New York State Department of Environmental Conservation

John P. Cahill
Commissioner

MEMORANDUM

TO: Michael J. O'Toole, Jr., Director, Division of Environmental Remediation
FROM: Edward R. Belmore, Director, Bureau of Western Remedial Action
SUBJECT: **ROD Briefing: Forest Glen Site No. 9-32-097**

DATE: SEP 10 1999

Attached for your review is the draft Record of Decision (ROD) for the Forest Glen Site. Also attached is a ROD Summary Sheet. A briefing has been scheduled for Wednesday, March 26, 1997 at 1:30 p.m. in your office. This is an NPL site and the USEPA has the lead on the project. The selected remedy is the same as was proposed and no major issues were raised during the comment period. We are preparing a ROD concurrence letter to the USEPA for your review. We do not yet have written concurrence from the NYSDOH.

As was discussed at length during the review of the proposal to amend the OU2 ROD, the original remedy called for consolidation of contaminated soil into the "northern aspect" of the site followed by placement of a Part 360 cover system. Based upon the change in site zoning from residential to commercial that has occurred, the EPA believes that capping in-place is a more cost-effective remedy. This would also make the remedy more compatible with commercial development of the site. A commercial developer is still interested in the site. If development does not occur, we believe that EPA should revert to the original remedy. EPA believes this would not be cost-effective and has agreed to revert to the original remedy only if the zoning is changed back to residential by the municipalities. In the DEC's concurrence for the proposal, we stated our preference that the remedy revert back if development does not occur but agreed that the EPA's approach would be protective. We recommend that the concurrence letter for the ROD contain the same qualification.

The full ROD contains several hundred pages of additional attachments that are not critical to this review (e.g., public meeting transcript) and have not been included but are available upon request.

The DEC project manager for this site is Mr. Vivek Nattanmai of this Bureau.

Attachments

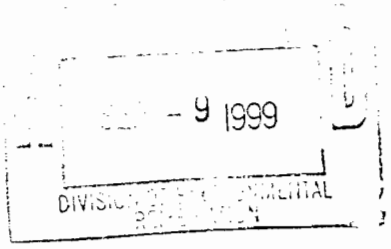
cc: w/att. T. Quinn
S. Ervolina
J. Harrington
A. English
V. Nattanmai

RECORD OF DECISION

Forest Glen Subdivision Site

Town of Niagara and City of Niagara Falls,
Niagara County, New York

United States Environmental Protection Agency
Region II
New York, New York
August 1999



ROD FACT SHEET

SITE

Site name: Forest Glen Subdivision Site

Site location: Town of Niagara and City of Niagara Falls, Niagara County, New York

HRS score: 37.50

ROD

Selected Remedy: Capping of contaminated soil above the cleanup goals, with limited excavation and consolidation of soil under an engineered cover system (cap) and the implementation of a maintenance and monitoring program to ensure the integrity of the cap. Institutional controls will be used to prevent intrusive activities from being performed on the cap.

Extraction and treatment of contaminated ground water until MCLs are reached in the on-property plume. The extracted ground water will be transported via sanitary sewer for treatment at the City of Niagara Falls Waste Water Treatment Plant. The off-property plume will be allowed to naturally attenuate with long-term ground-water monitoring.

	SOIL	GROUND WATER
Capital Cost:	$10,454,000	$ 291,200
O & M Cost:	$ 112,281	$3,431,900
Present-Worth Cost:	$12,454,000	$3,723,000

LEAD United States Environmental Protection Agency

Primary Contact: Gloria M. Sosa (212) 637-4283

Secondary Contact: Kevin M. Lynch (212) 637-4287

Main PRPs: The Goodyear Tire and Rubber Co.
Thomas G. Sottile

WASTE

Waste type: Various volatiles, semi-volatiles, PCBs, PAHs and inorganics.

Waste origin: Suspected industrial waste

Estimated waste quantity: Total volume of contaminated soil and sediment 285,200 cubic yards

Contaminated media: Soil, sediment and ground water

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Forest Glen Subdivision Superfund Site

City of Niagara Falls and Town of Niagara

Niagara County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Forest Glen Subdivision Site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from the NYSDEC is attached to this document (Appendix IV).

The information supporting this remedial action decision is contained in the administrative record for this Site. The index for the administrative record is attached to this document (Appendix III).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Forest Glen Subdivision Site, if not addressed by implementing the response actions selected in this Record of Decision, may present an imminent and substantial endangerment to the public health or welfare, or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision (ROD) selects a remedy for contaminated ground water (designated as Operable Unit 3) at the Site , as well as amends the 1998 ROD for soils and sediment (designated as Operable Unit 2). The first Operable Unit of Site remediation was the subject of a 1989 ROD which addressed the permanent relocation of the residents of the Forest Glen Subdivision.

Selected Ground-water Remedy (OU3)

The major components of the selected ground-water remedy include:

- Extraction of contaminated ground water from the on-property plume;

- The extracted ground water will be transported via sanitary sewer to the City of Niagara Falls Wastewater Treatment Plant;

- Construction of an on-site, 12-hour holding tank, as required by the City of Niagara Falls Wastewater Treatment Plant;

- Sampling from the storage tank effluent pipe will be conducted as required by the City of Niagara Falls Wastewater Treatment Plant;

- A Long-Term Ground-Water Monitoring Program will be conducted to assess whether the remedy is functioning as designed;

- A Monitored Natural Attenuation Study, including a baseline investigation and ground-water modeling, will be performed to evaluate intrinsic biodegradation and other natural attenuation processes. If monitoring indicates that natural attenuation is not effective in remediating the off-property ground-water contamination, active remedial measures will be considered.

The Remedial Action Objective for ground water is to restore the potable aquifer underlying the Site to drinking-water quality. It is expected that the contaminated ground water underlying the property will be restored to drinking-water standards in approximately 7 years. Also, it is expected to take approximately 12 to 14 years for the off-property contaminated ground water to achieve drinking-water standards.

Selected Soil/Sediment Remedy (OU2)

The zoning of the Site has changed from residential to commercial/light industrial. The 1998 ROD considered the anticipated future land-use at the Site to be residential. Since the land use changed, EPA reevaluated the remedial alternatives for contaminated soil and sediment and selected a new remedy.

EPA has determined, upon consideration of the requirements of CERCLA, the results of the RI/FS, the detailed analysis of the various alternatives, and public comments, that Alternative S-3, Capping, is the appropriate remedy for the contaminated soils and sediments at the Site. This remedy addresses the low-level threat wastes at the Site.

The major components of the selected soil/sediment remedy are as follows:

- Construction of an engineered cover system (landfill cap) over the contaminated soils/sediment at the site in conformance with the major elements described in 6 New York Code of Rules and Regulations Part 360 for landfill caps. Conceptually, the standard Part 360 cap includes: 18 inches of low-permeability soil cover barrier or geomembrane to ensure a permeability of 10-7 cm/sec, six inches of porous material serving as a drainage layer, 24 inches of soil as a barrier protection layer and six inches of topsoil and grass cover. The areas of the Site to be capped are the Berm and the areas of contaminated soil (above

TAGMs)in the Subdivision and Edgewood Drive Wooded Lots and the Berm. Areas of contaminated soil (above TAGMS) located in the Northern Aspect will be excavated and consolidated under the cap.

- Implementation of a long-term inspection and maintenance program to ensure cap integrity.

- Removal and off-site disposal of the vacant trailers and two permanent homes to prepare the Site for excavation and capping.

- Taking measures to secure institutional controls in the form of deed restrictions to limit future Site activities, as appropriate, and fencing to limit future access to the capped area.

- Capping the Wooded Wetland with six inches of clean sediment. If the Wetlands Assessment and Mitigation Plan conclude that the addition of six inches of clean sediment would have an adverse impact on the wetland, contamination in the Wooded Wetland would be excavated and it would be appropriately restored.

- An investigation will be performed in East Gill Creek during Remedial Design to determine if there are upstream sources of contamination that may impact the Site.

The Remedial Action Objective for contaminated soils and sediments is to contain the source area and to prevent further migration of contaminants to the ground water to the extent practicable.

A developer is interested in building a commercial development at the Site. If the Site is commercially developed, the engineered cover system (cap) covering the contaminated soils/sediments may not consist of the components listed in 6 NYCRR Part 360, but it would need to meet the requirements of an equivalent design, as specified in 6NYCRR, Section 360-2.13(w)of the New York State regulations.

The selected soils/sediment remedy is based on the anticipated future use of the Site as commercial/light industrial. If the proposed development fails to be implemented in a timely manner and the property is then promptly rezoned for residential use, EPA expects that it would issue a public notice changing the OU2 soils/sediment remedy back to the remedy selected in the 1998 ROD.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA § 121, 42 U.S.C. § 9621. It is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, given the scope of the action. However, the remedy does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume of contaminants as their principal element.

Because this remedy will result in hazardous substances remaining on the Site above health-based levels, a review will be conducted within five years after commencement of the remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

_____ _____

Jeanne M. Fox Date
Regional Administrator

TABLE OF CONTENTS

ATTACHMENTS

SITE NAME, LOCATION AND DESCRIPTION

The Forest Glen Subdivision Site is located in both the Town of Niagara and the City of Niagara Falls, Niagara County, New York (*see Figure 1*). The Site, approximately one-half mile north of Porter Road, is accessed from Service Road. Expressway Village mobile home subdivision is adjacent to the Site's southern boundary; I-190 is to the north and to the east; and the Conrail-Foote railroad yard is to the west.

The 39-acre Site (*see Figure 2*) is divided by East Gill Creek, a narrow, low-flowing creek, into separate parcels of land. South of Gill Creek is the now vacant 15-acre Forest Glen Subdivision, consisting of 51 mobile and two permanent residences. Access to the former Subdivision is through Edgewood Drive. Edgewood Drive formally was connected to an adjacent neighborhood, but the construction of the interstate highway I-190 in the early 1960s bisected the road. The southern portion of the Site also includes the Edgewood Drive Wooded Lots, which are two 3-acre undeveloped wooded lots located to the north and south of Edgewood Drive. The northern portion of the Site consists of the 18-acre Northern Aspect, which includes a 15-acre undeveloped triangle of land which is bordered on the west by a berm, approximately 11 feet in height. The 1.5-acre Wooded Wetland is on the eastern side of the Northern Aspect.

The Site is located in an area zoned for mixed residential, commercial and industrial use. The southern portion of the Site, including the former Subdivision, was zoned for residential land use. However, the City of Niagara Falls and the Town of Niagara recently (late 1998 and early 1999, respectively) rezoned these parcels of land to commercial/light industrial. The entire Site is now zoned commercial/light industrial.

The population of the City of Niagara Falls is 61,840. The population of Niagara County is 220,756. A total of 517 persons live within one-half mile of the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Prior to 1973, portions of the Site were owned by Michigan-Mayne Realty, the New York Power Authority and three individuals, Ernest Booth, James Strong, and Sanford Brownlee. In 1973, the land which now comprises the Site was purchased by Mr. Thomas G. Sottile, who, with his wife, Betty Sottile, formed the Niagara Falls U.S.A.

Campsite Corporation. Shortly thereafter, the property was subdivided. The development of the property, which included clearing and the installation of roads and utilities, took place during the mid-1970's. The sale of the properties in the Forest Glen Subdivision to individuals began in 1979.

Evidence of past waste disposal was apparent during the installation of utilities in the Subdivision which took place as early as 1973. During the installation of sewer and water lines, workers encountered resinous and powder-like waste, drums, and battery casing parts. There is also a history of reports indicating that residents encountered waste on their properties. In June 1980, the Niagara County Health Department (NCHD) responded to a complaint concerning the presence of drum tops and resinous material on the property of a resident living on Lisa Lane. Samples collected by the NCHD indicated that this material was a phenolic resin. Thomas Sottile was ordered by the NCHD in July 1980 to remove any wastes present at the Site to an approved landfill. It was subsequently reported to NCHD that approximately 10 truckloads of a yellow resin-like material were excavated and transported to the CECOS Landfill in Niagara Falls.

EPA first became involved in Forest Glen in 1987 when both NYSDEC and NCHD brought it to the Agency's attention. On August 6, 1987, as part of an initial Site Investigation, members of EPA's Field Investigation Team collected four soil samples in the northern portion of the subdivision. Analytical results for these samples indicated that volatile and semi-volatile organic chemicals and heavy metals were present at varying concentrations. In addition, numerous tentatively identified and unknown compounds which were difficult to analyze and quantify were noted at high concentrations. In an effort to determine if these compounds were present at other locations within the Subdivision, an expanded Site Investigation was conducted in September 1988. A total of 63 soil, waste, and sediment samples were obtained at this time to a maximum depth of 3.0 feet. Analytical results for these samples concluded that high concentrations of unknown and Tentatively Identified Compounds (TICs) were present at additional locations in the northern portion of the Subdivision.

In a March 9, 1989 Health Consultation, the Agency for Toxic Substances and Disease Registry (ATSDR) classified the Forest Glen Subdivision Site as posing a potential health threat to residents. ATSDR did not recommend that relocation was required at that time,

but, instead, indicated that TICs should be positively identified so that their health effects could be determined.

On March 25, 1989, EPA issued an Administrative Order, pursuant to Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, known as Supefund), requiring that three potentially responsible parties (PRPs), Thomas Sottile, the Niagara Falls USA Campsite Corporation, and Ernest Booth, carry out actions to reduce the immediate threat posed by conditions at the Site. Based on information available at the time EPA issued the Order, these three parties were viable and potentially responsible for contamination in the residential portion of the Site addressed in the Administrative Order. EPA ordered the PRPs to secure drums and containers at the Site which were leaking or in immediate danger of leaking and to submit a detailed Work Plan to EPA for construction and seeding of a cover to prevent contact with contaminated soil. The Order also directed that the Work Plan include fencing of the undeveloped areas east of the Subdivision on either side of Edgewood Drive and the off-site disposal of all drums and their contents present at the Site. These PRPs did not comply with this Order.

EPA executed interim measures to stabilize conditions and protect the public at the Site, including collection, staging, and securing drums and drum fragments that were located in the areas north and east of the Subdivision. EPA also installed temporary fencing around areas of suspected contamination in the two wooded areas north and south of Edgewood Drive. In addition, an area where contaminants were detected in high concentrations in surface soils was temporarily covered with concrete.

In April 1989, EPA resampled approximately fourteen of the locations that had previously exhibited the highest concentrations of compounds. An air sampling program was implemented in April 1989 that included the collection of samples of ambient air at locations throughout the Subdivision and beneath several mobile homes and from the basement of one permanent residence. The air sampling activities did not identify any of the target compounds, however, several compounds were detected that appeared to be originating from an upwind source.

In June 1989, the analysis of the soil samples collected in April of the same year positively identified aniline, phenothiazine, mercaptobenzothiazole, and benzothiazole present in the soils at significant concentrations.

On June 22 and 23, 1989, the New York State Department of Health (NYSDOH) conducted an exposure survey at the Forest Glen Subdivision. In that survey, 39 people from 23 households reported having contact with chemical wastes, and 45 people reported health problems that they believed were associated with chemicals on the Site.

Based on the positive identification of aniline, phenothiazine, mercaptobenzothiazole, and benzothiazole, together with the presence of semi-volatile polyaromatic hydrocarbons (PAHs), ATSDR issued a Preliminary Health Assessment for the Forest Glen Subdivision on July 21, 1989, which stated that the Site posed a significant threat to public health because of possible contact with contaminated soils and wastes and advised that immediate action be taken to relocate residents of the entire Subdivision beginning with the most contaminated areas.

On July 26, 1989, EPA, through an interagency agreement with FEMA, began a program which provided for the temporary relocation of residents from the Forest Glen Subdivision.

On July, 31, 1989, ATSDR issued a Public Health Advisory recommending that individuals be disassociated from the Site, that is, relocated, and that the Site be placed on the National Priorities List (NPL). The NPL is a list of sites slated for EPA cleanup or enforcement action under CERCLA Section 105.

The National Contingency Plan (NCP), which sets forth procedures and standards for the cleanup of hazardous waste sites, states in §300.425 (c), *Methods for determining eligibility for NPL*, that a release may be included on the NPL if "(3) the release satisfies the following criteria: (i) The Agency for Toxic Substances and Disease Registry has issued a health advisory that recommends dissociation of individuals from the release; (ii) EPA determines that the release poses a significant threat to public health; and (iii) EPA anticipates that it will be more cost effective to use its remedial authority than to use its removal authority to respond to the release."

Therefore, due to ATSDR's Health Advisory, the Site was listed on the NPL on November 29, 1989. Placement on the NPL enabled EPA to take remedial action at the Site. Before the Site was placed on the NPL, EPA had been utilizing its removal authority to take interim actions at the Site.

After completing a PRP search, EPA compiled a list of PRPs for the Forest Glen Subdivision Site. This list includes Goodyear Tire and Rubber Company, Thomas G. Sottile and the Niagara Falls USA Campsite Corporation.

On November 29, 1989, Special Notice was issued to the PRPs pursuant to Section 122 of the CERCLA. A sixty-day moratorium on remedial action at the Site, pending a good faith offer from the PRPs, was also initiated on that day. The PRPs subsequently declined to participate in any remedial action at the Site.

EPA conducted a Focused Feasibility Study of Relocation Options (FFS) to evaluate in detail three alternatives for relocating residents from the Site. The FFS evaluated a No-Action alternative, as required by CERCLA, as well as temporary and permanent relocation alternatives.

On December 29, 1989, EPA issued a Record of Decision (ROD) selecting permanent relocation of the residents of the Forest Glen Subdivision as the remedial action for the first operable unit (OU1). EPA, through the Federal Emergency Management Agency (FEMA), relocated the residents from June 1990, through December 1992.

Once EPA had relocated the residents from the Site, a Remedial Investigation and Feasibility Study (RI/FS) was performed to collect the data necessary to adequately characterize the Site for the purposes of developing and evaluating effective remedial alternatives, which, consistent with the NCP, may be implemented at the Site. EPA had information concerning the surficial contamination in the Subdivision prior to starting the RI/FS, but it did not know the vertical and lateral extent of the soil contamination and no data existed on the ground water.

On June 30, 1992, EPA again issued Special Notice to the PRPs. A sixty-day moratorium on EPA performing a RI/FS at the Site, pending a good faith offer from the PRPs, was also initiated on that day. However, the PRPs subsequently declined to participate in any RI/FS at the Site.

EPA conducted an RI/FS at the Site from 1994 to 1997. Initial Site Investigations were conducted in order to characterize the geologic and hydrogeologic conditions at the Site. In addition, surface and subsurface soil, wetland sediments, creek sediments, surface water and ground water were sampled.

EPA issued a Proposed Plan for Operable Unit 2, Soils, in September 1997. A public Meeting was held on October 15, 1997. In March 1998, EPA issued a Record of Decision for Operable Unit 2 selecting Excavation, Consolidation and Capping as the remedial action for soils at the Site.

EPA conducted a supplemental ground-water RI/FS in 1998 and early 1999 in order to address gaps in the ground-water data collected during the previous RI. EPA released the Proposed Plan for Operable Units 2 (Soil) and 3 (Ground Water) on April 16, 1999, as well as the Ground-Water Feasibility Study. The Proposed Plan presents EPA's preferred alternative for ground-water remediation, as well as proposes a revised remedy for the soils and sediments, Capping (in-place capping of contaminated soil with limited consolidation of soil and sediment).

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Ground-Water FS report and the Proposed Plan for the Site were released to the public for comment on April 16, 1999. These documents, as well as other documents in the administrative record were made available to the public at two information repositories maintained at the EPA Docket Room in Region II, New York and the U.S. EPA Public Information Office, located at 345 Third Street, Niagara Falls, New York. A notice of availability for the above-referenced documents was published in the Niagara Gazette on April 16, 1999. The public comment period established in these documents was from April 16 to May 17, 1999.

On April 28, 1999, EPA held a public meeting at the Niagara Fire Company Number One, located at 6010 Lockport Road, Niagara Falls, New York, to present the Proposed Plan to interested citizens and to answer any questions concerning the Plan and other details related to the RI and FS reports. Responses to the comments and questions received at the public meeting, along with other written comments received during the public comment period, are included in the Responsiveness Summary (*see Appendix V*). In addition, EPA also met with representatives of the Town of Niagara and City of Niagara Falls to discuss the Proposed Plan and to answer any questions concerning the Plan and other details related to the RI and FS reports.

SCOPE AND ROLE OF RESPONSE ACTION

Site remediation activities are sometimes segregated into different phases, or operable units, so that remediation of different environmental media can proceed separately, resulting in an expeditious cleanup of the entire Site. EPA has assigned three operable units for this Site. The first operable unit addressed the permanent relocation of the residents of the Forest Glen Subdivision which was completed in 1992.

The remedy selected in this ROD addresses ground-water contamination at the Site which EPA has designated as the third operable unit (OU3) or remediation phase. In addition, this ROD changes the remedy selected for the soil and sediment contamination, the second operable unit (OU2) for the Site. Subsequent to EPA's issuance of the March 1998 ROD for OU2, the intended future land use of portions of the Site changed from residential to commercial/light industrial. Therefore, EPA has reconsidered and reevaluated the soil/sediment remedial alternatives and selected a remedy which is consistent with the intended future land use. This ROD amends the 1998 ROD and is intended to be the final ROD for the Site.

SUMMARY OF SITE CHARACTERISTICS

EPA detected high levels of contamination in Site soils prior to the RI. Table 3 presents a summary of these analytical data collected by EPA during previous sampling events. Two areas with the highest levels of contamination were temporarily covered with concrete to prevent exposure to these contaminants. These covered areas were not resampled during the RI.

As part of the RI, initial site investigations were conducted in order to characterize the geologic and hydrogeologic conditions at the Site. In addition, surface and subsurface soil, wetland sediments, creek sediments, surface water and ground water were sampled.

A geophysical survey was conducted to investigate subsurface conditions and identify buried drums and waste. This work included an electromagnetic survey in the Northern Aspect and a seismic refraction survey in the Subdivision. Twelve test pits were excavated in the Northern Aspect at locations where anomalies were detected during the geophysical survey. A total of 48 surface soil samples were collected in the Subdivision, Northern Aspect and

Edgewood Drive Wooded Lots. Ten sediment samples were gathered from the Wooded Wetland. Two rounds of surface water and sediment samples were collected from East Gill Creek. A total of 34 wells in 15 locations were installed in the shallow and deep bedrock and the overburden. Four rounds of ground-water samples were collected to evaluate the nature and extent of ground-water contamination.

Samples collected from the different media were analyzed for the Target Compound List/Target Analyte List (TCL/TAL). The TCL consists of 130 compounds, including volatile organic compounds, semi-volatile organic compounds, pesticides and polychlorinated biphenyls (PCBs). The TAL inorganic analytes consist of 24 metals. In addition, based on the pre-RI sampling results, EPA developed a Site-specific list of rubber industry chemicals associated with Goodyear, designated as the Targeted Organic Compounds, (*see Table 1*) which were not included in the TCL/TAL.

A summary of the analytical data collected for OU2, listed by media and areas of concern, can be found in Table 2.

Physical Site Conditions

The Forest Glen Subdivision Site is generally flat, with the ground elevation increasing toward the north. Local variations in topography occur along East Gill Creek, the berm and several soil mounds. Surface elevations range from 591 feet above mean sea level (AMSL) in the Subdivision to 608 feet AMSL in the Northern Aspect.

Geology and Hydrogeology

The geology of the region consists predominantly of compact and generally impermeable lodgement till and glacial lacustrine clay common to the Niagara Escarpment. The lodgement till is a remnant of the receding glaciers of the last ice age. The resulting topography is generally flat, due to the scouring effect of the glacier and is poorly drained, due to the impermeability of the glacial lacustrine clay and glacial till.

The region surrounding the Site exhibits this glacial geomorphology, although evidence of manmade modification is apparent. The regional overburden consists of glaciolacustrine deposits (clay) and clay till deposits overlying the Lockport Dolomite bedrock. The Lockport Dolomite is a karst formation, generally 150 feet of dolostone overlying 120 feet of limestones

and shales, including the impermeable Rochester Shale, below which is limestone and sandstone, overlying the Queenstown Shale. The bedrock beneath the Site and throughout the region dips gently to the south at 29 feet per mile.

The Lockport Dolomite is the major water-producing formation of the area. At the Site, the hydrogeology is defined by three hydrostratigraphic zones: perched overburden water, shallow bedrock and deep bedrock. The overburden extends approximately from zero to 20 feet below ground surface (BGS). Due to the low permeability of the overburden clay and till, perched ground-water conditions were encountered at the Site. The shallow bedrock zone extends from 16 to 28 feet BGS. Ground water in this zone flows both vertically and horizontally through an interconnecting system of closely-spaced joints and bedding plane fractures. The deep bedrock zone is encountered at depths of 40 to 45 feet BGS. There is a zone of competent dolostone between the shallow and deep bedrock zones. It is probable that hydraulic communication occurs between the bedrock zones.

Ecology

There are four broad habitat categories at the Site: residential, wetland, aquatic and disturbed upland successional habitat. Nearly all the areas of the Site except the former Subdivision, have been determined to be wetland areas, including the following types: palustrine, forested, broad-leaved, deciduous wetland; palustrine scrub-shrub, broad-leaved, deciduous wetland, and emergent wetland.

Numerous on-site wildlife observations have been made, including the direct observations of birds, mammals, fish, amphibians, insects and arachnids. There were also observations of wildlife usage, such as scat, nests, tracks, runways and browsed vegetation.

Areas of Concern

The Site was divided into six areas of concern (AOCs) (*see Figure 2*) based upon their unique physical characteristics, historical use and waste disposal practices. The following is a description of each AOC.

AOC 1 - Berm

The 1.8-acre berm is located within the Northern Aspect (AOC 2). Approximately 1,300 feet long, 50 feet wide and 11 feet high, it is

bordered on the west and north by the Conrail Foote Railroad yard and to the south and east by the Northern Aspect. The berm was reportedly built in the 1970s to act as a sound barrier for the planned Subdivision and is constructed of fill material and native soil excavated from the ground surface of the Northern Aspect. Drums of waste material were discovered along the berm and were subsequently removed during previous EPA site activities.

AOC 2 - Northern Aspect

The Northern Aspect consists of an 15-acre open field located north of East Gill Creek and the Subdivision. According to historical records, the field was leveled and topsoil was used to create the earthen berm that acts as much of the Northern Aspect's western boundary. This area is bounded to the south by East Gill Creek and Service Road, to the north by the Conrail Foote railroad yard and to the east by Interstate 190. Anecdotal reports from area residents suggest illegal landfilling activities may have occurred in the Northern Aspect.

AOC 3 - Wooded Wetland

The Wooded Wetland is a 1.5-acre low-lying area located in the southeastern part of the Northern Aspect. This area is characterized as a palustrine forest, broad-leaved, deciduous wetland. It is bounded on the north and west by the Northern Aspect, on the south of East Gill Creek and to the east by Service Road. An intermittent stream was noted in the area occasionally connecting the Wooded Wetland to East Gill Creek.

AOC 4 - East Gill Creek

East Gill Creek is a narrow, shallow, low-flowing creek that serves as the Subdivision's northern boundary. Subdivision runoff is directed into the creek via two outfalls. Aerial photographs indicated that the creek was rerouted in the late 1960s from its original location 400 feet south of its present location. The creek flows onto the Site from the east through a series of culverts that flow under I-190.

AOC 5 - Edgewood Drive Wooded Lots

These are two wooded, undeveloped lots located north and south of Edgewood Drive. The lots are bisected by Edgewood Drive and are both bounded by T. Mark Drive to the west and Service Road to the

east. The north lot is approximately 3 acres in size and is bounded to the north by East Gill Creek. The south lot is approximately 3.3 acres in size and extends approximately 250 to the south of Edgewood Drive. Aerial photographs, together with stressed vegetation and topographical depressions, suggest that illegal landfilling occurred in the wooded areas over the years.

AOC 6 - Forest Glen Subdivision

This 15-acre area of concern includes the abandoned residential Subdivision located in the southwest corner of the Site. The Subdivision is bounded by T. Mark Drive to the east, the Conrail Foote Railroad yard to the west, Lisa Lane to the south and East Gill Creek to the north. The Subdivision is accessed via Edgewood Drive, off Service Road. The former residents of the Subdivision were relocated to prevent their exposure to high concentrations of surface-soil contaminants detected in sampling events performed by EPA prior to the RI. Areas of high contamination were temporarily covered with concrete.

Soil, Sediment and Surface-Water and Ground-Water Contamination

EPA detected high levels of contamination in Site soils prior to the RI (*See Table 3*). Two areas with the highest levels of contamination were temporarily covered with concrete to prevent exposure to these contaminants. These covered areas were not resampled during the RI.

In order to characterize the contamination, levels of organic contaminants detected at the Site were compared to NYSDEC's recommended soil cleanup objectives identified in the Technical and Administrative Guidance Memorandum (TAGM - *See Table 4*). The inorganic compounds, with the exception of mercury, were compared to soil background concentrations for these parameters. NYSDEC Technical Guidance for Screening Contaminated Sediments was used to assess sediments. Ground-water contamination was assessed against National Primary Drinking Water Standards (Maximum Contaminant Levels) and creek contamination was compared to New York State Water Classification and Quality Standards.

Fill was encountered in soil borings and test pits in the northwest section of the Northern Aspect, in all berm samples, in some borings in the Edgewood Drive Wooded Lots and in the northern and central section of the Subdivision. This fill varies in composition and appearance in different parts of the Site, but

generally includes black-stained material which is attributed to past dumping activities.

Soil Contamination: AOC 1 - Berm

The highest levels of contamination in the Berm were associated with the heavily stained fill material. The Targeted Organic Compounds were detected at the following concentrations in ppb: benzothiazole (410-150,000); diphenylamine (400-11,000); 2-mercaptobenzothiazole (270-1,100,000); 2-anilinobenzothiazole (90-960,000); N,N'-diphenyl-1,4-benzenediamine (18,000-210,000); perylene (1,400-3,800); phenothiazine (60-4,600); and phenyl isothiocyanate (1,100). The concentrations of these Targeted Organic Compounds in the Berm exceeded the NYSDEC cleanup objective for these contaminants by up to one thousand times (2-mercaptobenzothiazole). The semivolatile organic compounds were detected at the following range of concentrations in ppb: benzo(a)pyrene (210-3,800); benzo(b)fluoranthene (55-10,000); benzo(k)fluoranthene(55-11,000); benzo(a)anthracene (200-6,600); phenol (330-9,700); and 2-methylphenol (120-980). The concentrations of benzo(a)pyrene and phenol are 60 and 300 times the NYSDEC cleanup objective for these contaminants, respectively. The inorganic compounds were detected at the following range of concentrations in mg/kg or parts per million (ppm): cobalt (15.3-30.7); nickel (29.6-47.9); arsenic (2.3-15.8); chromium (21.4-120); mercury (0.19-13.5); lead (8.6- 73.6); copper (25-185); and vanadium (28.1-38.7). These metal concentrations are two to four times greater than their background concentrations, with the exception of the mercury which was detected at up to 135 times the NYSDEC cleanup objective for the contaminant.

It is estimated that there are approximately 56,000 cubic yards (cy) of subsurface soil in the Berm that contain contaminants above NYSDEC's cleanup objectives.

Soil Contamination: AOC 2 - Northern Aspect

The Targeted Organic Compounds were detected in surface soils in the Northern Aspect at the following concentrations in ppb: perylene (50-100) and 2-anilinobenzothiazole (80). The semivolatile organic compounds were detected in surface soils at the following concentrations in ppb: benzo(a)pyrene (27-260); and dibenzo(a,h)anthracene (25-50). The inorganic compounds were detected in surface soils at the following concentrations in ppm:

barium (114-278); beryllium (0.26-1.5); mercury (0.17-1.5); and nickel (18.7 - 49.10).

The highest contaminant concentrations were associated with fill material in subsurface soils. The Targeted Organic Compounds were detected in subsurface soils at the following concentrations in ppb: perylene (130-450); 2-anilinobenzothiazole (130-27,000); diphenylamine (320-330); 2-mercaptobenzothiazole (3,200-24,000); aniline (260-280); phenothiazine (270-470); and benzothiazole (2,200-3,200). The concentrations of these Targeted Organic Compounds in subsurface soils exceeded the NYSDEC cleanup objective for these contaminants by up to 28 times (2-mercaptobenzothiazole). The semivolatile organic compounds were detected in subsurface soils at the following concentrations: dibenzo(a,h)anthracene (26-330); benzo(a)pyrene (78-2,600); benzo(a)anthracene (91-7,700); phenol (57-200); benzo(b)fluoranthene (150-12,000); chrysene (87-2,700); and benzo(k)fluoranthene (75-12,000). The PAHs exceeded NYSDEC cleanup objectives by more than 40 times. The inorganic compounds were detected in subsurface soils at the following concentrations in ppm: arsenic (2-9.4); chromium (6.2-34.7); nickel (8.3-55.5); mercury (0.07-2.8); vanadium (10-70.4) and selenium (1.4-2.6). The inorganics were detected at levels one to two times above background levels, however, mercury was present at concentrations over 25 times the NYSDEC cleanup objective.

It is estimated that there are approximately 105,000 cy of surface and subsurface soil in the Northern Aspect that contain contaminants above NYSDEC cleanup objectives.

Sediment Contamination: AOC 3 - Wooded Wetland

PAH, pesticide and PCB contamination was found in sediments throughout the Wooded Wetland. The only Targeted Organic Compound detected in sediments was perylene (120-250 ppb). The semivolatile organic compounds (PAHs) were detected in sediments at the following concentrations in ppb: fluoranthene (300-920); pyrene (320-670); benzo(a)anthracene (160-510); chrysene (310-680); benzo(b)fluoranthene (570-1400); benzo(k)fluoranthene (620-1400); indeno(1,2,3-CD)pyrene (150-290); dibenzo(a,h)anthracene (52-80); benzo(g,h,i)perylene (160-390); and benzo(a)pyrene (260-530). Pesticides and PCBs were detected in sediments at the following concentrations: alpha-BHC (0.47-5.5); 4,4'-DDE (1.2-12); arochlor 1254 (68-110); and beta-BHC (2.1-8.1). The inorganic compounds were detected in the sediment at the following concentrations in ppm: arsenic (4.6-7.7); cadmium (1.1-1.5); chromium (36.7-53.5);

copper (29.2-51.9); lead (84.8-114); mercury (0.55-1.5); nickel (30.5-39.2); silver (1.2-2); and zinc (214-374). These inorganic compounds were detected at concentrations that are twice the cleanup objectives for these contaminants.

It is estimated that there are approximately 2400 cy of sediment that contain contaminants above NYSDEC cleanup objectives.

Sediment and Surface-Water Contamination: AOC 4 - East Gill Creek

East Gill Creek receives storm-water runoff from the Site. Pesticides and inorganics were found in surface-water at concentrations exceeding NYSDEC surface-water standards. The highest concentrations were seen in the downstream samples. Two pesticides which exceeded the NYSDEC surface-water standards, alpha-BHC and beta-BHC (up to 3,600 ppb), were frequently detected in sediments in the Wooded Wetland. Therefore, it appears that the creek could act as a contaminant migration pathway during times of high flow. Some contaminants found on-site in sediment and surface water may have been transported from an upstream source.

It is estimated that there are approximately 190 cy of sediment that contain contaminants above NYSDEC cleanup objectives.

Soil Contamination: AOC 5 - Edgewood Drive Wooded Lots

The highest concentrations generally were detected in the fill material in surface soils. The Targeted Organic Compounds were detected in surface soils at the following concentrations in ppb: perylene (5-12,000); 2-mercaptobenzothiazole (570-1,800); 2-anilinobenzothiazole (1,300-2,100); diphenylamine (50); N,N'-diphenyl-1,4-benzenediamine (2,800); and benzothiazole (260). The concentrations of these Targeted Organic Compounds exceeded the NYSDEC cleanup objective for these contaminants by up to two times (2-mercaptobenzothiazole). The semivolatile organic compounds were detected in surface soils at the following concentrations in ppb: chrysene (40-95,000); benzo(a)anthracene (54-100,000); benzo(b)fluoranthene (100-130,000); benzo(k)fluoranthene (98-120,000); benzo(a)pyrene (47-88,000); dibenzo(a,h)anthracene (68-16,000); indeno(1,2,3-cd)pyrene (240-25,000); and fluoranthene (56-130,000). The PAHs were found at concentrations up to 1400 times the NYSDEC cleanup objectives for these contaminants. The inorganic compounds were detected in surface soils at the following concentrations in ppm: nickel (23.6-139); mercury (0.07-2.5); lead

(8.7-157); arsenic (4.6-21.3); beryllium (0.29 - 1.5); and vanadium (32.3-125).

The only Targeted Organic Compound detected in subsurface soils in the Edgewood Drive Wooded Lots was perylene (0.08-6,800 ppb). The semivolatile organic compounds were detected in subsurface soils at the following concentrations in ppb: benzo(b)fluoranthene (87-98,000); benzo(k)fluoranthene (85-79,000); benzo(a)anthracene (53-56,000); chrysene (56-50,000); and benzo(a)pyrene(40-42,000). Although the PAH concentrations generally decreased in the subsurface soils, these levels ranged from 70 to 680 times the NYSDEC cleanup objectives. The inorganics were detected in subsurface soils at the following concentrations in ppm: nickel (8.5-69.4); mercury (0.14-3.2); cobalt (4.3-16.8); chromium (6.6-54.4); beryllium (0.44-1.7); barium (34.7-182); and lead (6.3-114). Metals in the subsurface were found at levels up to twice background levels.

It is estimated that there are approximately 54,100 cy of surface and subsurface soil in the Edgewood Drive Lots that contain contaminants above NYSDEC cleanup objectives.

Soil Contamination: AOC 6 - Subdivision

The highest concentrations of contaminants were found in the fill in surface soil in the northern end of the Subdivision. The Targeted Organic Compounds were detected in surface soils at the following concentrations in ppb: 2-anilinobenzothiazole (90-330,000); 2-mercaptobenzothiazole (120-47,000); benzothiazole (120-10,000); perylene (40-650); N,N'-diphenyl-1,4-benzenediamine (110-13,000); diphenylamine (40-1,600); phenothiazine (80-3,800); and phenyl isothiocyanate (100-130). The concentrations of these Targeted Organic Compounds in the surface soils of the Subdivision exceeded the NYSDEC cleanup objective for these contaminants by up to 55 times (2-mercaptobenzothiazole). The semivolatile organic compounds were detected in surface soils at the following concentrations in ppb: benzo(a)pyrene (100-2,500); benzo(a)-anthracene (130-2,900); chrysene (25-2,400); benzo(b)fluoranthene (220-7,200); benzo(k)fluoranthene (220-6,900); dibenzo(a,h)-anthracene (74-530); phenol (85-7,800); and 2-methyl phenol (60-360). These PAH and phenol concentrations are up to 40 and 260 times greater that NYSDEC cleanup objectives for these contaminants, respectively. While elevated levels of organic compounds were detected in surface soils, concentrations are significantly less than have been historically reported. The

inorganics were detected in surface soils at the following concentrations in ppm: copper (4.3-387); cobalt (1.1-193); mercury (0.11-5.7); and beryllium (0.08-0.97). Metals were detected at concentrations up to nine times the NYSDEC cleanup objectives for these contaminants.

The only volatile organic compounds detected in subsurface soils in the Subdivision were total xylenes (2-10,000). The Targeted Organic Compounds were detected in surface soils at the following concentrations in ppb: perylene (60-8,000); N,N'-diphenyl-1,4-benzenediamine (40-25,000); benzothiazole (100-16,000); diphenylamine (800-8,000); 2-mercaptobenzothiazole (200-50,000); 2 -anilinobenzothiazole (1,000-170,000); phenothiazine (800); and aniline (400). The concentrations of these Targeted Organic Compounds in the subsurface soils of the Subdivision exceeded the NYSDEC cleanup objective for these contaminants by up to 58 times (2-mercaptobenzothiazole).

The semivolatile organic compounds were detected in subsurface soils at the following concentrations in ppb: benzo(a)pyrene (320-170,000); benzo(a)anthracene (460-250,000); chrysene (530-160,000); benzo(b)fluoranthene (340-220,000); dibenzo(a,h)-anthracene (8,600-8,700); and phenol (250-7,500). The PAH concentrations exceeded NYSDEC cleanup objectives by more than 2,780 times. The inorganics were detected in subsurface soils at the following concentrations in ppm: nickel (0.02-132); chromium (0.02-46.6); vanadium (0.03-147); arsenic (2.5-14.6); and mercury (0.13-25.6). The inorganics were detected in the subsurface at levels between eight to nine times background. Mercury, however, was present at concentrations 250 greater than the NYSDEC cleanup objectives for this contaminant.

It is estimated that there are approximately 67,500 cy of surface and subsurface soil in the Subdivision, including those under the temporary concrete cover, that contain contaminants above NYSDEC cleanup objectives. Based on the results of several sampling events conducted to date at the Site, no contamination was detected in the southern portion of the Subdivision. These data, together with a review of aerial photographs taken at the Site, suggest that the southern portion of the Subdivision has not been used for industrial waste disposal.

In summary, the total volume of contaminated soil and sediments at the Site that exceed soil cleanup objectives is estimated at 285,200 cy.

Ground-Water Contamination

Four rounds of sampling indicated that the ground water is contaminated with volatile organic compounds (VOCs) and inorganics. Site soil contamination appears to have migrated vertically to the underlying ground water. VOCs were consistently detected in the monitoring wells downgradient of the fill areas at concentrations exceeding federal drinking-water standards in all four of the ground-water sampling rounds. While VOCs were not consistently detected in Site soils during the RI, they had been detected during previous sampling events. The highest VOC detections were noted in well MW-5S. The shallow ground water flows from all directions and towards a slight depression in the vicinity of this monitoring well.

VOCs were found in the ground water at the following concentrations in ppb: vinyl chloride (44-220); 1,1-dichloroethane (2-92); trichloroethene (2-350); 1,2-dichloroethene (total)(1-1709) and 1,1,1-trichloroethane (12-110). PAHs were detected at the following concentrations in ppb: benzo(a)pyrene (0.7); and di-n-octylphthalate (0.7-10).

The inorganic compounds were detected at the following concentrations in ppb: chromium (4.3-749); iron (182-19,300); lead (2.2-105); manganese (17.5-6,790); and nickel (9.3-725). The inorganic compounds were detected in both rounds of sampling, however, only chromium, nickel and lead exceeded federal drinking-water standards. All three of these metals were widely detected in Site soils.

The contaminated ground-water plume (*See Figure 5*) associated with the Site has been divided into two portions: the on-property plume with the highest concentrations of contaminants, and the off-property with significantly lower concentrations of contaminants. The on-property ground-water plume is considered to be the principal threat at the Site.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are specific goals to protect human health and the environment; they specify the contaminants of concern, exposure routes, receptors and acceptable contaminant levels for each exposure route. These objectives are based on the available information and standards, such as applicable or relevant

and appropriate ARARs and risk-based levels established in the risk assessment.

The RAOs which were developed for soil, sediment and ground water are designed, in part, to mitigate the health threat posed by ingestion, dermal contact or inhalation of particulates where these soils are contacted or disturbed. The RAOs are also intended to mitigate the health threat posed by the ingestion of ground water. Such objectives are also designed to prevent further leaching of contaminants from the soil to the ground water. The following RAOs were established:

1. Prevent direct contact with contaminated soils and sediments.

2. Mitigate the potential for contaminants to migrate from the soil into the ground water.

3. Reduce or eliminate the threat to human health and the environment posed by ground-water contamination by remediating ground water to MCLs, thereby restoring the aquifer to beneficial uses.

4. Reduce or eliminate the potential for migration of contaminants to potential receptors.

Preliminary Remediation Goals (PRGs) are cleanup objectives based on the available information and standards, such as applicable or relevant and appropriate (ARARs) and risk-based levels established in the risk assessment. The PRGs for soil are the NYSDEC recommended soil cleanup objectives identified in the TAGM (*see Table 4, Appendix II*). The primary soil PRGs are benzo(a)pyrene at 61 µg/kg or ppb, aniline at 100 µg/kg or ppb, phenol at 30 µg/kg or ppb, and mercury at 0.1 mg/kg or ppm.

The PRGs for sediment are NYSDEC recommended cleanup objectives identified in NYSDEC's Technical Guidance for Screening Contaminated Sediment, 1994. The primary sediment RAO for manganese is 460 mg/kg or ppm.

The PRGs for ground water are the federal drinking-water standards or MCLs. The primary ground-water PRGs are vinyl chloride at 2 µg/l or ppb and trichloroethene at 5 µg/l or ppb.

SUMMARY OF SITE RISKS

The Risk Assessment for the Forest Glen Subdivision Site was performed based on the assumption of a residential land-use scenario since the former Subdivision and other portions of the Site were, until recently, zoned residential. As aforementioned, the zoning of the entire Site is now commercial/light industrial. However, EPA has not performed another risk assessment utilizing a commercial land-use scenario due to some of the factors described below.

Many of the Targeted Organic Compounds, including 2-anilino-benzothiazole, benzothiazole and phenyl isothiocyanate, do not have toxicity data available. Therefore, these compounds were not included in the risk calculation. This may have underestimated the actual risks at the Site. In addition, risks may have been underestimated because EPA performed the risk assessment solely using data gathered during the RI. Areas with high concentrations of contaminants which were covered during the removal action at the Site were not resampled during the RI and included in the risk assessment analysis. There are significant potential risks associated with the concentrations of contaminants detected during sampling events prior to the RI. Aniline, for example, poses a significant potential cancer risk on the order of $1x10^{-4}$ based on the maximum concentration detected (11,000,000 ppb). Based primarily on the presence of the Targeted Organic Compounds, ATSDR, in its July 1989 Health Advisory, determined that there was a "significant risk to human health" at the Site.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at a site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (*e.g.*, ingesting contaminated well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The Site baseline risk assessment began with selecting contaminants of concern (COCs) for the various Site media: soils, sediments, ground water and surface water. COCs are selected based on the frequency of detection in RI samples, the magnitude of the concentrations detected and the relative toxicity of the contaminants. COCs characterize the contaminants that are most representative of risks at the Site.

The baseline risk assessment evaluated the health effects which could result from current and future land-use conditions. Under current-use conditions, exposure pathways based on ingestion and dermal contact with contaminants in soil and dermal contact with sediments and surface water at the Site were evaluated for both adult and child trespassers. Under future-use conditions, potential residents were evaluated for ingestion and dermal contact with contaminants in surface soil and sediments, inhalation of particulates from surface soil, ingestion of ground water, dermal contact with ground water, inhalation of VOCs in ground water while showering and ingestion of chemicals present in sediment and surface water at the Site. Future-use risks to construction workers on Site were evaluated through ingestion, dermal contact and inhalation of particulates from surface and subsurface soil.

Current federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the 10^{-4} to 10^{-6} (*i.e.*, a one-in-ten-thousand to one-in-a-million excess cancer risk or likelihood of an additional instance of cancer developing) and a maximum health Hazard Index (HI), which reflects noncarcinogenic effects for a human receptor, equal to 1.0. An HI greater than 1.0 indicates a potential of noncarcinogenic health effects.

The results of the baseline human health risk assessment are contained in the *Endangerment Assessment, Forest Glen Site, Niagara Falls, New York,* dated November 1996, which was prepared by CDM Federal Programs Corporation. Under current-use conditions, Site exposure pathways were evaluated for teenage trespassers. Receptors for future-use conditions at the Site were adults and children.

The risk assessment concluded that teenage trespassers were not at risk from potential contact with contamination in Site media, based on an estimated risk of 3.1×10^{-5}, which is with EPA's accepted risk range. The noncancer HI for teenage trespassers (HI=0.26) was well below the target level of 1.

However, the risk assessment concluded that potential future residents would be at risk from exposure to Site soil contamination and from ingestion of the organic compounds in the Site ground water.

For future-use conditions, the greatest carcinogenic risks to potential residents resulted from the incidental ingestion of surface soils from the Edgewood Drive Wooded Lots. These risks are 4.2×10^{-4} for adults and 9.6×10^{-4} for children, which exceed the target risk range. The greatest singular contributor to these risks is benzo(a)pyrene. The carcinogenic risk from the ingestion of Site ground water for adults is 7.4×10^{-4}. This risk is primarily a result of the presence of vinyl chloride and n-nitroso-di-n-propylamine.

The highest noncarcinogenic HIs for the future residential scenario for children by exposure via ingestion and inhalation (primarily manganese) are as follows: Subdivision-4.9; Northern Aspect-3.3; Edgewood Drive Wooded Lots-3.2. The HI for future residential exposure via ingestion of ground water is 8 for adults and 19 for children. The primary contributors to these risks are 1,2-dichloroethene, hexachlorobutadiene, arsenic and manganese.

Based on the results of the baseline risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare or the environment.

The future land use of the Site will be commercial/light industrial. The residential exposure risks discussed above are no longer applicable due to the change in land use. However, the risk of ingestion of ground water indicates a need for remedial action to restore the potable acquire underlying the Site to drinking-water standards.

Ecological Risk Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation*--a qualitative evaluation of the contaminant release, migration and fate; identification of contaminants of concern, receptors, exposure pathways and known ecological effects of the contaminants; and, selection of endpoints for further study.

Exposure Assessment--a quantitative evaluation of contaminant release, migration and fate; characterization of exposure pathways and receptors; and, measurement or estimation of exposure-point concentrations. *Ecological Effects Assessment*--literature reviews, field studies and toxicity tests, linking contamination to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The potential risk to ecologic receptors at the Site was assessed by comparing the estimated exposure levels with toxicity values. Aquatic, as well as terrestrial risks, were considered. Aquatic risks from East Gill Creek sediment and surface water were evaluated using the muskrat as a receptor. Terrestrial risks were evaluated using the shorttail shrew and the red-tail hawk.

Evaluation of the muskrat as an ecological receptor for chemicals from East Gill Creek sediment and surface water indicates the potential for both acute and chronic adverse effects. Aluminum and iron are the major contributors to these potential adverse effects.

Chemicals in Site soils also present the potential for adverse effects. For the shorttail shrew, an ecological receptor at the base of the food chain, the potential exists for both acute and chronic effects from exposure to contaminated soils and sediments in the Northern Aspect, Subdivision, Wooded Wetland and Edgewood Drive Wooded Lots. The primary contributor to this risk is lead, with chromium and copper as secondary contributors. For the red-tailed hawk, an ecological receptor at the top of the food chain, no acute adverse effects are expected from exposure to Site soils, either from individual AOCs or from the entire Site. However, the potential exists for chronic adverse effects for the red-tail hawk, primarily from copper.

It is possible that some ecological COCs detected in on-site sediment and surface water are not related to Site activities, but were transported from an upstream source. An example of this is water flowing onto the Site in East Gill Creek contains higher concentrations of compounds than water leaving the Site. An investigation of such potential upstream sources of contamination, which may be impacting the Site, is planned.

In Summary, the Ecological Risk Assessment indicates that there is a potential for adverse effects to ecology from Site soils and sediments.

Discussion of Uncertainties in Risk Assessment

The procedure and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis;
- environmental parameter measurement;
- fate and transport modeling;
- exposure parameter estimation; and,
- toxicological data.

Uncertainty in environmental sampling arises, in part, from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the contaminants of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the contaminants of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the baseline human health risk assessment provides upper-bound estimates of the risks to populations near the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the EPA's baseline human health risk assessment report for OU2.

The greatest carcinogenic risks at the Site are the ingestion of surface soil by adults and children in the Edgewood Drive Wooded Lots and the ingestion of ground water. The greatest noncarcinogenic risks at the Site are associated with the ingestion

of surface soil by adults and children in the Subdivision, Northern Aspect and the Edgewood Drive Wooded Lots and the ingestion of ground water. These risks were calculated assuming the future land use at the Site was residential.

In light of the above, EPA has determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this ROD, may present a potential threat to public health and welfare, or the environment.

DESCRIPTION OF GROUND-WATER REMEDIAL ALTERNATIVES

CERCLA requires that each selected Site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Five alternatives for addressing the ground-water contamination associated with the Forest Glen Subdivision Site were evaluated in in the Proposed Plan.

Construction time refers to the time required to physically construct the remedial alternative. This does not include the time required to negotiate with the responsible parties for the remedial design and remedial action, or design the remedy or to obtain institutional controls.

During the detailed evaluation of remedial alternatives, each alternative was assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

Alternative GW-1:
No Action

Capital Cost	$	0
O&M Cost	$	35,000
Present Worth Cost	$	35,000
Time to Construct	None	

CERCLA requires that the "No-Action" alternative be considered as a baseline for comparison with other alternatives. The No-Action alternative does not include institutional controls or active remedial measures to address contaminated ground water.

The no-action response also would include the development and implementation of a public awareness and education program for the residents in the area surrounding the Site. This program would include the preparation and distribution of informational press releases and circulars and convening public meetings. These activities would serve to enhance the public's knowledge of the conditions existing at the Site.

This alternative, if selected, would result in contaminants remaining on-site in concentrations exceeding health-based levels. Therefore, under CERCLA, the Site would have to be reviewed at least every five years.

Alternative GW-2: (Selected Remedy)
Ground-Water Extraction & Discharge to Wastewater Treatment Plant /On-Property Plume Capture & Off-Property Natural Attenuation

Capital Cost	$	291,200
O&M Cost	$	3,431,900
Present Worth Cost	$	3,723,000
Time to Construct	6	months

This alternative includes the extraction of contaminated ground water at the property boundary. Two ground-water extraction wells would be installed in the vicinity of monitoring well MW-5 and pumped at the rate of 15 gallons per minute (gpm) each for a total of 30 gpm. The ground water would be extracted from the shallow and deep portions of the fractured dolomite bedrock aquifer and collected in a storage tank. It is expected to take approximately seven years of operation to achieve cleanup standards (*i.e.*, MCLs) and restore the aquifer underlying the Site property to drinking-water quality. The off-property portion of the plume of

contaminated ground water has lower concentrations and would not be captured under this alternative, but allowed to naturally attenuate. Natural attenuation allows naturally occurring environmental processes (*i.e.*, dilution, dispersion, biodegradation, adsorption) to reduce contaminant mass. Once the source of contaminated ground water is cut-off, it is expected that the off-property plume will reach MCLs through natural attenuation in approximately 12 to 14 years. A long-term monitoring program of the entire plume would be performed to assess the effectiveness of the remedy, including a Monitored Natural Attenuation (MNA) study. The MNA Study, including a baseline investigation and ground-water modeling will be performed to evaluate intrinsic biodegradation and other natural attenuation processes. If monitoring indicates that natural attenuation is not effective in remediating the off-property ground-water contamination, more active remedial measures would be considered.

The extracted ground water would be transported to the City of Niagara Falls Wastewater Treatment Plant via sanitary sewer lines and would meet the pre-treatment requirements of the facility. A 12-hour holding tank will be built on-site to hold water during storms. The sanitary sewers will be inspected for competency prior to the discharge of any contaminated ground water.

Alternative GW-3:
Ground-Water Extraction & Discharge to Wastewater Treatment Plant/On-Property and Off-Property Plume Capture

Capital Cost	$ 453,200
O&M Cost	$ 4,753,400
Present Worth Cost	$ 5,206,600
Time to Construct	12 months

This alternative includes extraction of the on-property and off-property contaminated ground water. Four ground-water extraction wells would be installed, two in the vicinity of monitoring well MW-5 and two on the western side of the railroad tracks. Each well would be pumped at the rate of 10 gpm for a total of 40 gpm. The ground water would be extracted from the shallow and deep portions of the fractured dolomite bedrock aquifer and collected in a storage tank. It is expected that the on-property and off-property plume would be pumped for approximately 12 to 14 years before the ground water attains MCLs. A long-term ground-water monitoring program of the entire plume will be performed to assess the effectiveness of the remedy.

The extracted ground water would be discharged to the City of Niagara Falls Wastewater Treatment Plant via sanitary sewer lines and would meet the pre-treatment requirements of the facility. A 12-hour holding tank will be built on-site to hold water during storms. The sanitary sewers will be inspected for competency prior to the discharge of any contaminated ground water.

Alternative GW-4:
Ground Water Extraction, Treatment (Chemical Precipitation & Air-Stripping) & Surface-Water Discharge/On-Property Plume Capture & Off-Property Plume Natural Attenuation

Capital Cost	$ 1,328,800
O&M Cost	$ 4,183,200
Present Worth Cost	$ 5,512,000
Time to Construct	18 months

The major features of this alternative include ground-water extraction from the on-property plume using two extraction wells installed in the vicinity of monitoring well MW-5, pumped at a combined rate of 30 gpm and the monitored natural attenuation of the off-property plume. The extracted contaminated ground water would be collected in a storage tank and treated at an on-site treatment plant to meet the standards required for surface-water discharge. The treatment process would use chemical precipitation to remove the inorganic compounds (*e.g.*, iron, manganese)and air stripping to remove volatile chlorinated hydrocarbons. The treated ground water will then be discharged to East Gill Creek. Similar to Alternative GW-2, it is expected that ground water underlying the property would be restored to drinking-water quality in approximately seven years and off-property ground water would be restored to drinking-water quality in approximately 12 to 14 years. Monitoring wells would be used to conduct a long-term ground-water monitoring program to assess the effectiveness of the remedy. If monitoring indicates that natural attenuation is not effective in remediating the off-property ground-water contamination, more active remedial measures would be considered.

Alternative GW-5 :
Ground Water Extraction, Treatment (Chemical Precipitation & Air-Stripping) & Surface-Water Discharge/On-Property & Off-Property Plume Capture

Capital Cost	$ 1,139,600
O&M Cost	$ 6,179,300
Present Worth Cost	$ 7,318,900
Time to Construct	18 months

The major features of this alternative are the same as Alternative GW-4, however, this alternative extracts the contaminated ground water from both the on-property and off-property plumes. This remedy includes ground-water extraction from the on-property and off-property plumes utilizing four extraction wells pumped at a combined rate of 40 gpm. Two of the wells would be placed in the vicinity of monitoring well MW-5 and two others would be installed on the western side of the railroad tracks off the former Subdivision property.

The extracted contaminated ground water would be collected in a storage tank and treated at an on-site treatment plant, using chemical precipitation to remove the inorganic compounds (*e.g.*, iron, manganese) and air stripping to remove the volatile chlorinated hydrocarbons. The treated ground water would then be discharged to East Gill Creek. Similar to Alternative GW-3, monitoring wells would be used to conduct a long-term ground-water monitoring program of the entire plume will be performed to assess the effectiveness of the remedy. It is expected that the on-property and off-property plume would be pumped for approximately 12 to 14 years before the ground water attains MCLs.

COMPARATIVE ANALYSIS OF THE GROUND-WATER ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the NCP and OSWER Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

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.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

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 of residual and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of a remedial technology, 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.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. *State acceptance* indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes,

and/or has identified any reservations with the preferred alternative.

9. *Community acceptance* refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

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

- Overall Protection of Human Health and the Environment

Under Alternative GW-1, No Action, migration of the contaminants in the ground water would continue. The No-Action alternative would not provide any protection of human health and the environment as no active remedial measures or institutional controls are included in this alternative.

Alternatives GW-2, GW-3, GW-4 and GW-5 would protect human health and the environment because the ground water would be restored to drinking-water standards (MCLs). These alternatives address the principal threat at the Site, the on-property ground-water plume, by extracting and treating the contaminated ground water and returning the aquifer to beneficial uses.

- Compliance with ARARs

Contaminant-specific ARARs that apply to the Forest Glen Site include the Safe Drinking-Water Act (40 CFR 141) which promulgated the National Primary Drinking-Water Standards (MCLs).

The No-Action alternative does not contain the plume and the aquifer would not achieve drinking-water standards for a very long time. Alternatives GW-2, GW-3, GW-4 and GW-5 achieve ARARs to a similar degree. These ground-water alternatives would reach contaminant-specific ARARs (*e.g.*, MCLs) within 12 to 14 years.

- Long-Term Effectiveness and Permanence

Alternative GW-1, No Action, would not be effective in protecting human health and the environment over time. Alternatives GW-2, GW-3, GW-4 and GW-5 would provide long-term permanence and effectiveness because the aquifer would be restored to drinking-

water quality. The treatment technologies utilized in these alternatives are all reliable and demonstrated to be effective. The long-term ground-water monitoring associated with Alternatives GW-2, GW-3, GW-4 and GW-5 would ensure that the selected remedy is effective.

- Reduction in Toxicity, Mobility or Volume Through Treatment

Alternative GW-1, No Action, would not provide any reduction of toxicity, mobility or volume of contaminated ground water. Alternatives GW-2, GW-3, GW-4 and GW-5 would provide considerable reduction of toxicity, mobility and volume of contaminants in the on-property ground-water plume through treatment. Ground water would be extracted from the on-property aquifer, thereby significantly reducing overall the mobility of the contaminants. The volatile organic compounds would be absorbed by activated carbon at the City of Niagara Falls Wastewater Treatment Plant in Alternatives GW-2 and GW-3. When the carbon would be regenerated, the organic contaminants would be converted to carbon dioxide, water and hydrochloric acid (which is recycled and reused), thereby eliminating the toxicity. Alternatives GW-4 and GW-5 would reduce the inorganic and organic contaminants in the ground water via on-site treatment. Alternatives GW-3 and GW-5 also reduce the toxicity, mobility and volume of contaminants in the off-property plume through ground-water extraction and treatment. However, in Alternatives GW-2 and GW-4, the toxicity, mobility and volume of the off-property plume contaminants would addressed by monitored natural attenuation.

- Short-Term Effectiveness

Alternative GW-1, No Action, would not result in any adverse short-term impacts. The are no short-term threats to the neighboring community associated with any of the remedial options. However, potential short-term impacts would be associated with the other alternatives as a result of the direct contact of ground water by workers. These impacts would be minimized through worker health and safety protective measures.

The times required for the construction of the various alternatives is as follows:

Alternative GW-1 - No construction is included
Alternative GW-2 - 6 months
Alternative GW-3 - 12 months

Alternative GW-4 - 18 months
Alternative GW-5 - 18 months.

- Implementability

The pump and treat technologies are very well established and have been used extensively for addressing contaminated ground water. Capturing the off-property plume (Alternatives GW-3 and GW-5) would be slightly more difficult technically and administratively because a force main would have to be installed underneath the railroad tracks after an agreement had been obtained from Conrail. In addition, Alternatives GW-4 and GW-5 would require on-site treatment in order to meet stringent surface-water discharge criteria. All the services and materials needed to implement the pump and treat remedies are readily available commercially. Skilled workers are employed at the City of Niagara Falls Wastewater Treatment Plant to operate the numerous treatment processes. This existing facility has been operating for several years. All of the remedial alternatives would be administratively feasible.

- Cost

The O&M costs associated with all the alternatives include a ground-water monitoring program. The O&M costs associated with Alternatives GW-2 and GW-3 include waste-water treatment plant discharge fees. The O&M costs associated with of Alternatives GW-4 and GW-5 include the costs to operate and maintain the on-site treatment facility. The capital costs of Alternatives GW-2 through GW-5 include the installation of wells, piping and a storage tank. The capital costs associated with Alternatives GW-4 and GW-5 also include the construction of a on-site treatment facility.

- State Acceptance

After review of all available information, the NYSDEC has indicated that it concurs with the selected ground-water remedial alternative for OU3. NYSDEC's letter of concurrence is presented in Appendix IV of this document.

- Community Acceptance

Community acceptance of the preferred alternative for OU2 has been assessed in the Responsiveness Summary portion of this ROD following review of the public comments received on the RI/FS

report and Proposed Plan. All comments submitted during the public comment period were evaluated and are addressed in the attached Responsiveness Summary (Appendix VI).

DESCRIPTION OF SOIL/SEDIMENT REMEDIAL ALTERNATIVES

This ROD also serves to amend the remedy for soils and sediments selected in the OU2 ROD, dated March 1998.

The 1998 ROD presented the following six soil/sediment remedial alternatives: S-1, No Further Action; S-2 , Limited Action; S-3, Capping; S-4, Excavation, Consolidation and On-Site Disposal; S-5, Excavation and Off-Site Disposal; and, S-6, Excavation and On-Site Low Temperature Thermal Desorption and Solidification/Stabilization.

The 1998 ROD selected Alternative S-4, Excavation, Consolidation and On-Site Disposal, as the remedy for Site soils and sediments. This selection was based, in part, on the fact that the former Forest Glen Subdivision was zoned residential at the time. The selected remedy called for excavating the soils within the residentially-zoned areas of the Site (the southern portion) and consolidating these soils in the commercially-zoned areas of the Site (the northern portions). The contaminated sediments from East Gill Creek would be excavated and consolidated in the Northern Aspect. The consolidated wastes were to be covered with a cap in accordance with New York State regulations (6 NYCRR Part 360).

Subsequent to the issuance of the 1998 ROD, the City of Niagara Falls changed the zoning of the Forest Glen Subdivision to "negotiated planned development" which allows for commercial and light industrial use. The Town of Niagara also changed the zoning of approximately eight acres from residential to commercial/light industrial. The entire Site is now zoned commercial/light industrial. These zoning changes were a result, in large part, of a proposed commercial/light industrial development project which will cover the Site.

It is also noted that, although it was considered protective of public health and the environment, capping contaminants in place (Alternative S-3) was not selected by EPA because this alternative would not allow for unrestricted future use of the Site.

As a result of the rezoning of the former Subdivision and other sections of the Site, EPA decided to reevaluate the 1998 ROD remedy and the six remedial alternatives.

Alternative S-1: No Further Action

Capital Cost	$ 586,844
Annual O&M Cost	$ 9,582
Present Worth Cost	$ 643,500
Time to Construct	None

CERCLA requires that the "No-Action" alternative be considered as a baseline for comparison with other alternatives. The No-Further-Action alternative does not include institutional controls or active remedial measures to address on-site contaminated soils. However, this alternative does include the implementation of a ground-water monitoring program to monitor contaminant migration from contaminated soils. In addition, the permanent and mobile homes would be disposed.

The no-action response also would include the development and implementation of a public awareness and education program for the residents in the area surrounding the Site. This program would include the preparation and distribution of informational press releases and circulars and convening public meetings. These activities would serve to enhance the public's knowledge of the conditions existing at the Site.

This alternative, if selected, would result in contaminants remaining on-site in concentrations exceeding health-based levels. Therefore, under CERCLA, the Site would have to be reviewed at least every five years.

Alternative S-2: Limited Action

Capital Cost	$ 1,173,800
Annual O&M Cost	$ 35,100
Present Worth Cost	$ 2,469,200
Time to Construct	6 months

This alternative includes the installation of a fence surrounding the Site, the implementation of institutional controls (the placement of restrictions of ground-water wells at the Site and limitations on the future use of the Site) and a ground-water monitoring program to monitor contaminant migration from

contaminated soils. In addition, the permanent and mobile homes would be disposed.

This limited-action alternative would also include the development of public awareness and education programs for the residents in the surrounding area (see Alternative S-1).

This alternative, if selected, would result in contaminants remaining on-site in concentrations exceeding health-based levels. Therefore, under CERCLA, the Site would have to be reviewed at least every five years.

Alternative S-3 : Capping (6 NYCRR Part 360 Cap) - Selected Remedy

Capital Cost	$ 10,207,311
Annual O&M Cost	$ 112,281
Present Worth Cost	$ 12,454,000
Time to Construct	12 months

The major feature of this alternative is the construction of an engineered cover system (landfill cap) to eliminate the threat of exposure to contaminated soils and sediments. Contaminated soils/sediments would be consolidated under the cap and it is estimated that the final size of the capped area would be approximately 17 acres. The cap would be built according to New York State regulations (6 NYCRR Part 360), with the exception of the Wooded Wetland which would be capped with six inches of sediment.[1] No intrusive activities should be performed on the cap in order to preserve its integrity. Therefore, this alternative would include taking steps to secure institutional controls to limit future activities at the Site and fencing to limit future access. The permanent and mobile homes would be disposed. A ground-water monitoring program would be implemented to assess the effectiveness of the remedy. In addition, an investigation would be performed to determine if there are upstream sources of contamination that may impact the Site.

This alternative, if selected, would result in contaminants remaining on-site in concentrations exceeding health-based levels.

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[1] If further studies conclude that the addition of six inches of clean sediment would have an adverse impact on the wetland, contamination in the Wooded Wetland would be excavated and the Wooded Wetland would be appropriately restored. It is estimated that this work could be performed at a cost of approximately $50,000.

Therefore, under CERCLA, the Site would have to be reviewed at least every five years.

Alternative S-4: Excavation, Consolidation and On-Site Disposal

Capital Cost	$ 15,357,836
Annual O&M Cost	$ 34,334
Present Worth Cost	$ 16,397,000
Time to Construct	18 months

This alternative includes the excavation of approximately 190,200 cy contaminated soils from the Site AOCs and 190 cy of sediment from East Gill Creek and the consolidation of these excavated soils in the Northern Aspect. The contaminated soil and sediment would be compacted and covered with a cap approximately 8.5 acres in size and approximately 30 feet in height in accordance with New York State regulations (6 NYCRR Part 360), with the exception of the Wooded Wetland which would be covered with six inches of sediment[1]. The permanent and mobile homes would be disposed. Excavated areas would be backfilled with clean fill and topsoil and seeded. Monitoring wells in the Northern Aspect would be monitored to ensure the effectiveness of the remedy. This alternative would include taking steps to secure institutional controls to limit future activities in the Northern Aspect and fencing to limit future access to the capped area. This alternative would result in restricting future use in the Northern Aspect, but would allow productive use of the remainder of the Site.

This alternative, if selected, would result in contaminants remaining on-site in concentrations exceeding health-based levels. Therefore, under CERCLA, the Site would have to be reviewed at least every five years.

Alternative S-5: Excavation and Off-Site Disposal

Capital Cost	$ 106,350,434
Annual O&M Cost	$ 0
Present Worth Cost	$ 106,350,434
Time to Construct	12 months

This alternative also includes the excavation of approximately 282,600 cy of contaminated soils from AOCs 1,2,5 and 6, and 2,590

cy of sediments from East Gill Creek and the Wooded Wetland[2]. Excavated areas would be backfilled with clean fill, topsoil and seeded in the Northern Aspect, the Berm, the Wooded Lots and the Subdivision. Sediments from the East Gill Creek would be replaced with material of a similar nature and the Wooded Wetland would be appropriately restored. Waste characterization samples would be collected and analyzed, and the contaminated soils disposed in a Resource Conservation and Recovery Act (RCRA) licensed and approved off-site hazardous waste landfill. The permanent and mobile homes would be disposed.

Once the excavation work has been completed, there would be no future O&M costs or ground-water monitoring associated with this alternative because no contaminants would remain on-site exceeding health-based levels.

Alternative S-6: Excavation and On-Site Low Temperature Desorption and Solidification/Stabilization

Capital Cost	$ 81,986,000
Annual O&M Cost	$ 0
Present Worth Cost	$ 81,986,000
Time to Construct	18 months

This alternative also includes the excavation of approximately 282,600 cy contaminated soils from AOCs 1,2 5 and 6, and 2,590 cy of sediments from East Gill Creek and the Wooded Wetland[3]. These soils and sediments would then be treated on-site to remediate the organic contamination using low temperature thermal desorption (LTTD). The excavated soils and sediments would be fed to a mobile LTTD unit brought to the Site, where hot air injected at a temperature above the boiling points of the organic contaminants of concern would allow them to be volatilized into gases and escape from the soil. The organic vapors extracted from the soil would then either be condensed, transferred to another medium (such as activated carbon) or thermally treated in an afterburner operated to ensure the complete destruction of the volatile organics. The off-gases would be treated through a carbon vessel. Once the treated soil achieved the TAGM objectives, it would be tested in

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[2,3] If further studies conclude that the addition of six inches of clean sediment would have an adverse impact on the wetland, contamination in the Wooded Wetland would be excavated and the Wooded Wetland would be appropriately restored. It is estimated that this work could be performed at a cost of approximately $50,000.

accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether it constitutes a RCRA hazardous waste and, provided that it passes the test (*i.e.*, it is determined to be a hazardous waste), this treated soil would need to undergo on-site stabilization/solidification to chemically fix the inorganic contaminants to prevent leaching. The excavated areas would be backfilled with the treated soil and would be restored as described under Alternative S-5. Treatability studies would have to be performed during the remedial design phase to establish optimum operating conditions for the LTTD and solidification/stabilization. The permanent and mobile homes would be disposed.

Similar to Alternative S-5, once the contaminated soils have been treated and stabilized, there would be no future O&M costs or ground-water monitoring associated with this alternative because no contaminants would remain on-site exceeding health-based levels.

COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

- OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

All of the remedial alternatives, with the exception of No Further Action and Limited Action (S-1 and S-2), would provide adequate protection of human health by eliminating risks posed by exposure to contaminated surface soils.

Alternative S-3, Capping, would provide engineering controls (capping) to reduce the risk of exposure to contaminated surface soil and institutional controls (fencing, deed restrictions) to ensure cap integrity. Ground-water monitoring would be performed to ensure the remedy is protective. This alternative would also provide a source-control measure, since the impermeable cap would prevent rainwater from infiltrating through the vadose zone, thereby preventing the formation of leachate and the migration of contaminants.

Alternative S-4, Excavation, Consolidation and On-site Disposal, would also provide engineering and institutional controls. In addition, this alternative provides for the removal of contaminated soil through excavation in the southern portion of the Site, including the former Subdivision, thereby eliminating the risk of exposure to the contaminated soil by its permanent removal from the southern portion of the Site. Alternative S-4 removes the source of contamination to the ground water in the southern portion of the Site. The impermeable cap in the Northern aspect would prevent

rainwater from infiltrating through the ground, thereby preventing the formation of leachate and the migration of contaminants.

Alternative S-5, Excavation and Off-site Disposal, would eliminate the risk of exposure to contaminated soils, as well as being an effective source-control measure. This excavation alternative would provide a greater degree of protection of human health and the environment than Alternatives S-3, S-4, and S-6, as the contaminants would be removed permanently from the Site. This alternative also provides the most effective source-control measure.

Alternative S-6, Excavation and On-Site Low Temperature Desorption and Solidification/Stabilization, would eliminate the risk of exposure to contaminated soils through treatment of these soils. This alternative is also an effective source-control measure since the soils would be treated to remove the organic contaminants and fix the inorganic compounds in the soil to prevent leachate formation and the migration of contaminants.

- COMPLIANCE WITH ARARS

While there are no federal or New York State ARARs for organic compounds in soil, one of the remedial action goals is to meet soil TAGM objectives. Action-specific ARARs for the Site include Federal and State regulations for treatment, temporary storage, and disposal of wastes (40 CFR Part 256-268 and 6 NYCRR Part 360). Location-specific ARARs include Executive Order 11990 on wetlands protection. "To be considered" are TAGM 4046, New York State sediment criteria, the Executive Order 11988, *Floodplain Management* and EPA's 1985 Statement of *Policy on Floodplains and Wetlands Assessments for CERCLA Actions*, and the *National Historic Preservation Act of 1966*.

No action-specific ARARs correspond to Alternatives S-1 and S-2, No Further Action and Limited Action, as no remedial activities would be conducted at the Site. TAGMs would not be reached under either alternative. These alternatives would also never achieve MCLs in the ground water as the Site soils would continue to be a source of contamination to the underlying aquifer.

Alternative S-3, Capping, would achieve ARARs through the capping of the Site in accordance with 6 NYCRR Part 360. Alternative S-4, Excavation, Consolidation and On-site Disposal, would comply with ARARs through the excavation of contaminated soils in the southern

portion of the Site, the consolidation of these excavated soils in the Northern Aspect and the placement of a Part 360 cap over the consolidated soils.

Alternative S-5, Excavation and Off-site Disposal, would comply with ARARs through the excavation of contaminated soils at the Site. Excavated soils would be disposed of off-site at an EPA-approved licensed facility. Any off-site transportation of hazardous wastes would be conducted in accordance with all applicable hazardous-waste manifest and transportation requirements. Alternative S-6 would meet ARARs through the treatment and subsequent fixation of contaminated soils.

- LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative S-1, No Further Action, would not provide for long-term effectiveness and permanence as contaminants would remain in Site soils with no institutional controls implemented to prevent human contact with the wastes. Alternative S-2, Limited Action, provides marginal long-term effectiveness in that it deters inadvertent access through the implementation of institutional controls and the placement of a fence around the Site, but does not eliminate the potential for trespassers, future residential exposure or preclude further migration of contaminants. In addition, Alternatives S-1 and S-2 do not provide for long-term effectiveness and permanence because these alternatives leave the temporary concrete cover in place in the Subdivision.

The degree of long-term effectiveness of Alternative S-3, Capping, and Alternative S-4, Excavation, Capping and On-site Disposal, is dependent on the continued integrity and maintenance of the Part 360 cap. Deed restrictions would limit the types of activities that may performed on the cap. Annual maintenance would be performed on the cap. The cap eliminates the threat of direct contact and prevents infiltration of rainwater through the vadose zone. Alternative S-4 will achieve long-term effectiveness and permanence in the southern portion of the Site because the contaminants, including those under the temporary concrete cover, would be removed.

Alternative S-5, Excavation and Off-site Disposal, will achieve long-term effectiveness and permanence, since the contaminated soil is excavated from the Site and removed to an off-site facility. Alternative S-6, Excavation and On-site Low Temperature Desorption

and Solidification/Stabilization, would significantly reduce or eliminate the leaching of contaminants to the ground water.

Long-term monitoring and maintenance would be required for all remedial alternatives, with the exception of Alternative S-5, which would provide long-term effectiveness and permanence by removing the contaminants from the Site.

- REDUCTION IN TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT

Alternatives S-1 and S-2, No Further Action and Limited Action, would not provide a reduction in the toxicity, mobility, or volume of contaminants. These alternatives rely entirely upon biological processes. Alternatives S-3, Capping, and S-4, Excavation, Consolidation and On-site Disposal, would reduce the mobility of the contaminants by placing these soils under the cap, but would not reduce the toxicity or volume of the contaminants. Alternative S-5, Excavation and Off-site Disposal, would provide for the physical removal of the contaminated material and the maximum reduction in toxicity, mobility of contaminants, however, this reduction is not achieved through treatment. Alternative S-6, Excavation and On-site Low Temperature Desorption and Solidification/Stabilization, would reduce toxicity, mobility and volume of contaminants through treatment since the organic contaminants would be eliminated through thermal destruction and the inorganic contaminants would be chemically fixed to the soil to prevent the formation of leachate.

- SHORT-TERM EFFECTIVENESS

Alternatives S-1 and S-2, No Further Action and Limited Action, would not result in any adverse short-term impacts. Potential short-term impacts would be associated with the other alternatives due to the direct contact with soils by workers and/or the generation of vapor and particulate air emissions. Such impacts would be addressed through worker health and safety controls, air pollution controls such as water spraying, dust suppressants, and tarps for covering waste during loading, transporting and waste feeding preparation. Site and community air monitoring programs would be implemented when conducting such activities, to ensure protection of workers and the nearby community.

It is estimated that all the alternatives could be completed as follows (not including the time to complete the remedial design):

Alternative S-1 - immediately;
Alternative S-2 - 6 months;
Alternative S-3 - 12 months;
Alternative S-4 - 18 months;
Alternative S-5 - 12 months; and,
Alternative S-6 - 18 months.

- IMPLEMENTABILITY

Although more difficult to implement than the No-Further-Action alternative, fencing the Site, performing ground-water monitoring and effecting institutional controls are all actions that can be readily implemented. These actions are technically and administratively feasible and require readily available materials and services. Placing a solid waste cap over the contaminated soils, or excavating soils in the southern portion of the Site and consolidating the contaminated soils in the Northern Aspect and then placing a cap over the consolidated soils, can be accomplished using technologies known to be reliable and has been readily implemented at sites across the country.

All of the alternatives are implementable from an engineering standpoint. Each alternative would utilize commercially available products and accessible, proven technology. Each alternative is administratively feasible. Alternatives S-3, Capping and S-4, Excavation, Consolidation and On-site Disposal are both implementable using proven technology. These alternatives have complex administrative issues regarding consolidation of the contaminated material on-site and the need to comply with air emission standards. Alternative S-5, Excavation and Off-Site Disposal, is implementable. Administrative issues include the verification of the current approved status of the off-site disposal facility. Alternative S-6, Excavation and On-site Low Temperature Desorption and Solidification/Stabilization, is the most technically complex alternative, however, the technologies which will be utilized have been demonstrated to be successful at numerous other sites. This alternative would require a treatability study to obtain design parameters for the full-scale system. Since there are few mobile LTTD units in existence, there may be a delay of up to six months before a mobile LTTD unit is available to be brought on-site.

- COST

The capital, present worth, and operation and maintenance (O&M) costs for the soil Alternatives S-1 to S-5 are summarized in Table 5. Alternative S-1, No Further Action, has a present worth cost of $643,500 which includes an annual O&M cost of $9,582. Alternative S-2, Limited Action, has a present worth cost of $2,469,200 which includes an annual O&M cost of $35,100. Alternative S-3, Capping, has a present worth cost of $12,454,000 that includes an annual O&M cost associated with maintenance of the cap. Alternative S-4, Excavation and On-site Disposal, has a present worth cost of $16,397,000. Alternative S-5, Excavation and Off-site Disposal, is substantially more expensive with a present worth cost of $106,350,400, due to the high capital cost of excavation and off-site disposal. Alternative S-6, Excavation and On-site Low Temperature Desorption and Solidification/Stabilization, is also substantially more expensive with a present worth cost of $81,986,000, due to the high cost of treatment.

- STATE ACCEPTANCE

The State of New York concurs that the proposed amendment to OU2 is a protective remedy, but it nevertheless has indicated that it concurs with the proposed amendment to the extent the commercial/light industrial development mentioned above occurs as envisioned. If the envisioned development were not to occur, the State requests EPA to reconsider the modification of the OU2 remedy.

- COMMUNITY ACCEPTANCE

Community acceptance of the new preferred alternative for OU2 has been assessed in the Responsiveness Summary portion of this ROD following review of the public comments received on the Ground-Water FS report and Proposed Plan. All comments submitted during the public comment period were evaluated and are addressed in the attached Responsiveness Summary (Appendix VI). The Community generally has accepted the preferred remedy.

SELECTED REMEDY

SOILS/SEDIMENTS (OU2)

EPA has determined, upon consideration of the requirements of CERCLA, the results of the RI/FS, the detailed analysis of the various alternatives, and public comments, that Alternative S-3, Capping, is the appropriate remedy for the contaminated soils and sediments at the Site. This remedy addresses the Low-Level Threat Wastes identified at the Site. These are wastes which present an excess cancer risk that is not far from the acceptable risk range and can be contained by engineering controls (*e.g.*, landfill cap).

The major components of the selected remedy for soils and sediments are as follows:

- Construction of an engineered cover system (landfill cap) over the contaminated soils at the Site in conformance with the major elements described in 6 New York Code of Rules and Regulations Part 360 for landfill caps. Conceptually, the standard Part 360 cap includes: 18 inches of low-permeability soil cover barrier or geomembrane to ensure a permeability of 10-7 cm/sec, six inches of porous material serving as a drainage layer, 24 inches of soil as a barrier protection layer and six inches of topsoil and grass cover. The areas of the Site to be capped include the Berm and the portions of contaminated soil (above TAGMs)in the former Subdivision and Edgewood Drive Wooded Lots. Areas of contaminated soil (above TAGMS) located in the Northern Aspect will be excavated and consolidated under the cap, as well as contaminated sediments excavated along East Gill Creek.

- Implementation of a long-term inspection and maintenance program to ensure cap integrity.

- Removal and off-site disposal of the permanent and mobile homes.

- Taking measures to secure institutional controls in the form of deed restrictions to limit future Site activities, as appropriate, and fencing to limit future access to the capped area.

- Capping the Wooded Wetland with six inches of clean sediment. If the Wetlands Assessment and Mitigation Plan conclude that

the addition of six inches of clean sediment would have an adverse impact on the wetland, contamination in the Wooded Wetland would be excavated and it would be appropriately restored.

- Performance of an investigation in East Gill Creek during Remedial Design to determine if there are upstream sources of contamination that may impact the Site.

The goal of the remedial action is to contain the source area and to prevent further migration of contaminants to the ground water. Based on information obtained during the investigation, and the analysis of the alternatives, the selected remedy will provide 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, will comply with ARARs, will be cost-effective, and will reduce the mobility of contaminants permanently by utilizing permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The selected soil remedy would result in contaminants remaining on-site in concentrations exceeding health-based levels. Therefore, under CERCLA, the Site will have to be reviewed at least every five years to ensure that the remedy remains protective of human health and the environment.

There is the potential for a commercial development at the Site. If the Site is commercially developed, the cap covering the contaminated soil may not consist of the components of a standard Part 360 cap, but would need to meet the requirements of 6NYCRR, Section 360-2.13(w), the New York State regulations which indicate that changes to the standard design of a cover system may be proposed that document and substantiate that the resulting cover system would perform in the same manner as the standard cover system. In consultation with the New York State Department of Environmental Conservation, the following performance criteria for an alternative engineered cover system at the Forest Glen Site have been identified:

1. The equivalent cover system must prevent exposure to the waste materials and contaminated soils.

2. The cover system must prevent infiltration of water into the subsurface.

3. Roofing systems must convey water away from the cover system to prevent infiltration of water into the subsurface.

4. The subbase of parking systems must contain a seamed geomembrane and be sloped to a storm-water drainage system.

5. The equivalent cover system will be adequately operated and maintained indefinitely.

As stated above, the selected soil remedy is based on the anticipated future use of the Site as commercial/light industrial. If the proposed development fails to be implemented in a timely manner and the property is then promptly rezoned for residential use, EPA expects that it would issue an Explanation of Significant Differences (ESD) pursuant to Section 117 of CERCLA which would announce that the OU2 soils/sediments remedy would change to the remedy selected in the 1998 ROD.

GROUND WATER (OU3)

EPA has determined, upon consideration of the requirements of CERCLA, the results of the RI/FS, the detailed analysis of the various alternatives, and public comments, that Alternative GW-2 is the appropriate remedy for the contaminated ground water at the Site. This remedy addresses the principal threat at the Site, the on-property contaminated ground water.

The major components of the selected ground-water remedy include:

- Extraction of contaminated ground water from the on-property plume;

- The extracted ground water will be transported via sanitary sewer to the City of Niagara Falls Wastewater Treatment Plant;

- Construction of an on-site 12-hour holding tank, as required by the City of Niagara Falls Wastewater Treatment Plant;

- Sampling from the storage tank effluent pipe will be conducted as required by the City of Niagara Falls Wastewater Treatment Plant;

- A Long-Term Ground-Water Monitoring Program will be conducted to assess the whether the remedy is functioning as designed;

- A Monitored Natural Attenuation Study, including a baseline investigation and ground-water modeling, will be performed to evaluate intrinsic biodegradation and other natural attenuation processes. If monitoring indicates that natural attenuation is not effective in remediating the off-property ground-water contamination, more active remedial measures will be considered.

The Remedial Action Objective for ground water is to restore the potable aquifer to drinking-water quality. It is expected that the contaminated ground water underlying the property will be restored to drinking-water standards in approximately 7 years. Also, it is expected to take approximately 12 to 14 years for the off-property contaminated ground water to achieve drinking-water standards.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, as available. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Capping the contaminated soils in place at the Site is expected to be effective in preventing contact with the contaminated soils. Limited soil excavation and consolidation of these soils under the cap reduces the areal extent of the cap. Although contaminants will remain in soils, the cap will eliminate or reduce infiltration of precipitation, thereby minimizing the potential for migration of contaminants to ground water. The

institutional controls will help protect human health by preventing access to the contamination and future exposure of individuals to it. Extraction and treatment of contaminated ground water will provide overall protection of human health and the environment by achieving ARARs in the bedrock aquifer.

The long-term monitoring of the ground water will assess whether the cap and the pump and treat system are functioning as designed, thus ensuring that the remedy remains protective of human health and the environment.

Compliance with ARARs

Federal MCLs and New York State drinking-water standards are ARARs with respect to the potable bedrock aquifer. The selected remedy will be effective in meeting these ARARs, since it includes the treatment of contaminated ground water until such time as ARARs are achieved. Action-specific ARARs for the Site include Federal and State regulations for capping, temporary storage, and disposal of wastes (40 CFR Part 256-268 and 6 NYCRR Part 360). Location-specific ARARs for the Site include Executive Order 11990 on wetlands protection. "To be considered" criteria are TAGM 4046, NY State sediment criteria, the Executive Order 11988, "Floodplain Management" and EPA's 1985 Statement of "Policy on Floodplains and Wetlands Assessments for CERCLA Actions". The selected remedy will comply with these standards through capping of the contaminated soils at the Site. A wetlands assessment will be performed during the remedial design and a mitigation plan will be developed to address any adverse impacts on the wetlands that may be caused by the remedial action.

Cost-Effectiveness

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital costs and O&M costs have been estimated and used to develop present worth costs. In the present-worth cost analysis, annual costs were calculated for 30 years (estimated life of an alternative) using a five percent discount rate and based on 1997 costs. The selected remedy has the lowest cost that will achieve the goals of the response actions and is cost-effective because it will provide the best overall effectiveness proportional to its cost.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Overall, the selected remedy is considered to include the most appropriate solution to contamination in the soil and ground water at the Site because it provides the best balance of trade-offs among the alternatives with respect to the nine evaluative criteria. Extraction and treatment of the contaminated water is a permanent solution to the on-property ground-water contamination.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied by the selected remedy since the on-property ground-water plume, the principal threat at the Site, will be extracted and treated.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternatives presented in the Proposed Plan.

APPENDIX I

FIGURES

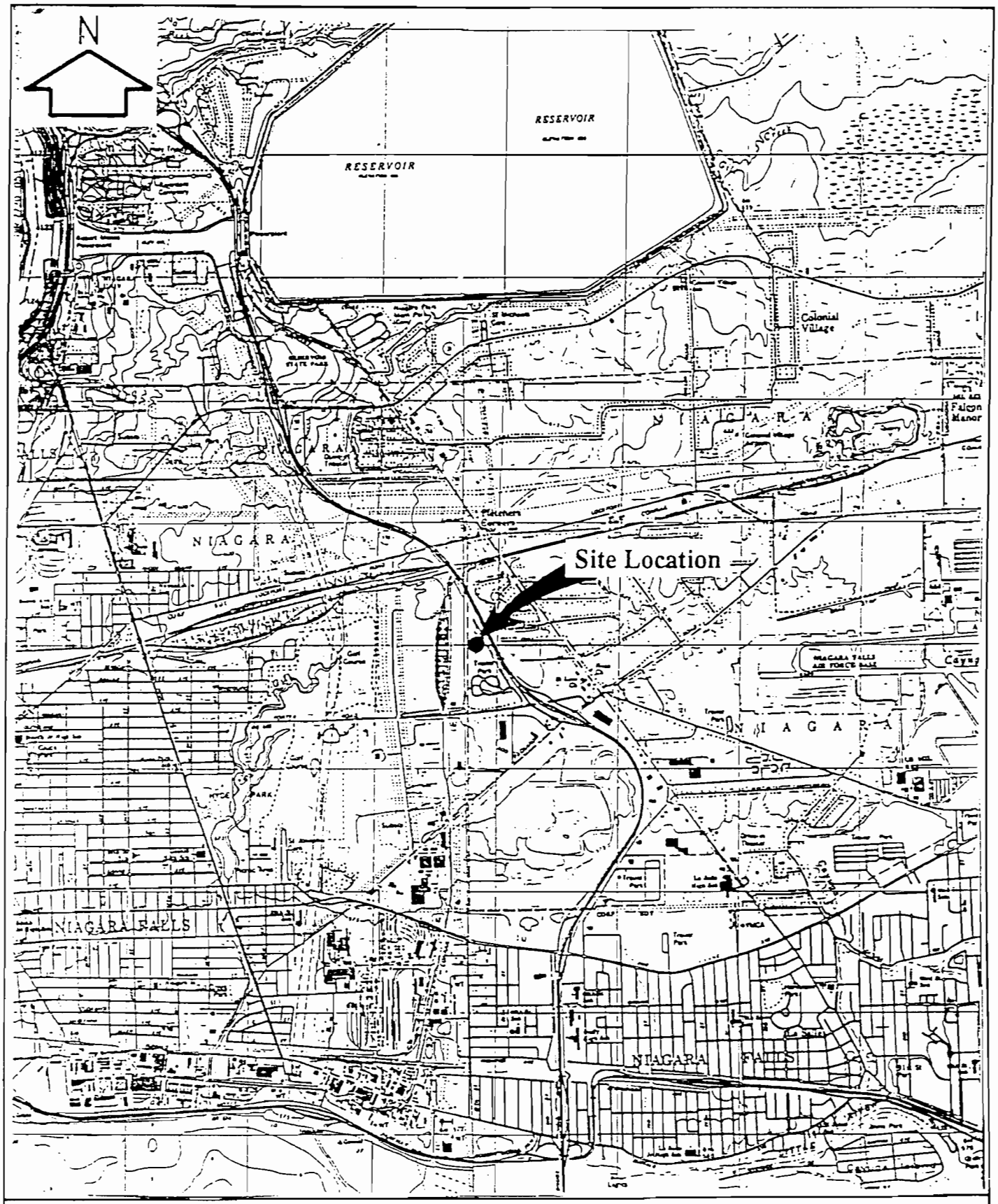

Figure 1
SITE LOCATION MAP

FOREST GLEN SITE
NIAGARA FALLS, NEW YORK

Source: USGS Topographic Maps

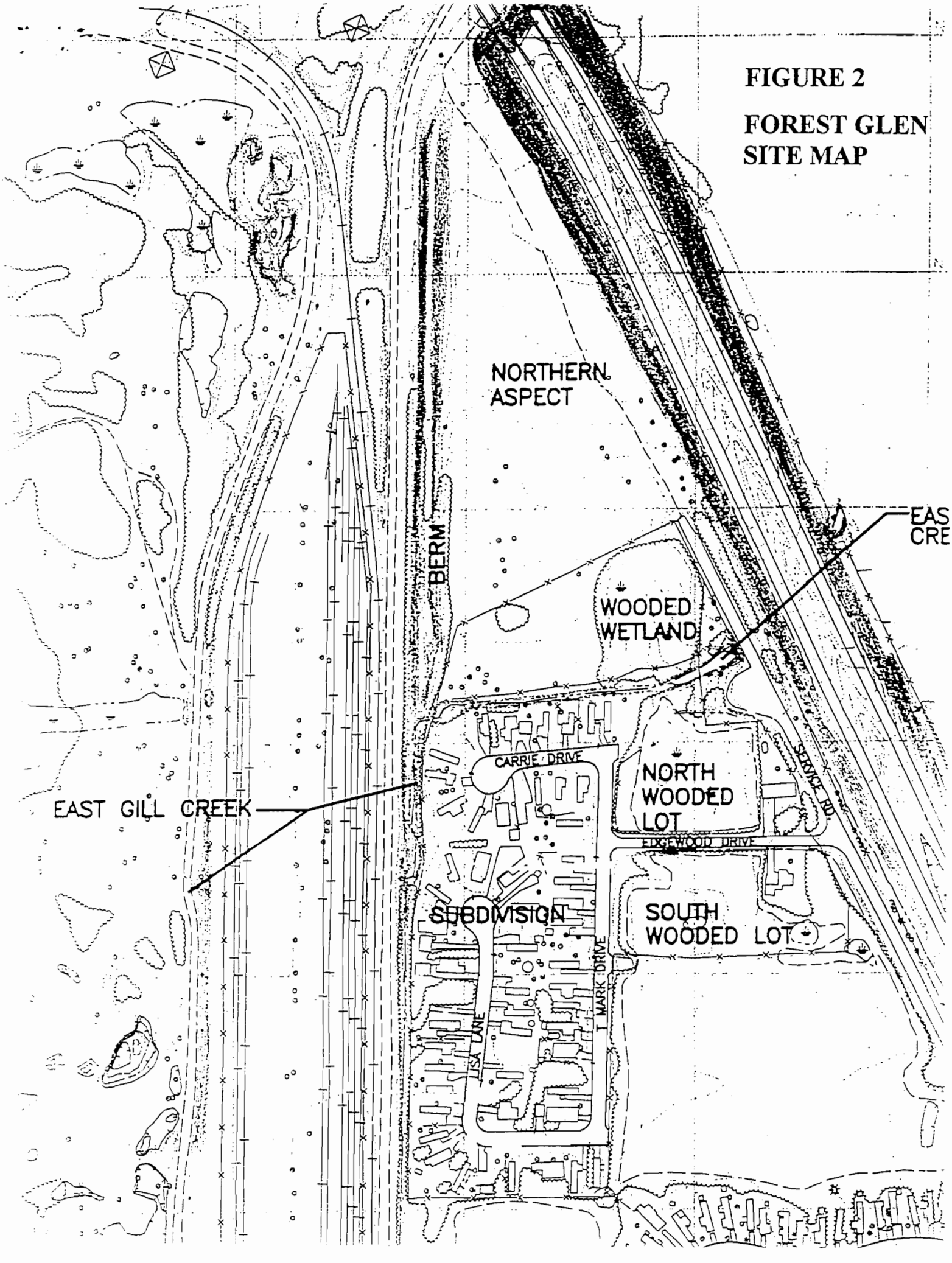
FIGURE 2
FOREST GLEN
SITE MAP
NORTHERN
ASPECT
BERM
EAS
CRE
WOODED
WETLAND
CARRIE DRIVE
NORTH
WOODED
LOT
SERVICE RD.
EAST GILL CREEK
EDGEWOOD DRIVE
SUBDIVISION
SOUTH
WOODED LOT
LISA LANE
T MARK DRIVE

FIGURE 3 -

SOIL SAMPLING LOCATIONS

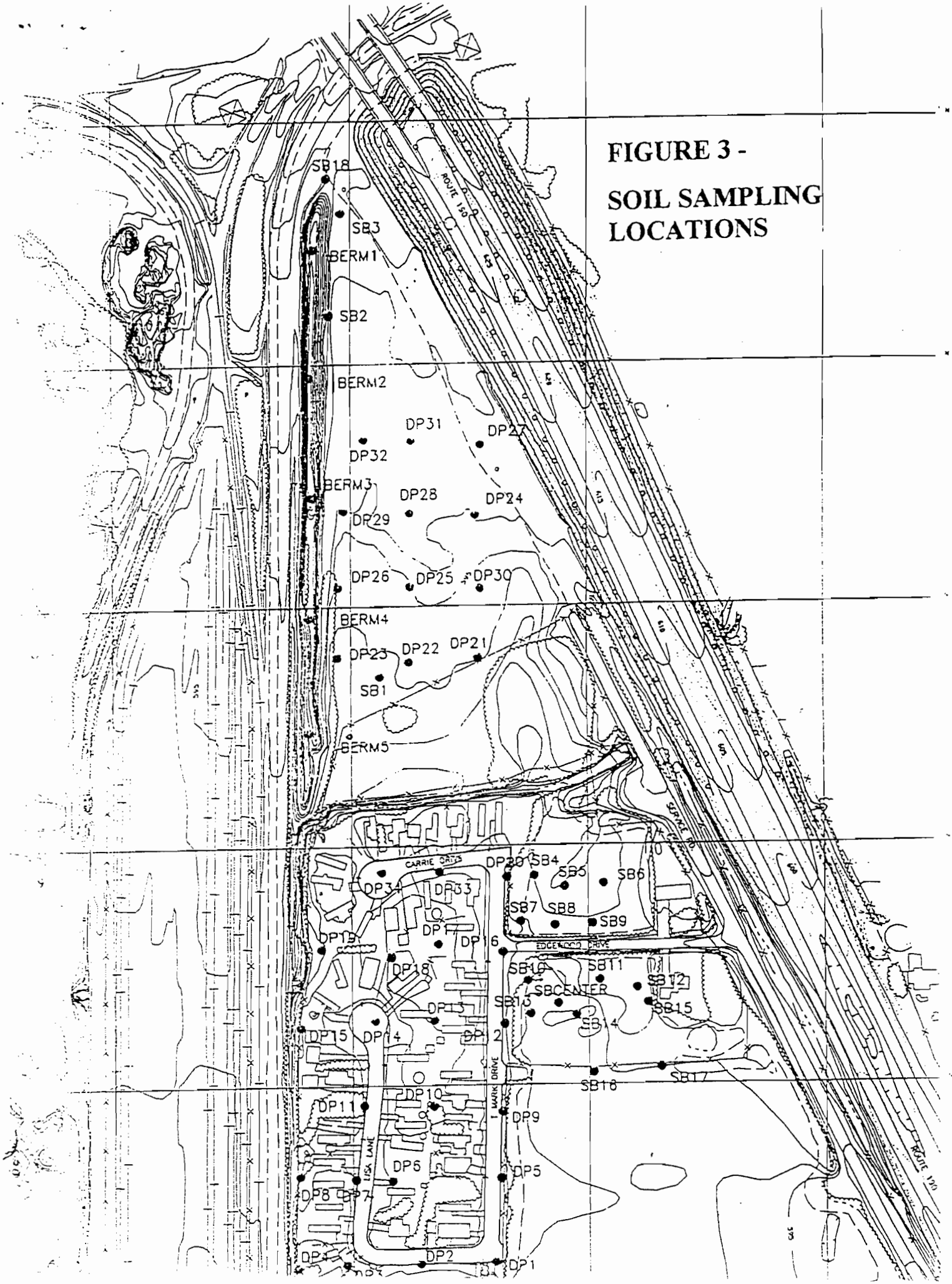

FIGURE 4 -

MONITORING WELL LOCATIONS

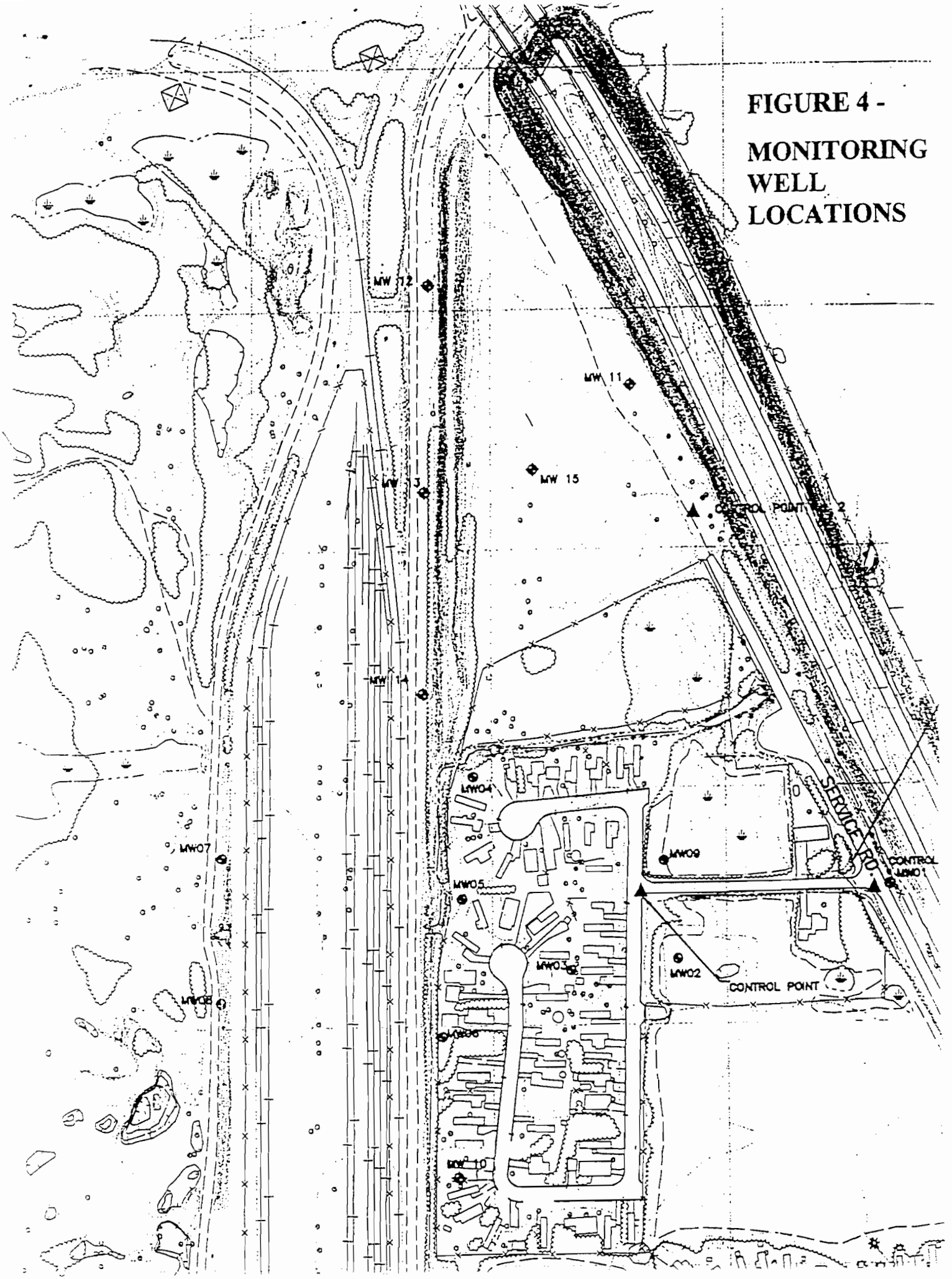

FIGURE 5 -

AREA OF GROUNDWATER PLUME

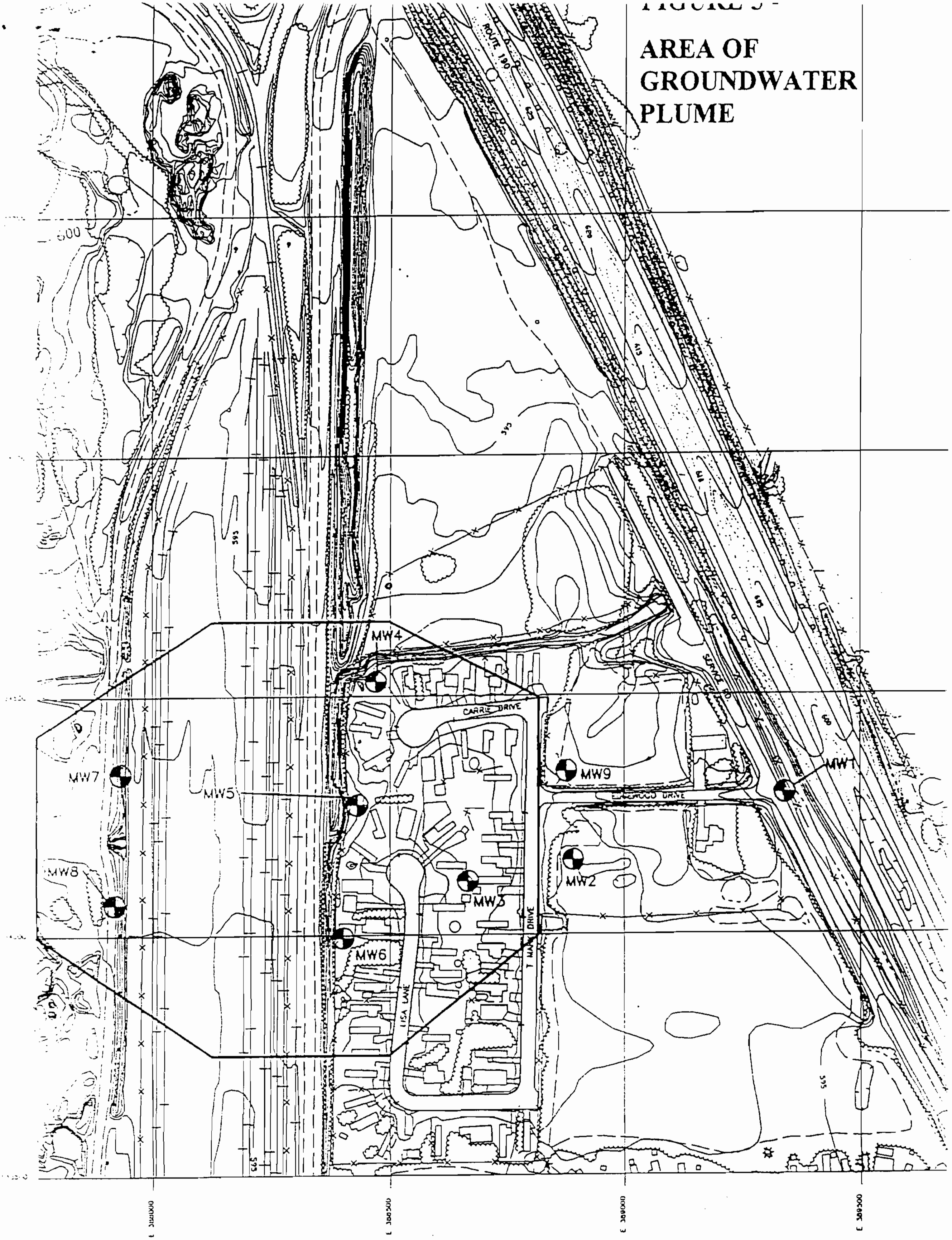

FIGURE 6 - EXTENT OF FILL

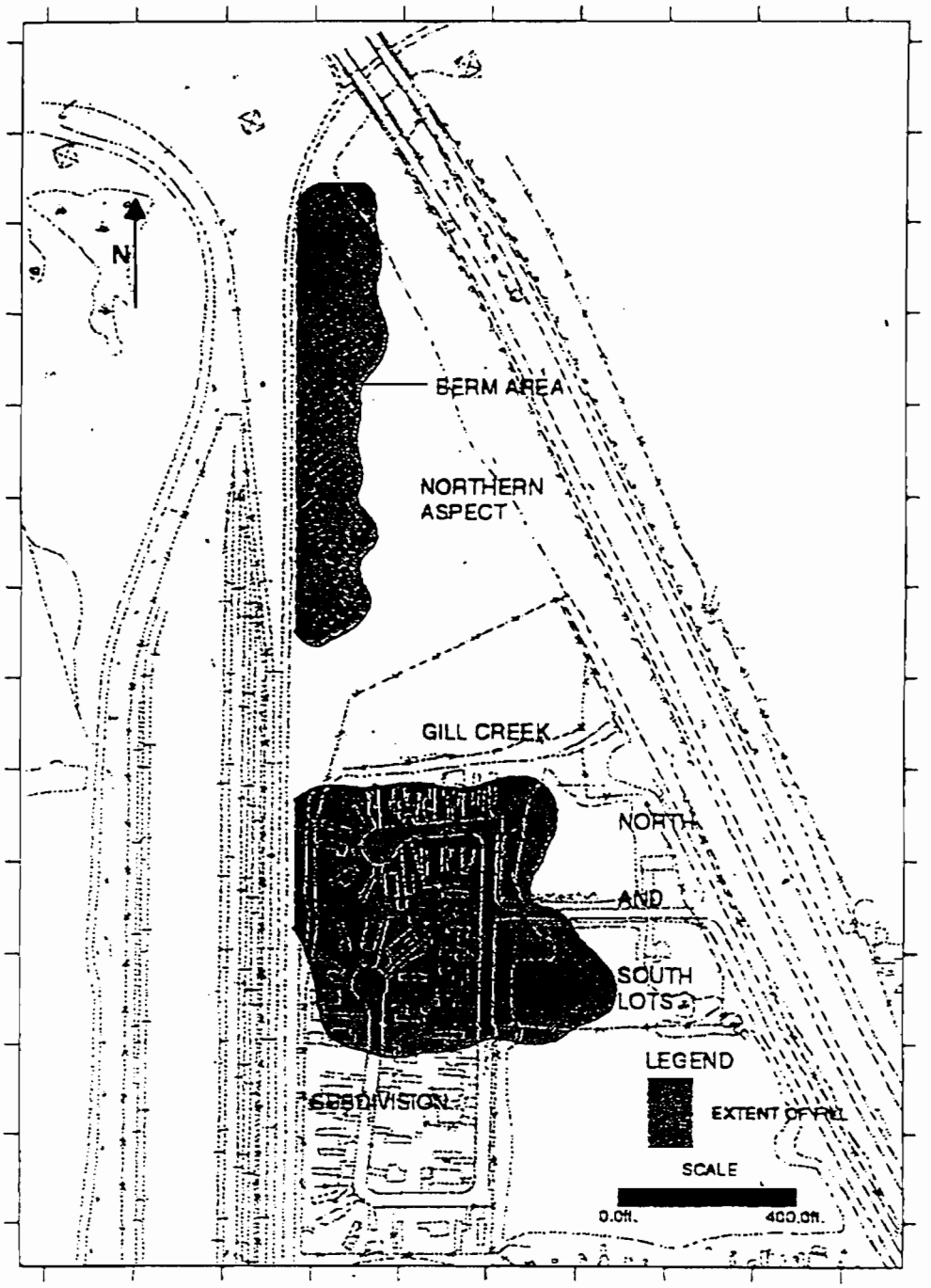

TABLE 4
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
TAGMs - SOIL CLEANUP OBJECTIVES

TARGETED ORGANIC COMPOUNDS	
Contaminants of Concern	NYSDEC TAGM 4046 Cleanup Goal (ppm)
Aniline	0.10
2-Anilinobenzothiazole	TBD
2-Mercaptobenzothiazole	0.85*
Phenothiazine	0.85*
Benzothiazole	TBD
Phenyl Isothiocyanate	TBD
Diphenylamine	TBD
Perylene	0.85*
N,N-Diphenyl-1,4-Benzenediamine	0.85*

*Values computed using the methodology in TAGM 4046 and subsequently adjusted to the Pratical Quantitaion limits of those compounds in soil.

TABLE 4
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
TAGMs - SOIL CLEANUP OBJECTIVES

INORGANIC COMPOUNDS	
Contaminants of Concern	TAGMs (ppm)
Arsenic	7.5 or SB
Barium	300 or SB
Beryllium	0.16 or SB
Cadmium	10 or SB
Chromium	50 or SB
Cobalt	30 or SB
Copper	25 or SB
Lead	SB
Manganese	SB
Mercury	0.1
Nickel	13 or SB
Selenium	2 or SB
Silver	SB
Vanadium	150 or SB
Zinc	20 or SB

SB = Site background

TABLE 4
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
TAGMs - SOIL CLEANUP OBJECTIVES

SEMI-VOLATILE ORGANIC COMPOUNDS	
Contaminants of Concern	TAGM Cleanup Goal (ppm)
Anthracene	50
Benzo(a)anthracene	0.224 or MDL
Benzo(a)pyrene	0.061 or MDL
Benzo(b)flouranthene	0.224 or MDL
Benzo(g,h,i)perylene	50
Benzo(k)flouranthene	0.224 or MDL
Chrysene	0.4
Dibenzo(a,h)anthracene	0.014 or MDL
Flouranthene	50
Indeno(1,2,3-cd)pyrene	3.2
2-methylphenol	0.1 or MDL
Phenanthrene	50
Phenol	0.03 or MDL

MDL = Method Detection Limit

PCBs & PESTICIDES	
Contaminants of Concern	TAGMs
Aroclor 1254	1.0 (surface) 10.0 (subsurface)
Alpha - BHC 110	0.11
Beta - BHC 200	0.2
4,4'-DDE 210	2.1

APPENDIX VI

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
FOREST GLEN SUBDIVISION SITE

1.0 INTRODUCTION

A responsiveness summary is required by Superfund regulation. It provides a summary of public comments and concerns received during the public comment period, and the United States Environmental Protection Agency's (EPA) and the New York State Department of Environmental Conservation's (NYSDEC) responses to those comments and concerns. All comments summarized in this document have been considered in EPA and NYSDEC's final decision for the selected remedy for the Forest Glen Subdivision Site.

This Responsiveness Summary is organized into the following sections:

2.0 SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

This section summarizes the involvement of EPA as the lead agency for community relations at the Site.

3.0 SUMMARY OF COMMENTS RECEIVED DURING PUBLIC MEETING AND EPA'S RESPONSES

This section summarizes verbal comments submitted to EPA by local residents at the public meeting and provides EPA's responses to these comments.

4.0 SUMMARY OF WRITTEN COMMENTS AND EPA'S RESPONSES

This section summarizes written comments submitted to EPA during the public comment period and EPA's responses to these comments.

5.0 APPENDICES

There are five appendices attached to this document. They are as follows:

Appendix A - Proposed Plan

Appendix B - Public Notices published in the Niagara Gazette

Appendix C - April 28, 1999
Public Meeting Attendance Sheets

Appendix D - April 28, 1999
Public Meeting Transcript

Appendix E - Letters Submitted During the
Public Comment Period

2.0 SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

Community involvement at the Site has been relatively strong. EPA has served as the lead agency for community relations and remedial activities at the Site.

The Proposed Plan for both ground-water and soil contamination at the Site was released to the public for comment on April 16, 1999. This document, together with the Remedial Investigation report, the Feasibility Study, the Ground-Water Feasibility Study, the Endangerment Assessment (Human Health and Ecological Risk Assessment) and other reports, were made available to the public in the Administrative Record file at the EPA Docket Room in Region II, New York, and at the EPA Public Information Office, 345 Third Street, Niagara Falls, New York.

The notice of availability for the above referenced documents was published in the Niagara Gazette on April 16, 1999. A similar notice was sent to the addressees on the Site mailing list.

On April 28, 1999, EPA conducted a public meeting at the Niagara Fire Company No. 1 at 6010 Lockport Road, Niagara Falls, New York to discuss the Proposed Plan and to provide an opportunity for the interested parties to present comments and questions to EPA.

3.0 SUMMARY OF COMMENTS RECEIVED DURING PUBLIC MEETING AND EPA'S RESPONSES

Comments expressed at the April 28, 1999 public meeting and EPA's responses to these comments are presented as follows:

Comment #1: Paul Dicky with the Niagara County Health Department asked if that once the contaminated ground water was cleaned up to MCLs (drinking-water standards) under the preferred alternative (estimated to be 7 years for the on-property plume and 12 years for the off-property plume), would the ground water

have to be perpetually lowered (by extraction) to prevent future ground water from flowing over the wastes and recontaminating the aquifer?

EPA's Response: The contaminated fill and soil at the Site are in the overburden and are not in direct contact with the ground water. The overburden, consisting of clay deposits and till, extends from 0 to 20 feet below the ground surface (BGS). During the RI, it was determined that the overburden had no ground-water flow. The ground-water flow at the Site is in the bedrock. The shallow bedrock zone extends from 16 feet to 28 feet BGS and the deep bedrock zone extends from 40 to 45 feet BGS. The cap which will be placed over contaminated soil as part of the soils remedy will prevent the formation of leachate by stopping rainwater from percolating through the wastes. EPA believes that once the ground water underlying the Site attains MCLs, the capped wastes will not recontaminate the ground water.

Comment #2: A citizen asked if there was a clay bed under the wastes and if the preferred remedy included a synthetic liner? He also asked if EPA was concerned that the wastes may leak through the clay.

EPA's Response: Although it appears that there is a clay layer throughout most of the Site, it also appears that this layer may not be continuous since the ground water has been contaminated by the chemicals in Site soils. As the selected remedy calls for capping the soils in place, there will be no liner under the contaminated soils. An impermeable cap will be placed on top of the contaminated soils to prevent the infiltration of rain water through the soil, thereby preventing the formation of leachate caused by the percolation of rain water through the contaminated soils. A long-term ground-water monitoring plan will be required to verify that no leakage occurs under the cap. If there is any indication that the remedy is not functioning as designed, EPA will reevaluate the remedy and take appropriate action.

Comment #3: The Deputy Supervisor of the Town of Niagara expressed concerns about leakage in the sewer system into which the preferred remedy proposes to discharge the extracted ground water for treatment by the City of Niagara Falls Wastewater Treatment Plant. The Town believes the sewers need work.

EPA's Response: The sewer will be inspected for competency during the Remedial Design phase of the project. If any

significant problem is identified, it will be corrected before any ground water is discharged. The sewer will be periodically inspected during the duration of its use to transport the contaminated ground water to the City of Niagara Falls Wastewater Treatment Plant.

Comment #4: The Chairman of the Town of Niagara Environmental Commission (EC) commented the that the new preferred Alternative S-3 (Capping) was more acceptable to the EC than the current selected remedy, Excavation, Consolidation and On-Site Disposal (S-4), because it does not result in a 30-foot mound in the northern portion of the Site. However, the EC considered Excavation and Off-Site Disposal (Alternative S-5) to be a better choice, since it would involve the removal of all contaminated materials from the Site.

EPA's Response: Each remedial alternative was assessed by EPA utilizing the nine criteria set forth in the National Continency Plan. Overall protection of human health and the environment and compliance with "applicable and relevant and appropriate requirements" (ARARs) are the two threshold criteria which must be met. The five balancing criteria are long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability and cost. The two modifying criteria are state and community acceptance.

All of the action alternatives (*i.e.*, Alternatives S-3 through S-6) were considered to be protective of human health and the environment and could meet ARARs. However when these alternatives were reevaluated with respect to the change in intended future land use, EPA believes that the selected remedy, Alternative S-3 provides the best balance of the remaining criteria.

The cost of excavating all of the contaminated material and disposing of it off-site, as included in Alternative S-5, was estimated to be approximately $106 million. EPA has recognized that removal of large volumes of waste such as contained in municipal landfills or other large disposal sites similar to Forest Glen, can be excessively costly and not practical. As a result, in 1993, EPA issued the guidance document, *Presumptive Remedy for CERCLA Municipal Landfill Sites* (OSWER Directive No. 9855.0-49FS), which indicates that proper closure and capping is an effective means of protecting public health and the environment for landfills and other large disposal areas. The

selection of Alternative S-3 as the appropriate remedy for the Site is consistent with this guidance. Upon completion of the construction of a cap, a long-term maintenance program will ensure that the cap does not fail. In addition, EPA will be reviewing the Site at five-year intervals to ensure that the remedy remains protective of public health and the environment.

Comment #5: Concern was expressed about runoff from the Site with respect to Expressway Village, a neighboring trailer park.

EPA's Response: The cap placed over the contaminated soil will be designed such that Site drainage will not cause any negative impacts, such as flooding at Expressway Village or on the adjacent railroad property. The design of any commercial development at the Site will also include a plan to address Site runoff.

Comment #6: A citizen asked if EPA knew who the Potentially Responsible Parties (PRPs) were at the Site and if any effort was being made to have them pay for the remedial action.

EPA's Response: EPA is currently negotiating with three PRPs, the Goodyear Tire and Rubber Company, Thomas G. Sottile and Niagara Falls, USA Campsites, Inc., to recover past costs at the Site and implement the soil and ground-water remedies selected in the ROD.

Comment #7: The same citizen asked why EPA did not demand that the PRPs pay for Alternative S-5, Excavation and Off-Site Disposal.

EPA's Response: EPA selects a remedy based on the nine criteria identified above. Remedies are selected without consideration as to whether there are PRPs to pay the cost of implementation. See also EPA's response to Comment #4.

Comment #8: A resident of Expressway Village asked whether any testing had been done there to determine if these was any contamination at the trailer park related to the Forest Glen Site.

EPA's Response: EPA conducted two separate sampling events in Expressway Village and the Agency for Toxic Substances and Disease Registry (ATSDR) reviewed the results of the sampling and issued two Preliminary Health Assessments. EPA and ATSDR

concluded that no contamination from Forest Glen was found in Expressway Village. Historical evidence also indicates that there is no contamination at Expressway Village associated with Forest Glen Site. In a series of aerial photographs, the Site appears disturbed at the end of Edgewood Drive, providing evidence of waste disposal. However, the area where Expressway Village is now located appears in these aerial photographs as undisturbed woods during the time the dumping occurred.

Comment #9: A resident of Expressway Village noted that it was already difficult to make a turn from Service Road onto Porter Road and that she sometimes had to wait through several traffic lights. A commercial development would increase traffic.

EPA's Response: EPA is not involved in land use or zoning determination for the Site. These determinations are made by local governments (*i.e.*, the City of Niagara Falls and the Town of Niagara.) The resident's concerns should be expressed to the appropriate offices of these municipal governments.

Comment #10: A citizen expressed displeasure at the change in zoning and said that the area has established communities that would be affected by a commercial development.

EPA's Response: Please see EPA's response to Comment #9.

Comment #11: A citizen remarked that though a cap would cover the contaminated soils, the wastes would remain in place. Who will be responsible for the cap over the years? Will it be maintained?

EPA's Response: It is EPA's responsibility to ensure that the cap is maintained. If the responsible parties implement the remedy, EPA would ensure that they provide adequate long-term maintenance of the cap. If EPA and NYSDEC were to jointly fund the construction of the cap, it would be NYSDEC's responsibility to provide long-term cap maintenance. The remedial design of the selected remedy will include an Operations and Maintenance Plan detailing activities to be performed which will ensure the integrity of the cap. A Long-Term Ground-Water Monitoring Program will provide data to determine whether the cap is working effectively as designed. In addition, the Site will be reviewed by EPA at least every five years to determine if the selected remedy continues to be protective of human health and the environment.

Comment #12: A citizen said that the chemicals would remain in the ground and that she was concerned about people's health.

EPA's Response: The selected remedy allows the chemicals to remain in the ground, however, the exposure pathways of these chemicals to receptors, either human or environmental, will be eliminated by an impermeable cap placed over the contaminated soil. The cap will prevent exposure to the contaminated soil and will prevent the percolation of rainwater through the wastes. The contaminated on-property ground water will be extracted and treated until drinking water standards (MCLs) are achieved. The off-property contaminated ground water will be monitored and allowed to naturally attenuate until MCLs are reached. While it is noted that there are currently no users of ground water in the area, any potential future exposure pathway of ingesting contaminated ground water will be eliminated.

Comment #13: A citizen asked how frequently wells would be monitored at the Site.

EPA's Response: The Long-Term Ground-Water Monitoring Plan has not yet been designed. This Plan, which will be prepared as part of the Remedial Design, will set forth a schedule for ground-water monitoring. Typically, the ground water is monitored quarterly at first. Frequency of monitoring may then be reduced to semi-annually or annually, depending on the results of the previous monitoring.

Comment #14: A citizen asked whether there would be signs posted indicating that there is hazardous waste buried on the Site.

EPA's Response: Once the contaminated areas have been capped, there will not be any signs posted on the property. However, institutional controls (*e.g.*, deed restrictions) would be used to limit future Site activities to ensure that the integrity of the cap is not compromised. It will be recorded in the deed that there are wastes in the soils under the cap.

Comment #15: A citizen asked if the creek bed would be remediated.

EPA's Response: The creek bed will be remediated to levels specified by the New York State Sediment Criteria.

Comment #16: Paul Dicky of the Niagara County Health Department asked whether the time predicted for the aquifer to be restored to drinking-water standards (7 years for the on-property plume and 12 years for the off-property plume) was for volatile organic compounds only.

EPA's Response: The time to reach drinking-water standards predicted by EPA modeling was for both organics and inorganics.

Comment #17: Mr. Dickey commented that iron in the aquifer might never reach MCLs.

EPA's Response: The man-made chemicals in the aquifer will be remediated to MCLs. However, naturally ocurring metals, such as iron, which exist at high levels in the local environment, would be remediated to their naturally occuring background level.

Comment #18: The Deputy Supervisor of the Town of Niagara asked who would actually monitor the construction of the remedy.

EPA's Response: If the PRPs were to implement the remedial actions, EPA would oversee the construction at the Site and would likely ask the Corps of Engineers to provide construction oversight.

4.0 SUMMARY OF WRITTEN COMMENTS AND EPA'S RESPONSES

The following written comments were submitted by Goodyear Tire and Rubber Company, a PRP, and Cherokee Environmental Risk Management, the proposed developer for the Site:

Comment #19: Goodyear commented that the new preferred remedy is more appropriate for the Site because there is now an opportunity for commercial development, whereas the remedy in the 1998 ROD precluded the use of the Site and created a 30-foot mound in the northern area of the Site.

EPA's Response: EPA agrees and changed its 1998 remedy decision as a result of the change in intended future land-use from residential to commercial/light industrial.

Comment #20: The developer commented that any "hot spot" areas of contamination lying outside the area to be capped (*see Figure*) should be excavated and placed under the cap. This will ease the implementation of the development as there will be

clean areas in which to place utility corridors and storm-water management structures. Goodyear believes the size of the cap should be minimized as much as possible.

EPA's Response: EPA agrees with these comments. Areas of soil outside the extent of the contaminated fill which exceed the TAGM cleanup levels should be excavated and placed under the cap to minimize the capped area. One such area is the surficial soil which exceeds the TAGMs for PAHs. The size of the cap costed out in the Feasibility Study (17 acres) was an optimization of many factors related to capping, such as slopes. EPA encourages the minimization of the capped areas by the excavation and consolidation of contaminated soils which exceed the TAGM values.

Comment #21: Goodyear believes that current conditions at the Site indicate that active biodegradation and attenuation of Site-related volatile organic compounds in ground water is occurring now. Goodyear thinks that contaminants in the ground water are not increasing, but are stable with time. This stability indicates that the off-property plume is in equilibrium. Goodyear believes this equilibrium indicates that the plume will not increase in the future. Goodyear wants to perform a more detailed study of Monitored Natural Attenuation (MNA) at the Site, including baseline conditions before the installation of the cap in order to optimize potential ground-water remedies. A continuing study would evaluate the effect of the cap on the ground water. Then, this information would be used to design the pump and treat system or other appropriate remedial measures. Goodyear believes that an active pump and treat system would interfere with a proper study of MNA.

Cherokee agrees that MNA is an appropriate remedy for the off-property plume. However, they also believe there should be further investigation of MNA for the on-property plume. Cherokee agrees with Goodyear that these detailed MNA studies should be performed prior to the installation of active remedial measures (*i.e.*, pumping) to ensure an appropriate remedy.

EPA's Response: The selected remedy includes a baseline MNA study to document existing conditions in the aquifer. The Ground-Water FS did not include a detailed MNA Study and more Site-specific information is necessary. EPA will review and evaluate studies submitted by Goodyear and/or Cherokee and consider the information with respect to the selected remedy. However, the selected remedy includes the installation of a

simple ground-water extraction system in areas of highest contamination in the vicinity of Monitoring Well MW-5. Once the information for the baseline MNA study is collected, the areas of contaminated soil should be capped while the ground-water extraction wells are installed and operating. MNA ground-water studies should continue concurrently with these construction activities. These remedial activities should be sequenced such that a cap is installed but there is no delay in the installation of active remedial measures.

Comment #22: Goodyear commented that active pumping will affect the ground-water system such that we will not be able to determine the effectiveness of the cap.

EPA's Response: EPA believes that an effective ground-water monitoring system can be designed to ensure the effectiveness of the remedy. EPA agrees with Goodyear that it may not be possible to quantify the reduction in leachate formation as a result of capping the contaminated soils in place. However, EPA will be able to determine if the concentrations of contaminants of concern from the Site in the ground water decrease as expected.

Comment #23: Cherokee agreed that institutional controls are appropriate for the Site and they intend to restrict future use of the property to commercial uses and institute a ban on excavation in areas of contaminated soil. However,. the prospective development would not be fenced as areas of contamination would be inaccessible under the cap.

EPA's Response: A traditional Part 360 cap has a soil layer on top. Proper maintenance of the cap is essential to prevent erosion of the soil layer. The selected remedy includes a fence to prohibit activities on the cap which may damage it or interfere with its integrity. If the proposed development proceeds, an equivalent cap design will be utilized. The top layer of such an equivalent cap would be asphalt. Therefore, a fence will not be necessary to maintain the integrity of the equivalent cap.

Comment #24: Cherokee acknowledged that there are concerns with respect to the competency of the sewers. Since a properly functioning sewer is important to Cherokee's development plans for the Site, they agree to work closely with the Town of Niagara, the City of Niagara Falls and Goodyear to ensure that the sewer concerns are adequately addressed.

EPA's Response: Adequacy of the sewers will be reviewed during Remedial Design and EPA will work with local governments and the PRPs on this issue.