives.

Community Acceptance

Community acceptance of the preferred alternatives will be assessed in the ROD following review of the public comments received on the proposed Plan.

PROPOSED REMEDY

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 5A (Excavation/Consolidation/Containment with Part 360-Equivalent Design Barrier Cap, Bank Stabilization/Collection of Leachate Seep/Treatment by Discharge to a POTW) and Institutional Controls as the preferred remedy for the Site. Specifically, this would involve the following:

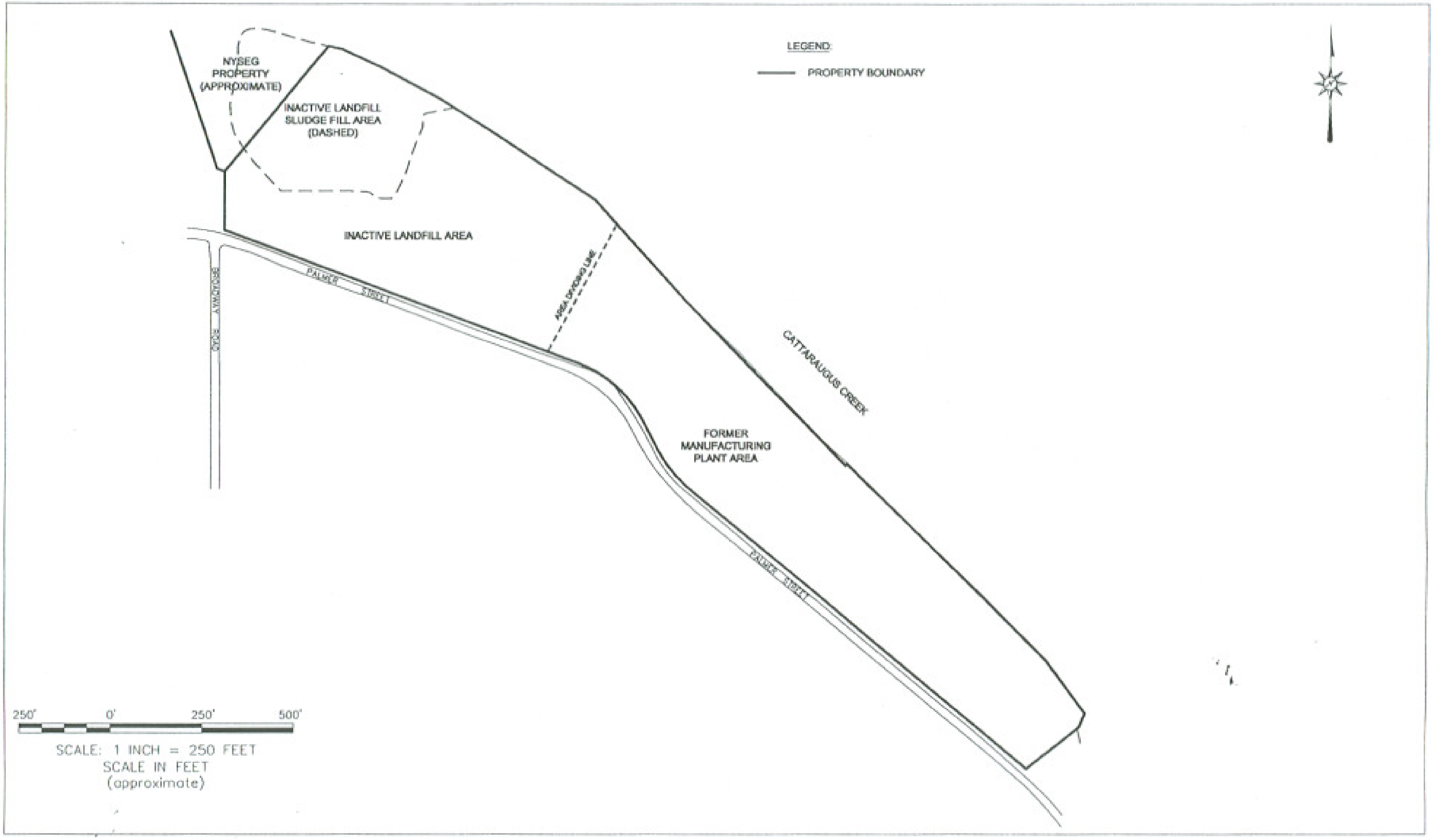
- Excavating the three hot-spot areas and consolidating them within the Elevated Fill Subarea, then capping the 5-acre Elevated Fill Subarea of the ILA with a low permeability equivalent design barrier cap, consistent with the requirements of 6 NYCRR Part 360, including seeding with a mixture to foster natural habitat.

- Collecting the leachate seeps, pretreating the leachate, as necessary, then discharging the leachate seep to the POTW collection system for further treatment and discharge. As a contingency, if treatment of the leachate seep in the POTW is not available, the leachate would be treated using a sequencing batch reactor and discharged to Cattaraugus Creek. Since the installation of the cap and groundwater diversion system should reduce leachate generation, the volume of seep leachate requiring treatment is anticipated to be reduced or eliminated over time. For this reason, POTW treatment with any necessary pretreatment would likely be the most cost-effective option and, therefore, the preferred option. The specific treatment and disposal option will be further evaluated during the remedial design phase.

- Installing a groundwater diversion system to limit groundwater migration through the Elevated Fill Subarea. The upgradient groundwater diversion system would employ a slurry wall keyed into the upper 1-2 feet of soft shale bedrock. The slurry wall would be constructed upgradient of the perimeter of the Elevated Fill Subarea, extending from the remnants of the former hydroelectric dam on the creek bank to the southwestern site boundary;

- Installing a passive gas venting system for proper venting of the 5-acre Elevated Fill Subarea of the ILA;
- Stabilizing the banks of the Cattaraugus Creek;
- Establishing institutional controls in the form of deed restrictions/environmental easement and restrictive covenants on future uses of the Elevated Fill Subarea and to prevent use of groundwater on the Site for potable purposes;
- Performing long-term operation and maintenance including inspections and repairs of the landfill cap, gas venting, and leachate systems;
- Performing air monitoring, surface and groundwater quality monitoring; and
- Evaluating Site conditions at least once every five years to determine if a modification to the selected alternative is necessary.

The selected alternative provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the selected alternative will be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.



PETER COOPER LANDFILL SITE
GOWANDA, NEW YORK

FIGURE 1
SITE MAP

CDM