NEW YORK STATE SUPER FUND STANDBY CONTRACT

Feasibility Study Report
Utica City Dump

Site No. 6-33-015

Work Assignment No. D002676-29

September 29, 2000

Prepared for:

New York State Department *of* Environmental Conservation
Division of Environmental Remediation
50 Wolf Road
Albany, NY 12233

Prepared by:

Lawler, Matusky & Skelly Engineers LLP
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, NY 10965

In Association with:

CLOUGH, HARBOUR & ASSOCIATES LLP

CLOUGH, HARBOUR & ASSOCIATES LLP
ENGINEERS, SURVEYORS, PLANNERS
& LANDSCAPE ARCHITECTS

THE GALLERIES OF SYRACUSE
441 SOUTH SALINA STREET
SYRACUSE, NEW YORK 13202-2424
TEL: 315-471-3920 • FAX: 315-471-3569
www.cloughharbour.com

September 29, 2000

Mr. Dave Tromp
Division of Environmental Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

RE: UTICA CITY DUMP – FINAL DELIVERABLES
CHA PROJECT 6832

Dear Mr. Tromp:

Clough, Harbour & Associates LLP, in association with Lawler, Matusky & Skelly Engineers LLP, is pleased to submit our final deliverables for the Utica City Dump Project. These include six copies of the Revised Feasibility Study, the presentation boards that you previously requested, and in addition revised covers for the Remedial Investigation Report. Note, as I recently discussed with you, we had mistakenly sent you revised covers for the Feasibility Study instead of the RI report. We are also including an electronic copy of the text, figures and tables that make up the Feasibility Study.

It has been a pleasure working with you. If you have any questions, please do not hesitate to call.

Sincerely,

CLOUGH, HARBOUR & ASSOCIATES LLP
ENGINEERS, SURVEYORS, PLANNERS
& LANDSCAPE ARCHITECTS

Christopher Burns, Ph.D., P.G.
Project Manager

CB/am
Enclosures
cc: Ed Maikish, LMS (w/enclosure)
Darrell Swerdoski, DEC (w/enclosure)
Greg Rys, DOH (w/enclosure)
Mark Corey, CHA (w/enclosure)

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BAT	Best Available Technology
BCT	Best Control Technology
BMP	Best Management Practices
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CHA	Clough Harbour & Associates, LLP
CWA	Clean Water Act
CWTS	Constructed Wetlands Treatment System
CY	Cubic Yard
EA	Each
FS	Feasibility Study
HDPE	High Density Polyethylene
LF	Linear Feet
LMS	Lawler Matusky & Skelly Engineers, LLP
LS	Lump Sum
NCP	National Contingency Plan
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PRAP	Proposed Remedial Action Plan
RI	Remedial Investigation
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SCG	Standards, Criteria, and Guidelines
SDWA	Safe Drinking Water Act
SF	Square Feet
SPDES	State Pollution Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
T&E	Threatened and Endangered Species
TAGM	Technical and Administrative Guidance Memorandum
TOGS	Technical and Operational Guidance Series
USC	United States Code
USF&WS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

7.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Identification and screening of technologies and development and analysis of remedial alternatives for the Utica City Dump are presented in the feasibility study, which is contained in Sections 7 through 11 of this report. A site plan of existing conditions is presented in Figure 7-1.

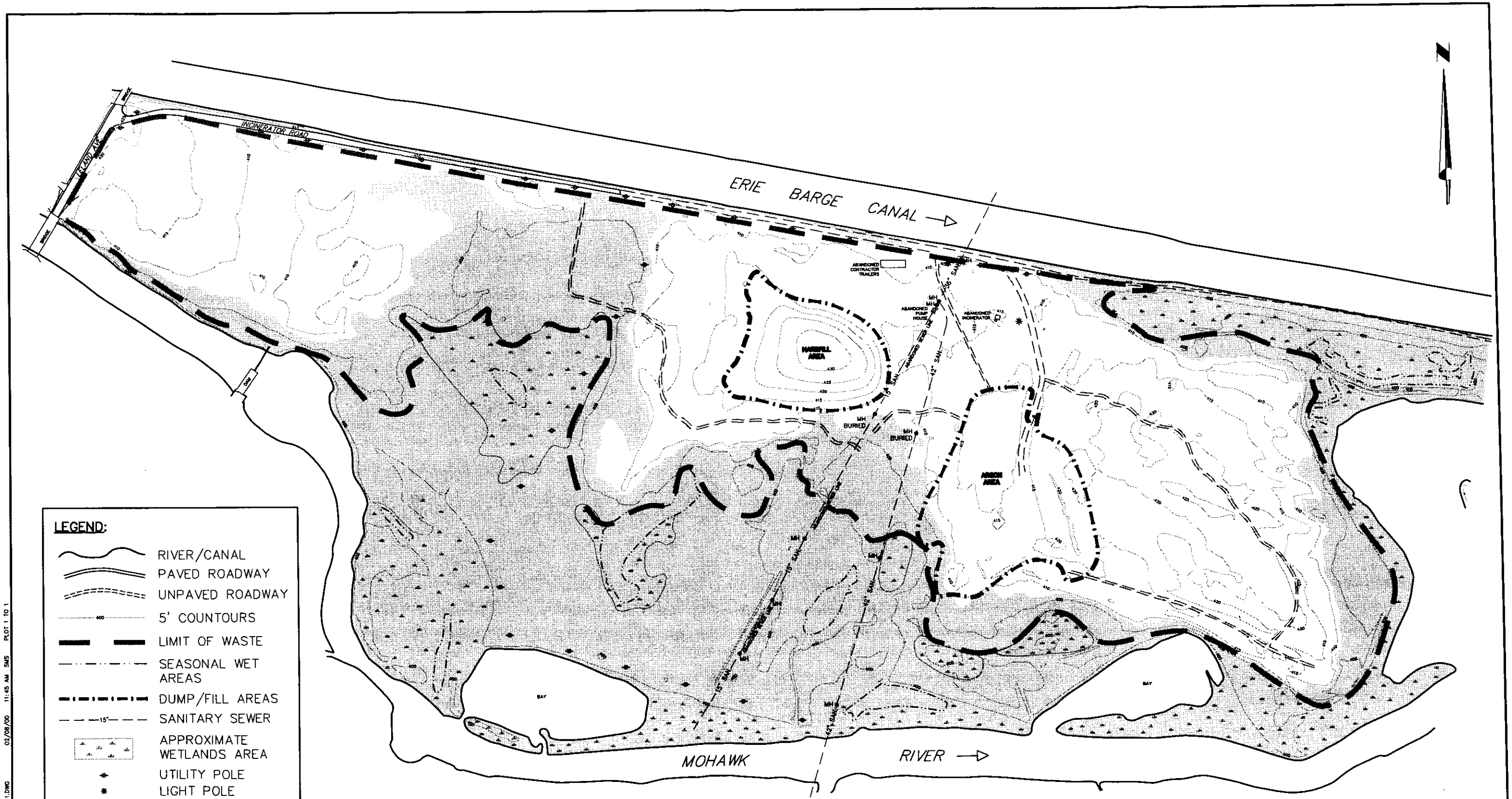
Section 7, Identification and Screening of Alternatives, includes an identification of Applicable or Relevant and Appropriate Requirements (ARARs), a summary of remedial action objectives and cleanup criteria, descriptions of general response options, and rationale for excluding various technologies from further consideration.

Technologies that survive the screening process are developed into remedial alternatives in Section 8, Development and Detailed Description of Alternatives. Section 9 includes an evaluation of each alternative relative to seven specific criteria including short and long term effectiveness, implementability, compliance with ARARs, protection of human health and the environment, reduction of toxicity, mobility, or volume, reliability, and cost.

Section 10, Comparative Analysis of Alternatives, provides an evaluation of performance of each remedial alternative in relation to specific evaluation criteria. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key trade-offs can be identified and evaluated. Section 11 describes the recommended alternative and provides rationale for the recommendation.

7.1 IDENTIFICATION OF ARARS

Applicable or relevant and appropriate requirements (ARARs) for the contaminants of concern at the Utica City Dump site are identified and summarized below. ARARs are usually developed using standards promulgated under environmental laws, such as RCRA or the Clean Air Act. Applicable requirements are defined as those promulgated Federal or state requirements that specifically address a hazardous substance, pollutant, or contaminant found at a CERCLA site. Relevant and appropriate requirements are those promulgated Federal or state requirements, that are not directly applicable, but address problems sufficiently similar to those encountered at the CERCLA site that their application is appropriate (NCP Section 300.5). In the state of New York, state ARARs are referred to as Standards, Criteria, and Guidelines (SCGs). Onsite remedial actions must meet all federal ARARs and all state SCGs if the state's standards are promulgated, more stringent than the related federal standard, and identified in a timely manner.



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LMS Lawler, Matusky & Skelly Engineers, LLP
Environmental Science & Engineering Consultants

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FIGURE 7-1
EXISTING CONDITIONS

UTICA CITY DUMP RI/FS

A discussion of the three major types of ARARs, location specific, chemical specific, and action specific, is presented in the following sections.

7.1.1 Location-Specific ARARs

Location specific ARARs are restrictions placed on the type of activities to be conducted based solely upon the site's location. The local characteristics of the site must be evaluated with regard to potential adverse affects that remedial activities may have on the environment. A list of potential location specific ARARs is summarized in Table 7-1.

7.1.1.1 Wetlands

Wetland resources within and adjacent to the site were surveyed, including both vegetation and wildlife species surveys. Both Class I and Class II wetlands were found to exist on and adjacent to the site. Figure 4-2 depicts wetlands on and adjacent to the site. Therefore, federal and state wetland regulations are considered ARARs. These include Executive Order 11990 and 40 CFR 6.302(a), Protection of Wetlands, and The Clean Water Act, Section 404. These federal regulations require preparation of a wetlands assessment and avoidance or minimization of adverse impacts to wetlands. State regulations include NYCRR Title 6, Section X, Parts 662-665, which set requirements for freshwater and tidal wetlands and the mapping, classification, and permit process. Part 703 surface water regulations, described below, also apply.

7.1.1.2 Surface Water

There are no existing direct surface water discharges from the site. However, the site is bounded on two sides by surface water bodies, the Erie Barge Canal and the Mohawk River. Both have been identified by NYSDEC as Class C surface water bodies. Class C surface waters are defined as water bodies that shall be suitable for fish propagation and survival, whose best usage is for fishing. This classification of water is also suitable for primary and secondary contact recreation. This means that water quality standards are primarily for the protection of aquatic life, and secondarily for human health. Human ingestion would only be incidental during recreation, as Class C water bodies are not used as potable water sources. Federal regulations that are ARARs for this location include the Fish and Wildlife Coordination Act [16USC 661 et seq., 40 CFR 6.302] , the Clean Water Act, Section 404 [40 CFR parts 125, 230, 231], and the Marine Protection and Resource Act [Section 103]. State ARARs include NYCRR Title 6, Section X,

Table 7-1
Location-Specific ARARs
Utica City Dump

	Location	Requirement	Prerequisite(s)	Citation	Comments
1.	Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; PCB treatment, storage, or disposal.	40 CFR 264.18(b); 40 CFR 761.75	Applicable because part of the landfill is in the 100-year floodplain.
2.	Within floodplain	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values of the floodplain.	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	Executive Order 11988, Protection of Floodplains, (40 CFR 6, Appendix A)	Applicable because part of the landfill is in the 100-year floodplain.
3.	Critical habitat upon which endangered species or threatened species depends	Action to conserve endangered species or threatened species, including consultation with the Department of the Interior.	Determination of endangered species or threatened species.	Endangered Species Act of 1973 (16 USC 1531 et seq.); 50 CFR Part 200, 50 CFR Part 402	The USF&WS has indicated that no Federally listed or proposed T&E species exist in the area of the Utica City Dump. The black tern was cited as a species of special concern that does occur in this area, and its status is being monitored by the Service "throughout much of its range".
4.	Wetland	Action to minimize the destruction, loss, or degradation of wetlands.	Wetland as defined by Executive Order 11990 Section 7.	Executive Order 11990, Protection of Wetlands, (40 CFR 6, Appendix A)	Applicable because wetlands are present next to or on the site.
5.	Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit.	Wetland as defined by Executive Order 11990 Section 7.	Clean Water Act Secton 404; 40 CFR Parts 230, 231	Applicable because wetlands are present next to or on the site.
6.	Area affecting stream or river	Action to protect fish or wildlife.	Diversion, channeling, or other activity that modifies a stream or river and affects fish or wildlife.	Fish and Wildlife Coordination Act (16 USC 661 et seq.); 40 CFR 6.302	The Fish and Wildlife Coordination Act requires consultation with the Department of Fish and Wildlife prior to any action that would alter a body of water of the United States
7.	Within area affecting national wild, scenic, or recreational river	Avoid taking or assisting in action that will have direct adverse effect on scenic river.	Activities that affect or may affect any of the rivers specified in Section 1276(a)	Scenic Rivers Act (16 USC 1271 et seq. Section 7(a); 40 CFR 6.302(e)	This regulation is to be considered. The Mohawk River is not designated as a wild and scenic river at the site. However, it is a scenic river for 8 miles at Oneida, approximately 25 miles upstream from the site.
8.	Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Action to recover and preserve artifacts.	Alteration of terrain that threatens significant scientific, prehistorical, historical, or archaeological data.	National Archaeological and Historical Preservation Act (16 USC Section 469); 36 CFR Part 65	Should scientific, prehistorical, or historical artifacts be found at the site, this will become applicable.

Parts 701-703, which list specific standards that must be met for Class C waters. Acceptable contaminant levels for class C waters are shown in Table 5-17.

7.1.1.3 Habitat critical to Endangered or Threatened Species

Although there are several "species of special concern" that inhabit the site, there are no threatened or endangered species in the area. Therefore, ARARs pertaining to threatened or endangered species are not applicable to this site.

7.1.1.4 Wild, Scenic, or Recreational Rivers

Regulation 40 CFR 6.302 references the Wild and Scenic Rivers Act. The Erie Barge Canal is not considered a wild, scenic, or recreational river under this act. Sections of the Mohawk River are designated as wild and scenic under this act, but these sections are not adjacent to or flowing through the site, so this ARAR is not applicable to this site.

7.1.1.5 Archaeological/Historic Sites

The Utica City Dump is not in an area where action may cause irreparable harm, loss, or destruction of significant artifacts. Therefore, historic or archaeologic ARARs are not applicable to the site.

7.1.2 Chemical-Specific ARARs

Chemical specific ARARs are based on technologically feasible or risk-based contaminant concentrations that are acceptable for discharge to the environment. Ten contaminants found on site are listed on Table 5-14 and each has chemical specific ARARs for soil and water, based on the Clean Water Act, and NYSDEC Groundwater Standards. Table 5-16 lists a variety of contaminants that are regulated by NYSDEC (NYCRR Title 6, Section X, Part 703) with the appropriate surface water quality standards. Table 5-17 lists EPA surface water criteria applicable to the site. Table 5-18 lists chemical specific sediment criteria promulgated by NYSDEC (Technical Guidance for Screening Contaminated Sediments, 1993) and applicable to the site. Table 5-19 lists chemical specific soil guidelines currently used in Canada and being used by the EPA (Canadian Council of Ministers of the Environment, 1991).

7.1.2.1 Clean Water Act

Under the Clean Water Act, USEPA has developed guidelines for water quality that are used to set levels for NPDES (National Pollution Discharge Elimination System) permits. However, discharges from a state remedial activity would be subject to the substantive requirements of the State Pollutant Discharge Elimination System. Both surface water and groundwater contaminants at the Utica City Dump, not covered by other enforceable standards, would be subject to these requirements. Two types of criteria developed under this act are described below.

- Federal Water Quality Criteria for Human Health Protection: The goal of these criteria is to protect humans from hazards associated with exposure both from drinking water and from consumption of fish. The criteria identify concentrations at which there would be no adverse health effects. The drinking water standard applies for incidental ingestion that may occur during recreation, and the fish consumption criteria applies, in the case of the Utica City Dump site, due to the classification of the adjacent surface waters as Class C waterbodies.

- Federal Water Quality Criteria for Aquatic Health Protection: These criteria include two sets of concentration values, one to provide protection of aquatic life from acute exposures, and one to provide protection from chronic exposures.

Equivalent state regulations are in 6 NYCRR Parts 700 to 705, Water Quality Regulations for Surface Waters and Groundwaters.

7.1.2.2 Safe Drinking Water Act

This act establishes enforceable drinking water standards called maximum contaminant levels (MCLs). These allowable contaminant levels would be relevant and appropriate for groundwater in Class I and II aquifers, and therefore relevant and appropriate for the Utica site. In New York State, the enforceable standards for drinking water are found under Part 5 of the State Sanitary Code.

7.1.3 Action-Specific ARARs

Action specific ARARs are technology or activity-based requirements with respect to hazardous wastes or other media. They govern the design, construction and operation of remedial actions

as provided under RCRA or 6 NYCRR Part 360. Table 7-2 outlines the state and Federal action specific ARARs that apply to the Utica City Dump site.

7.1.3.1 New York State Solid Waste Facilities Management Regulations

The requirements of 6 NYCRR Part 360 regulate all aspects of solid waste management facilities, including construction, operation, and closure. This regulation contains prescriptive requirements for the final cover system. The most pertinent requirements of 6 NYCRR part 360 are those relating to closure and post-closure procedures. The regulations state that all regulated facilities must develop a closure plan defining the nature and extent of current and potential release or migration of contaminants from the site. A closure investigation report must be submitted as part of this requirement. Leachate and gas collection systems may also be required under circumstances where gas or leachate pose a risk to health, safety, or property. In addition, a 30 year post-closure monitoring and maintenance plan is required.

State regulations for solid waste landfill closure found in 6 NYCRR Part 360 are more stringent than federal requirements in Subtitle D of RCRA.

Because the Utica Dump ceased normal operation in 1972, it should have been closed according to the regulations in effect at that time. The 1972 version of NYCRR Part 360 states that municipal landfills must be closed using a two foot depth of "suitable cover material" capable of supporting vegetation. New York State DEC has suggested considering the closure of the Utica City Dump using the 1972 final closure requirements.

7.1.3.2 NYS Hazardous Waste Regulations

Parts 370-374 of 6 NYCRR are also considered ARARs, and affect the treatment, storage, or disposal of any hazardous waste originating from the site. In most cases, these regulations are more stringent and more prescriptive than the federal regulations, and will therefore be the overriding ARARs for this site. Part 375 governs the investigation and remediation of inactive hazardous waste sites. These regulations provide the framework for conducting this feasibility study.

Table 7-2:
Action-Specific ARARs for the Utica City Dump

Federal Action-Specific ARARs and New York State Standards, Criteria, and Guidelines

	Action	Requirement	Prerequisite(s)	Citation	Comments
1.	Capping to Meet Current Regulations	Placement of a cap over hazardous waste (e.g. closing a surface impoundment or waste pile as a landfill, or similar action) requires a cover designed and constructed to: Provide long-term minimization of infiltration of liquids through the capped area Function with minimum maintenance Promote drainage and minimize erosion or abrasion of the cover Accommodate settling and subsidence so that the cover's integrity is maintained. Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.	RCRA waste in landfill Significant management (treatment, storage, or disposal) of hazardous waste will make requirements applicable; capping without disturbance will not make requirements applicable, but technical requirements may be relevant and appropriate.	40 CFR 264.310(a) (Landfills); 40 CFR 264.258(b) (Waste Piles); 40 CFR 264.228(a) (Surface Impoundments) 6 NYCRR Part 360, Solid Waste Management Facilities	RCRA is not considered applicable since the landfill ceased to accept waste in 1972 and has not accepted RCRA wastes after November 19, 1980. However, RCRA capping requirements could be relevant and appropriate. A RCRA cap would serve to isolate and contain landfill solids and contaminated soils and limit infiltration of precipitation. Excavation of wastes would make these requirements as well as the landfill construction and operation requirements applicable for wastes that are designated as hazardous.
2.	Capping continued	Eliminate free liquids, stabilize wastes before capping (surface impoundment) Restrict post-closure use of property as necessary to prevent damage to the cover. Prevent run-on and run-off from damaging cover. Protect and maintain surveyed benchmarks used to locate waste cells (landfills, waste piles) Disposal or decontamination of equipment, structures, and soils. Monitor and control fugitive dust during remedial activities.		40 CFR 264-228(a) 40 CFR 264.117(c) 40 CFR 264.228(b) 40 CFR 264-310(b) 40 CFR 264.111 NYSDEC TAGM #HWR-4031	Applicable for any remedial construction activities.
2a.	Capping to Meet 1972 Requirements	Provide a final compacted cover of at least two feet of a suitable cover material. Maintain proper surface water drainage to prevent the seepage of water through the fill. A 1% to 3% grade with culverts and lined ditches as needed is essential. Keep side slopes gentle to prevent erosion. Seed the top and side slopes promptly. Inspect the area at least once a year and repair cracks, erosion and depressions promptly.	Facility ceased accepting waste materials in 1972.	6 NYCRR Part 360, Regulations in effect in 1972 NYSDEC SW-P5(12/73); Sanitary Landfill	Applicable since the facility ceased accepting waste materials in 1972. The landfill may be closed under regulations in effect when the facility ceased accepting waste. 1973 NYSDEC guidance for finishing off a fill area.
3.	Closure with Waste in Place (Capping)	Eliminate free liquids by removal or solidification. Stabilization of remaining waste and waste residues to support cover. Installation of final cover to provide long-term minimization of infiltration. Post-closure care and groundwater monitoring		40 CFR 264.228(a)(2) 40 CFR 264.228(a)(2) and 40 CFR 264.228(b) 40 CFR 264.310 and 6 NYCRR Part 360 40 CFR 264.310	See discussion under capping.
4.	Consolidation	Area from which materials are removed should be remediated.	Disposal by disturbance of hazardous waste and moving it outside unit or boundary of contaminated area.	See Closure	If nonhazardous wastes are excavated and moved outside the current area of contamination, these requirements will become relevant and appropriate. These regulations are intended to insure that when wastes are consolidated at a central location, the former locations of the wastes are remediated. If the wastes which are excavated for consolidation are determined to be hazardous wastes, this regulation will be applicable.

Table 7-2:
Action-Specific ARARs for the Utica City Dump

	Action	Requirement	Prerequisite(s)	Citation	Comments
	Consolidation	Consolidation in storage piles/storage tanks will trigger storage requirements.		See Waste Piles in this table.	RCRA requirements for storage in containers, tanks, or piles will be relevant and appropriate for nonhazardous wastes which are similar to RCRA hazardous wastes, or for hazardous wastes disposed prior to November 1980, which are excavated from the site and stored prior to consolidation and/or disposal.
	Consolidation	Placement on or in land outside unit boundary of area of contamination will trigger land disposal requirements and restrictions. Action is required to provide proper treatment and disposal of excavated hazardous wastes to meet RCRA standards.	After November 8, 1988	40 CFR 286 (Subpart D) and 6 NYCRR Part 376	Certain listed hazardous wastes are not eligible for disposal in landfills or other land based facilities unless treated to RCRA specified criteria. The requirement may be relevant and appropriate to some nonhazardous wastes at the site which are contaminated with hazardous constituents at levels similar to those in listed wastes, and are excavated for reconsolidation and disposal outside the current area of contamination.
	Consolidation	Develop fugitive and odor emission control plan for this action.		CAA Section 101 and 40 CFR 52 and 6 NYCRR Parts 200, 201, 211, 257, and Air Guide 1	Odor regulations are intended to limit nuisance conditions from air pollution emissions. Fugitive emission controls are one feature of the state implementation plan used to achieve/maintain the ambient air quality standards for particulate matter.
5.	Direct Discharge of Treatment System Effluent	Applicable federal water quality criteria for the protection of aquatic life must be complied with when environmental factors are being considered.	Surface discharge of treated effluent.	50 FR 30784 (July 29, 1985) and 6 NYCRR Parts 750-757	Applicable for onsite leachate and/or groundwater treatment including treatment via constructed wetlands system.
		Applicable federally approved state water quality standards must be complied with. These standards may be in addition to or more stringent than other federal standards under the CWA.	Surface discharge of treated effluent.	40 CFR 122.44 and 6 NYCRR Parts 750-757.	If state regulations are more stringent than federal water quality standards, the state standards will be applicable to direct discharge. NYSDEC has authority under 40 CFR 131 to implement direct discharge requirements within New York. A SPDES permit must be obtained from NYSDEC for any direct discharge to surface water at the site.
		The discharge must be consistent with the requirement of a Water Quality Management plan approved by EPA under Section 208(b) of the Clean Water Act.		CWA Section 208(b)	Discharge must comply with substantive but not administrative requirements of the management plan.
		Use of best available technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants. Technology-based limitations may be determined on a case-by-case basis.	Surface discharge of treated effluent.	40 CFR 122.44(a)	If treated effluent is discharged to surface waters, these treatment requirements will be applicable. Permitting and reporting requirements will be applicable only if the effluent is discharged at an offsite location. NYSDEC will determine effluent standards for a SPDES permit.
		Discharge limits must be established for all toxic pollutants that are or may be discharged at levels greater than those that can be achieved by technology-based standards.	Surface discharge of treated effluent.	40 CFR 122.44(e) and 6 NYCRR Parts 750-757.	Exact limitations are based on review of the proposed treatment system and receiving water characteristics. NYSDEC will determine effluent standards for a SPDES permit.
		Discharges must be monitored to assure compliance.	Surface discharge of treated effluent.	40 CFR 122.44(I)	NYSDEC will incorporate monitoring requirements into the SPDES permit.
		Develop and implement a Best Management Practices (BMP) program and incorporate in the SPDES permit to prevent the release of toxic constituents to surface waters.	Surface water discharge	40 CFR 125.100	These issues are determined on a case-by-case basis by NYSDEC for any proposed surface discharge of treated wastewater. Although a CERCLA site remediation is not required to obtain a SPDES permit for onsite discharges to surface waters, the substantive requirements of the SPDES permit program must be met by the remediation action if possible. NYSDEC will determine BMP requirements.
		The BMP program must: Establish specific procedures for the control of toxic and hazardous pollutant spills. Include a prediction of direction, rate of flow, and total quantity of toxic pollutants where experience indicates a reasonable potential for equipment failure. Assure proper management of solid and hazardous waste in accordance with RCRA regulations.			
6.	Discharge to POTW	Pollutants that pass through the POTW without treatment, interfere with POTW operation, or contaminate POTW sludge are prohibited.		40 CFR 403.5	Requirements are applicable for discharges of liquid to the POTW.

Table 7-2:
Action-Specific ARARs for the Utica City Dump

	Action	Requirement	Prerequisite(s)	Citation	Comments
		Discharges must comply with the local POTW pretreatment program, including POTW specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.		40 CFR 403.5 and local POTW regulations	
7.	Excavation	Area from which materials are excavated may require cleanup to levels established by closure requirements.	Disposal by disturbance of hazardous waste and moving it outside the unit or area of contamination.	40 CFR 264 Disposal and Closure Requirements	If contaminated materials that are not hazardous wastes are excavated from the site during remediation, the RCRA requirements for disposal and site closure (of the excavated area) may become relevant and appropriate. See discussion under Capping, Closure with Waste-In-Place, etc.
		Movement of excavated materials to a previously uncontaminated, onsite location, and placement in or on land may trigger land disposal restrictions.	Materials containing RCRA hazardous wastes subject to land disposal restrictions	40 CFR 268 (Subpart D)	The land disposal restrictions restrict disposal of certain hazardous wastes. Some municipal landfill wastes may be derived from or may be sufficiently similar to restricted wastes to make the land disposal restrictions relevant and appropriate.
		All listed and characteristic hazardous wastes or soils and debris contaminated by a RCRA hazardous waste and removed from a CERCLA site may not be land disposed until treated as required by Land Ban. If alternate treatment technologies can achieve treatment similar to that required by Land Ban, and if this achievement can be documented, then a variance may not be required.	Waste disposed was RCRA waste.	40 CFR 268	If soil is a characteristic waste, and if waste disposed prior to November 1980 is now designated as a RCRA waste, then soils/sediment and leachate contamination from those wastes must be managed as a RCRA waste.
		Develop fugitive and odor emission control plan for this action.		CAA Section 101 and 40 CFR 52	Odor regulations are intended to limit nuisance conditions from air pollution emissions. Fugitive emission controls are one feature of the state implementation plan used to achieve/maintain the ambient air quality standards for particulate matter.
8.	Operation and Maintenance	Post-closure care to ensure that site is maintained and monitored.		40 CFR 264.118 (RCRA, Subpart G)	Post-closure requirements for operation and maintenance of municipal landfill sites are relevant and appropriate to new disposal units with nonhazardous waste, or existing units capped in-place. If municipal landfill wastes are determined to be hazardous wastes, and new disposal units are created, the post-closure requirements will be applicable.
9.	Slurry Wall	Excavation of soil for construction of slurry wall may trigger cleanup or land disposal restrictions.	Disposal by disturbance of hazardous waste and moving it outside the unit or area of contamination	See Consolidation, Excavation in this table.	See discussion under Consolidation and Excavation
10.	Waste Pile	Use liner and leachate collection and removal system.	RCRA hazardous waste, non-containerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	40 CFR 264.251	

7.2 REMEDIAL ACTION OBJECTIVES (RAOs) AND CLEANUP CRITERIA

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Eliminate, to the extent practicable, migration of groundwater that does not meet NYSDEC Class GA Ambient Water Quality Criteria.
- Eliminate, to the extent practicable, exposure to contaminated soils.
- Eliminate to the extent practicable, the migration of PCBs into the Mohawk River or Canal via erosion of PCB contaminated soils, transport of suspended sediment with surface water, and transport of PCBs contained in groundwater or surface waters.
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.
- Eliminate, to the extent practicable, the exposure of fish and wildlife to levels of PCBs above standards/guidance values.

Remedial action technologies and alternatives are evaluated relative to their ability to meet the RAOs.

7.3 GENERAL RESPONSE ACTIONS (GRAs)

GRAs are broad classifications of actions that will satisfy RAOs. GRAs are developed on a medium-specific basis and include the following:

- No Action
- Institutional Controls
- Source Control Actions

- Surface Water/Sediment Control Actions
- Leachate Control Actions
- Groundwater Control Actions
- Treatment Technologies

The following general response actions describe those actions that typically apply to municipal landfill sites containing hazardous wastes.

7.3.1 No Action (with monitoring)

The no action alternative must be considered as an alternative at inactive hazardous waste sites. The no action alternative would include only the periodic monitoring of the site to test for transport of contaminants across site boundaries. This alternative will serve as a basis by which the other alternatives will be judged.

7.3.2 Institutional Controls

Institutional controls include actions such as fencing or deed restrictions that would prevent human exposure to contaminants by regulation of the area's use and restriction of access, reducing the potential for accidental human exposure to contaminants. However, institutional controls will not prevent exposure of wildlife to contaminants.

7.3.3 Source Control Actions

A source control action may be defined as the construction or installation and implementation necessary to prevent the continued release of contaminants into the environment. These substances would be released primarily from an identified source on the surface, or within the ground at this site. Source control actions include activities that provide a permanent solution, such as destruction, removal, or solidification. Activities that result in a reduction in toxicity, volume of the waste, or risk associated with the waste, are also considered source control actions.

7.3.3.1 Waste Containment

Containment of the waste and reduction of its mobility could be accomplished by the construction of a cover system that would prevent direct contact of the waste by humans and wildlife. Cover systems also limit infiltration of water, and consequently limit the generation

and transport of contaminated leachate to surface and ground water, or wetlands. Containment technologies do not reduce the toxicity or volume of waste. Risk associated with the waste is reduced because containment removes the exposure pathways for direct contact with waste materials and the future leachate generation rate is reduced. However, containment technologies require future oversight including continued monitoring and maintenance. Containment technologies are not considered permanent remedies however, because containment technologies do not reduce the toxicity or volume of waste and because future oversight is integral to the success of the remedy.

Two examples of waste containment cover systems are the NYCRR Part 360 cover specified in both the current regulation and the 1972 version of the same regulations. The required system under the 1972 regulations consists of a two foot thick layer of "suitable cover material" capable of supporting vegetation. This would accomplish many of the goals of waste containment, including reducing infiltration and leachate production, and removing the pathway of direct exposure to wastes on the ground surface.

The current regulation under Part 360 requires a layer of geotextile, twelve inches of gas venting material, a 60 mil HDPE geomembrane, a 24-inch barrier protection layer, a geotextile composite, six inches of topsoil and a seed, fertilizer, and mulch mix. Alternatively, an 18-inch clay layer with permeability less than 10^{-7} cm/sec can be substituted for the 60 mil geomembrane, and necessitates a twenty-four inch barrier protection layer.

7.3.3.2 Waste Reclamation

Waste reclamation includes activities that would permanently remove the waste. Incineration of the waste and proper disposal of any hazardous residues offsite, or removal of all contaminated wastes, soils, sediments and water, are considered permanent solutions. These activities require access to a RCRA permitted hazardous waste landfill, and restoration of the area after the reclamation activities are performed.

7.3.4 Sediment Control Actions

7.3.4.1 Sediment Removal

Removal of contaminated sediment from the Erie Barge Canal on the north border of the site, and the Mohawk River on the southern border of the site would eliminate these sediments as a source of contamination relative to the neighboring surface water.

7.3.4.2 Sediment Isolation

The purpose of this technology is to physically isolate contaminated surface water and sediment in order to prevent the exposure of humans and wildlife to these sources. Examples of sediment isolation technologies include a porous media barrier or capping of contaminated sediments.

A porous media barrier would consist of placing course gravel to fill in shallow surface water areas. This type of barrier could be installed without dewatering the area of concern. Capping of contaminated sediments would consist of a cap made of low permeability clay or composite layers similar to a landfill cap. Dewatering of the area would be necessary for installation of the cap.

7.3.5 Leachate Control Actions

Leachate from the site drains into groundwater and surface water and seeps to the surrounding wetlands. Leachate is formed from precipitation or run-on that infiltrates through the overlying soils and wastes. It picks up pollutants as it descends through the waste materials, and contributes contaminants to groundwater, that seep out to the surface or to surface water bodies.

7.3.5.1 Leachate Collection

Leachate collection can be accomplished through use of subsurface drains or collection trenches that would prevent flow of the leachate into surrounding wetlands. Collection systems would direct the discharge to a sump for extraction and treatment or disposal. Leachate could also be removed using vertical or horizontal extraction wells and treated, or disposed of offsite.

The collection trench would use a slotted underdrain pipe and gravel backfill to collect the leachate in a manhole or sump. The trench could be lined on the down gradient side with a

geomembrane, to reduce the flow of clean groundwater to the trench and enhance separation of leachate and groundwater.

Leachate collection sumps could also be used to collect the leachate from limited seep areas. Leachate collection sumps function similarly to a trench but the collection zone is limited to the area near the sump. Any of these methods could be used to route leachate to an on-site or offsite treatment system (see the treatment technologies discussion below).

7.3.5.2 Leachate Containment

Leachate can be controlled at the perimeter of the landfill using subsurface barriers. A brief discussion of subsurface barrier technologies is presented below in Section 7.3.6 on groundwater control actions.

7.3.5.3 Leachate Seep Removal

Creating a subsurface drain, and allowing the leachate to percolate into the subsurface would eliminate the presence of leachate seeps at the ground surface. The leachate seep may be occurring due to leachate/groundwater flowing laterally along a low-permeability clay soil layer until it outcrops at the surface thus causing a seep. Overexcavating the seep area to penetrate the low permeability layer, then backfilling the excavation with a high permeability gravel will cause the leachate to flow downward into the subsurface and will eliminate presence of leachate at ground surface.

7.3.5.4 Landfill Cap Extension

Extension of the landfill cap over areas of contaminated leachate seeps would prevent direct contact with contaminated leachate and would prevent contaminants in the leachate from flowing overland into nearby surface water bodies. However, leachate may flow through the subsurface soils to reach surface water bodies or groundwater.

7.3.6 Groundwater Control Actions

Groundwater at the site is mounded within the dump area, and groundwater flow is radially toward the Barge Canal and Mohawk River. Seasonal variations in the rainfall and river levels cause groundwater elevation variations and a change in the position of the groundwater divide as

discussed in Section 4 of the RI report. Although a cap and cover system would reduce infiltration and transport of contaminants in groundwater as discussed above, the groundwater would continue to respond to hydrodynamic and elevation changes in the river and canal.

7.3.6.1 Groundwater Extraction

Active extraction of the groundwater through recovery wells would reduce transport of contaminants in groundwater offsite. Due to seasonal variation and the radial nature of the groundwater flow at the site, this technology would require a large number of wells closely spaced to encircle the site. The recovered groundwater would then need to be treated or disposed (See treatment technologies discussion below). This action is used on sites with relatively higher permeability subsurface soils.

Passive groundwater extraction through use of collector trenches would also prevent migration of contaminants to neighboring wetlands and the bordering water bodies. Again, the trenches would need to be dispersed around the site, and the collected water would require treatment and disposal. This action is used on sites with relatively lower permeability subsurface soils.

7.3.6.2 Subsurface Barriers

Subsurface barriers could be used to control the migration of contaminated groundwater or leachate from the dump area. However, control of the upgradient hydrostatic head would be necessary in order to prevent the water from flowing around, over, or under the barrier. Examples of potential subsurface barriers include:

- Sheet piles
- Slurry walls
- Grout Curtains

These could be used adjacent to affected wetland areas, or at the perimeters of the site, considering the outward, and changing direction of groundwater flow at the site. Vertical barriers could also be implemented with a groundwater/leachate collection trench to help separate contaminated leachate seeps from surface water and wetlands, in particular in the eastern portions of the site. This would entail installing a flexible membrane liner (FML) on the downgradient face of the trench.

7.3.6.3 Reactive permeable treatment walls

Unlike the subsurface barriers above, reactive permeable walls function by having contaminated groundwater or leachate flow through the wall. A trench is first excavated across the path of contaminated groundwater flow. The trench is then filled with a material specifically designed to remove or transform the contaminants found on the particular site. Iron filings are an example of a material that may be used as the reactive media to oxidize organic constituents in leachate or groundwater. This technology can be used to treat groundwater contaminated with volatile organic constituents, including chlorinated volatile organic compounds, metals, and nitrates. Use of this technology is favorable because it is a passive system that requires no mechanical equipment and no energy input. A reactive wall could be used at the Utica site at several locations around the perimeter of the site, or adjacent to wetlands being impacted by leachate seeps.

7.4 TREATMENT TECHNOLOGIES

7.4.1 On-site Treatment

The goal of on-site treatment activities is to remediate the area in question and to prevent the migration of contaminants without excavating, removing, or disturbing the dumped waste. These activities usually involve reducing the toxicity of the contaminants.

7.4.1.1 Natural attenuation

Natural attenuation is the natural subsurface process of degradation, dilution, adsorption, and volatilization that occurs when contaminants are left undisturbed. Natural attenuation can be a biological, chemical, or physical process, or a combination of several processes. All of these processes result in the concentration of contaminants in soil and groundwater being reduced over a certain area. It is common to see declining concentrations of contaminants at sites even before remedial actions begin. This remedial technique may be the most cost-effective way to reduce contaminant concentrations below regulatory or risk-based levels. It is not the same as the "no action" alternative because long term monitoring must be included to verify that the process is effective. Natural attenuation is a good option when the more active clean-up options will not affect the rate of remediation or where there is no technically practicable remedial method available. Natural attenuation should not be used when contaminant plumes continue to migrate, especially toward downgradient receptors.

7.4.1.2 Enhanced Natural Attenuation

The processes of natural attenuation can be enhanced through use of several alternative methods. Bioremediation can include the use of microbial organisms to consume and convert the waste into harmless byproducts. This can be enhanced by the addition of specific microbes to the area of concern, or the addition of certain limiting nutrients or elements that existing microbes require to increase their population and consumption of organic constituents.

Air sparging can be used to enhance volatilization of VOCs from groundwater by aerating wells that are placed in the contaminated areas.

Bioventing involves providing oxygen (in the form of air) to the subsurface to enhance aerobic biodegradation. This is effective for many aromatic volatile organic compounds including Benzene, Toluene, Ethylbenzene, and Xylene, (BTEX), which can be removed through aerobic biodegradation or volatilization, and for other compounds of low volatility which can also be aerobically consumed.

7.4.1.3 Leachate Recovery/ Constructed Wetlands (Phytoremediation)

Constructed wetlands are designed to mimic processes found in natural wetlands. As water flows through the wetland, biological and chemical processes destroy organic constituents, and demobilize metals and pathogens in the water. The soil matrix and sand and gravel units control the flow rate of water through the wetland and provide a reactive surface area for chemical reactions. Microorganisms found naturally in soil and water breakdown contaminants into simpler non-toxic forms that are taken in by plant roots.

Constructed wetlands can be used to treat the leachate and runoff from the site that may be contaminated. The RI has shown that leachate seeps contaminated with organics are most prevalent during wet seasons of the year and are mostly found in locations east and northeast of the site (near L-2 and L-4 on Figure 3-6).

7.4.1.4 Onsite Treatment for Leachate and/or Groundwater

Onsite treatment of leachate and/or groundwater would involve leachate/groundwater collection, pumping to a treatment system (possibly a package system) and a discharge to an SPDES permitted outfall. Treatment processes could include:

- Air stripping
- Granular activated carbon
- Physical/Chemical processes for metals removal (chemical addition, precipitation, clarification, filtration)
- UV/Ozone
- Constructed Wetland (as discussed above)
- Polishing ponds
- Air Sparging/ Soil Vapor Extraction

Treatment processes may be used individually or in combination and may operate in batch or continuous flow mode depending on the flow characteristics of the leachate/groundwater, and permit limits that must be met. The following is a brief summary of each of the treatment unit processes.

An air stripping system/unit involves pumping groundwater to an air stripper to remove volatile constituents. The offgas is either discharged or routed to an activated carbon system depending on permitting requirements and contaminant levels in the offgas.

A granular activated carbon system/unit consists of directing contaminated groundwater or air through a column of high surface area carbon that acts as a sorbent for removing the contaminants from the medium.

Other physical or chemical treatment methods could be used to remove iron and other metals. This would result in a byproduct sludge that would require offsite disposal. Biological treatment to remove organic constituents and metals, such as a package WWTP could be possible, and would be used under a SPDES permit for discharge of treated waters to adjacent surface waters.

Another treatment technique involves ultraviolet light and ozone which can be used in combination as reagents in an advanced oxidation process. This is a mechanism by which organic contaminants are transformed into byproducts of carbon dioxide and water.

7.4.2 Offsite Treatment

Any of the above treatment technologies can also be administered offsite. This would involve transportation of the leachate or groundwater to be treated to the offsite facility. At the Utica dump, offsite treatment could be performed at the POTW located 0.5 miles away. Groundwater or leachate would flow by gravity to an existing sanitary sewer that crosses the site. Alternatively, groundwater or leachate could be pumped to the facility or stored in tanks and hauled offsite by truck.

7.5 OPTIONS REMOVED FROM FURTHER CONSIDERATION

The following section presents technologies and options which were initially considered but have been eliminated from further consideration because they are difficult to implement, ineffective, impractical, or unproven. Waste materials will remain onsite under all of the alternatives under consideration. The majority of wastes disposed of at the site consisted of municipal solid waste. However, records indicate that there has been some historical disposal of industrial electroplating wastes. These are considered hazardous wastes under current regulations. The percentage of hazardous waste is thought to be much less than 25%, and perhaps less than 5%. Interviews with town officials have revealed that hazardous wastes were disposed only east of the hardfill area. However, records were not kept on the exact locations of industrial and hazardous waste disposal and it is not practical to locate and segregate the hazardous portions of the site for permanent treatment and disposal. Conventional isolation and control technologies offer the most viable remedial action. Consequently, none of the proposed alternatives are considered to be permanent remedies.

7.5.1 Total Waste Reclamation

On site incineration would destroy the waste, but it would be extremely costly. In addition it would likely be met with public opposition. Total waste excavation has been eliminated from further consideration because it is extremely difficult to implement due to the large size of the site. NYSDEC has indicated that permanent remedies such as incineration and total waste reclamation are impractical for large municipal landfill sites such as the Utica City Dump.

7.5.2 Surface Water Containment

Surface water containment is not practical in this situation. Because the adjacent surface water bodies are rivers, collected water would need to be treated and discharged. It would be much more practical to collect and treat leachate seeps/outbreaks or runoff before they impact the surface water bodies.

7.5.3 Sediment Isolation

This option is impractical for this site because of the large site area and volume of the adjacent surface water bodies. As discussed above, the landfill capping will eliminate the migration pathway for onsite sources.

7.5.4 Groundwater Extraction

The RI has indicated that groundwater quality has not been determined to be a threat to human health or the environment, except in the cases where it results in contaminated leachate seeps. Groundwater is not a source of drinking water in this area. The tested groundwater does not reveal significant constituents requiring remedial action. Groundwater extraction has been determined to be of limited benefit, yet would incur a large cost and effort.

7.5.5 In-Situ Treatment

The volume and areal extent of waste and nonhomogeneous nature of waste placement at the site makes in-situ treatment extremely difficult to implement. In situ treatment is not typically used at municipal solid waste sites. RI data has not revealed any "hot spots" or sources of contamination which warrant localized in situ treatment.

7.5.6 Enhanced Natural Attenuation

Waste materials are widespread and it is not practical to implement enhanced natural attenuation across a large area. The mechanism used to enhance degradation, sorption, or reduction would need to be applied over the entire site area, thereby making this option costly and inefficient.

7.5.7 Onsite Treatment Technologies

Construction of an onsite treatment facility would involve a significant capital expenditure, in addition to ongoing operation and maintenance requirements. For the small quantity of leachate that is anticipated, construction of a gravity sewer, pumping, or hauling the leachate to the nearby POTW is a more practical alternative. However, a constructed wetland treatment system (CWTS) is retained as a leachate/groundwater treatment technology because it offers treatment using a natural system and is less complex than a mechanical system.

7.6 SUMMARY

ARARs that apply to the Utica City Dump site include the action specific ARARs such as NYS Part 360 landfill closure requirements. Because the Utica City Dump ceased normal operation in 1972, it should have been closed according to the regulations in effect at that time. Closure to meet 1972 requirements is the basis of two of the alternatives presented in Section 8.

Location specific ARARs include regulations relating to wetlands and the floodplain. Remedial alternatives must consider methods to reduce impacts to wetland areas during construction and operation at the site. For actions proposed in the floodplain, a technical analysis will be required in design, to evaluate the impact of the construction on the flood carrying capacity of the floodway.

Chemical specific ARARs include the Clean Water Act, NYSDEC Groundwater Standards, and NYSDEC Technical Guidance for Screening Contaminated Sediments. Site-specific remedial action objectives were developed based on the contaminants and media of concern, and the identified exposure pathways. General response actions that satisfy the remedial action objectives were then proposed. Finally, technologies were screened and obviously impractical or infeasible technologies were eliminated from further consideration.

Table 7-3 provides a summary of the remedial technology screening that was presented in this section. The status of each technology is given as either retained or rejected and a brief statement of the basis for each decision is provided. Technologies that were retained are assembled into remedial alternatives in Section 8.

Table 7-3:
Remedial Technology Screening
Utica City Dump Feasibility Study

Remedial Technology	Status	Basis
No Action	Retain	Retained as a baseline to compare other alternatives. Monitoring will measure concentrations over time.
Institutional Controls	Retain	Useful in reducing potential human exposure. No adverse environmental impact from construction. Easy to maintain. However, hazards posed by exposed wastes and leachate seeps remain.
Source Control Actions:		
Waste Containment Options:		
1972 NYCRR Part 360 Cover	Retain	Facility ceased accepting waste in 1972. Regulations in effect at that time require cover for exposed wastes, reducing the potential for human and animal exposure. Soil cover reduces infiltration and leachate production rate.
Current NYCRR Part 360 Cover	Retain	Closure to meet current regulaitons provides for reduced human and animal exposure to wastes. Cover system reduces infiltration and leachate production.
Waste Reclamation:		
Incineration	Reject	Substantial capital outlay, potential public opposition, significant permitting effort, impractical to remove and incinerate all waste due to the large volumes of material involved.
Waste Removal, Hauling, Disposal, Site Restoration	Reject	Identification and total removal difficult due to heavy vegetation, large area of site and anticipated large volume of waste.
Surface Water/Sediment Control Actions:		
Sediment Removal	Retain	Sediment contamination may be acting as continuous source to the river and aquatic organisms. The Utica Dump may be contributing to PCBs contamination in river sediments.
Surface Water/Sediment Isolation	Reject	Impractical due to large area and volume of surface water bodies, could destroy wildlife habitats.
Leachate/Groundwater Control Actions		
Leachate Seep overexcavation and gravel backfill	Retain	Will enhance downward flow of leachate, preventing emergence on the surface as a seep.
Leachate Collection	Retain	Leachate collection before it reaches groundwater or surface water is a practical alternative.
Leachate Seep Collection in sump	Retain	Will work in concert with an overexcavated seep area. Collected leachate can then be routed to an existing sanitary sewer main, or pumped to storage or treatment.
Collection Trenches	Retain	Efficient, low cost, creates hydraulic barrier to separate seeps from wetlands.
Vertical Extraction Wells	Retain	Established technology efficient in removing leachate from discrete areas.
Horizontal Extraction Wells	Retain	Established technology efficient in removing leachate from discrete areas.
Leachate Containment		
Sheet Piles	Reject	Ineffective if used alone, water likely to flow around, over or under, could be used in combination with collection trench.

Table 7-3:
Remedial Technology Screening
Utica City Dump Feasibility Study

Remedial Technology	Status	Basis
Slurry Walls	Reject	Ineffective if used alone, water likely to flow around, over or under, could be used in combination with collection trench.
Grout Curtain	Reject	Ineffective if used alone, water likely to flow around, over, or under, could be used in combination with collection trench.
Reactive Permeable Treatment Wall	Retain	Effective in removing VOCs, SVOCs, or metals, no operations or maintenance costs.
Treatment Technologies		
Natural Attenuation	Retain	This process occurs naturally, however, a long term monitoring program must be instituted.
Enhanced Natural Attenuation	Reject	Not practical for large areas, not effective in reducing metals concentrations. High metals concentration could be a performance inhibitor.
Onsite Treatment		
Air Stripping	Reject	Pumping or hauling to POTW is more practical for low volume and low contaminant concentrations.
Granular Activated Carbon	Reject	Pumping or hauling to POTW is more practical for low volume and low contaminant concentrations.
Physical Chemical Processes	Reject	Pumping or hauling to POTW is more practical for low volume and low contaminant concentrations.
Constructed Wetlands	Retain	Effective in reducing contaminants of concern. Leachate is treated using natural mechanisms.
Polishing Ponds	Retain	May be used to polish treated leachate from constructed wetlands.
Offsite Treatment Options:		
Pump to POTW	Retain	POTW is close to site, use of existing sewer main is feasible.
Store and Haul to POTW	Retain	POTW is close to site, the cost of storing and hauling has been compared to pumping.

8.0 DEVELOPMENT AND DETAILED DESCRIPTION OF ALTERNATIVES

In the previous section, general response actions for waste remediation at the site were outlined and technology screening was performed. The next step is to combine the technologies that were retained under various general response options into remedial alternatives.

The technologies that were presented in Section 7 represent either complementary or mutually exclusive measures that address a specific component of, or a fully comprehensive remediation plan. The purpose of this section is to assemble the candidate technologies into alternatives that will meet remedial action objectives by addressing the sources of contamination, eliminating pathways of exposure, mitigating groundwater and leachate contamination, and protecting potential receptors from the contaminants associated with the site.

The representative general response actions that were not eliminated from further consideration were combined into five alternatives. The primary areas of concern are the areas within the limits of waste and areas of exposed waste at several locations shown on Figure 8-1, and the leachate seeps near wetland areas at leachate sample locations L2 and L4.

The following six potential alternatives will be developed further:

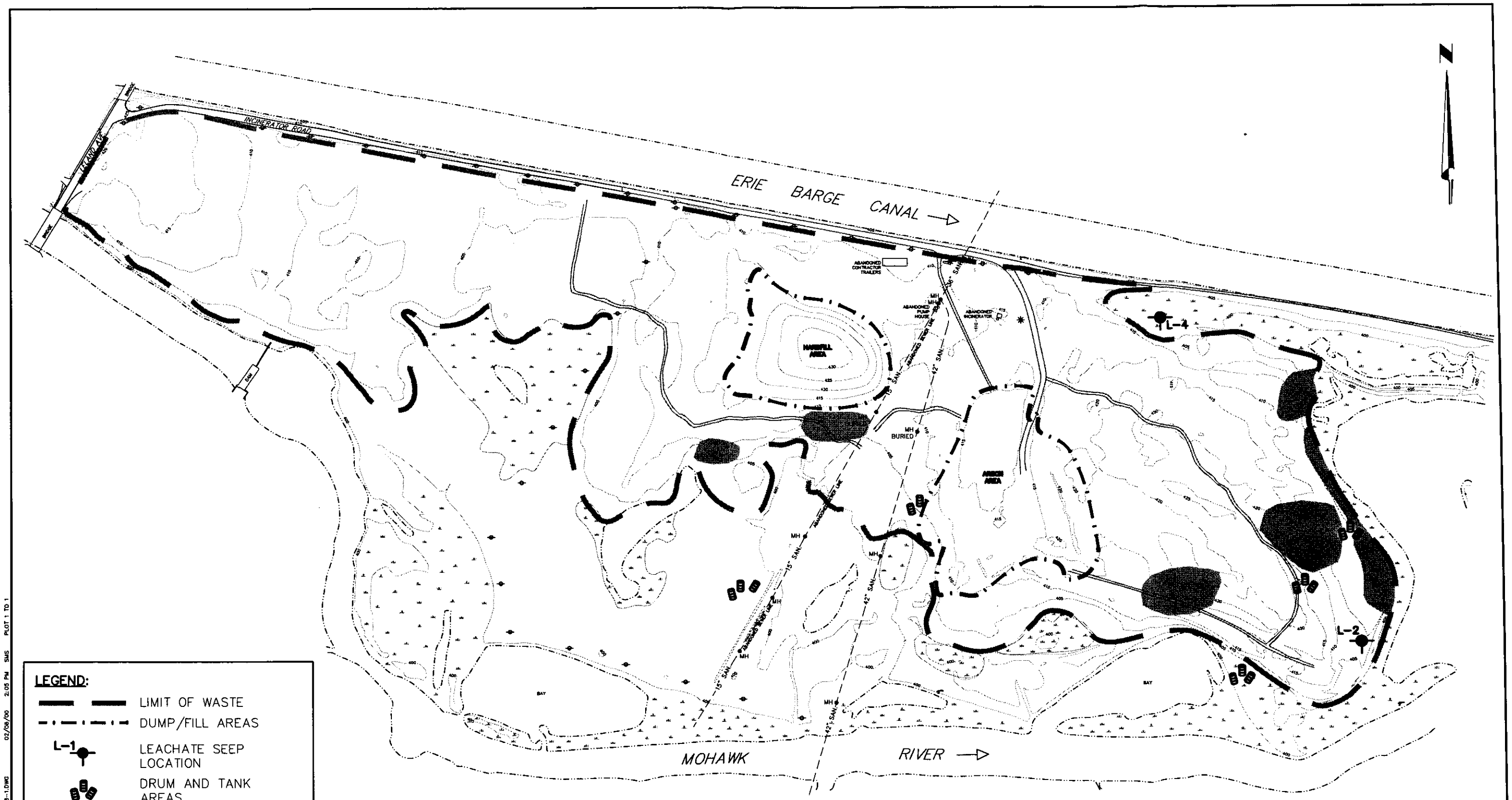
1. No Action (includes monitoring of the contaminants and media of concern)

2. Institutional Controls (including deed restrictions and fencing)

3. Limited Actions (including a range of potential actions that may be taken to address specific areas of concern but that do not address the whole site)

4. Construction of a landfill cap based on Part 360 requirements including three capping alternatives:

    4a. Meet regulations in effect in 1972 when the facility ceased normal operation,
    4b. Meet current Part 360 requirements (HDPE Geomembrane Barrier Layer)
    4c. Meet current Part 360 requirements (Clay Soil Barrier Layer)



LEGEND:

- LIMIT OF WASTE
- DUMP/FILL AREAS
- L-1 LEACHATE SEEP LOCATION
- DRUM AND TANK AREAS
- AREAS OF EXPOSED WASTE

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

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FIGURE 8-1
AREAS OF EXPOSED WASTE AND DEBRIS
UTICA CITY DUMP RI/FS

5. Collect and treat leachate. If necessary, this alternative may be implemented as part of one of the remedial action alternatives listed above. Leachate collection will include installation of a leachate collection trench along the east side of the site where contaminated leachate seeps have been observed. Four alternatives for leachate treatment are included:

   5a. Discharge Leachate to the Offsite Publicly Owned Treatment Works (POTW)
   5b. Store Leachate in Onsite Tanks and Haul to the POTW
   5c. Onsite Constructed Wetlands Treatment System (CWTS)
   5d. Leachate Collection Sumps

6. Remove sediment. This alternative would involve removal of a limited amount of sediment along the riverbanks at the southern and eastern edges of the landfill. Removal of contaminated sediments would be performed from shore and would extend out from the riverbank as far as practicable using a backhoe and gradall type machinery. Use of a silt curtain down stream of the work area would be necessary to collect dislodged sediment before it traveled downstream.

The following sections provide a description of actions that are proposed under each alternative, and an evaluation of effectiveness and implementability.

8.1 ALTERNATIVE 1: NO ACTION (WITH MONITORING)

The no action alternative includes periodic monitoring of the site to measure contaminant concentrations over time. This alternative relies on the natural attenuation of contaminants that will occur over time. It does not rely on any remedial action, but will be used as a baseline to which other alternatives can be compared. Costs of monitoring were developed using an estimate based on monitoring that was performed during the RI.

8.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

This alternative limits the exposure pathways by restricting access to the site, thus reducing the possibility of direct contact with surface soil, leachate seeps, exposed waste, or contaminated runoff. Although institutional controls represent a separate alternative, they could also be combined with any of the other alternatives described in this section to provide protection of human health.

8.2.1 Deed Restrictions

Deed restrictions can be implemented to control the future land use of the areas on and around the Utica City Dump site. This can assure that the land is used only for purposes that will not lead to exposure of humans or wildlife to contaminants, and that will not compromise any engineering controls that have been put in place as remedial actions. These restrictions should be included within the deed to the property so as to become a permanent record of the contamination in the area, and to indicate the necessity of precluding human exposure and providing appropriate development of the site.

8.2.2 Fencing

Fencing can serve to restrict access to the site. Fences used for this purpose should typically be 8-foot high chain link, and may be topped with barbed wire. This alternative will include fencing surrounding the entire site. Signs should be posted on fencing warning of the dangers associated with trespassing. Maintenance of the fencing is important if it is to properly serve its function.

The proposed fence location is shown in Figure 8-2. The proposed fence is provided across the site entrance, extending around the boundaries of the entire site. This would provide a hindrance to anyone attempting to walk or drive onto the site.

Fence specifications used for cost estimating purposes are:

- Chain link fence
- Industrial grade
- Schedule 40 galvanized steel posts and cross members
- 8 feet high
- 6 gauge wire
- Double swing gates
- 14,500 feet of fencing

Operation and maintenance estimates for maintaining the fence are based on replacing or maintaining the fence at a rate of 5 percent of the original cost of installation each year. Additionally, the estimate provides for replacement of the double swing gate every five years.

LOCATION OF 8' HIGH CHAIN LINK FENCE

LOCATION OF 20' WIDE DOUBLE SWING GATES

INCINERATOR ROAD

LEAND AVE

ERIE BARGE CANAL →

ABANDONED CONTRACTOR TRAILERS

ABANDONED PUMP HOUSE

ABANDONED INCINERATOR

MH

MH BURIED

MH BURIED

HASKELL AREA

ASHES AREA

42" SAN

15" SAN

15" SAN

42" SAN

42" SAN

MH

MH

MH

MH

BAY

BAY

MOHAWK RIVER →

N

LEGEND:

PROPOSED FENCE

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 400 ft.

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FIGURE 8-2
ALTERNATIVE 2
INSTITUTIONAL CONTROLS
UTICA CITY DUMP RI/FS

I:\6832\DRAWINGS\FEASIBILITY STUDY\ FIG8-2.DWG 02/08/00 2:15 PM SMS PLOT 1 TO 1

Experience at the site to date shows that the gate has been replaced once already in only two years of NYSDEC investigation of the site.

A monitoring program identical to that implemented as part of the no action alternative would be implemented with this alternative. In addition, regularly scheduled operation and maintenance activities on the fence would be necessary.

Because the area of significant habitat that will be disturbed is small, representing 1.6 and 1.5 percent of the on-site floodplain forest and shallow emergent marsh, respectively, the impact to wildlife using these communities will be small. Wetland permits will be required to conduct the work in the areas of the site identified as federal wetlands. In areas identified as state wetlands, permits are not required, but substantive requirements must be met.

The fencing installed as part of this alternative will have a negative effect on wildlife by restricting movement and in some cases may result in injury or death to wildlife by collision (especially birds). To minimize effects on wildlife movement/crossing, the fence should have small holes in it to allow wildlife to pass and it should be constructed from a material that is visible to wildlife (e.g., galvanized metal), especially birds to avoid collisions. Fencing should be high enough (recommended 8 feet) to discourage deer from attempting to jump the fence. These actions should help to minimize the negative effects to wildlife associated with fencing.

8.3 ALTERNATIVE 3: LIMITED ACTIONS

Limited actions include a range of potential actions that may be taken to address specific areas of concern but that do not address the whole site. Figure 8-3 shows some of the actions included in this alternative. Limited actions address discrete tasks to meet the remedial action objectives for various media. Limited actions could include a combination of the following activities:

- Continued Monitoring
- Limited Waste Excavation and Placement (for waste materials outside the area to be covered)
- Repair erosion gullies, provide erosion control measures
- Cover leachate seeps
- Leachate Recovery at selected areas
- Leachate seep overexcavation and gravel backfill

20' WIDE DOUBLE SWING GATE

PROPSED FENCE LOCATION

DEMOLISH EXISTING STRUCTURES
DISPOSE IN LANDFILL

APPROXIMATE SEEP LOCATION (L-4)
– EXCAVATE AND BACKFILL

ERIE BARGE CANAL

INCINERATOR ROAD

GRAND AVE.

WASTE AREA

ABANDONED CONTRACTOR TRAILERS

ABANDONED PUMP HOUSE

ABANDONED INCINERATOR

ABANDONED 42" SAN.

MH BURIED

MH BURIED

ASHES AREA

15" SAN.

42" SAN.

BAY

BAY

MOHAWK RIVER

GROUT ABANDONED SEWER

APPROXIMATE SEEP LOCATION (L-2)
– EXCAVATE AND BACKFILL

L-2

L-4

LEGEND:

- LIMIT OF WASTE
- DUMP/FILL AREAS
- PROPOSED FENCE
- DRUM AND TANK AREAS
- 1972 PART 360 CAP & COVER

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 400 ft.

I:\6832\DRAWINGS\FEASIBILITY STUDY\ FIG8-3.DWG 02/04/00 8:25 AM SMS PLOT 1 TO 1

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FIGURE 8-3
ALTERNATIVE 3
LIMITED ACTION PLAN
UTICA CITY DUMP RI/FS

- Cover areas of exposed waste
- Demolition and Disposal of Onsite Structures (Incinerator Debris and Stack, Pump House and sewer line, Trailers).
- Limited Fencing
- Deed Restrictions

8.3.1 Continued Monitoring

The continued monitoring program would consist of the same monitoring as the no action alternative. Monitoring locations would be selected according to previous sampling results, the grade and topography of the land, and to address particular areas of concern. The purpose of monitoring would be to evaluate leachate/groundwater quality over time and to assess the degree to which the remedial actions were meeting the established remedial goals.

8.3.2 Limited Waste Excavation

Limited waste excavation and placement involves removing waste materials that may be outside the limits of the proposed landfill cover, and placing them within the landfill area. Scattered wastes could be excavated, and placed in a selected landfill area and covered with a soil cover. An estimated 5,000 cy of material will be excavated and placed within the landfill area.

8.3.3 Repair Eroded Areas

Eroded areas of the present site would be repaired so that additional wastes are not exposed, and to prevent further deterioration of the landfill cover. Erosion control would also limit contaminant migration from the site, by protecting the cap and cover system and by controlling transport of possibly contaminated soil or wastes via wind and water and subsequent deposition on adjacent lands, in surface waters, sediment and wetlands.

8.3.4 Leachate Seep Overexcavation and Gravel Backfill

A low permeability layer in the Utica City Dump area may be creating perched groundwater areas, and seep areas. In this alternative, areas where seeps presently exist during the wet season would be overexcavated. Figure 8-4 shows a typical cross-section for seep area backfill. The excavated area would be backfilled with high permeability gravel. This would cause the seep to drain through the high permeability gravel and percolate into the ground, instead of flowing to

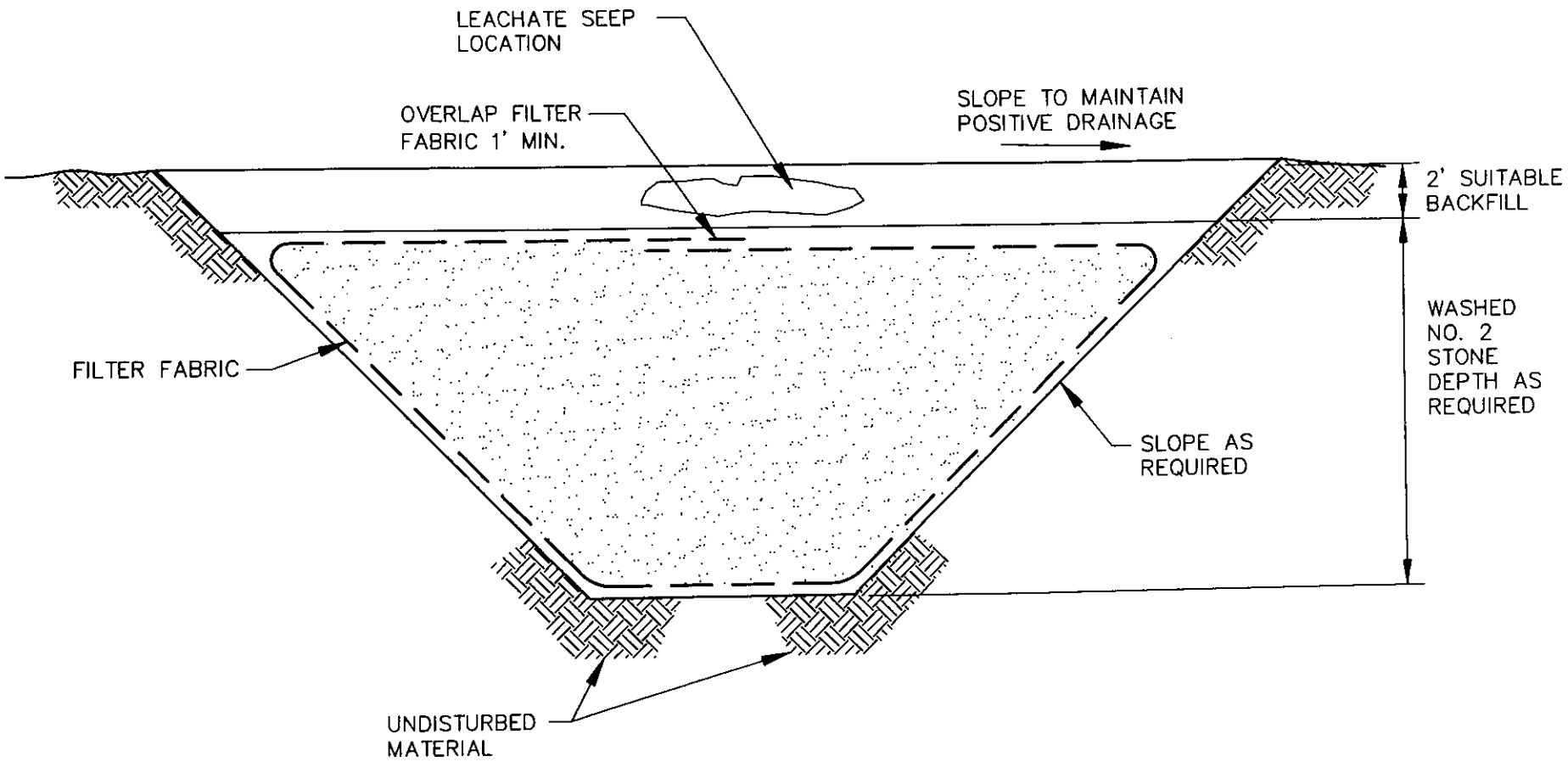

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FIGURE 8-4
6NYCRR PART 360
TYPICAL CROSS SECTION - OVER EXCAVATION/BACKFILL
UTICA CITY DUMP RI/FS

the surface as a seep. Overexcavation would penetrate that low permeability clay lens and some of the material above and below it. When backfilled with gravel, this area would enhance the downward flow of water, where previously it had flowed laterally along a low permeability layer until it emerged as a seep. Although this would simply redirect the leachate into the subsurface, investigation has shown that the groundwater is not presently significantly impacted by the leachate, and that there is not an associated exposure route connected with groundwater as there is with surface exposure to leachate seeps. Additionally, this migration route exists naturally over most of the site. The degree to which overexcavation and gravel backfill of the seeps reduces contaminant related risk depends on the success with which this action decreases or prevents migration of contaminants to the waterbodies adjacent to the site.

8.3.5 Cover Areas of Exposed Waste

Areas of exposed waste would be covered with an engineered soil cover to contain the wastes, reduce infiltration and leachate generation, enhance runoff, control erosion and stabilize the site. This would be consistent with applying 1972 closure standards. Interviews with the City of Utica revealed that hazardous wastes were only disposed in the area east of the hardfill. Also, because ground water is not used as a source of drinking water in this area and because exposed wastes are not prevalent on the western portion of the site, it is appropriate to limit the cover for Alternative 3 to the eastern portion of the site. The areas proposed to be covered were those areas found to have exposed waste and contain most of the visible drums and other debris observed on site. These visual determinations were made during several site visits. The areas to be covered are delineated on Figure 8-3.

Because the design for this alternative would not conform to current 6 NYCRR Part 360 standards, a Part 360 waiver would need to be obtained.

8.3.6 Demolish Onsite Structures

Demolition of onsite structures has been requested by NYSDEC as part of this project. The structures have been determined to be a health and safety hazard, and will be demolished and disposed in the landfill. The structures to be demolished include the former incinerator stack, pump house, and abandoned construction trailers. In addition, the abandoned sewer line across the site will be filled with grout to prevent it from serving as a potential conduit for leachate migrating from the site or for groundwater or surface water migrating to the site.

8.3.7 Fencing

Fencing could be used on a limited basis to provide access restrictions in targeted areas where easy access is presently resulting in trespassing onto the site. The proposed fence is similar to that described in the Institutional Controls alternative, but would not surround the site. Instead, it would be provided across the site entrance, extending approximately 600 feet along Leland Avenue on the west side of the site, and extending 500 feet along the Barge Canal and Mohawk River embankments on the north and south sides of the site.

The proposed fence does not completely encircle the site. However, it is considered to be a hindrance to someone who may attempt to gain access by walking on to the property, or who may try to dump waste on the site through use of the access road.

8.3.8 Deed Restrictions

Deed restrictions placed on the property would restrict or prohibit certain types of land use of the site and would be used in conjunction with any of the above actions.

8.3.9 Summary of Alternative 3 (Modified Area Approximately 52 Acres)

The type of cap and cover system proposed above as part of this alternative meets 6 NYCRR Part 360 ARARs in effect when the facility ceased normal operation in 1972. The landfill will be covered with two feet of suitable cover material over the area east of the hardfill, where, according to the City of Utica, hazardous waste was disposed. Six inches of topsoil will be placed and seeded to provide grass vegetation cover.

Exposure to contaminated leachate will be reduced by covering the waste materials, which will reduce the production of leachate, by covering or overexcavating leachate seeps, and by collecting and treating contaminated leachate, if necessary. Fencing, deed restrictions, institutional controls and monitoring activities will help meet ARARs for the site.

Figure 8-3 shows the extent of the landfill cover to be provided under this alternative. Estimated quantities used for cost estimating purposes are:

- Clearing over 52 Acres
- Up to 5,000 cy of waste excavation and placement

- 325,000 cy of cover material
- 21,000 cy of topsoil
- 11,500 linear feet of hay bales and silt fence
- 1,600 feet of fence with a double swing gate

Site structures including the old incinerator facility and smoke stack, pump house, contractor trailers, and abandoned sewer line and manholes will be demolished and debris will be disposed in the landfill.

8.4 ALTERNATIVE 4: COVER SANITARY LANDFILL AREAS (EXCLUDING THE HARD-FILL AREA AND THE ARSON DISPOSAL AREA)

Installation of a cap and cover system is commonly performed during closure of municipal landfill sites. Requirements for landfill closure and the installation of a cover are regulated under 6 NYCRR Part 360. When the Utica City Dump ceased normal operation in 1972, proper closure requirements were not met. One alternative is to close the site according to the requirements of 6 NYCRR Part 360 as they existed in 1972 when the facility stopped accepting waste. Another option is to close the site according to the current (1999) 6 NYCRR Part 360 landfill requirements.

8.4.1 Alternative 4a: 1972 NYS Part 360 Cap Requirements

In 1972, landfill closure requirements called for a final compacted cover of at least two feet of suitable cover material. Control of the area through use of signs and fencing is also required in these regulations. However, no other requirements for cover system specifications are included.

Figure 8-5 shows the extent of the site to be covered by this alternative. The cover is proposed to extend over the majority of the site. However, the hardfill area and arson debris portions of the site have already been covered and these areas are not addressed under this alternative (except that existing erosion gullies are to be repaired by the City of Utica). Because the required Part 360 cap would not be installed, Part 360 waivers would need to be obtained as part of implementing this alternative.

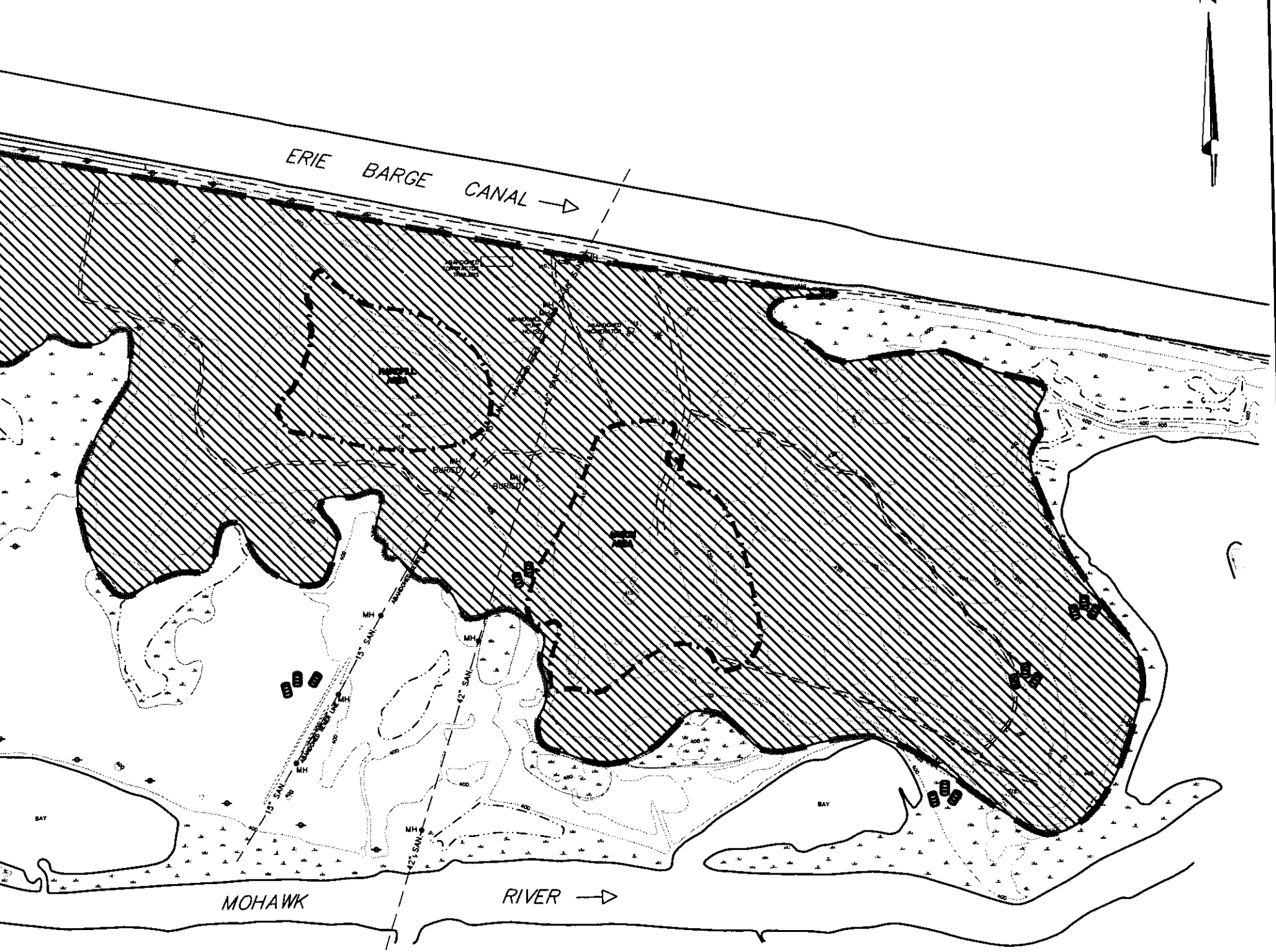

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FIGURE 8–5

Estimated quantities used for cost estimating purposes are:

- Clearing up to 116 Acres
- Up to 47,000 cy of site grading
- Up to 2,150 cy of waste excavation and placement
- 480,000 cy of earth fill
- 94,000 cy of topsoil
- 16,400 linear feet of hay bales and silt fence
- 16,400 feet of fence with a double swing gate

This alternative provides two feet of soil cover over the entire area of the Utica City Dump. Also, the proposed fence will completely surround the site as required by 6 NYCRR Part 360 regulations in effect in 1972. Implementing this alternative would ensure that there are no hazards posed by exposed wastes or by areas where the existing soil cover may be inadequate. Because this alternative does not include a current Part 360 cap, a Part 360 waiver from NYSDEC would be necessary in order to implement it.

8.4.2 Alternative 4b: Current NYS Part 360, RCRA and Modified Composite Layer Cap (Geomembrane Cap)

The Part 360 regulations have evolved substantially since 1972. Technological advancements in the design of cover systems have led to increased effectiveness of the covers and their ability to limit exposure, prevent transport of waste, and reduce landfill leachate. The current NYCRR Part 360 requirements for a municipal landfill cover include a multi-layered system involving several different materials. Figure 8-6 shows a typical cap and cover cross section to meet current 6 NYCRR Part 360 requirements.

Waste materials are graded and fill material will be imported to bring the landfill surface to the grade necessary for placement of the cap and cover system. Directly above the graded landfill surface, a non-woven geotextile is placed. Next a layer of granular material 12 inches thick to vent gases is placed on top of the geotextile. Above this, a 60-mil. HDPE geomembrane is placed. This layer is then overlain by a geonet/geotextile composite layer. Barrier protection fill of 12" thickness is placed above this, with a final layer of 6" of topsoil, mulched or seeded as the outermost layer.

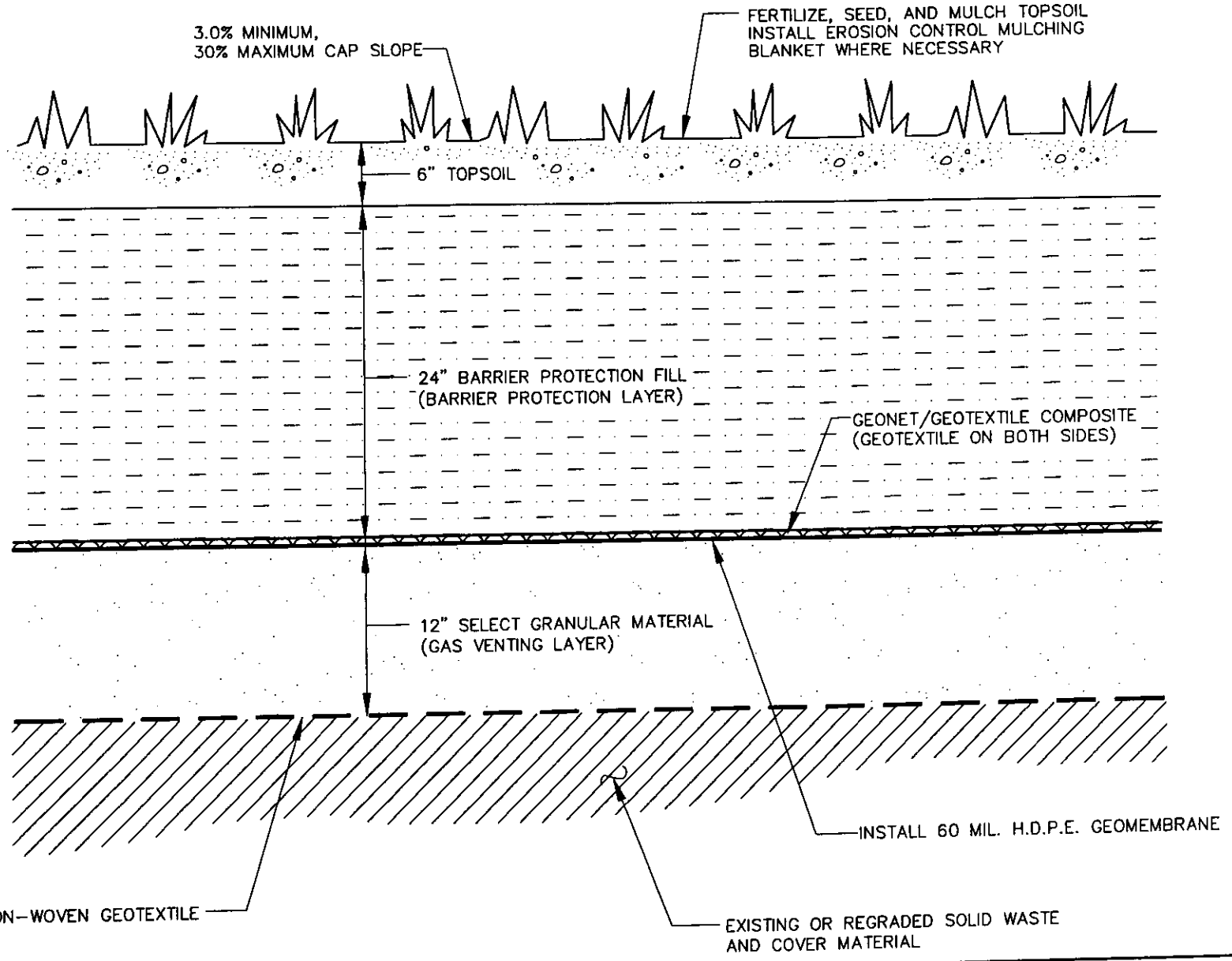

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FIGURE 8-6
ALTERNATIVE 4b: TYPICAL CROSS SECTION 6NYCRR PART 360 GEOMEMBRANE CAP
UTICA CITY DUMP RI/FS

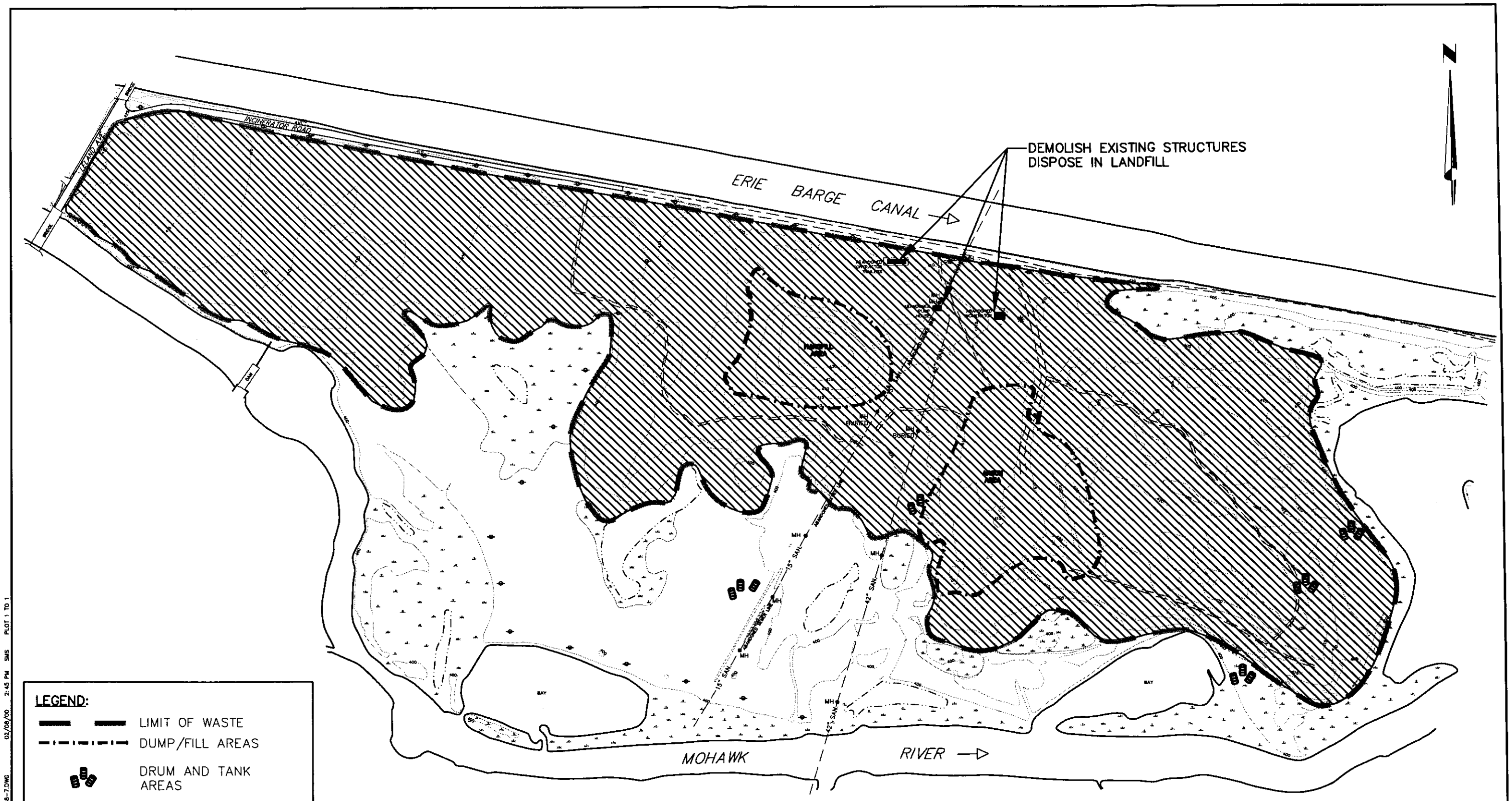
Estimated quantities used for cost estimating purposes are:

- Clearing up to 132 Acres
- 53,500 cy of site grading
- Up to 1,700 cy of waste excavation and placement
- 1,310,000 cy of earth fill placement
- 640,700 sy of nonwoven geotextile placement
- 213,600 cy of granular material for gas venting
- 5.76 million sf of 60 mil HDPE geomembrane
- 640,700 sy of woven geotextile
- 426,000 cy of barrier protection earth fill
- 106,800 cy of topsoil
- 275,000 sf of mulching blankets
- 16,400 linear feet of hay bales and silt fence
- 16,400 feet of fence with a double swing gate

State landfill requirements are more stringent than federal requirements for municipal solid waste landfills, so a landfill closure would need to satisfy the state requirements as ARARs. A plan view of the landfill cover under alternative 4b is presented in Figure 8-7. Cover is provided over the hardfill and arson landfill areas since these would contribute to leachate generation beneath the part 360 cap if they were not included. Figures 8-8 and 8-9 show three-dimensional views of the site surface before and after closure, respectively. To emphasize relief across the site, vertical scales in Figure 8-8 and Figure 8-9 are exaggerated by a factor of 20.

8.4.3 Alternative 4c: Current NYS Part 360, RCRA and Modified Composite Layer Cap (18-Inch Clay Cap)

Alternative 4c is similar to Alternative 4b except that an 18-inch clay cap is used instead of the 60-mil HDPE geomembrane. A nonwoven geotextile is proposed to separate the clay cap and the granular gas-venting layer instead of the woven geonet/geotextile composite that was used with the HDPE geomembrane. Figure 8-10 shows a typical cross section of the cap and cover system using a clay cap to meet the requirements of 6 NYCRR Part 360.



LEGEND:

- LIMIT OF WASTE
- DUMP/FILL AREAS
- DRUM AND TANK AREAS
- CURRENT PART 360 CAP & COVER

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 400 ft.

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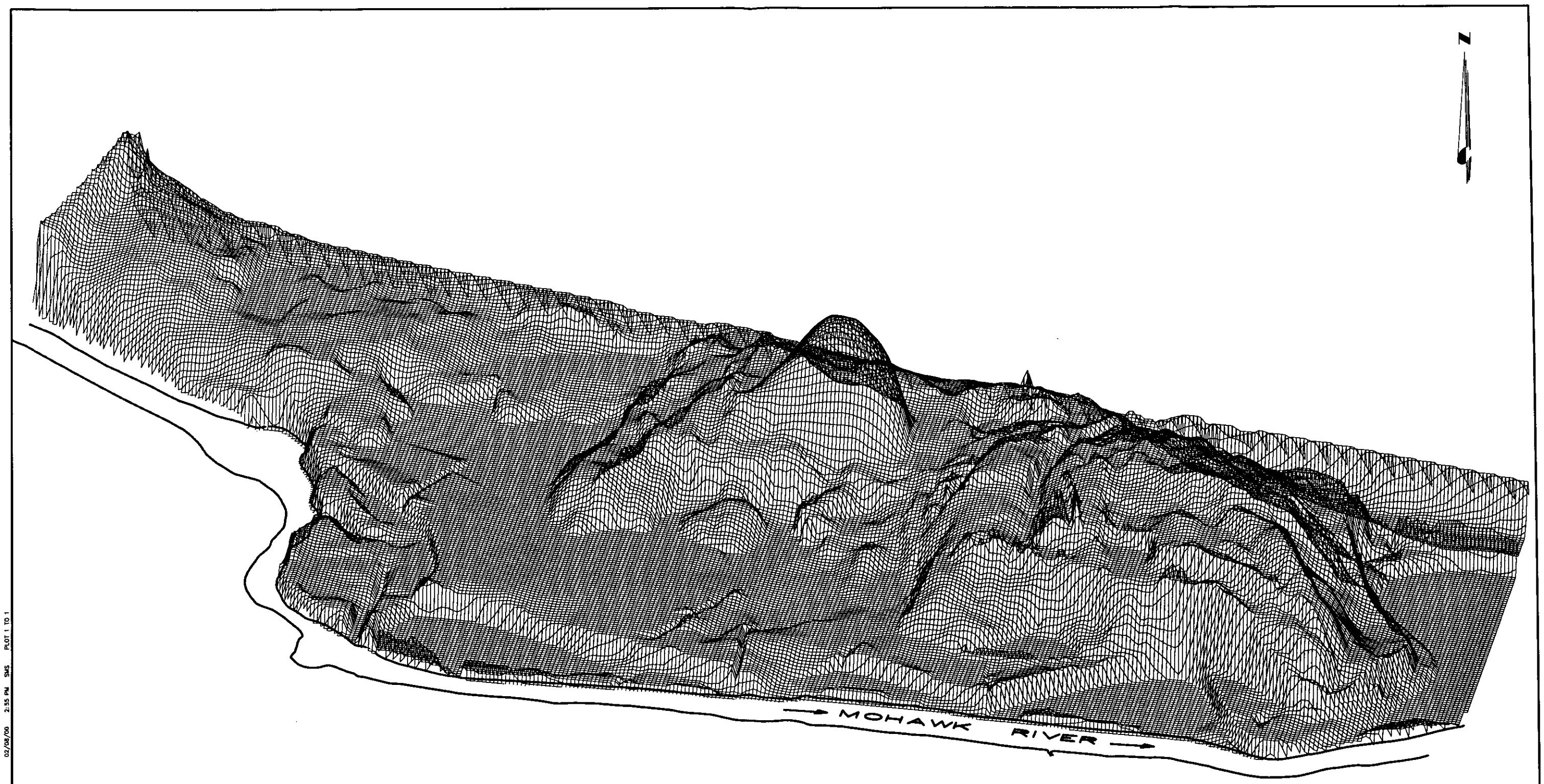
FIGURE 8–7
ALTERNATIVE 4b & c
1999 PART 360 CAP
UTICA CITY DUMP RI/FS



NOTE: VERTICAL SCALE EXAGGERATION APPROXIMATELY 20 TO 1 OF HORIZONTAL SCALE.

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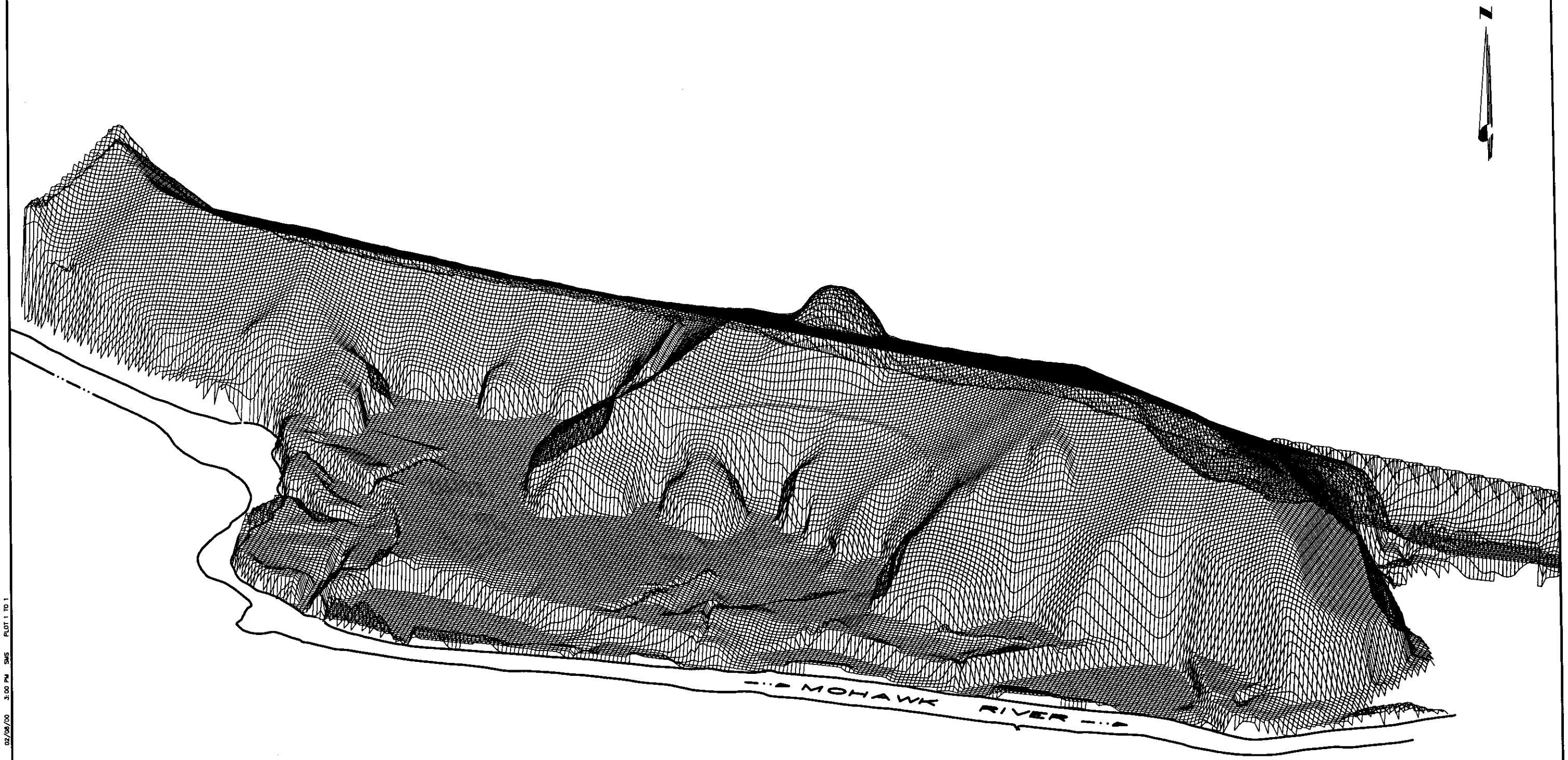
FIGURE 8–8
EXISTING GRADES ONSITE
1999

UTICA CITY DUMP RI/FS

E:\6532\DRAWINGS\FEASIBILITY STUDY\ FIG8-8.DWG 02/08/00 2:55 PM SMS PLOT 1 TO 1



NOTE: VERTICAL SCALE EXAGGERATION APPROXIMATELY 20 TO 1 OF HORIZONTAL SCALE.

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FIGURE 8-9
GRADES AFTER PART 360 CAP
1999
UTICA CITY DUMP RI/FS

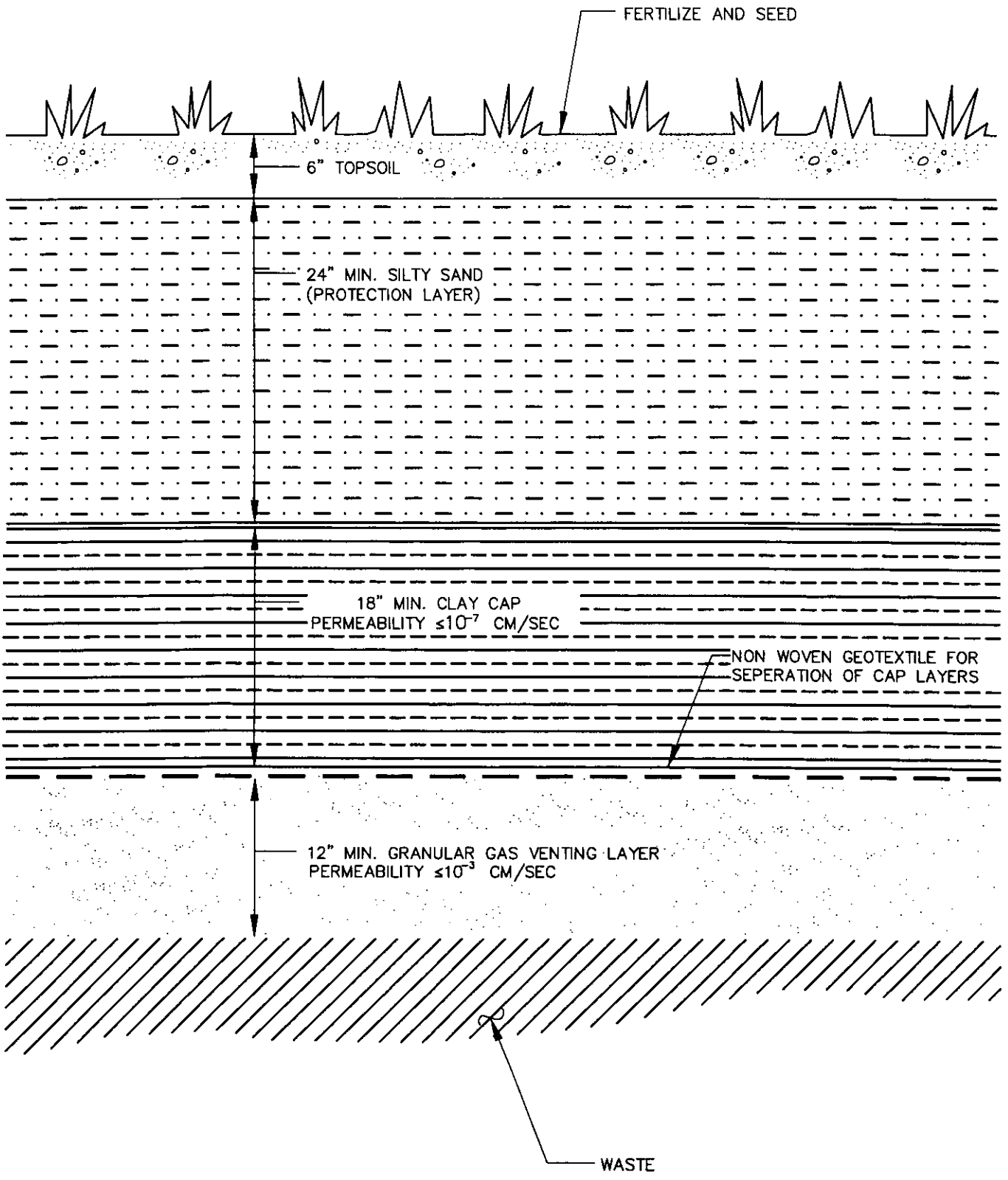

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FIGURE 8–10
ALTERNATIVE 4c: TYPICAL CROSS SECTION
6NYCRR PART 360 CLAY CAP
UTICA CITY DUMP RI/FS

Costs of this alternative depend on local availability of a suitable source of clay soil. Cost of clay depends on the haul distance. Clay typically becomes less cost effective than a geomembrane liner with haul distances of greater than 10 miles.

Estimated quantities used for cost estimating purposes are:

- Clearing up to 132 Acres
- 53,500 cy of site grading
- Up to 1700 cy of waste excavation and placement
- 1,310,000 cy of earth fill placement
- 640,700 sy of nonwoven geotextile placement
- 213,600 cy of granular material for gas venting
- 320,500 cy of clay ($K=10^{-7}$)
- 426,000 cy of barrier protection earth fill
- 106,800 cy of topsoil
- 275,000 sf of mulching blankets
- 16,400 linear feet of hay bales and silt fence
- 16,400 feet of fence with a double swing gate

8.5 ALTERNATIVE 5: LEACHATE COLLECTION AND TREATMENT

The proposed leachate collection system includes installation of a collection trench along the northeast and east side of the site where contaminated leachate seeps have been observed intermittently during wet seasons of the year. If necessary, this alternative may be implemented as part of one of the remedial action alternatives listed above.

To capture the leachate on the northeast and east sides of the Utica City Dump, a passive collection trench could be used. The trench would consist of an excavated drainage trench with a slotted drainpipe installed in the bottom of the trench and gravel backfill above the pipe. The trench would be lined on the down gradient side with an impermeable geomembrane, to help separate contaminated leachate seeps from groundwater, surface water and wetlands. Figure 8-11 shows a cross-section of a typical collection trench. Figure 8-12 shows the proposed leachate collection trench location along the east side of the Utica City Dump.

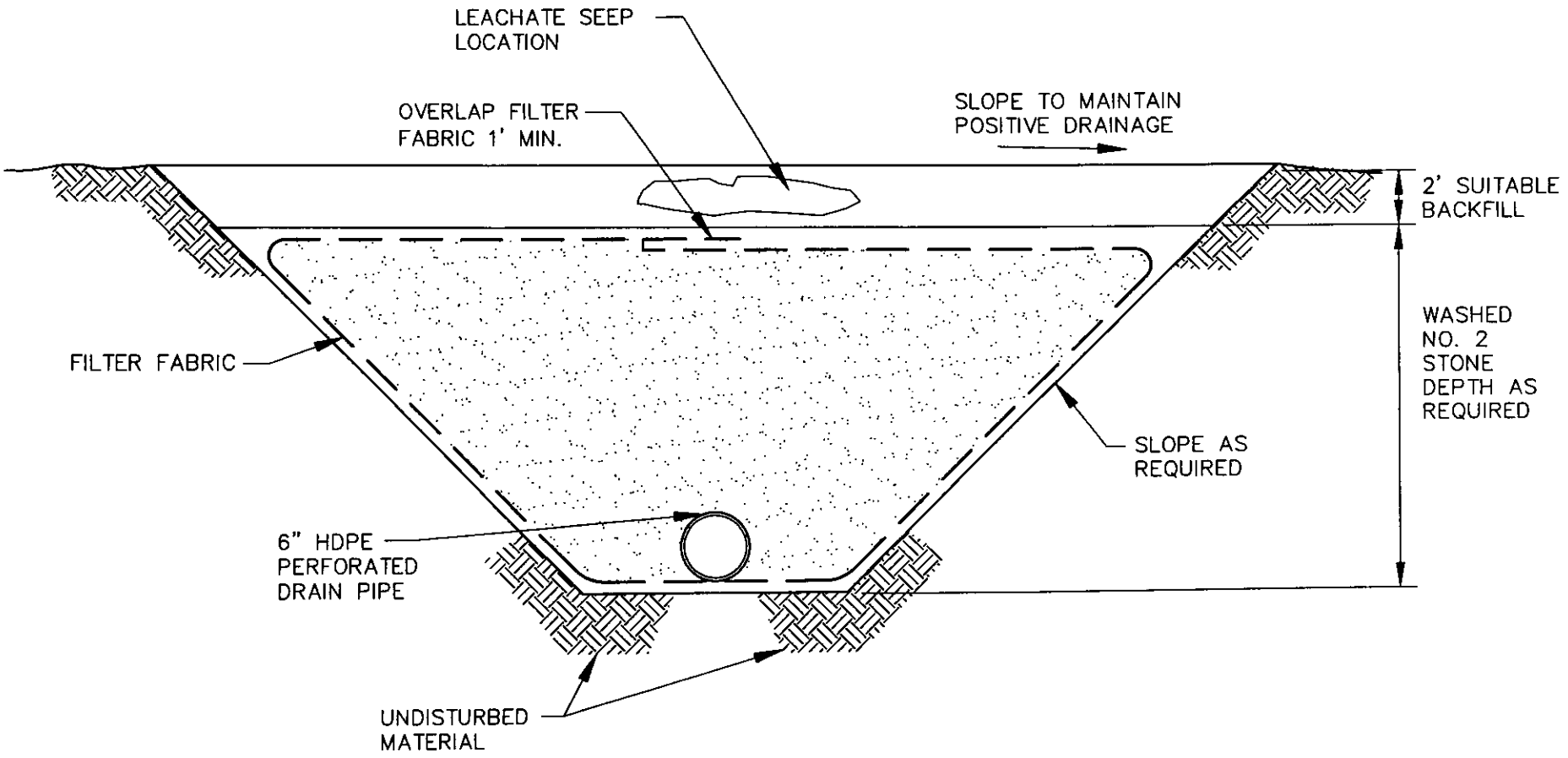

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FIGURE 8–11
6NYCRR PART 360
TYPICAL CROSS SECTION LEACHATE COLLECTION TRENCH
UTICA CITY DUMP RI/FS

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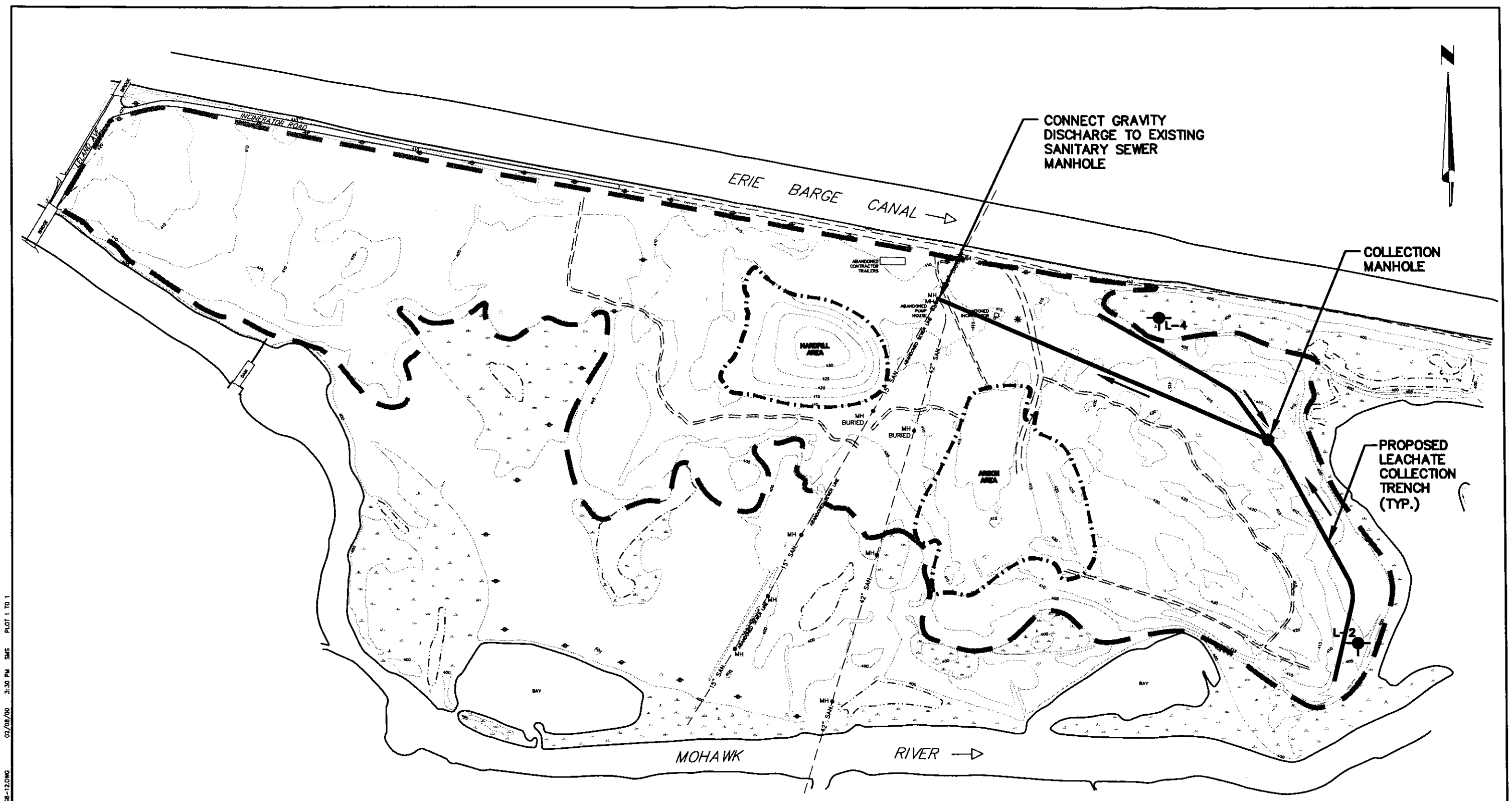

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 400 ft.

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FIGURE 8–12
ALTERNATIVE 5A - LEACHATE COLLECTION TRENCH LOCATION
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Four alternatives for leachate collection and treatment are included:

5a. Discharge leachate to the offsite Publicly Owned Treatment Works (POTW)
5b. Store leachate in onsite tanks and haul to the POTW
5c. Onsite Constructed Wetlands Treatment System (CWTS)
5d. Leachate Collection Sumps

Alternatives 5a through 5c involve a leachate collection trench while Alternative 5d includes leachate collection sumps at the seep locations. Leachate discharge options for Alternative 5d are similar to Alternatives 5a, 5b, or 5c. The following is a brief description of each alternative for leachate treatment.

8.5.1 Alternative 5a: Discharge Leachate to the Offsite Publicly Owned Treatment Works (POTW)

This alternative involves collecting leachate in a leachate collection trench that connects by gravity sewer line to the municipal sewer line that crosses the site (see Figure 8-12). The municipal sewer line flows to the offsite POTW that is located approximately 0.5 miles from the site.

Estimated quantities used for cost estimating are:

- Clearing up to 6 acres
- 4,000 ft trench excavation
- spreading of excess material
- 4,000 ft 6-inch buried pipeline
- Connection to the existing sewer line

An indirect discharge permit may be needed to allow leachate discharge to the POTW. However, because of the low volume and low concentration of leachate constituents, it is anticipated that the POTW will accept the wastestream. Monitoring of the wastestream may be required.

8.5.2 Alternative 5b: Store leachate in onsite tanks and haul to the POTW

If discharge to the offsite POTW is not technically feasible or the pipeline does not have adequate capacity, then leachate storing and hauling may be implemented. This alternative involves constructing a pump station and storage tanks for storing leachate. Figure 8-13 shows a conceptual plan for this alternative.

Estimated quantities used for cost estimating are:

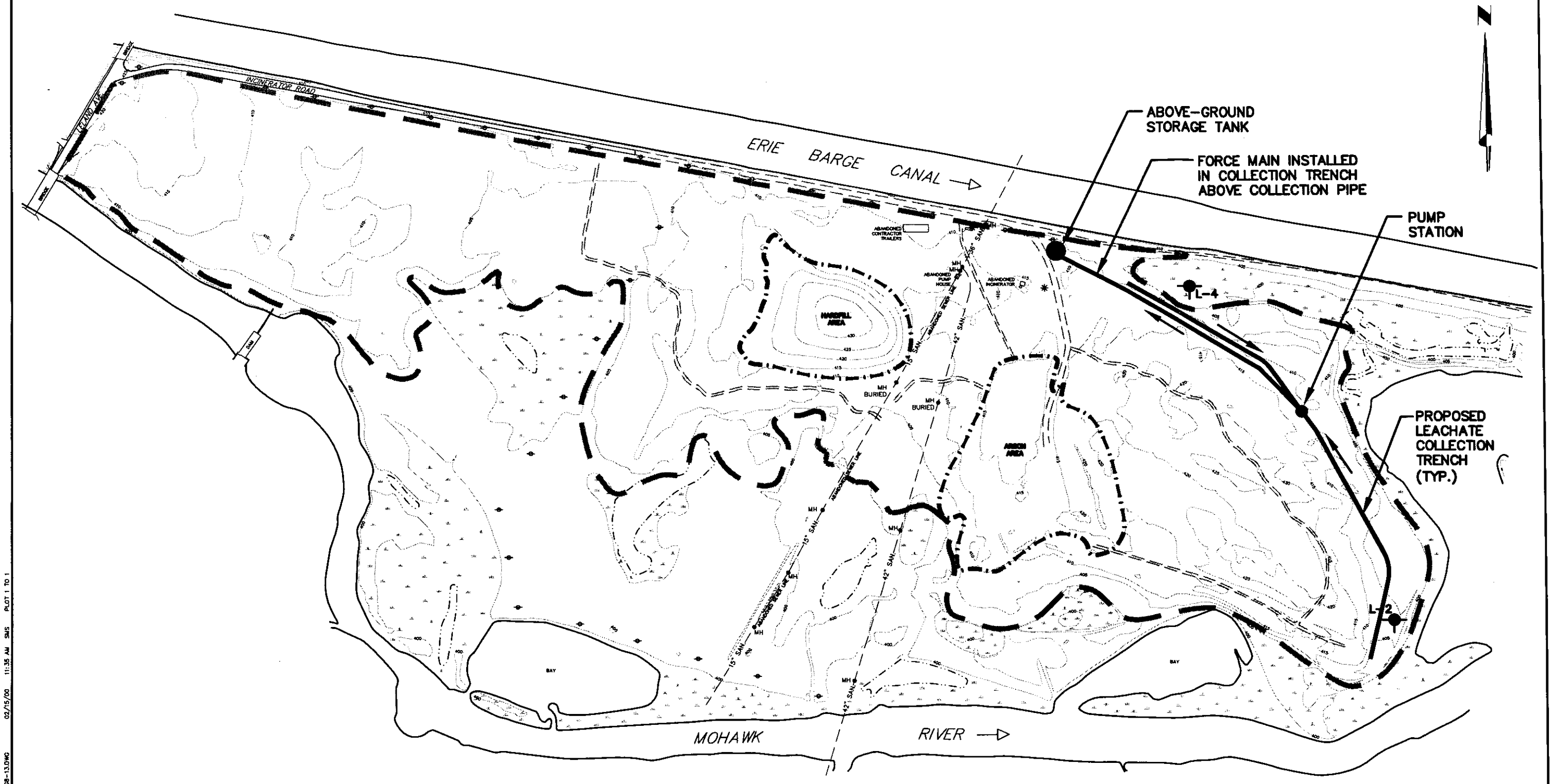
- Clearing of up to 6 acres
- 1 Storage tank, 30,000 gallon capacity
- Pump station
- Local control panel
- 4,000 ft trench excavation
- 4,000 ft 6 inch buried pipeline

8.5.3 Alternative 5c:Wetland Enhancement (Constructed Wetland) to Treat Leachate

Figure 8-14 shows a proposed location of the leachate collection trench. Gravity flow through the trench to the constructed wetlands for treatment is preferred to avoid the need for operating and maintaining a pumping station. However, due to the relatively flat slope of the site (less than 1%), flow could be directed via pumping to the wetland system.

The complexity of constructed wetlands can range from the "creation of a marsh in a natural setting where one did not permanently exist before, to intensive construction involving earth moving, grading, impermeable barriers or erection of containers such as tanks or trenches. The vegetation that is introduced or emerges from these constructed systems will generally be similar to that found in the natural wetlands." (USEPA 1988).

Constructed wetlands can be used to treat leachate and runoff from the site that may be contaminated. The objective of the constructed wetland is to reduce the concentration of volatile organic compounds, semi-volatile compounds, and metals to concentrations that will meet all governing regulations. The Remedial Investigation has shown that leachate seeps contaminated with organic constituents exist only in locations east and northeast of the Utica City Dump (near L-2 and L-4) during wet seasons of the year, and metals were found at all leachate seeps sampled.



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(IN FEET)

1 inch = 400 ft.

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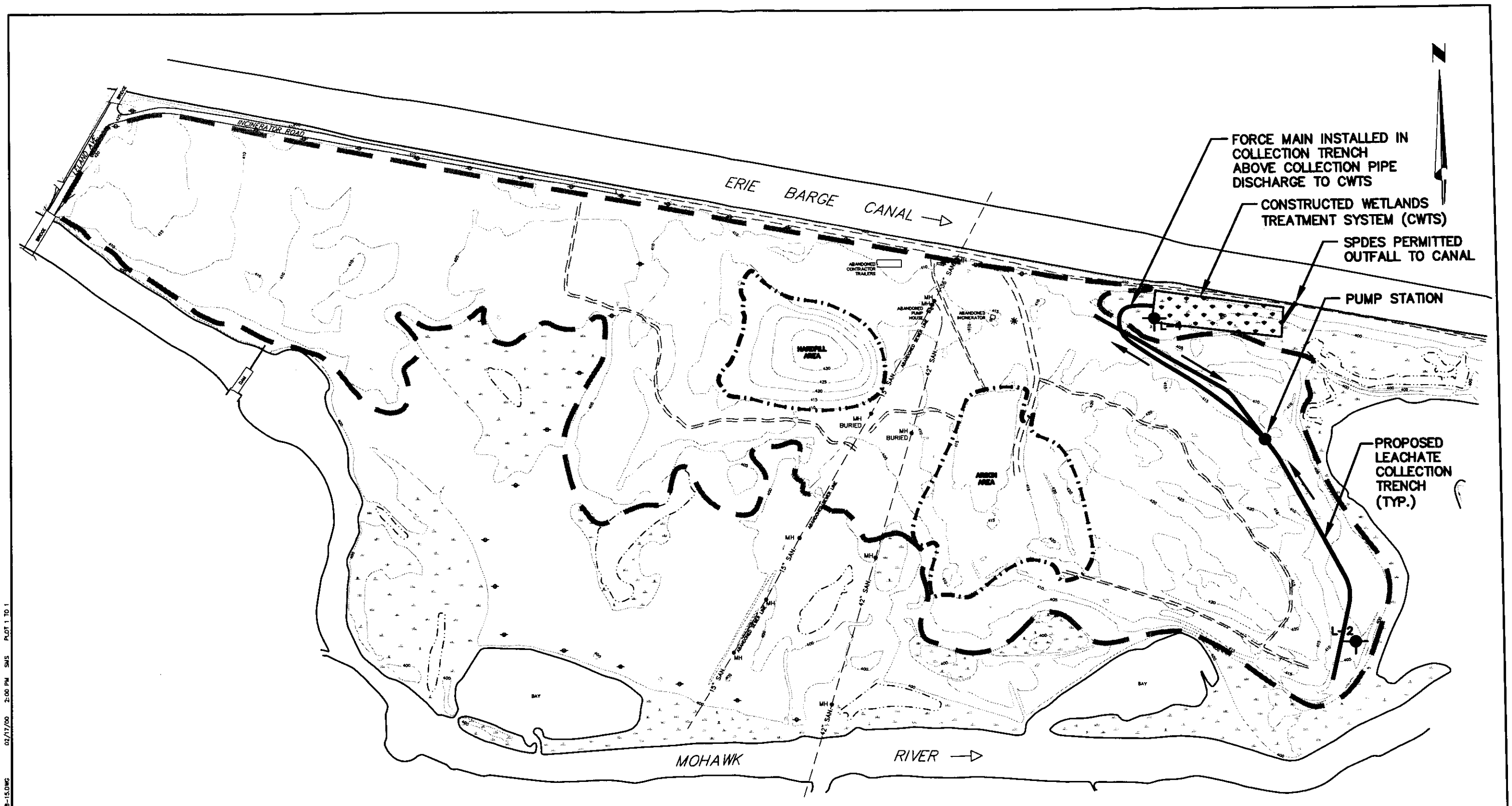
FIGURE 8-13
ALTERNATIVE 5B - LEACHATE COLLECTION TRENCH LOCATION
UTICA CITY DUMP RI/FS



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(IN FEET)

1 inch = 400 ft.

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FIGURE 8–14
ALTERNATIVE 5C - LEACHATE COLLECTION/CONSTRUCTED WETLAND
UTICA CITY DUMP RI/FS

I:\8832\DRAWINGS\FEASIBILITY STUDY\ FIG8-15.DWG 02/17/00 2:00 PM SWS PLOT 1 TO 1

The design of a constructed wetland is based upon site conditions, site hydrology, and contaminant loading and concentrations. Several site conditions need to be considered when designing a constructed wetland system. These include soil depth and permeability, water table depth and seasonal variations, surface topography, size and shape of property, surface water flow, and climatic conditions. In order to maximize the performance and efficiency of the constructed wetland system/cell, the following areas also need to be addressed: system configuration, type of wetland system, liner systems, distribution systems, cell substrate, and vegetation. A generic cross section of a typical constructed wetland cell is shown in Figure 8-15.

There are two basic types of constructed wetlands, subsurface and surface flow systems. Subsurface systems have no visible standing water which reduces problems with odor, mosquitoes, surface staining caused by metals, potential health risks, and freezing in colder climates. Subsurface systems are designed so that the contaminated leachate flows through a gravel substrate and soil matrix. Chemical processes, microorganisms, and plant root absorption will reduce concentrations of organics, non-organics, and metals. The second system is a surface flow system (overland flow) where there is continually standing water at the surface. The overland flow method reduces high levels of organics, non-organics, and metals by oxidation, precipitation, volatilization, and photolysis of pollutant compounds.

Estimated quantities used for cost estimating are:

- Clearing of up to 6 acres
- 2,000 ft trench excavation
- 1,670 cy clay earthen dam
- 40 gmp pump station
- 2,550 ft 6 inch pipeline
- 12,000 sf phragmite plants
- 740 cy pea gravel bedding
- 12,000 sf soil matrix
- 12,000 sf 60 mil HDPE liner
- 4 acres of wetland mitigation

A monitoring program is required to assess the effectiveness of the constructed wetland for reducing concentrations of contaminants. The program would consist of periodic monitoring of flow rates, water quality, weather conditions, and vegetation growth.

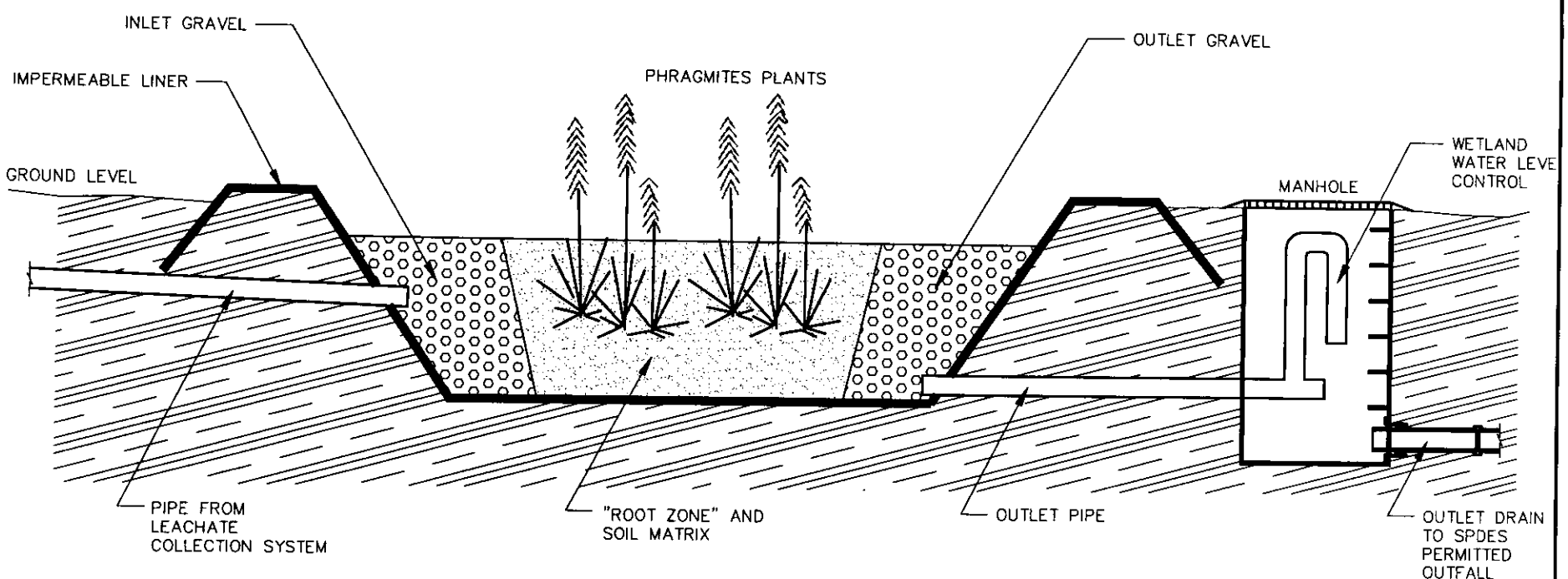

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FIGURE 8–15
TYPICAL CROSS SECTION OF A CONSTRUCTED WETLAND TREATMENT CELL

UTICA CITY DUMP RI/FS

8.5.4 Alternative 5d: Leachate Collection Sumps

This alternative could be used in conjunction with any of alternatives 5a, 5b, or 5c. Seeps at the site occur during the wet season, and seem to occur because of perched groundwater that travels horizontally through the site mound due to a zone or lens of low permeability that prevents it from percolating downward.

This alternative involves construction of leachate collection sumps in limited areas where seeps have been observed. Specifically, the alternative proposes two leachate collection sumps; one each at seep locations where samples L-2 and L-4 were collected. (See Figure 8-16) The sumps consist of a manhole installed and approximately 100 feet of leachate collection trench extending from either side of the manhole. Leachate would flow by gravity sewer to the city sewer line.

8.6 ALTERNATIVE 6: LIMITED SEDIMENT REMOVAL

The proposed sediment removal action includes excavation of sediments along the northern shore of the Mohawk River on the southeast corner of the landfill. This alternative could be implemented alone or in combination with any of the remedial action alternatives discussed above.

Figure 8-17 shows the location of the sediment removal, which would extend from approximately sampling location SED-5 to SED-8 (see Figure 4-9), a total distance of approximately 3,000 feet. The sediment would be removed to a depth of approximately 1-foot using a backhoe based on shore. The removal width would extend to approximately 30 feet from shore, depending on the reach of the backhoe specified. Silt curtains placed in the water beyond the limit of work, would be utilized to minimize the migration of disturbed sediments. Exact details of removal action quantities and locations would be determined during the remedial design phase.

Spoils from the removal process would be tested for PCBs for waste characterization. Sediments with PCBs greater than 50 ppm would be disposed offsite at a TSCA-approved facility. Sediments with concentrations of PCBs less than 50 ppm would be transported to the landfill, spread, and covered with 2 feet of clean fill. Based on previous sediment sampling results, no off-site disposal is anticipated. Excavated sediments would be staged and mixed to promote drying before transport off-site or to the landfill for final spreading.

CONNECT GRAVITY DISCHARGE TO EXISTING SANITARY MANHOLE (TYP.)

COLLECTION MANHOLE (TYP.)

PROPOSED 100 LF LEACHATE COLLECTION TRENCH TWO SIDES OF COLLECTION MANHOLE (TYP.)

ERIE BARGE CANAL

INCINERATOR ROAD

ISLAND LF

MARSELL AREA

ABANDONED CONTRACTOR TRAILERS

ABANDONED PUMP HOUSE

ABANDONED INCINERATOR

ARSON AREA

L-1

L-2

L-3

L-4

MH

BAY

MOHAWK RIVER

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 400 ft.

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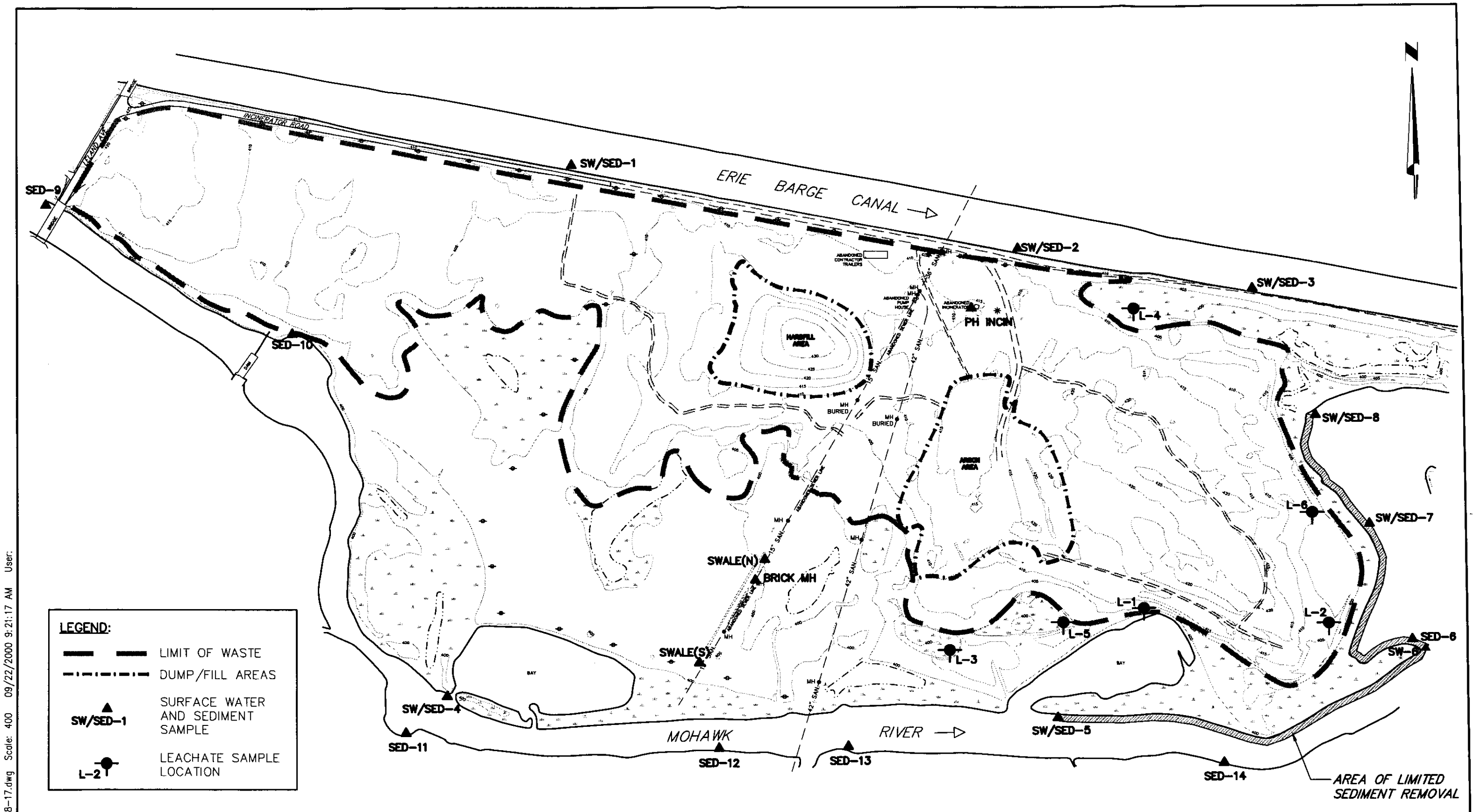
FIGURE 8–16
ALTERNATIVE 5D - LEACHATE COLLECTION SUMPS
UTICA CITY DUMP RI/FS

I:\6832\DRAWINGS\FEASIBILITY STUDY\FIG8-16.DWG 02/15/00 12:30 PM SMS PLOT 1 TO 1



NOTE:
SAMPLE LOCATIONS APPROXIMATE.

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FIGURE 8-17
ALTERNATIVE 6
LIMITED SEDIMENT REMOVAL
UTICA CITY DUMP RI/FS

File: N:\6832\FinalFigs\Fig8-17.dwg Scale: 400 09/22/2000 9:21:17 AM User:

Estimated quantities used for cost estimating are:

- 3 acres of clearing along the riverbank
- 3,400 cy of sediment to excavate
- 3,400 cy of silty sand to replace removed sediments
- 6,800 cy of clean fill to cover sediments in the landfill
- 1,700 cy of topsoil
- 5 acres of re-vegetation
- 8 weeks of fieldwork to complete the project

9.0 DETAILED ANALYSIS OF ALTERNATIVES

The detailed analysis of alternatives consists of the evaluation and presentation of the relevant information needed to allow decision-makers to select a site remedy. Each alternative developed in Section 8 is assessed against the seven evaluation criteria described in Section 9.1. Successful alternatives must meet the specific requirements listed below:

- Be protective of human health and the environment
- Attain SCGs (or explain why compliance with SCGs is not needed to protect public health and the environment)
- Satisfy the preference for treatment that significantly and permanently reduces toxicity, mobility, or volume of hazardous wastes as a principal element (or provide an explanation in the Record of Decision (ROD) as to why it does not)
- Be cost-effective

9.1 EVALUATION CRITERIA

Seven evaluation criteria have been developed to address the requirements and considerations listed above. These evaluation criteria serve as the basis for conducting the detailed analyses and for subsequently selecting an appropriate remedial action. The evaluation criteria are:

- Short-term impacts and effectiveness
- Long-term effectiveness and performance
- Reduction of toxicity, mobility, or volume
- Implementability
- Compliance with SCGs
- Overall protection of human health and the environment
- Cost

The evaluations conducted during the detailed analysis phase build on previous evaluations conducted in Section 8. The results of the detailed analysis serve to document the evaluations of alternatives and provide the basis for selecting a remedy.

Each of the six alternatives developed in Section 8 have been evaluated relative to the evaluation criteria listed above. Each of these criteria was evaluated using methods and tables developed in the Technical and Administrative Guidance Memorandum #4030 (TAGM), published by the NYSDEC in 1990. These tables are included in Appendix J. For each criterion, the tables pose various questions and replies are numerically rated for each potential alternative. Numeric scores are given according to answers to these questions. Each alternative then receives a total score for each broad criterion.

These criteria have been developed so that preference is given to remedies that permanently reduce the toxicity, mobility, and volume of the hazardous substances. Conventional isolation and control technologies offer the most viable remedial action. Consequently, none of the proposed alternatives are considered to be permanent remedies. Waste materials will remain onsite under all of the alternatives under consideration. Some constituents are mobile and will continue to be a source of contamination to leachate and groundwater.

The recommended alternative, or combination of alternatives, will be further refined during the design phase of the project. Descriptions of the potential alternatives presented in this section have been developed, and quantities estimated based on available information so that order of magnitude comparative cost estimates can be prepared.

9.2 COST ANALYSIS

As part of the Feasibility Study, a Comparative Cost estimate was prepared for each of the alternatives and subalternatives. Unit prices for materials, equipment, labor, and overhead and profit were taken from the 2000 Means Site Work & Landscape Cost Data, product vendors, construction companies, and historical data. Annual sampling costs were based on costs included in the approved budget for field work at the Utica City Dump. General Condition, General Mobilization, Design Fees, Legal & Administrative Fees and Health & Safety costs were placed on a sliding scale as a percentage of the total capital cost. To provide a common basis for assessing capital and operation/maintenance costs of the various alternatives, a 30-year present worth cost analysis was performed using an interest factor of five percent.

After each alternative had been formulated, essential parts of the design and construction were quantified. To determine the quantities of each material for the selected alternative, the areas were scaled from representative figures. Minimum depths, thickness, material size, configuration, slope, location, height, etc. were taken from conceptual report figures presented in Section 8. For earthen quantities and unit pricing, the order of magnitude cost estimate was prepared using a haul route of 10 miles.

Operation and maintenance costs were determined for each alternative by following state and federal guidelines for site visits, routine maintenance, sampling and data reporting. The annual site repair costs are a fixed percentage of the initial total capital costs. All other operation and maintenance costs were calculated using historical cost data and experience at similar sites.

Because complete engineering designs have not yet been completed for any of the alternatives and only limited information was available at the time of this cost estimate, the order-of-magnitude comparative cost estimates have an expected accuracy of plus 50 percent to minus 30 percent. The estimates are intended to be used to compare relative magnitude of costs among the various alternatives and should not be used to obtain project funding. Project funding should be obtained based on cost estimates prepared during preliminary and final design of the selected alternative. Adequate contingency should be included to allow for uncertainties that exist, and for unexpected conditions that may arise during construction.

Final costs may vary from these cost estimates due to many factors including:

- Local availability of construction materials and services
- Property ownership and other legal issues
- Changes that will occur in final design
- Availability of acceptable alternate low cost materials for general fill
- Landfill gas collection systems and/or leachate collection systems implementation
- Wetlands and floodplain considerations and other regulatory issues
- Unforeseen conditions encountered during construction that may require design changes or additional controls for erosion, dust, surface drainage, waste removal, subsurface water, etc.
- Weather conditions during construction
- Changes in final quantities and unit costs

- Final implementation method (traditional design and construction, design/build, or other method)
- Design engineer's qualifications, experience, and capabilities
- Market rates for equipment, fuel, labor variations
- Interest rates and inflationary considerations
- Local market conditions during bidding and project implementation

A summary of the cost estimates for the six alternatives is given on Table 9-1. In addition, a cost sensitivity analysis was performed to examine the changes in cost reflected by variations in several cost estimate assumptions. Specifically, several assumptions include as a variable addressing only the eastern portion of the site where hazardous wastes were disposed. Table 9-1 therefore includes the costs of Alternatives 4a, 4b, and 4c with a reduced cover area of 52 acres. The cost analysis and the sensitivity analysis are discussed more fully in Section 10.7-10.8.

The following sections describe each alternative and the degree to which each fulfills the criteria of ARAR compliance, Implementability, effectiveness, and cost. Fulfillment of additional criteria is discussed in Section 10.

9.3 ALTERNATIVE 1: NO ACTION (WITH MONITORING)

Under this alternative, no action would be implemented at the site, except for periodic groundwater and leachate monitoring. Periodic monitoring will consist of sampling and analysis of the existing onsite wells, wetlands, and leachate seeps. The monitoring program will be used to monitor changes in contaminant concentrations at selected locations over time, and to evaluate the degree to which contaminants appear to be migrating away from the site.

The monitoring program may detect any significant increases in concentrations that could occur due to possible releases from buried drums or tanks that could occur as the containers degrade over time or from leachate seeps that may occur after significant rainfall events.

The no action alternative does not meet chemical specific SCGs. The alternative provides no control of exposure to the landfilled wastes. Contaminants detected during the RI in soil, leachate, and groundwater would remain in place. This alternative provides no reduction in toxicity, mobility, or volume of contaminated soil, groundwater, leachate, or sediment. It also does not meet location-specific SCGs (e.g., for freshwater wetlands) or technology standards for required landfill covers.

Table 9-1
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Analysis

Cost Estimate for Utica Landfill					
Alternatives	**Capital Cost**	**Annual O&M Cost**	**Present Worth O&M**	**Total Present Worth**	**Cost Ranking***
1. No Action	$0	$36,000	$549,000	$549,000	*1*
2. Institutional Controls	$576,000	$71,000	$1,086,000	$1,661,000	*2*
3. Limited Action	$5,433,000	$69,000	$1,063,000	$6,496,000	*3*
4a. 1972 Part 360 Regulations - 116 acres cover	$10,758,000	$89,000	$1,363,000	$12,122,000	*4*
1972 Part 360 Regulations - 52 acres cover	$5,973,000	$84,000	$1,297,000	$7,270,000	
4b. Current Part 360 Regulations - 132 acres (Geomembrane)	$33,767,000	$124,000	$1,902,000	$35,669,000	*6*
Current Part 360 Regulations - 52 acres (Geomembrane)	$15,823,000	$98,000	$1,502,000	$17,325,000	
4c. Current Part 360 Regulations - 132 acres (Clay Cap)	$30,915,000	$119,000	$1,829,000	$32,743,000	*5*
Current Part 360 Regulations - 52 acres (Clay Cap)	$14,443,000	$96,000	$1,473,000	$15,916,000	
Alternatives 5 and 6 could be implemented in combination with any of Alternatives 1-4:					
5a. Leachate Collection & Treatment - Route Offsite to POTW	$301,000	$46,000	$705,000	$1,006,000	*1*
5b. Leachate Collection & Treatment - Store & Haul	$443,000	$274,000	$4,206,000	$4,649,000	*4*
5c. Leachate Collection & Treatment - Onsite Constructed Wetland	$875,000	$111,000	$1,712,000	$2,587,000	*3*
5d. Leachate Collection & Treatment - L-2 & L-4 Collection Sumps	$303,000	$82,000	$1,259,000	$1,562,000	*2*
6 Limited Sediment Removal	$414,000	$0	$0	$414,000	-

* the lowest cost alternatives received the lowest rank

The results of the ecological risk assessment for the aquatic exposure pathways at or adjacent to the site indicate that the existing conditions pose a moderate ecological risk to fish and aquatic-feeding birds and mammals. Fish are at risk from PCBs, aluminum, copper, selenium, and zinc. The calculated risk to fish from metals was relatively low, but the risk from PCBs was moderately high. The results of the risk assessment indicated that aquatic-feeding birds are at a potential risk from DDT, PCBs, cobalt, lead, and vanadium, and are at a likely risk from aluminum and chromium. The calculated risk for aluminum was determined to be relatively low, while the risk from chromium was moderate. Piscivorous mammals are potentially at risk from barium, manganese, thallium, and vanadium and are at a likely risk from PCBs and aluminum. The risks from PCBs and aluminum to piscivorous mammals were calculated to be moderately high. It should be noted that although PCBs appear to be site-related, other known sources of PCBs exist upstream of the site. Therefore, the degree to which any remedial action taken to reduce the risk posed by PCBs to receptors associated with the aquatic environment adjacent to the site is questionable.

Since Alternative 1 does not involve any active remediation at the site, the levels of contaminant-related risk would be expected to remain similar to the existing conditions discussed above. The degree to which natural attenuation may decrease the risk from contaminants over time is uncertain, but any natural attenuation is expected to be a long-term process. In the interim, contaminant levels are likely to result in adverse effects on fish, bird, and mammal populations that inhabit or feed from the waterbodies adjacent to the site. In addition, terrestrial bird and mammal populations are potentially at risk as well.

This alternative does not result in any short term risks to the public or short-term environmental impacts that may result from remedial construction activities. However, no action is not a permanent or long lasting remedy, and does not involve treatment of the waste, or waste residual left on site. Long-term operation and maintenance would be required to maintain the site.

Alternative 1 is simple to implement. However, it does not reliably meet performance goals, and may necessitate additional remedies at a later date. Costs associated with no action include sampling, analysis, and reporting costs. This alternative is the least costly of the six alternatives.

9.4 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

Alternative 2 consists of fencing, deed restrictions, and an environmental monitoring program. Implementation of this alternative would restrict access to humans from the site but would

generally not restrict use by wildlife. One exception may be larger mammals (primarily deer), which may be partially excluded from the site due to fencing. Therefore, the contaminant-related ecological risk associated with this alternative would be similar to that discussed under Alternative 1.

This alternative addresses the exposure pathways by restricting access to the site, thereby reducing the possibility of direct contact with surface seeps, exposed wastes, and contaminated surface soil. Access restrictions would consist of an 8-foot high chain link fence completely surrounding the site. Deed restrictions would assure that this land would not be used inappropriately in the future. Deed restrictions would prevent the site area from being disturbed by future development and the fence will prevent access by people thus reducing the potential for human exposure to waste materials.

Institutional controls provide limited protection for human health by limiting site access and restricting future use of the property. However, this alternative does not meet any chemical specific SCGs, location specific SCGs, or action specific SCGs because exposed wastes and other site contaminants will remain.

This alternative meets some but not all of the remedial action objectives, and future remedial action may be necessary. However, this alternative is one of the least costly to implement. It is estimated to be two orders of magnitude less costly than the alternatives involving cap and cover systems. Costs are associated with construction of a fence, administration of deed restrictions, and monitoring using the network of monitoring wells established during the RI. This alternative is more costly than no action, but less costly than any other alternative.

9.5 ALTERNATIVE 3: LIMITED ACTIONS

Limited actions are described above in Section 8.3 and include institutional controls, monitoring, limited waste excavation and placement, limited cover for selected areas where existing cover is inadequate and where hazardous waste was known to have been placed, erosion control, excavation/backfill/covering of leachate seeps, demolition of onsite structures, sealing abandoned sewer lines, and an environmental monitoring program.

The proposed limited action alternative would effectively protect human health. This alternative meets some of the identified ARARs. Continued monitoring will provide data to evaluate the degree to which the actions attain the goals set forth in the design.

Excavation of waste that is currently within wetlands or floodways and placement within the area to be covered reduces the geographical extent of the waste materials. Repair and maintenance activities to prevent erosion on the landfilled areas will stabilize the landfilled wastes. Excavation of seep areas will eliminate the associated pathway of human and animal exposure to leachate at ground surface, and will also prevent seeps from flowing across the ground to wetland areas.

ARARs pertaining to landfill cover design at the time the facility ceased normal operation will be met. It will be necessary to obtain Part 360 waivers for the cover, since it will not meet the slope and gas venting requirements of the current Part 360 regulation. ARARs, such as the wetland and floodway regulations will also be satisfied.

Short-term risks to the community or to the environment are from trucking associated with construction activities, generation of dust during construction, and clearing activities that will temporarily disrupt animal habitat. The construction is anticipated to take less than 2 years to implement. Waste will be left on site, and long term operation and maintenance would be required for an indefinite period.

With regard to habitat-related impacts of the proposed landfill cap under this alternative, covering the areas of exposed waste would result in short-term and long-term loss of habitat and negative effects on ecological communities inhabiting approximately 52 acres of disturbed habitat. The land involved would be planted and managed as a grassland community, representing a complete change from forested communities (long-term), but less of a change from successional old field and landfill/dump (short-term) because grasslands are similar to these habitats. About 38 acres of successional southern hardwoods and 5.36 acres of floodplain forest will be removed. Because there are similar areas of successional southern hardwoods and floodplain forests adjacent, the site will continue to provide habitat for wildlife that prefer these habitats.

Habitat enhancement (creating ecological communities attractive to wildlife) may be used to mitigate the effects of site disturbance. With plantings and management, the environment will be enhanced through the removal and/or isolation of contaminants and debris. The resulting grassland community will provide habitat for grassland species, including some threatened, endangered, and special concern species. Grassland communities are declining in New York and much of the US. Many of the grassland birds (upland sandpiper, northern harrier, American kestrel, short-eared owl, field sparrow, vesper sparrow, Savannah sparrow, grasshopper sparrow,

Henslow's sparrow, bobolink, eastern meadow lark, are also declining in the northeast. Wildlife that prefer edge (forests-fields) including deer, fox, rabbit, red-tailed hawks, etc. will also benefit by the creation of grassland habitat. It will take one to two years to establish field habitats that would provide the wildlife benefits currently provided by the existing old field habitats on-site. The eventual use of this habitat by grassland species will be gradual, taking several years for grassland species to discover and occupy the newly created habitat. The disturbance in the floodplain forest and shallow emergent marsh habitats will require wetland permits and if possible the areas should be returned to the same habitat type once construction is completed. Construction methods will utilize techniques that reduce the damage to the habitat.

The limited actions alternative is technically feasible and has few uncertainties in construction. Technologies used as part of this alternative are relatively reliable and technical problems and delays are unlikely. Minimal coordination is needed for the administration of these actions, and all services, materials, and equipment are readily available. However, additional remedial actions may be necessary at a later date.

This alternative is more costly to implement than the two previous alternatives and less costly than Alternative 4, which addresses the entire site. Significant costs are associated with clearing land and the cost of fill for covering areas of exposed waste.

9.6 ALTERNATIVE 4: COVER UTICA CITY DUMP

Installation of a cap and cover system is commonly performed during closure of municipal landfill sites. Requirements for landfill closure and the installation of a cover are regulated according to NYCRR part 360. When the Utica City Dump ceased normal operation in 1972, proper closure requirements were not met. One alternative is to close the site according to the requirements of the NYCRR Part 360 as they existed in 1972 when the facility stopped accepting waste (Alternative 4a). Another option is to close the site according to the current (1999) NYCRR Part 360 requirements (Alternatives 4b and 4c). Any alternatives that include closing the dump without meeting current Part 360 requirements would be required to obtain a Part 360 waiver.

The degree to which this proposed cap would reduce the risk associated with the ecological receptors inhabiting or feeding from the waterbodies adjacent to the site depends on the degree to which the cap reduces contaminant migration into these waterbodies. The cap in Alternative 4a is expected to reduce surface water infiltration and leachate production somewhat, thereby

possibly reducing the risk to fish and aquatic-feeding receptors. The caps proposed under Alternatives 4b and 4c will significantly reduce leachate production and are therefore expected to reduce the risk to fish and aquatic-feeding receptors better than the cap proposed under Alternative 4a.

With each of the landfill cover options discussed below, short-term risks to the community include trucking activities, potential dust generation and habitat disruption during construction. Again, the long-term benefits associated with this remedy far outweigh the short-term impact. Engineering controls will be utilized to mitigate this impact whenever possible, such as minimizing construction in wetlands, reducing vegetation and habitat destruction when possible, controlling fugitive dust, and controlling stormwater runoff.

With regard to habitat-related impacts of the proposed landfill cap under this alternative, covering the areas of exposed waste would result in both short-term and long-term loss of habitat and negative effects on ecological communities inhabiting approximately 116 to 132 acres of disturbed habitat. This would result in both the short-term and long-term loss of habitat and resulting negative effects on ecological communities. The land involved would be planted and managed as a grassland community, representing a complete change from forested communities, but less of a change from successional old field and landfill/dump. About 85.50 acres of successional southern hardwoods and 5.36 acres of floodplain forest, will be removed (long-term loss). Because there are similar areas of successional southern hardwoods and floodplain forests adjacent to the site, the area will continue to provide habitat for wildlife that prefer these habitats.

With plantings and management, the environment will be enhanced through the removal and/or isolation of contaminants and debris. The resulting grassland community will provide habitat for grassland species, including some threatened, endangered, and special concern species. Wildlife that prefers edge (forests-fields) including deer, fox, rabbit, red-tailed hawks, etc. will also benefit by the creation of grassland habitat. It will take one to two years to establish field habitats that would provide the wildlife benefits currently provided by the existing old field habitats on-site. The eventual use of this habitat by grassland species will be gradual, taking several years for grassland species to discover and occupy the newly created habitat. The disturbance in the floodplain forest and shallow emergent marsh habitats will require wetland permits and if possible should be returned to the same habitat type once construction is completed. Construction methods will utilize techniques that reduce the damage to the habitat.

Landfill cover remedies will take less than two years to implement, but operation and maintenance will need to continue for at least 30 years. Additional remediation may be required to address leachate collection and treatment if contaminated leachate seeps continue to persist after closure construction is complete.

9.6.1 Alternative 4a: 1972 Part 360 Cover

Under the 1972 NYCRR Part 360 regulations, landfill closures are to be constructed using two feet of a "suitable cover material" that can support vegetation. This option is being explored because it is the applicable regulation that was in place at the time that the Utica City Dump ceased normal operation, and it describes the procedure that should have occurred at that time.

Installing a cover system will reduce leachate generation rates and consequently, the potential for groundwater contamination will be reduced. The 1972 landfill ARARs will be met but the current action specific standards in NYCRR Part 360 are not met. Location specific ARARs involving wetlands and floodplain protection will be met.

The 1972 cover alternative involves more extensive construction than the previous alternatives due to the large irregular nature of the site and the degree of vegetation that will need to be removed. Uncertainties include the possible presence of unknown waste materials including possible drums or tanks that may be uncovered during construction, the stability of the landfill surface for placing the soil cover, the potential for landfill gas generation, and the possibility of site flooding.

The technology is somewhat reliable in meeting remedial goals. Technical problems could delay the construction schedule, and additional remedies may need to be applied at a later date. Necessary administrative coordination is minimal and services, materials, and equipment are readily available.

This alternative is relatively costly compared with the other alternatives. However it is less costly than the alternatives that fulfill the current landfill closure requirements. Significant factors contributing to cost include clearing the land, the fill material to be used, revegetation, and the construction of the remedy itself.

9.6.2 Alternative 4b: Part 360 Geomembrane Cover to Meet Current Regulations

This alternative fully meets the action specific ARARs, as it is designed according to the most recent landfill closure standards (NYCRR Part 360 Regulations). Location specific ARARs are also met under this alternative.

This alternative is somewhat difficult to construct because of the technical requirements of installing a multi-layer cap and cover system that includes an HDPE geomembrane across the site. Uncertainties for this alternative are similar to those identified for the 1972-cover alternative. The technology is very reliable in meeting remedial goals. The administration of this alternative should be very feasible, and all necessary equipment, services, and materials are readily available.

Because installation of an HDPE geomembrane is a specialty service, requiring special equipment to properly install the geomembrane according to manufacturer instructions, most general contractors must subcontract for the installation services. This alternative therefore, is not as readily available within the local construction services market as construction of a clay cap (see section 9.6.3), which uses commonly available earthmoving equipment.

This alternative is more costly than the other alternatives. Most of this cost can be attributed to clearing land, materials, and the construction of the multi-layer landfill cap and cover system. Potential cost reductions from using low cost fill materials, eliminating the landfill gas collection system, or addressing a limited area of the site are presented in Section 10.4, Cost Sensitivity Analysis.

The standard landfill design required by NYSCRR 6 Part 360 includes a system for discharge and possible collection of landfill gas from beneath the multi-layer landfill cover. A landfill gas survey must be performed in order to design the collection system. A gas survey and Part 360 waiver are also necessary if those designing the landfill cap believe that a landfill gas collection system is not necessary. Landfill gas created by the degradation of wastes is also dispersed naturally in the absence of a cap and gas collection system. The wastes in the Utica dump have had almost thirty years to degrade and release gas, and have not had significant cover in place to collect or restrict release of gas produced. For this reason, a landfill gas collection system may not be necessary if a landfill cap and cover system are installed at the Utica site.

Results from the March, 2000 landfill gas survey show that methane gas is only present in the eastern portion of the site, and only in low concentrations. In order to vent the gas from these locations, if necessary, point vents could be used. This would significantly reduce the costs from those used in the cost estimates of the alternatives that meet current Part 360 requirements. Part 360 requires a gas venting layer across the whole site, although the City could apply for a waiver to replace the venting layer with point vents. Point vents would be an effective means of releasing gas from localized areas. If a landfill gas collection system is not necessary, the costs of Alternatives 4b and 4c will be reduced as shown in the Cost Sensitivity Analysis in Section 10.

9.6.3 Alternative 4c: Part 360 Clay Cover to Meet Current Regulations

This alternative also meets the action specific ARARs, as it is an alternative design that meets the current 6 NYCRR Part 360 landfill closure standards. The only difference is the use of an 18-inch thick low-permeability clay layer in place of the 60-mil HDPE geomembrane.

Estimates show that this alternative could be slightly less costly than Alternative 4b, but both alternatives are significantly more costly than the other alternatives which were previously discussed. Again, cost for this alternative would be reduced if a site-wide landfill gas collection system is not necessary, if low cost fill materials are available, or if the cap and cover system addresses a limited area of the site (See Cost Sensitivity Analysis in Section 10.4). The cost of clay soil depends on the haul distance to the site. Haul distances greater than 8 to 10 miles typically result in the use of geomembrane (Alternative 4b) being less costly than the use of clay.

Because clay cap construction is performed using common earthwork equipment, local contractors should have the ability to perform the work. As a result, construction services should be more readily available in the local market than with Alternative 4b, geomembrane cap.

9.7 ALTERNATIVE 5: LEACHATE COLLECTION AND TREATMENT

The proposed leachate collection systems include installation of a collection trench or collection sumps along the northeast and east side of the site where contaminated leachate seeps have been observed intermittently during wet seasons of the year. If necessary, this alternative may be implemented as part of one of the remedial action alternatives listed above.

Although the collection, treatment, and disposal of leachate is not expected to significantly reduce the risk posed to ecological receptors in the terrestrial portion of the site (discussed under

Alternative 1 above), this action would be expected to reduce the migration of contaminants from the site into the adjacent waterbodies. Therefore, the contaminant-related risk to ecological receptors inhabiting and feeding from the waterbodies adjacent to the site is expected to decrease if this action is taken. This is particularly true for the metals that were calculated to pose a risk to aquatic-feeding receptors and that were found at high levels in the leachate samples collected from the site. Such metals include aluminum, cobalt, copper, lead, and zinc. DDT (including 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD) was also calculated to pose a risk to piscivorous birds and was detected at high concentrations in the leachate samples collected from the site. Therefore, collecting, treating, and disposing of leachate in and around the landfill would be expected to decrease the risk posed by metals and total DDT to aquatic receptors at or near the site.

In this alternative, contaminated leachate and groundwater is collected and routed to the POTW or to an onsite CWTS. Therefore, leachate is no longer present as a seep at ground surface and the exposure pathway is removed. Collected leachate is no longer a threat to adjacent wetlands or surface water bodies. This alternative meets the action specific and location specific ARARs associated with leachate management. This alternative poses few short-term risks to the community or to the environment. It can be implemented in less than two years, and unlike the other alternatives, this alternative involves permanent treatment of the contaminants associated with the collected leachate.

To capture the leachate on the northeast and east sides of the Utica City Dump a passive collection trench or leachate collection sumps would be used. The trench would consist of an excavated drainage trench with a slotted drainpipe installed in the bottom of the trench and gravel backfill above the pipe. Figure 8-11 shows a cross-section of a typical collection trench.

Four different alternatives for leachate collection and treatment follow.

5a. Discharge Leachate to the Offsite Publicly Owned Treatment Works (POTW)
5b. Store Leachate in Onsite Tanks and Haul to the POTW
5c. Onsite Constructed Wetlands Treatment System (CWTS)
5d. Leachate Collection Sumps

Alternatives 5a through 5c involve a leachate collection trench while Alternative 5d includes leachate collection sumps at the seep locations with discharge similar to Alternatives 5a, 5b, or 5c. The following is a brief description of each alternative.

9.7.1 Alternative 5a: Discharge to Offsite POTW

This alternative involves discharging leachate to the offsite POTW located approximately 0.5 miles from the site. The existing gravity sewer line that crosses the site is approximately 24 ft deep at the manhole near the abandoned pump station. Therefore, it is possible for collected leachate to flow by gravity to this sewer.

Use of gravity flow will avoid the costs associated with construction and operation of a pumping station. However, gravity flow requires excavating a trench approximately 24 feet deep for the sewer line installation. This trench excavation may require excavating through waste and contaminated leachate and soil. Excavated materials including contaminated soil, waste, and debris, will require proper handling and disposal. Proper worker health and safety procedures including respiratory protection and use of personnel protective equipment (PPE) will be required for excavating through areas of past waste disposal.

Because this alternative avoids constructing and operating a pumping station, it is less costly than the other leachate treatment alternatives. The primary costs of this alternative are associated with construction of the leachate collection trench and discharge sewer line. However, costs will increase significantly if the excavation passes through areas where contaminated soils are found to be hazardous wastes. In this event, using a pump station and force main to avoid excavating hazardous wastes may be desired.

9.7.2 Alternative 5b: Store leachate in onsite tanks and haul to the POTW

Under this alternative, the collected leachate would be pumped to storage tanks and subsequently hauled to the offsite POTW. This alternative avoids construction of a gravity sewer line. However, construction and operation of a pump station and storage tank is required. Maintenance costs include hauling leachate over a long period of time. Short and long term risks to the public are somewhat higher for this alternative because of the increased vehicle traffic associated with the trucking activity that will occur over a long period of time. The frequency of hauling will depend on the volume of leachate collected, which depends on the type, and extent of cap implemented, extent of the collection system, and the amount of rainfall at the site. Because of the long term costs associated with hauling, current estimates show this to be the most costly of the leachate collection and treatment options.

9.7.3 Alternative 5c: Constructed Wetlands Treatment System (CWTS)

The CWTS meets the chemical-specific ARARs associated with constituents in leachate. Leachate will be collected and treated, reducing contaminant sources to groundwater and surface water.

With proper maintenance, the life span of this remedial action is 25-30 years. Moderate long term monitoring is required, and operation and maintenance will be necessary for an indefinite period.

The CWTS is considered easy to construct, with few uncertainties. The necessary technologies, equipment, and services are readily available in the local construction services market. The technology is reliable in meeting the remedial goals, and technical problems resulting in delays are unlikely. Potential operational uncertainties include the ability for the system to continually meet SPDES discharge permit limits and the possibility for short-circuiting through the system or for iron fouling. This alternative would require some administrative coordination with other agencies including the US Army Corps of Engineers and the US Fish and Wildlife Service.

The area proposed for the CWTS is in a wetland area. A permit will be required for the CWTS to be built in a federal wetland area and mitigation of wetlands will be required. Mitigation efforts may require construction of additional wetland areas to offset the area impacted by construction activities.

Cost estimates for this alternative show that it is more costly than Alternatives 5a and 5d, but less costly than storing and hauling the leachate offsite.

9.7.4 Alternative 5d: Leachate Collection Sumps

This alternative is similar to the alternatives presented above except that leachate collection sumps would be installed instead of a more extensive leachate collection trench. The sumps would be located near the observed leachate seeps. Since the sumps are limited in length and area served, the quantity of leachate collected would be less than with a collection trench. Therefore, the sumps may be less effective than a trench, but the objective of removing and treating the seeps would be accomplished.

Collecting less leachate will require less hauling and less area for a CWTS. Therefore, although the sumps may be less effective than a collection trench, overall costs associated with leachate treatment are reduced if this alternative is selected.

9.8 ALTERNATIVE 6: LIMITED SEDIMENT REMOVAL

Limited sediment removal is described in Section 8.6 and includes the removal of sediments along the riverbank on the northern edge of the Mohawk River at the southeast corner of the landfill. The sediment removal would extend from approximately sampling location SED-5 to SED-8 (see Figure 8-17).

The primary purpose of this removal action is the protection of fish and wildlife. PCBs were detected in every sediment sample around the perimeter of the landfill except SED-8, indicating a regional PCBs contamination problem. Documented sources of PCBs contamination are located upstream of the landfill, and a fish advisory was issued for the Mohawk River in a report by the New York State Department of Health entitled, *2000-2001 Health Advisories: Chemicals in Sportfish and Game*. In addition, concentrations of PCBs in upstream samples SED-4 and SED-11 exceed applicable guidance values. While evidence exists of regional PCBs contamination, concentrations of PCBs in sediments of the proposed removal area are elevated compared to the concentrations detected along the southern bank of the Mohawk River and upstream portions of the northern bank of the Mohawk River. Because hazardous wastes were disposed in the eastern portion of the landfill, this area may have contributed to the elevated levels of PCBs detected in the proposed removal area.

Therefore, removal of sediments from this limited area is included as a remedial alternative to eliminate an ongoing source of PCBs to fish and wildlife. This alternative is protective of wildlife and the environment and addresses the RAO of eliminating, to the extent practicable, the exposure of fish and wildlife to levels of PCBs above standards/guidance values.

Excavated sediments will be tested to determine if they are hazardous wastes or if they meet the definition of PCB-contaminated wastes (i.e., greater than 50 ppm total PCBs). If hazardous or determined to be PCB-contaminated wastes, the sediments will be disposed offsite. Non-hazardous sediments will be placed within the landfill and covered with 2 feet of clean soil. Action specific ARARs will be met during the implementation of this remedy. Spoils will be dried, as necessary, for transport offsite or to the landfill.

Short-term risks include health risks to workers during the excavation, transportation, and drying of the sediment spoils. These risks can be controlled and minimized through the use of engineering controls. Construction is anticipated to take several months.

Habitat related impacts include disturbance of habitats on the riverbanks and bottom during excavation. This disturbance is temporary, and any short-term risks are outweighed by the long-term benefits of removing the PCBs contamination from this habitat. Risks will also be mitigated through the use of engineering controls, such as silt curtains, to prevent the migration of contaminated silt downstream during excavation. The removed sediments will be replaced with clean silty sand.

The sediment removal alternative is technically feasible and has few uncertainties in construction. Equipment used for this alternative is reliable, and technical problems and delays are unlikely. By limiting the sediment removal to a shore-based technique, costs are minimized while still achieving the RAO.

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a comparative analysis of relative performance of each alternative in relation to each of the seven specific evaluation criterion. This analysis is in contrast to the preceding analysis in Section 9 in which each alternative was analyzed independently without the consideration of interrelationships between alternatives. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key trade-offs may be identified and evaluated.

The first five criteria (short term effectiveness; long term effectiveness, and permanence; reduction of toxicity, mobility, and volume; implementability; and cost) require more discussion than the remaining criteria because the key trade-offs or concerns among alternatives relate to one or more of these five. The overall protectiveness and compliance with SCGs criteria serve as threshold determinations in that they either will or will not be met.

Community preference has not been evaluated during the RI/FS because such information is not yet available. Community preference will be addressed more throroughly once comments on the RI/FS report and the Proposed Remedial Action Plan (PRAP) have been received and a final remedy selection decision is made.

The comparative analysis includes a narrative discussion describing the strengths and weaknesses of the alternatives relative to one another with respect to each criterion. Variations of key uncertainties that could change the expectations of their relative performance are also discussed.

Differences between alternatives are measured either qualitatively or quantitatively, as appropriate, and substantive differences between alternatives (e.g. greater short term effectiveness concerns, greater cost, differences in total scores, etc.) are identified. Quantitative information that was used to assess the alternatives (e.g. specific cost estimates, time until response objectives would be obtained and levels of residual contamination) are included in these discussions.

The scores for each alternative for each criteria evaluated are shown on Table 10-1. Detailed analysis of individual criteria are presented in Appendix J.

Table 10-1:
Summary of Detailed Evaluation of Alternatives Criteria

Alternative	Table J-1 ARAR Compliance	Table J-2 Protection of Human Health and the Environment	Table J-3 Short-Term Effectiveness	Table J-4 Long-Term Effectiveness and Performance	Table J-5 Reduction of Toxicity, Mobility or Volume	Table J-6 Implement ability	Cost Score	Cost Rank*	TOTAL	Total Rank
Maximum Score:	10	20	10	15	15	15	15		100	
Alternative 1 - No Action	0	8	6	3	0	11	15	1	43	5
Alternative 2 - Institutional Controls	0	8	6	3	0	11	14	2	42	6
Alternative 3 - Limited Actions	4	20	9	5	2	13	9	3	62	1
Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	5	20	9	5	2	11	4	4	56	4
Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	6	20	9	7	3	13	1	6	59	3
Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	6	20	9	7	3	13	2	5	60	2
Alternatives 5 and 6 could be implemented in combination with any of Alternatives 1-4:										
Leachate Collection and Treatment										
(used in conjunction with any of the above alternatives)										
Alternative 5a - Discharge Leachate to Offsite POTW	6	18	9	8	10	15	12	1	78	1
Alternative 5b - Store/Haul Leachate to Offsite POTW	6	18	9	8	10	15	6	4	72	4
Alternative 5c - Leachate Treatment via Wetlands	6	18	9	10	9	13	7	3	72	3
Alternative 5d - Leachate Collection Sumps	6	18	9	8	10	15	10	2	76	2
Alternative 6 - Limited Sediment Removal	8	18	9	7	3	13	13	-	71	-

Note: Refer to Tables in Appendix J for evaluation of each criteria.

* the lowest cost alternatives received the lowest rank

10.1 COMPLIANCE WITH ARARS

Table J-1 summarizes ARAR compliance of each alternative. Alternatives focus on waste material isolation and containment. As such, the chemical specific ARARs that are exceeded for several constituents of concern (see Section 4) are not met. The No Action and Institutional Controls alternatives do not meet action specific ARARs for landfill closure. However, the potential for human exposure to soil contaminants and exposed wastes can be reduced by implementing the institutional controls alternative. The cap and cover systems implemented under alternatives 3 and 4 will reduce infiltration and control leachate production. Therefore, the rate that landfill leachate enters groundwater will be reduced. This could eventually result in groundwater ARARs being met. Alternative 6 involves removal of contaminated sediments from the Mohawk River, which would contribute to compliance with surface water and sediment ARARs. However, chemical-specific ARARs may not be met, because the presence of regional PCBs contamination would prohibit removal to achieve the standards/guidance values.

Alternative 3 provides a 2 ft soil cover over the portion of the site where exposed waste materials are prevalent, where contaminated leachate seeps exist, and where more significant impact to groundwater has occurred. This meets the closure standard of 1972, when the facility ceased normal operation. Alternative 3 provides for disposal of exposed drums, tanks and other debris.

Under Alternative 3, the area west of the hardfill area will not be covered. However, this area does not contain significant areas of exposed waste and groundwater contaminants appear to be less prevalent. The only monitoring well installed in this western potion of the site, well CHA-6S, contained benzene and cholorbenzene at concentrations exceeding the TOGS standard by a factor of 3. Because ground water is not used as a source of drinking water in this area and because exposed wastes are not prevalent on the western portion of the site, it may be appropriate to limit the cover for Alternative 3 to the eastern portion of the site. Historically, only the eastern portion of the site received hazardous waste for disposal. Alternative 3 also provides for demolition of structures, and removal and institutional controls including a fence to control site access.

Alternative 4a provides a cap and cover system that covers the entire site. It also meets the closure standard of 1972. This alternative meets ARARs more completely than alternative 3 because it covers the entire site including the western portion where, although exposed wastes are not as prevalent, additional cover will provide additional waste containment. Alternatives 4b and 4c meet the current landfill closure standards, which consist of a multilayer cap. Current

landfill closure standards are more protective of human health and the environment than the 1972 closure standard, because waste materials are better contained and infiltration and subsequent leachate generation is greatly reduced.

Alternatives 5a-5d provide collection and treatment of leachate seeps. They would be designed to collect leachate so that it no longer appears as a seep at ground surface. In contrast, Alternative 3 provides over-excavation and backfill of the leachate seep areas. This will also remove the presence of the leachate seep at ground surface, but will not provide leachate collection and treatment. Alternative 6 provides removal of contamination from the river bottom that may have resulted from leachate from the landfill.

10.2 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Criteria to evaluate protection of human health and the environment are summarized on Table J-2. None of the alternatives reduce all health risks to the extent that unrestricted use of the site would be feasible after remediation. In addition, the site will not be appropriate for providing sound structural foundation for buildings or other structures due to the probability of settlement as wastes degrade. Under alternatives 4a, 4b, and 4c the site could possibly be used for a parking lot, golf driving range, nature area, or recreational area.

Under each remedial alternative, there is little potential for human exposure to contaminants via air, except for potential organic vapor emissions and fugitive dust during construction. This would be controlled through applied engineering controls. Human exposure to hazards posed by exposed waste material, contaminated groundwater, surface water, and soil is a concern under the no action and institutional controls alternatives. Based on RI sampling results, surface soil contaminants exceed screening standards at several locations across the site, and leachate seeps at the surface pose a continued health risk. Direct exposure via contact with exposed waste is reduced under Alternatives 3 through 4c. Exposure to contaminated leachate is reduced under Alternatives 5a-5d. There is currently not a significant human health exposure associated with contaminated sediments. However, aquatic fish and wildlife are likely exposed to and affected by this contamination. The removal of sediments and replacement with clean soils, under Alternative 6, would result in an increased protection of aquatic life and the environment.

10.3 SHORT TERM EFFECTIVENESS

The short term effectiveness of each alternative is summarized on Table J-3. Alternatives 3-6 involve some short term risks to the community. Implementation of each alternative (except the No Action alternative) involves short term risks to human health and the environment. However, the long term benefits of the remedial actions outweigh the short term risks. In addition, actions can be taken to mitigate the short term risks.

These risks result from trucking activities associated with construction. This trucking can result in fugitive dust generation, and increased traffic through the community. However, engineering controls can be applied to reduce the production of dust, and to reduce traffic hazards. These short term risks are outweighed by the long term benefit of implementing any of the landfill closure, leachate treatment, or sediment removal alternatives (Alternatives 3-6).

During any alternative's implementation, hazards to human health may be posed by exposed waste, leachate, and sediment. These hazards have existed since 1972, and fencing has provided a partial access restriction during that time. Public access controls and good engineering practices during construction will limit risk to public. Short term risks are also posed to animals and waterfowl through exposure to hazardous substances in soil and leachate during construction. Again, these risks have existed since at least 1972. The long term benefits of implementing the remedies outweighs this short term risk.

Installation of the cap and cover system as part of Alternatives 3-5 will require substantial clearing of trees and vegetation across the site, which will temporarily disrupt animal habitat during the construction. However, Alternatives 3 through 5 have the long-term benefit of reducing the potential for exposure of humans and wildlife to contaminants from leachate seeps and surface soil. Alternative 6 will also disrupt habitat during construction, but has the long term benefit of reducing the potential for exposure of wildlife to contaminants. Alternatives 1 and 2 do not have the short-term risk of habitat disruption, but do not have the long term benefit of reducing human and wildlife exposure to contaminants.

Alternatives 1 and 2 would be implemented within one year. The time required to implement Alternatives 3-6 is less than 2 years.

10.4 LONG TERM EFFECTIVENESS

Long term effectiveness is measured by permanence of the remedy, the lifetime of the remedy, and its adequacy and reliability. While none of the presented alternatives are considered permanent, alternatives 4 and 5 are considered to have the longest lifetime, of about 30 years. Alternatives 4b, 4c, and 5 are also considered to be more adequate and reliable, followed by alternatives 3 and 4a. Alternatives 1 and 2 are not considered generally reliable or adequate because of the hazards posed by exposed waste and surficial contaminants.

Long term effectiveness of each alternative is summarized on Table J-4. Alternatives 1 and 2 have the shortest lifetime, at less than 15 years. After this time, an evaluation for further remedial action would be necessary. Alternatives 3 and 4a have expected lifetimes at 15-20 years, and alternatives 4b, 4c, 5a, 5b, 5c, and 5d have an expected lifetime of 25-30 years. All alternatives rely upon onsite land disposal, which is appropriate for the site. However, onsite disposal and landfill closure is not considered a permanent remedy under CERCLA.

The majority of wastes disposed of at the site were municipal solid waste. However, records indicate that there has been some historical disposal of industrial and electroplating wastes, primarily in the eastern portion of the site. These are considered hazardous, or potentially hazardous wastes under current regulations. As a percentage of all materials landfilled at the site, the percentage of hazardous waste is thought to be much less than 25%, and perhaps less than 5%. Records were not kept on the exact locations of industrial and hazardous waste disposal and it is not possible to locate and segregate the hazardous portions for permanent treatment and disposal. For these reasons, hazardous wastes will remain at the site.

Long term effectiveness can be measured by examining the adequacy of each alternative. Alternative 1 is inadequate for meeting remedial action goals. Alternative 2, institutional controls, is adequate for reducing the potential for human contact with contaminants. It is not adequate for reducing wildlife exposure to contaminated soil and leachate. Alternative 3 is adequate for reducing both potential wildlife and human exposure. It also provides for covering exposed waste and reducing leachate seeps. Alternative 4 is adequate for reducing human and wildlife exposure to waste, and for providing additional cover of wastes across the entire site. Alternative 5 is adequate for reducing the potential for human and wildlife exposure to contaminated leachate.

Reliability is another characteristic that can measure the long term effectiveness of a remedial action. A reliable alternative performs its function with reduced long term oversight and maintenance. Long term operation and maintenance (for five years or more) is required for all alternatives.

Institutional controls could reliably perform their function of reducing the potential for human contact, but would need annual repairs and inspections. Alternative 3, limited actions, and alternative 4a, covering the entire site, would be reliable, provided that routine maintenance and inspections are performed. The capped portions would need to be checked for erosion and subsidence. Fencing would need to be inspected for holes or breeches. Mowing will be required at least two times per year and seeding will be required to maintain vegetation cover for any bare areas.

Alternatives 4b and 4c would be the most reliable, if designed and constructed according to sound engineering practice for landfill closure. Proper design of the landfill cap and cover systems of alternatives 4b and 4c is critical for their reliability. Design must include adequate drainage to avoid erosion and slope failure of masses of cover material. The various layers of the multilayer cap must also demonstrate structural stability. Necessary material thickness and transmissivity, slope angles and slope lengths, must be carefully designed to allow rainfall and infiltration to be transmitted off of the cover without causing failure of the cover or drainage systems. Characteristics of geotextile materials used must also be carefully specified.

Long term monitoring at the site is required for all alternatives. Long term operation and maintenance activities are more involved for Alternative 4, the cap and cover systems, but are also required for Alternatives 2, 3 and 5a-5d.

Under Superfund, all remedial activities must undergo a 5-year review process subsequent to the passage of the Record of Decision (ROD). This requirement would apply to the site regardless of the remedial alternative implemented.

10.5 REDUCTION OF TOXICITY, MOBILITY AND VOLUME

Table J-5 summarizes reduction of toxicity, mobility, and volume of waste for each alternative. Because waste is left in place, volume and toxicity of wastes are not reduced under Alternatives 1, 2, 3, and 4. Mobility of the hazardous waste is significantly reduced due to reduced infiltration under Alternatives 3 and 4. Leachate treatment, proposed under alternatives 5a-5d,

reduces toxicity, mobility, and volume through use of various leachate collection and treatment technologies. Wetlands treatment (Alternative 5c) is particularly beneficial because it provides irreversible treatment using an onsite natural treatment system.

10.5.1 Leachate Production Estimates (HELP model results)

The Hydrologic Evaluation of Landfill Performance (HELP) model was used to evaluate the performance of each cover system proposed under the various alternatives for comparative analysis purposes. HELP model output and a summary memo are included in Appendix K.

The cap proposed as part of the limited actions (Alternative 3) is estimated to cover 52 acres, and consist of a two foot cover of structural fill. The model predicted an average daily percolation through the capped area of approximately 28,200 gallons. Alternative 4a proposed the same type of cover, fulfilling 1972 regulations, but over a larger area, of 116 acres. This alternative resulted in an average daily percolation of approximately 63,000 gallons. Alternative 4b, consisting of the cover meeting current regulations was estimated to cover 132 acres and resulted in only 800 gallons of average daily percolation. The same cover, with a clay layer substituted for the geomembrane (Alternative 4c) allowed over 5,600 gallons of daily average percolation.

The limited action cover shows less percolation than the Alternative 4a cover simply because a much smaller cover area was evaluated. Obviously, the area not covered under Alternative 3 would produce more percolation than if covered as proposed under Alternative 4a.

The model shows that infiltration through the proposed clay cap is more than through an HDPE geomembrane liner. Both of these alternatives allow only a fraction of the percolation allowed by the 1972 cap and cover system.

10.5.2 Summary of Effectiveness and Reduction of Toxicity, Mobility and Volume

Leachate collection and treatment included in Alternative 5 would reduce the toxicity, mobility and volume of the leachate seeps. This is the only alternative that includes treatment. Mobility of the contaminants would be reduced under Alternatives 3 and 4, where reduced infiltration to the landfill due to the cap and cover system would result in decreased leachate production and mobility. Alternative 6 would reduce the mobility of contaminants by relocating contaminated sediments to the landfill and covering the sediments with clean soil. By removing the sediments,

contaminant transfer to surface water and subsequent migration would be reduced. Alternatives 1 and 2 do not reduce the toxicity, mobility, or volume of the constituents.

10.6 IMPLEMENTABILITY

Table J-6 summarizes the implementability analysis for each alternative. Ease of construction is a factor which sets the various alternatives apart. Alternative 1, no action, involves no construction, and by definition, is easy to implement. The institutional controls alternative involves the construction of a fence restricting access to the site. This is also considered easy to construct. Schedule delays due to technical problems are not likely to occur during the implementation of alternatives 1 or 2. However, alternatives 1 and 2 do not incorporate actions that will meet remedial goals. Future remedial actions may later be necessary if either of these alternatives is implemented.

The sediment removal alternative (Alternative 6) would involve limited clearing for construction of access points to the Mohawk River and for the transportation of wastes to the center of the dump. This construction would be less involved, less complex, and less likely to experience delays than construction associated with landfill closure. The landfill closure alternatives (3, 4a, 4b, and 4c) involve construction activities including clearing the land prior to construction. There are uncertainties with the extent of construction necessary given the quantities of material needed to cover the extent of waste for these landfill options. The likelihood of technical problems and schedule delays increases with construction complexity. The complex landfill designs of alternatives 4b and 4c would therefore be more difficult to implement than the other alternatives. However, the technologies used in Alternatives 4b and 4c are more reliable than those used in the other alternatives. Future remedial actions would not be anticipated if Alternatives 4b or 4c were implemented.

All alternatives are considered administratively feasible. However, the wetlands treatment alternative (5c) would require more effort to administer relative to the other alternatives. The wetlands treatment implementation would require coordination with the Department of Fish and Wildlife and the Army Corp of Engineers. In addition, a 404 permit for construction activities in wetlands and a SPDES permit for discharge of treated leachate to surface water would be necessary.

The availability of services, materials, and equipment may also affect the implementability of each alternative. It may be difficult to locally obtain contractors able to perform the technically

demanding task of multi-layer cap construction with the geomembrane layer (Alternative 4b). Basic earthmoving and clearing required by implementation of any of the other alternatives are readily available within the local market.

Alternatives 3, 4b, 4c and 5c are more difficult to construct, but are more effective than alternatives 1, 2, and 6. The highest scores for implementability are received by alternatives 5a, 5b, and 5d. They are not difficult to construct, are administratively simple, and incorporate reliable technologies that will meet remedial goals.

10.7 COST COMPARISON

Table 9-1 summarizes the comparative cost analysis. Capital and annual O&M costs are shown, and present worth values are calculated. The last column presents a ranking of the alternatives according to cost, with "1" being the lowest cost. Remedial alternatives are ranked separately from leachate collection and treatment alternatives.

The least costly alternative is Alternative 1, No Action, followed by Alternative 2, Institutional Controls at $0.55 million and $1.67 million respectively. Alternative 3, Limited Actions, and Alternative 4a, 1972 6 NYCRR Part 360 cover, have estimated total present worth of $6.5 million and $12.1 million respectively. The most costly alternatives are Alternatives 4b - Geomembrane Cap and Alternative 4c - Clay Cap, with estimated total present worth of $35.7 million and $32.7 million respectively. Capital and operating costs may be reduced significantly with consideration of several factors discussed in the sensitivity analysis presented below.

10.8 SENSITIVITY ANALYSIS

A cost sensitivity analysis was performed to calculate changes in cost resulting from changes in certain components of several alternatives. Cost estimate comparisons to consider the impact of reducing the cover area, eliminating the gas collection system and using low cost fill materials, are given in Table 10-2.

10.8.1 Landfill Area Reduced

One option examined was that of reducing the area covered by Alternatives 4b and 4c from 132 acres to 52 acres. Fifty-two acres is the area of the cover proposed as part of Alternative 3, Limited Actions. Reduction of Alternative 4b, Geomembrane Cap, to cover an area of 52 acres

Table 10-2
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Cost Sensitivity Analysis

1. Reduce Area Covered by Alternatives 4b and 4c from 132 Acres to 52 Acres:

Appendix Table	Case	Alternative	Total Capital Cost		Total Capital Cost Reduction	Annual O&M		PW of O&M Cost		Total PW Cost		Total PW Cost Reduction	Percent PW Cost Reduction
			132 Acres	52 Acres		132 Acres	52 Acres	132 Acres	52 Acres	132 Acres	52 Acres		
L-12	1a.	Alternative 4b, Geomembrane Cap	$33,766,722	$15,822,804	$17,943,918	$123,721	$97,711	$1,901,902	$1,502,063	$35,668,624	$17,324,867	$18,343,757	51%
L-13	1b.	Alternative 4c, Clay Cap	$30,914,583	$14,443,051	$16,471,532	$118,963	$95,840	$1,828,751	$1,473,303	$32,743,334	$15,916,355	$16,826,980	51%

2. Landfill Gas Collection System Not Required:

Appendix Table	Case	Alternative	Cover Area	Total Capital Cost		Total Capital Cost Reduction	Annual O&M		PW of O&M Cost		Total PW Cost		Total PW Cost Reduction	PW Cost Reduction
				With Gas Collection	Without Landfill Gas Collection		With Gas Collection	Without Landfill Gas Collection	With Gas Collection	Without Landfill Gas Collection	With Gas Collection	Without Landfill Gas Collection		
L-14	2a.	Alternative 4b, Geomembrane Cap	132 Acres	$33,766,722	$29,340,086	$4,426,635	$123,721	$116,828	$1,901,902	$1,795,933	$35,668,624	$31,136,019	$4,532,605	13%
L-15	2b.	Alternative 4c, Clay Cap	132 Acres	$30,914,583	$26,533,763	$4,380,820	$118,963	$113,023	$1,828,751	$1,737,438	$32,743,334	$28,271,201	$4,472,133	14%
L-16	2c.	Alternative 4b, Geomembrane Cap	52 Acres	$15,822,804	$13,469,487	$2,353,317	$97,711	$94,520	$1,502,063	$1,453,010	$17,324,867	$14,922,497	$2,402,370	14%
L-17	2d.	Alternative 4c, Clay Cap	52 Acres	$14,443,051	$12,365,302	$2,077,749	$95,840	$93,023	$1,473,303	$1,429,995	$15,916,355	$13,795,297	$2,121,058	13%

3. Use Locally Available Low Cost Fill Materials: (Gas Collection System Included in Alts 4a and 4b)

Appendix Table	Case	Alternative	Cover Area	Total Capital Cost		Total Capital Cost Reduction	Annual O&M		PW of O&M Cost		Total PW Cost		Total PW Cost Reduction	PW Cost Reduction
				$7.20/cy	$3.00/cy		$7.20/cy	$3.00/cy	$7.20/cy	$3.00/cy	$7.20/cy	$3.00/cy		
L-18	3a.	Alternative 3, Limited Actions	52 Acres	$5,433,096	$3,795,551	$1,637,545	$69,124	$65,403	$1,062,599	$1,005,408	$6,495,695	$4,800,958	$1,694,737	26%
L-19	3b.	Alternative 4a, 1972 Cover	116 Acres	$10,758,367	$8,339,839	$2,418,528	$88,675	$85,395	$1,363,149	$1,312,738	$12,121,517	$9,652,577	$2,468,940	20%
L-20	3c.	Alternative 4b, Geomembrane Cap	132 Acres	$33,766,722	$27,823,444	$5,943,278	$123,721	$114,772	$1,901,902	$1,764,320	$35,668,624	$29,587,764	$6,080,860	17%
L-21	3d.	Alternative 4c, Clay Cap	132 Acres	$30,914,583	$24,314,017	$6,600,566	$118,963	$110,013	$1,828,751	$1,691,169	$32,743,334	$26,005,186	$6,738,148	21%
L-22	3e.	Alternative 4b, Geomembrane Cap	52 Acres	$15,822,804	$12,451,980	$3,370,823	$97,711	$93,141	$1,502,063	$1,431,801	$17,324,867	$13,883,782	$3,441,085	20%
L-23	3f.	Alternative 4c, Clay Cap	52 Acres	$14,443,051	$11,072,228	$3,370,823	$95,840	$91,270	$1,473,303	$1,403,042	$15,916,355	$12,475,270	$3,441,085	22%

4. Reduce Area to 52 Acres, No Landfill Gas Collection, Use Locally Available Low Cost Fill Materials:

Appendix Table	Case	Alternative	Cover Area	Total Capital Cost		Total Capital Cost Reduction	Annual O&M		PW of O&M Cost		Total PW Cost		Total PW Cost Reduction	PW Cost Reduction
				Base Case	No Gas Collection, Low Cost Fill		Base Case	No Gas Collection, Low Cost Fill	Base Case	No Gas Collection, Low Cost Fill	Base Case	No Gas Collection, Low Cost Fill		
L-24	4a.	Alternative 4b, Geomembrane Cap	132Acres	$33,766,722	$22,739,520	$11,027,201	$123,721	$107,878	$1,901,902	$1,658,350	$35,668,624	$24,397,871	$11,270,753	32%
L-25	4b.	Alternative 4c, Clay Cap	132Acres	$30,914,583	$19,933,197	$10,981,386	$118,963	$104,073	$1,828,751	$1,599,855	$32,743,334	$21,533,053	$11,210,282	34%
L-26	4c.	Alternative 4b, Geomembrane Cap	52 Acres	$15,822,804	$10,098,663	$5,724,141	$97,711	$89,950	$1,502,063	$1,382,749	$17,324,867	$11,481,412	$5,843,455	34%
L-27	4d.	Alternative 4c, Clay Cap	52 Acres	$14,443,051	$8,994,479	$5,448,572	$95,840	$88,453	$1,473,303	$1,359,733	$15,916,355	$10,354,212	$5,562,142	35%

results in a total present worth cost of $17.3 million and a present worth cost reduction of 51%. Reduction of Alternative 4c to cover an area of 52 acres results in a total present worth cost of $15.9 million and a present worth cost reduction of 51%.

10.8.2 Gas Collection System Eliminated

The standard landfill design required by 6 NYSCRR Part 360 includes a system for discharge and possible collection of landfill gas from beneath the multi-layer landfill cover. The possibility of eliminating the landfill gas collection system was examined in the cost sensitivity analysis. With the landfill gas collection system eliminated, total present worth cost for Alternative 4b was $31.1 million, with a present worth cost reduction of 13%. Total present woth cost for Alternative 4c was $28.3 million, with a present worth cost reduction of 14%.

Another possibility is that the landfill covers a reduced area and does not require a gas collection system. This results in a total present worth cost for Alternative 4b of $14.9 million for the 52 acre case without the gas collection system. Total present worth cost for Alternative 4c was $13.8 million, with a present worth cost reduction of 13%.

10.8.3 Low Cost Fill Materials

Use of low cost or free clean fill materials may be an option that would result in a cost reduction for the landfill alternatives. Changes in capital cost and preset worth cost were calculated for Alternative 3 and 4a, as well as Alternatives 4b and 4c for the entire site and for the reduced area of 52 acres. For these 6 potential alternatives, the cost reductions achieved by using low cost fill materials is shown in the third block on Table 10-2. Total present worth cost reductions ranged from 17% to 48%.

10.8.4 Combinations of Changes

Of the above potential changes, several could be implemented in combination. The cost sensitivity analysis examines cost reduction for a elimination of the landfill gas collection system, use of low cost fill material, and coverage of a 52 acre area for Alternatives 4b and 4c. For the 52 acre case, this results in a total present worth cost of $11.5 million and a present worth cost reduction of 34% for Alternative 4b (a 67% reduction from the base case of 132 acres). For Alternative 4c, a total present worth cost of $10.3 million and a present worth cost reduction of 35% results (a 68.5% reduction from the base case of 132 acres).

The gas collection system could be eliminated and low cost fill is used for the original 132 acre coves in Alternatives 4b and 4c. This results in a total present worth cost of $24.4 million and a present worth cost reduction of 32% for Alternative 4b. For Alternative 4c, a total present worth cost of $21.5 million and a present worth cost reduction of 34% results.

This cost sensitivity analysis has shown that significant cost reductions may be achieved by reducing the area to be covered by the multi layer cap and cover system, eliminating the landfill gas collection system, and using low cost fill materials.

10.9 SUMMARY OF COMPARATIVE ANALYSIS

The outcome of the comparative analysis of alternatives is summarized in Table 10-1. Total scores for each of the evaluation criteria are shown for each alternative. The table in Appendix J that corresponds to the more detailed evaluation is referenced above the heading of each column. Scores can be compared to the maximum possible score at the top of the column.

In Table 10-1, the column showing cost score was developed based on the cost estimates shown on Table 9-1. The cost values were converted to a score ranging from 1 to 15. The least costly alternatives received the highest score. Cost scores were then ranked in three separate groups. The leachate collection and treatment alternatives were ranked against each other because one of them would most likely be used in conjunction with another alternative. Alternatives 1-4c were ranked as a group because only one will be implemented, at the exclusion of the others. Alternative 6 was not ranked because it would likely be combined with any of Alternatives 1-4c, but would not exclude the implementation of the Alternative 5.

The total overall score encompassing all criteria is included on Table 10-1. The last column shows the ranking of the alternatives based on this overall total score. Again, alternatives 5 and alternative 6 are ranked separately from alternatives 1-4c.

Overall scores for alternatives 1 through 4 ranged from 42 to 62. Alternative 3 received the highest score of 62, followed closely by Alternatives 4c and 4b with scores of 60 and 59 respectively.

For the leachate collection and treatment alternatives 5a-5d, scores ranged from 72 to 78. Alternative 5a, route leachate to the sanitary sewer that crosses the site, received the highest score. Alternative 6 received an overall score of 71.

11.0 RECOMMENDED ALTERNATIVE

This section presents the recommended alternative for remediation of the Utica City Dump. The recommended alternative will lead to preparation of the Proposed Remedial Action Plan (PRAP), public notice, and a local public comment period. The recommendation is based upon the preceding results presented in the Remedial Investigation, the detailed and comparative analysis of alternatives presented in Sections 9 and 10, and the rationale presented below.

The recommended alternatives for remediation at the Utica City Dump are a combination of Alternative 3 - Limited Action and Alternative 6 - Limited Sediment Removal. These alternatives are described in detail in Sections 8.3 and 8.6. They consists of the following actions:

- 1972 6 NYSCRR Part 360 Landfill Closure
- Waste Excavation and Placement
- Repair of Erosion Areas
- Overexcavation and Gravel Backfill for Leachate Seeps
- Demolition and Disposal of Onsite Structures
- Limited Fencing
- Deed Restrictions
- Monitoring
- Limited shore-based sediment removal

The combined total cost of implementing Alternative 3 and Alternative 6 is $6,910,000.

The landfill cap fulfills the requirements for landfill closure that existed in 1972. These requirements were in place when the Utica City Dump ceased normal operation, but were not implemented at that time. Exposed waste, including drums and tanks, that exist outside of the 52 acre area to be covered will be excavated and placed on the area to be covered. The eastern portion of the site, where hazardous wastes were disposed, will be covered, eliminating the surface soil route of human and wildlife exposure. Several structures on site will be demolished and also placed on the area to be covered. Areas of erosion will be repaired and maintained.

Leachate seeps observed at the time of landfill cap construction will be over-excavated and backfilled with gravel to prevent the seeps from coming to the surface where there is a potential for human or wildlife exposure. To limit site access, fencing will be installed along Leland

Avenue and will extend 500 feet along the northern and southern borders of the site. Deed restrictions will prevent improper use or development of the site. Continued periodic monitoring is necessary to evaluate the success of the remedy.

11.1 RATIONALE FOR RECOMMENDING ALTERNATIVES 3 AND 6

The presence of exposed waste, including drums and tanks, is considered unacceptable. Therefore, Alternative 1, No Action, and Alternative 2, Institutional Controls, do not provide adequate protection for hazards associated with exposed waste. Alternative 3, however, provides cover over the eastern, and southeastern portions of the site where exposed wastes are prevalent, and hazardous wastes were historically disposed. This removes the pathway of human and wildlife exposure via contaminated surface soil. Data show that groundwater in these areas is more significantly impacted by past disposal activities. Also, leachate seeps along the eastern border of the site will be addressed by over-excavation and backfill, which will prevent leachate from forming seeps at ground surface. Two feet of soil cover provided under Alternative 3 will cover the seep areas.

Under Alternative 3, the area west of the hardfill area will not be covered. However, this area does not contain significant areas of exposed waste and groundwater contamination appears to be less prevalent. Access to the western portion of the site (as well as other areas of the site) will be limited by constructing a fence along Leland Avenue and along the northern and southern borders and the western area of the site will continue to be monitored.

Providing cover over the entire site, including eastern and western portions, is proposed under Alternative 4a which is estimated to be approximately two times the cost of Alternative 3. Because exposed wastes do not appear to be prevalent in the western portion of the site, there is no historic evidence of hazardous waste disposal there, and groundwater is not significantly impacted, the additional cost of providing cover over the western area of the site does not seem warranted.

Alternative 3 meets the landfill closure standard of 1972 when the facility ceased normal operations. This proposed action is reliable, easy to implement, and is protective of human health and the environment over the short and long term. Providing two feet of soil cover over the eastern portion of the site will reduce the hazard posed by exposed waste materials in the area, and will reduce infiltration and subsequent leachate production thus reducing mobility of contaminants.

Current regulations for landfill closure require multi-layer cap and cover systems as proposed in Alternatives 4b, Geomembrane, and 4c, Clay Cap. These multi-layer cap systems provide more reliable containment of waste materials, at a cost that is approximately six times the cost of Alternative 3. Total present worth is estimated to be approximately $35.7 million for Alternative 4b versus $6.5 million for Alternative 3. The conditions found at the site, as characterized by sampling performed during the RI, do not warrant the substantially increased cost associated with a multi layer cap/cover system described under alternatives 4b and 4c. Based on the preceding discussions, Alternative 3, Limited Actions, seems to provide adequate, effective, and reliable protection for human health and the environment, at a reasonable cost.

Implementation of Alternative 6 in combination with Alternative 3, achieves reduction in the volume of contamination found in sediments of the Mohawk River. This reduction aims to reduce exposure of fish and wildlife to contaminants on the river banks and bottom. Shore-based removal of sediment is a permanent remedy that is reliable, relatively easy to implement, and cost effective.

Appendix J

TAGM Tables

Table J-1: Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidelines (SCGs)

(Maximum Score = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 6 - Limited Sediment Removal
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	Yes	4											
		No	0	0	0	0	0	0	0	0	0	0	0	2
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	Yes	3			1	2	3	3	3	3	3	3	3
		No	0	0	0									
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	Yes	3			3	3	3	3	3	3	3	3	3
		No	0	0	0									
	TOTAL (Maximum = 10)			***0***	***0***	***4***	***5***	***6***	***6***	***6***	***6***	***6***	***6***	***8***

Table J-2: Protection of Human Health and the Environment
(Maximum Score = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 6 - Limited Sediment Removal
1. Use of the site after remediation.	Unrestricted use of the land and water	Yes	20											
	(If answer is yes, to to the end of the Table.)	No	0	0	0	0	0	0	0	0		0	0	0
		TOTAL (Maximum = 20)		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	3	3	3	3	3	3	3	3	3	3	3	3
		No	0											
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	4			4	4	4	4	4	4	4	4	4
		No	0	0	0									
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	3			3	3	3	3	3	3	3	3	3
		No	0	0	0									
		Subtotal (maximum = 10)		**3**	**3**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
3. Magnitude of residual public health risks after the remediation.	i) Health risk	< 1 in 1,000,000	5			5	5	5	5	5	5	5	5	5
	ii) Health risk	< 1 in 100,000	2	2	2									
		Subtotal (maximum = 5)		**2**	**2**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
4. Magnitude of residual environmental risks after the remediation	i) Less than acceptable		5			5	5	5	5	3	3	3	3	3
	ii) Slightly greater than acceptable		3	3	3									
	iii) Significant risk still exists		0											
		Subtotal (maximum =5)		**3**	**3**	**5**	**5**	**5**	**5**	**3**	**3**	**3**	**3**	**3**
		TOTAL (maximum = 20)		***8***	***8***	***20***	***20***	***20***	***20***	***18***	***18***	***18***	***18***	***18***

Table J-3: Short Term Effectiveness
(Maximum Score = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 6 - Limited Sediment Removal
1. Protection of community during remedial actions.	Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes	0											
		No	4	4	4	4	4	4	4	4	4	4	4	4
	Can the risk be easily controlled?	Yes	1											
		No	0											
	Does the mitigative effort to control risk impact the community life-style?	Yes	0											
		No	2											
	Subtotal (maximum = 4)			4	4	4	4	4	4	4	4	4	4	4
2. Environmental Impacts	Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3)	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	4											
	Are the available mitigative measures reliable to minimize potential impacts?	Yes	3			3	3	3	3	3	3	3	3	3
		No	0	0	0									
	Subtotal (maximum =4)			0	0	3	3	3	3	3	3	3	3	3
3. Time to implement the remedy	What is the required time to implement the remedy?	< 2yr.	1	1	1	1	1	1	1	1	1	1	1	1
		>2yr.	0											
	Required duration of the mitigative effort to control short-term risk.	< 2yr.	1	1	1	1	1	1	1	1	1	1	1	1
		>2yr.	0											
	Subtotal (maximum =2)			2	2	2	2	2	2	2	2	2	2	2
	TOTAL (maximum = 10)			6	6	9	9	9	9	9	9	9	9	9

Table J-4: Long Term Effectiveness and Performance
(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 6 - Limited Sediment Removal
1. On-site or off-site treatment or land disposal	On-site treatment *		3									3		
	Off-site treatment *		1										1	
	On-site or off-site land disposal		0	0	0	0	0	0	0	1	1			0
	Subtotal (maximum = 3)			**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**3**	**1**	**0**
*treatment is defined as destruction or seperation/treatment or solidifaction/chemical fixation of inorganic wastes														
2. Permanence of the remedial alternative.	Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes	3											
		No	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal (maximum =3)			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
3. Lifetime of remedial actions.	Expected lifetime or duration of or effectiveness of the remedy.	25-30yr.	3					3	3	3	3	3	3	3
		20-25yr.	2											
		15-20yr.	1			1	1							
		<15yr.	0	0	0									
	Subtotal (maximum =3)			**0**	**0**	**1**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site	None	3											
		<25%	2	2	2	2	2	2	2	2	2	2	2	2
		25-50%	1											
		>50%	0											
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	2											
	iii) Is the treated residual toxic?	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	1											
	iv) Is the treated residual mobile?	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	1											
	Subtotal (maximum = 5)			**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
5. Adequacy and reliability of controls.	i)Operation and maintenance required for a a period of:	< 5yr.	1											
		> 5yr.	0	0	0	0	0	0	0	0	0	0	0	0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv")	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	1											
	iii) Degree of confidence that controls can adequately handle the potential problems	Moderate to very confident	1			1	1	1	1	1	1	1	1	1
		Somewhat to not confident	0	0	0									
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives)	Minimum	2											
		Moderate	1	1	1	1	1	1	1	1	1	1	1	1
		Extensive	0											
	Subtotal (maximum = 4)			**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
	TOTAL (maximum = 15)			***3***	***3***	***5***	***5***	***7***	***7***	***8***	***8***	***10***	***8***	***7***

Table J-5: Reduction of Toxicity, Mobility or Volume
(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembrane)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 5 - Limited Sediment Removal
1. Volume of hazardous waste reduced (reduction in volume or toxicity)	i) Quantity of hazardous waste destroyed or treated.	99-100%	8											
*If Factor 1 is not applicable, go to Factor 2.	Immobilization technologies do not score under Factor 1.	90-99%	7											
		80-90%	6											
		60-80%	4											
		40-60%	2							2	2	2	2	
		20-40%	1											
		< 20%	0											
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes	0	0	0	0	0	0	0	0	0	0	0	0
		No	2											
	Subtotal (maximum = 10)			**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**2**	**0**
If subtotal = 10, go to Factor 3														
	iii) After remediation, how is the untreated residual hazardous waste material disposed?	Off-site land disposal	0											
		On-site land disposal	1			1	1	1	1			1		1
		Off-site destruction or treatment	2							2	2		2	
2. Reduction in mobility hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment.	90-100%	2					2	2					2
		60-90%	1			1	1			0	0	0	0	
*If Factor 2 is not applicable, go to Factor 3		< 60%	0	0	0									
	ii) Method of Immobilization													
	-Reduced mobility by containment		0	0	0	0	0	0	0					0
	-Reduced mobility by alternative treatment technologies.		3							3	3	3	3	
	Subtotal (maximum = 5)			**0**	**0**	**2**	**2**	**3**	**3**	**5**	**5**	**4**	**5**	**3**
3. Irreversibility of the destruction of treatment or immobilization of hazardous waste.	Completely Irreversible		5											
	Irreversible for most of the hazardous waste constituents.		3							3	3	3	3	
	Irreversible for only some of the hazardous waste constituents		2											
	Reversible for most of the hazardous waste constituents.		0	0	0	0	0	0	0					
	Subtotal (maximum = 5)			**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**3**	**3**	**0**
	TOTAL (maximum = 15)			***0***	***0***	***2***	***2***	***3***	***3***	***10***	***10***	***8***	***10***	***3***

Table J-6: Implementability
(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3 - Limited Actions	Alternative 4a - 1972 Part 360 Cover Sanitary Landfill	Alternative 4b - Current Part 360 Cap/Cover Landfill (Geomembran e)	Alternative 4c - Current Part 360 Cap/Cover Landfill (Clay Cap)	Alternative 5a - Discharge Leachate to Offsite POTW	Alternative 5b - Store/Haul Leachate to Offsite POTW	Alternative 5c - Leachate Treatment via Wetlands	Alternative 5d - Leachate Collection Sumps	Alternative 6 - Limited Sediment Removal
1. Technical Feasibility														
a. Ability to construct technology	I) Not difficult to construct No uncertainties in construction.		3	3	3	3				3	3		3	3
	II) Somewhat difficult to construct. No uncertainties in construction.		2				2	2	2			2		
	III) Very difficult to construct and/or significant uncertainties in construction.		1											
b. Reliability of technology	i) Very reliable in meeting the specified process efficiencies or performance goals.		3					3	3	3	3	3	3	2
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.		2	0	0	2	2							
c. Schedule delays due to technical problems.	i) Unlikely		2	2	2	2				2	2	2	2	2
	ii) Somewhat likely		1				1	1	1					
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.		2					2	2	2	2	2	2	2
	ii) Some future remedial actions may be necessary.		1	1	1	1	1							
	Subtotal (maximum = 10)			**6**	**6**	**6**	**6**	**8**	**8**	**10**	**10**	**9**	**10**	**9**
2. Administrative Feasibility														
a. Coordination with other agencies.	i) Minimal coordination is required.		2	2	2	2	2	2	2	2	2	1	2	1
	ii) Required coordination is normal.		1											
	iii) Extensive coordination is required.		0											
	Subtotal (maximum = 2)			**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**
3. Availability of Services and Materials														
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes	1	1	1	1	1	1	1	1	1	1	1	1
		No	0											
	ii) Will more than one vendor be available to provide a competitive bid?	Yes	1	1	1	1	1	1	1	1	1	1	1	1
		No	0											
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes	1	1	1	1	1	1	1	1	1	1	1	1
		No	0											
	Subtotal (maximum = 3)			**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
	TOTAL (maximum = 15)			***11***	***11***	***13***	***11***	***13***	***13***	***15***	***15***	***13***	***15***	***13***

Appendix K

Help Model Results

INTER-OFFICE CORRESPONDENCE

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS, SURVEYORS, PLANNERS & LANDSCAPE ARCHITECTS

Date: February 18, 2000

To: Mark Corey

From: David Arthur

Subject: **UTICA CITY LANDFILL – PROJECT # 6832.07.14**

Four (4) different cover systems for the Utica City Landfill were evaluated to determine the "Average Yearly Percolation" and "Average Daily Percolation" from the bottom of the waste. The Hydrologic Evaluation of Landfill Performance (HELP) Model Version 3 was utilized to determine each cover systems performance. The cover systems used are as follows:

A. Landfill area of 52 acres. Cover system consists of one (1) layer of common earth (structural fill) two feet thick. The permeability of the structural fill is 3.3×10^{-5} cm/sec.

B. Landfill area of 116 acres. Cover system consists of one (1) layer of common earth (structural fill) two feet thick. The permeability of the structural fill is 3.3×10^{-5} cm/sec.

C. Landfill area of 132 acres. Cover system consists of five (5) layers in order as follows:
   1. Topsoil layer six inches thick.
   2. Barrier protection soil 12 inches thick with a permeability of 1.2×10^{-4} cm/sec.
   3. Geocomposite material (lateral drainage) layer.
   4. 60 mil HDPE geomembrane.
   5. Select granular material (gas venting material) 12 inches thick with a permeability of 3.1×10^{-3} cm/sec.

D. Landfill area of 132 acres. Cover system consists of five (5) layers in the same order as the above (C) system except layer number four is a barrier soil eighteen inches thick instead of a 60 mil HDPE geomembrane. The permeability of the barrier soil is 1×10^{-7} cm/sec.

Each different cover system was modeled with a 12-foot layer of underlying municipal soil waste. The maximum drainage slope used was 1,500 ft. at a slope of five percent. All pertinent weather data was generated by the HELP Model using the Syracuse, NY weather station.

Thirty years of data was generated for each of the three cover systems. The results are shown in the following table:

Table 1: Utica City Landfill Cover System Evaluation

Cover System	Average Yearly Percolation	Average Daily Percolation
A	10,306,193 gallons	28,236 gallons
B	22,990,733 gallons	62,988 gallons
C	292,793 gallons	802 gallons
D	2,054,708 gallons	5,629 gallons

Appendix L

Cost Estimates

Table L-1
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 1: No Action

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Total Capital Costs				***$ -***
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Total Annual Cost				***$ 35,700***
Assumptions:				
Inflation Rate for Calculations	5.0%			
Number of Years	30			
Present Worth O&M				***$ 548,797***
TOTAL PRESENT WORTH				***$ 548,797***

Table L-2
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 2: Institutional Controls

Cost Categories	Unit Price	Unit	Quantity		Cost
Capital Costs					
Fence, chain link industrial, schedule 40, 8' high, 6 ga. wire	$ 30.50	LF	14500	$	442,250
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	2	$	4,550
Clear & grub dense brush including stumps	$ 5,700.00	ACRE	6	$	34,200
Cut & chip medium trees -12" diam.	$ 4,250.00	ACRE	14	$	59,500
Engineering Consulting Services - Survey	$25,000.00	LS	1	$	25,000
Legal & Administrative	$10,000.00	LS	1	$	10,000
Total Capital Costs				***$***	***575,500***
Operation & Maintenance					
Annual Sampling of Groundwater	$17,900.00	LS	1	$	17,900
Annual Sampling of Surface Water & Sediment	$12,800.00	LS	1	$	12,800
Data Summary Report	$ 5,000.00	LS	1	$	5,000
Bi-annual site-inspection	$ 1,500.00	EA	2	$	3,000
Bi-annual report	$ 1,500.00	EA	2	$	3,000
Annual report	$ 1,000.00	EA	1	$	1,000
Annual Repairs to Fence (5% of Original Construction)	$27,025.00	LS	1	$	27,025
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.4	$	910
Total Annual O&M				***$***	***70,635***
Present Worth O&M				***$***	***1,085,833***
TOTAL PRESENT WORTH				***$***	***1,661,333***

Assumptions:

Inflation Rate used in Calculations	5.0%
Number of Years	30

Table L-3
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 3: Limited Action

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	4	$ 6,000
Well Installation - 20' deep	$ 1,250.00	EA	8	$ 10,000
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 7.27	CY	325,000	$ 2,362,750
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	0	$ -
Topsoil Layer	$ 12.58	CY	21,000	$ 264,180
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	125,000	$ 33,750
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Excavation of Leachate Seeps L-2 & L-4	$ 22.40	CY	1,300	$ 29,120
Backfill of Leachate Seeps L-2 & L-4	$ 7.27	CY	1,300	$ 9,451
Fence, chain link industrial, schedule 40, 8' high, 6 ga. wire	$ 30.50	LF	1,600	$ 48,800
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Subtotal Capital Cost				**$ 3,417,878**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 136,715
Health & Safety	1.5%	Proj Tot	1	$ 51,268
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	10.4%	Proj Tot	1	$ 356,341
Legal & Administrative	5.0%	Proj Tot	1	$ 170,894
Total Capital Cost				**$ 5,433,096**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Bi-annual Site Inspection	$ 2,500.00	EA	2	$ 5,000
Bi-annual Report	$ 1,500.00	EA	2	$ 3,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 2,750.00	EA	2	$ 5,500
Annual Site Repairs	0.5%	Proj Tot	1	$ 17,469
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 69,124***
Present Worth O&M				***$ 1,062,599***
TOTAL PRESENT WORTH				***$ 6,495,695***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-4
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 4A: 1972 Part 360 Regulations - 116 acres

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	76	$ 429,400
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	40	$ 174,000
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	2,150	$ 15,803
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	47,000	$ 217,610
Common Earth Fill (10^{-5})	$ 7.27	CY	480,000	$ 3,489,600
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	0	$ -
Topsoil Layer	$ 12.58	CY	94,000	$ 1,182,520
Establish Vegetation	$ 2,134.00	ACRE	116	$ 247,544
Mulching Blankets	$ 0.27	SF	245,000	$ 66,150
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 6,574,888**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 262,996
Health & Safety	1.5%	Proj Tot	1	$ 98,623
Construction Inspection	$ 25,000.00	ACRE	116	$ 2,900,000
Engineering Consulting Services - Survey & Design	9.0%	Proj Tot	1	$ 593,117
Legal & Administrative	5.0%	Proj Tot	1	$ 328,744
Total Capital Cost				**$ 10,758,367**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 2,500.00	EA	4	$ 10,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,000.00	EA	2	$ 12,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 22,520
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0	$ 455
Total Annual O&M				***$ 88,675***
Present Worth O&M				***$ 1,363,149***
TOTAL PRESENT WORTH				***$ 12,121,517***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-5
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 4B: Current Part 360 Geomembrane Cap-132 Acres

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 7.27	CY	1,310,000	$ 9,523,700
Woven Geotextile	$ 1.83	SY	640,700	$ 1,172,481
Gas Venting Layer (5 mi haul)	$ 11.39	CY	213,600	$ 2,432,904
Composite Drainage Netting	$ 0.66	SF	5,760,000	$ 3,801,600
60 MIL HDPE Liner	$ 0.72	SF	5,760,000	$ 4,147,200
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	132	$ 145,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	35,500	$ 521,495
18" Dia HDPE Installation-Header	$ 38.31	LF	16,000	$ 612,960
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire, galvanized steel	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 26,291,534**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 1,051,661
Health & Safety	1.5%	Proj Tot	1	$ 394,373
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	7.9%	Proj Tot	1	$ 2,071,865
Legal & Administrative	2.5%	Proj Tot	1	$ 657,288
Total Capital Cost				**$ 33,766,722**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 54,066
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 123,721***
Present Worth O&M				***$ 1,901,902***
TOTAL PRESENT WORTH				***$ 35,668,624***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30
Number of Years	30

Table L-6
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 4C: Current Part 360 Clay Cap-132 Acres

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 7.27	CY	1,310,000	$ 9,523,700
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	213,600	$ 2,432,904
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	320,500	$ 6,147,190
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	132	$ 145,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	35,500	$ 521,495
18" Dia HDPE Installation-Header	$ 38.31	LF	16,000	$ 612,960
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire, galvanized steel	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 23,317,443**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 932,698
Health & Safety	1.5%	Proj Tot	1	$ 349,762
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	7.9%	Proj Tot	1	$ 1,848,808
Legal & Administrative	5.0%	Proj Tot	1	$ 1,165,872
Total Capital Cost				**$ 30,914,583**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 49,308
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 118,963***
Present Worth O&M				***$ 1,828,751***
TOTAL PRESENT WORTH				***$ 32,743,334***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-7
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 5A: Leachate Collection & Treatment - Route Offsite to POTW

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & Grub dense brush including stumps	$ 5,650.00	ACRE	1	$ 5,650
Clear & Grub, Cut & Chip Trees to 6" diam., remove stumps	$ 4,350.00	ACRE	5	$ 21,750
Trench Excavation	$ 14.69	LF	4,000	$ 58,760
Excess Material Spread/Remove	$ 9.26	CY	2,000	$ 18,520
6" Dia Perf HDPE - Collector	$ 14.69	LF	2,000	$ 29,380
6" Dia HDPE - Doubled Wall	$ 13.00	LF	2,000	$ 26,000
Pipe Bedding - Collector	$ 10.33	CY	4,350	$ 44,936
Permitting	$ 30,000.00	LS	1	$ 30,000
Subtotal Capital Cost				**$ 234,996**
Mob/Demob, Gen Cond. & Bond	4.0%	Proj Tot	1	$ 9,400
Health & Safety	1.5%	Proj Tot	1	$ 3,525
Construction Inspection	$ 15,000.00	WEEK	1	$ 15,000
Engineering Consulting - Design	11.2%	Proj Tot	1	$ 26,319
Legal & Administrative	5.0%	Proj Tot	1	$ 11,750
Total Capital Cost				***$ 300,990***
Operation & Maintenance				
POTW Treatment Cost	$ 4.00	KGAL	10,220	$ 40,880
Annual Site Repairs - Collector	$ 5,000.00	EA	1	$ 5,000
Total Annual O&M				***$ 45,880***
Present Worth O&M				***$ 705,288***
TOTAL PRESENT WORTH				***$ 1,006,278***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-8
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 5B: Leachate Collection & Treatment - Store & Haul

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & Grub dense brush including stumps	$ 5,650.00	ACRE	1	$ 5,650
Clear & Grub, Cut & Chip Trees to 6" diam., remove stumps	$ 4,350.00	ACRE	5	$ 21,750
Trench Excavation	$ 14.69	LF	4,000	$ 58,760
Pump Station - 40 g/m; 45 ft TDH	$ 60,000.00	EA	1	$ 60,000
30,000 gal. Above Ground Storage Tank	$ 75,000.00	EA	1	$ 75,000
6" Dia Perf HDPE - Collecter	$ 14.69	LF	2,000	$ 29,380
6" Dia HDPE - Doubled Wall	$ 13.00	LF	2,000	$ 26,000
Pipe Bedding - Collector	$ 10.33	CY	4,350	$ 44,936
Permitting	$ 30,000.00	LS	1	$ 30,000
Subtotal Capital Cost				**$ 351,476**
Mob/Demob, Gen Cond. & Bond	4.0%	Proj Tot	1	$ 14,059
Health & Safety	1.5%	Proj Tot	1	$ 5,272
Construction Inspection	$ 15,000.00	WEEK	1	$ 15,000
Engineering Consulting - Design	11.2%	Proj Tot	1	$ 39,365
Legal & Administrative	5.0%	Proj Tot	1	$ 17,574
Total Capital Cost				***$ 442,746***
Operation & Maintenance				
Hauling Cost	$ 600.00	DAY	365	$ 219,000
POTW Treatment Cost	$ 4.00	KGAL	10,220	$ 40,880
Annual Energy Cost	$ 2,000.00	YEAR	1	$ 2,000
Annual Repairs - Pump Station	$ 6,750.00	EA	1	$ 6,750
Annual Site Repairs - Collectors	$ 5,000.00	EA	1	$ 5,000
Total Annual O&M				***$ 273,630***
Present Worth O&M				***$ 4,206,364***
TOTAL PRESENT WORTH				***$ 4,649,109***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-9
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 5C: Leachate Collection & Treatment - Onsite Constructed Wetland

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & Grub dense brush including stumps	$ 5,650.00	ACRE	1	$ 5,650
Clear & Grub, Cut & Chip Trees to 6" diam., remove stumps	$ 4,350.00	ACRE	5	$ 21,750
Trench Excavation	$ 14.55	LF	2,000	$ 29,100
Clay Earthen Dam/Berm	$ 14.22	CY	1,670	$ 23,747
Pump Station - 40 GPM	$ 60,000.00	EA	1	$ 60,000
6" Dia HDPE - Doubled Wall	$ 13.00	LF	550	$ 7,150
6" Dia Perf HDPE - Collector	$ 14.69	LF	2,000	$ 29,380
Pipe Bedding	$ 10.33	CY	550	$ 5,682
Phragmite Plants	$ 5.00	SF	12,000	$ 60,000
Gravel Bedding - pea gravel	$ 98.50	CY	740	$ 72,890
Soil Matrix - 36"	$ 6.68	SF	12,000	$ 80,160
60 mil HDPE Liner	$ 0.72	SF	12,000	$ 8,640
Wetland Mitigation	$ 65,000.00	ACRE	4	$ 260,000
Permitting	$ 30,000.00	LS	1	$ 30,000
Subtotal Capital Cost				**$ 694,149**
Mob/Demob, Gen Cond. & Bond	4.0%	Proj Tot	1	$ 27,766
Health & Safety	1.5%	Proj Tot	1	$ 10,412
Construction Inspection	$ 15,000.00	WEEK	2	$ 30,000
Engineering Consulting - Survey/Design	11.2%	Proj Tot	1	$ 77,745
Legal & Administrative	5.0%	Proj Tot	1	$ 34,707
Total Capital Cost				***$ 874,779***
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Monthly Monitoring	$ 1,500.00	EA	12	$ 18,000
Monthly Report	$ 600.00	EA	12	$ 7,200
Annual Energy Costs	$ 2,000.00	YEAR	1	$ 2,000
Annual Repairs - Pump Station	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs - CWTS	$ 35,000.00	EA	1	$ 35,000
Total Annual O&M				***$ 111,400***
Present Worth O&M				***$ 1,712,491***
TOTAL PRESENT WORTH				***$ 2,587,270***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-10
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 5D: Leachate Collection & Treatment - Leachate Collection Sumps

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & Grub dense brush including stumps	$ 5,650.00	ACRE	2	$ 11,300
Clear & Grub, Cut & Chip Trees to 6" diam., remove stumps	$ 4,350.00	ACRE	2	$ 8,700
Excavation of Sumps	$ 24.20	CY	150	$ 3,630
Trench Excavation	$ 14.69	LF	2,700	$ 39,663
6" Dia HDPE - Doubled Wall	$ 13.00	LF	2,800	$ 36,400
6" Dia Perf HDPE - Collector	$ 14.69	LF	400	$ 5,876
Pipe Bedding	$ 10.33	CY	2,300	$ 23,759
Wetland Mitigation	$ 65,000.00	ACRE	1	$ 65,000
Permitting	$ 30,000.00	LS	1	$ 30,000
Subtotal Capital Cost				**$ 224,328**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 8,973
Health & Safety	1.5%	Proj Tot	1	$ 3,365
Construction Inspection	$ 15,000.00	WEEK	2	$ 30,000
Engineering Consulting Services - Survey & Design	11.2%	Proj Tot	1	$ 25,125
Legal & Administrative	5.0%	Proj Tot	1	$ 11,216
Total Capital Cost				**$ 303,007**
Operation & Maintenance				
POTW Treatment Cost	$ 4.00	KGAL	10,220	$ 40,880
Bi-Annual Inspection	$ 2,000.00	EA	2	$ 4,000
Bi-Annual Report	$ 1,000.00	EA	2	$ 2,000
Annual Site Repairs - Sump	$ 35,000.00	EA	1	$ 35,000
Total Annual O&M				***$ 81,880***
Present Worth O&M				***$ 1,258,696***
TOTAL PRESENT WORTH				***$ 1,561,703***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-11
UTICA CITY DUMP - FEASIBILITY STUDY
Order-of-Magnitude Comparative Cost Estimate

Alternative 6: Limited Sediment Removal

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	3	$ 16,950
Shored-based sediment removal with track excavator	$ 37.00	CY	3,400	$ 125,800
Silty sand backfill to replace sediments	$ 10.00	CY	3,400	$ 34,000
Silt curtain	$ 36,000.00	LS	1	$ 36,000
Waste characterization sampling (PCBs)	$ 100.00	EA	40	$ 4,000
Common earth fill (10^{-5}) (2-ft cover for excavated sediment)	$ 7.27	CY	6,800	$ 49,436
Topsoil Layer	$ 12.58	CY	1,700	$ 21,386
Establish Vegetation	$ 2,134.00	ACRE	5	$ 10,670
Subtotal Capital Cost				**$ 298,242**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 11,930
Health & Safety	1.5%	Proj Tot	1	$ 4,474
Construction Inspection	$ 5,000.00	WEEK	8	$ 40,000
Engineering Consulting Services - Survey & Design	15.0%	Proj Tot	1	$ 44,736
Legal & Administrative	5.0%	Proj Tot	1	$ 14,912
Total Capital Cost				**$ 414,294**

TOTAL PRESENT WORTH	***$ 414,294***

Table L-12
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 Geomembrane Cap - 52 acres

Case 1a

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 7.27	CY	669,000	$ 4,863,630
Woven Geotextile	$ 1.83	SY	251,110	$ 459,531
Gas Venting Layer (5 mi haul)	$ 11.39	CY	83,705	$ 953,400
Composite Drainage Netting	$ 0.66	SF	2,259,970	$ 1,491,580
60 MIL HDPE Liner	$ 0.72	SF	2,259,970	$ 1,627,178
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	52	$ 57,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	21,000	$ 308,490
18" Dia HDPE Installation-Header	$ 38.31	LF	11,530	$ 441,714
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire,	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 12,222,715**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 488,909
Health & Safety	1.5%	Proj Tot	1	$ 183,341
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.3%	Proj Tot	1	$ 1,016,704
Legal & Administrative	5.0%	Proj Tot	1	$ 611,136
Total Capital Cost				**$ 15,822,804**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 31,556
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 97,711***
Present Worth O&M				***$ 1,502,063***
TOTAL PRESENT WORTH				***$ 17,324,867***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-13
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - (52 acres)

Case 1b

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 7.27	CY	669,000	$ 4,863,630
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	83,705	$ 953,400
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	125,600	$ 2,409,008
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	52	$ 57,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	21,000	$ 308,490
18" Dia HDPE Installation-Header	$ 38.31	LF	11,530	$ 441,714
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 11,053,433**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 442,137
Health & Safety	1.5%	Proj Tot	1	$ 165,801
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.4%	Proj Tot	1	$ 929,007
Legal & Administrative	5.0%	Proj Tot	1	$ 552,672
Total Capital Cost				**$ 14,443,051**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 29,685
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0	$ 455
Total Annual O&M				***$ 95,840***
Present Worth O&M				***$ 1,473,303***
TOTAL PRESENT WORTH				***$ 15,916,355***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-14
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 Geomembrane Cap - 132 acres (No Gas Collection)

Case 2a

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 7.27	CY	1,310,000	$ 9,523,700
Woven Geotextile	$ 1.83	SY	640,700	$ 1,172,481
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	5,760,000	$ 3,801,600
60 MIL HDPE Liner	$ 0.72	SF	5,760,000	$ 4,147,200
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 21,983,124**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 879,325
Health & Safety	1.5%	Proj Tot	1	$ 329,747
Construction Inspection	$25,000	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	8.0%	Proj Tot	1	$ 1,748,734
Legal & Administrative	5.0%	Proj Tot	1	$ 1,099,156
Total Capital Cost				**$ 29,340,086**
Operation & Maintenance				
Annual Sampling of Groundwater	$17,900	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$12,800	LS	1	$ 12,800
Data Summary Report	$5,000	LS	1	$ 5,000
Quarterly Site Inspection	$3,000	EA	4	$ 12,000
Quarterly Report	$1,500	EA	4	$ 6,000
Annual Report	$2,000	EA	1	$ 2,000
Mowing	$6,750	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 47,173
Replacement of Gate (every 5 yrs)	$2,275	EA	0.2	$ 455
Total Annual O&M				***$ 116,828***
Present Worth O&M				***$ 1,795,933***
TOTAL PRESENT WORTH				***$ 31,136,019***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-15
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - 132 acres (No Gas Collection)

Case 2b

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 7.27	CY	1,310,000	$ 9,523,700
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	320,500	$ 6,147,190
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 19,604,884**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 784,195
Health & Safety	1.5%	Proj Tot	1	$ 294,073
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Consulting Services - Survey & Design	8.0%	Proj Tot	1	$ 1,570,366
Legal & Administrative	5.0%	Proj Tot	1	$ 980,244
Total Capital Cost				**$ 26,533,763**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	YEAR	4	$ 12,000
Quarterly Report	$ 1,500.00	YEAR	4	$ 6,000
Annual Report	$ 2,000.00	YEAR	1	$ 2,000
Mowing	$ 6,750.00	YEAR	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 43,368
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0	$ 455
Total Annual O&M				***$ 113,023***
Present Worth O&M				***$ 1,737,438***
TOTAL PRESENT WORTH				***$ 28,271,201***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-16
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 Geomembrane Cap - (52 acres & No Gas Collection)

Case 2c

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 7.27	CY	669,000	$ 4,863,630
Woven Geotextile	$ 1.83	SY	251,110	$ 459,531
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	2,259,970	$ 1,491,580
60 MIL HDPE Liner	$ 0.72	SF	2,259,970	$ 1,627,178
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 10,228,379**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 409,135
Health & Safety	1.5%	Proj Tot	1	$ 153,426
Construction Inspection	$25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.5%	Proj Tot	1	$ 867,128
Legal & Administrative	5.0%	Proj Tot	1	$ 511,419
Total Capital Cost				**$ 13,469,487**
Operation & Maintenance				
Annual Sampling of Groundwater	$17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 28,365
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 94,520***
Present Worth O&M				***$ 1,453,010***
TOTAL PRESENT WORTH				***$ 14,922,497***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-17
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - (52 acres & No Gas Collection)

Case 2d

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 7.27	CY	669,000	$ 4,863,630
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	125,600	$ 2,409,008
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 9,292,629**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 371,705
Health & Safety	1.5%	Proj Tot	1	$ 139,389
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.6%	Proj Tot	1	$ 796,947
Legal & Administrative	5.0%	Proj Tot	1	$ 464,631
Total Capital Cost				**$ 12,365,302**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 26,868
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0	$ 455
Total Annual O&M				***$ 93,023***
Present Worth O&M				***$ 1,429,995***
TOTAL PRESENT WORTH				***$ 13,795,297***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-18
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 3: Limited Action (Low Cost Fill)

Case 3a

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	4	$ 6,000
Well Installation - 20' deep	$ 1,250.00	EA	8	$ 10,000
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 3.00	CY	325,000	$ 975,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	0	$ -
Topsoil Layer	$ 12.58	CY	21,000	$ 264,180
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	125,000	$ 33,750
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Excavation of Leachate Seeps L-2 & L-4	$ 22.40	CY	1,300	$ 29,120
Backfill of Leachate Seeps L-2 & L-4	$ 7.27	CY	1,300	$ 9,451
Fence, chain link industrial, schedule 40, 8' high, 6 ga. wire	$ 30.50	LF	1,600	$ 48,800
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Subtotal Capital Cost				**$ 2,030,128**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 81,205
Health & Safety	1.5%	Proj Tot	1	$ 30,452
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	12.4%	Proj Tot	1	$ 252,260
Legal & Administrative	5.0%	Proj Tot	1	$ 101,506
Total Capital Cost				**$ 3,795,551**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Bi-annual Site Inspection	$ 5,000.00	EA	1	$ 5,000
Bi-annual Report	$ 1,500.00	EA	1	$ 1,500
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 2,750.00	EA	2	$ 5,500
Annual Site Repairs	0.8%	Proj Tot	1	$ 15,248
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 65,403***
Present Worth O&M				***$ 1,005,408***
TOTAL PRESENT WORTH				***$ 4,800,958***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-19
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4A: 1972 Part 360 (Low Cost Fill)

Case 3b

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	76	$ 429,400
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	40	$ 174,000
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	2,150	$ 15,803
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	47,000	$ 217,610
Common Earth Fill (10^{-5})	$ 3.00	CY	480,000	$ 1,440,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	0	$ -
Topsoil Layer	$ 12.58	CY	94,000	$ 1,182,520
Establish Vegetation	$ 2,134.00	ACRE	116	$ 247,544
Mulching Blankets	$ 0.27	SF	245,000	$ 66,150
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 4,525,288**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 181,012
Health & Safety	1.5%	Proj Tot	1	$ 67,879
Construction Inspection	$ 25,000.00	ACRE	116	$ 2,900,000
Engineering Consulting Services - Survey & Design	9.7%	Proj Tot	1	$ 439,397
Legal & Administrative	5.0%	Proj Tot	1	$ 226,264
Total Capital Cost				**$ 8,339,839**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 2,500.00	EA	4	$ 10,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,000.00	EA	2	$ 12,000
Annual Site Repairs	0.4%	Proj Tot	1	$ 19,240
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 85,395***
Present Worth O&M				***$ 1,312,738***
TOTAL PRESENT WORTH				***$ 9,652,577***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-20
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B:Current Part 360 Geomembrane Cap - 132 acres (Low Cost Fill)

Case 3c

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 3.00	CY	1,310,000	$ 3,930,000
Woven Geotextile	$ 1.83	SY	640,700	$ 1,172,481
Gas Venting Layer (5 mi haul)	$ 11.39	CY	213,600	$ 2,432,904
Composite Drainage Netting	$ 0.66	SF	5,760,000	$ 3,801,600
60 MIL HDPE Liner	$ 0.72	SF	5,760,000	$ 4,147,200
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	132	$ 145,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	35,500	$ 521,495
18" Dia HDPE Installation-Header	$ 38.31	LF	16,000	$ 612,960
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 20,697,834**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 827,913
Health & Safety	1.5%	Proj Tot	1	$ 310,468
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	8.0%	Proj Tot	1	$ 1,652,338
Legal & Administrative	5.0%	Proj Tot	1	$ 1,034,892
Total Capital Cost				**$ 27,823,444**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 45,117
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 114,772***
Present Worth O&M				***$ 1,764,320***
TOTAL PRESENT WORTH				***$ 29,587,764***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30
Number of Years	30

Table L-21
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap- 132 acres (Low Cost Fill)

Case 3d

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 3.00	CY	1,310,000	$ 3,930,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	213,600	$ 2,432,904
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	320,500	$ 6,147,190
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	132	$ 145,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	35,500	$ 521,495
18" Dia HDPE Installation-Header	$ 38.31	LF	16,000	$ 612,960
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 17,723,743**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 708,950
Health & Safety	1.5%	Proj Tot	1	$ 265,856
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	8.1%	Proj Tot	1	$ 1,429,281
Legal & Administrative	5.0%	Proj Tot	1	$ 886,187
Total Capital Cost				**$ 24,314,017**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 40,358
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 110,013***
Present Worth O&M				***$ 1,691,169***
TOTAL PRESENT WORTH				***$ 26,005,186***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-22
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 - Geomembrane Cap (52 acres & Low Cost Fill)

Case 3e

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 3.00	CY	669,000	$ 2,007,000
Woven Geotextile	$ 1.83	SY	251,110	$ 459,531
Gas Venting Layer (5 mi haul)	$ 11.39	CY	83,705	$ 953,400
Composite Drainage Netting	$ 0.66	SF	2,259,970	$ 1,491,580
60 MIL HDPE Liner	$ 0.72	SF	2,259,970	$ 1,627,178
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	52	$ 57,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	21,000	$ 308,490
18" Dia HDPE Installation-Header	$ 38.31	LF	11,530	$ 441,714
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire,	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 9,366,085**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 374,643
Health & Safety	1.5%	Proj Tot	1	$ 140,491
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.6%	Proj Tot	1	$ 802,456
Legal & Administrative	5.0%	Proj Tot	1	$ 468,304
Total Capital Cost				**$ 12,451,980**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 26,986
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 93,141***
Present Worth O&M				***$ 1,431,801***
TOTAL PRESENT WORTH				***$ 13,883,782***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-23
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - (52 acres & Low Cost Fill)

Case 3f

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 3.00	CY	669,000	$ 2,007,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	83,705	$ 953,400
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	125,600	$ 2,409,008
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	52	$ 57,200
6" Dia Perf HDPE - Collector	$ 14.69	LF	21,000	$ 308,490
18" Dia HDPE Installation-Header	$ 38.31	LF	11,530	$ 441,714
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 8,196,803**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 327,872
Health & Safety	1.5%	Proj Tot	1	$ 122,952
Construction Inspection	$25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.7%	Proj Tot	1	$ 714,760
Legal & Administrative	5.0%	Proj Tot	1	$ 409,840
Total Capital Cost				**$ 11,072,228**
Operation & Maintenance				
Annual Sampling of Groundwater	$17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 25,115
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 91,270***
Present Worth O&M				***$ 1,403,042***
TOTAL PRESENT WORTH				***$ 12,475,270***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-24
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 Geomembrane Cap -132 acres (No Gas Collection & Low Cost Fill)

Case 4a

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 3.00	CY	1,310,000	$ 3,930,000
Woven Geotextile	$ 1.83	SY	640,700	$ 1,172,481
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	5,760,000	$ 3,801,600
60 MIL HDPE Liner	$ 0.72	SF	5,760,000	$ 4,147,200
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 16,389,424**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 655,577
Health & Safety	1.5%	Proj Tot	1	$ 245,841
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	8.1%	Proj Tot	1	$ 1,329,207
Legal & Administrative	5.0%	Proj Tot	1	$ 819,471
Total Capital Cost				**$ 22,739,520**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 38,223
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 107,878***
Present Worth O&M				***$ 1,658,350***
TOTAL PRESENT WORTH				***$ 24,397,871***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-25
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - 132 acres (No Gas Collection & Low Cost Fill)

Case 4b

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	92	$ 400,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	1,700	$ 12,495
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	12	$ 18,000
Well Installation - 20' deep	$ 1,250.00	EA	32	$ 40,000
Final Grading of Subgrade	$ 4.63	CY	53,500	$ 247,705
Common Earth Fill (10^{-5})	$ 3.00	CY	1,310,000	$ 3,930,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	320,500	$ 6,147,190
Topsoil Layer	$ 12.58	CY	106,800	$ 1,343,544
Establish Vegetation	$ 2,134.00	ACRE	132	$ 281,688
Mulching Blankets	$ 0.27	SF	275,000	$ 74,250
Non-Woven Geotextile	$ 0.93	SY	640,700	$ 595,851
Haybales	$ 2.61	LF	16,400	$ 42,804
Silt Fences	$ 0.68	LF	16,400	$ 11,152
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 14,011,184**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 560,447
Health & Safety	1.5%	Proj Tot	1	$ 210,168
Construction Inspection	$ 25,000.00	ACRE	132	$ 3,300,000
Engineering Consulting Services - Survey & Design	8.2%	Proj Tot	1	$ 1,150,839
Legal & Administrative	5.0%	Proj Tot	1	$ 700,559
Total Capital Cost				**$ 19,933,197**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 6,750.00	EA	2	$ 13,500
Annual Site Repairs	0.2%	Proj Tot	1	$ 34,418
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 104,073***
Present Worth O&M				***$ 1,599,855***
TOTAL PRESENT WORTH				***$ 21,533,053***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-26
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4B: Current Part 360 Geomembrane Cap - (52 acres & No Gas Collection & Low Cost Fill)

Case 4c

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$ 71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 3.00	CY	669,000	$ 2,007,000
Woven Geotextile	$ 1.83	SY	251,110	$ 459,531
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	2,259,970	$ 1,491,580
60 MIL HDPE Liner	$ 0.72	SF	2,259,970	$ 1,627,178
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	0	$ -
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 7,371,749**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 294,870
Health & Safety	1.5%	Proj Tot	1	$ 110,576
Construction Inspection	$ 25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	8.9%	Proj Tot	1	$ 652,881
Legal & Administrative	5.0%	Proj Tot	1	$ 368,587
Total Capital Cost				**$ 10,098,663**
Operation & Maintenance				
Annual Sampling of Groundwater	$ 17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$ 12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 23,795
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 89,950***
Present Worth O&M				***$ 1,382,749***
TOTAL PRESENT WORTH				***$ 11,481,412***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30

Table L-27
UTICA CITY DUMP - FEASIBILITY STUDY
Cost Sensitivity Analysis

Alternative 4C: Current Part 360 Clay Cap - (52 acres & No Gas Collection & Low Cost Fill)

Case 4d

Cost Categories	Unit Price	Unit	Quantity	Cost
Capital Costs				
Clear & grub dense brush including stumps	$ 5,650.00	ACRE	40	$ 226,000
Clear & Grub, Cut & chip medium trees -12" diam.	$ 4,350.00	ACRE	12	$ 52,200
Limited Waste Excavation of drums & debris outside limit of waste	$ 7.35	CY	5,000	$ 36,750
Demolition of Incinerator Smoke Stack, Pump House, and Trailers	$71,950.00	LS	1	$ 71,950
Well Abandonment	$ 1,500.00	EA	6	$ 9,000
Well Installation - 20' deep	$ 1,250.00	EA	6	$ 7,500
Final Grading of Subgrade	$ 4.63	CY	25,000	$ 115,750
Common Earth Fill (10^{-5})	$ 3.00	CY	669,000	$ 2,007,000
Woven Geotextile	$ 1.83	SY	0	$ -
Gas Venting Layer (5 mi haul)	$ 11.39	CY	0	$ -
Composite Drainage Netting	$ 0.66	SF	0	$ -
Clay Cap (10^{-7})	$ 19.18	CY	125,600	$ 2,409,008
Topsoil Layer	$ 12.58	CY	41,900	$ 527,102
Establish Vegetation	$ 2,134.00	ACRE	52	$ 110,968
Mulching Blankets	$ 0.27	SF	85,000	$ 22,950
Non-Woven Geotextile	$ 0.93	SY	251,110	$ 233,532
Haybales	$ 2.61	LF	11,530	$ 30,093
Silt Fences	$ 0.68	LF	11,530	$ 7,840
Gas Vents	$ 1,100.00	EA	0	$ -
6" Dia Perf HDPE - Collector	$ 14.69	LF	0	$ -
18" Dia HDPE Installation-Header	$ 38.31	LF	0	$ -
Fence, chain link industrial, schedule 40, 8' high, 6 ga. Wire	$ 30.50	LF	16,400	$ 500,200
Double swing gates, incl. Post and hardware 8' high, 20' wide	$ 2,275.00	EA	1	$ 2,275
Access Road	$ 24.40	CY	2,700	$ 65,880
Subtotal Capital Cost				**$ 6,435,999**
Mob/Demob, Gen. Cond.	4.0%	Proj Tot	1	$ 257,440
Health & Safety	1.5%	Proj Tot	1	$ 96,540
Construction Inspection	$25,000.00	ACRE	52	$ 1,300,000
Engineering Consulting Services - Survey & Design	9.1%	Proj Tot	1	$ 582,700
Legal & Administrative	5.0%	Proj Tot	1	$ 321,800
Total Capital Cost				**$ 8,994,479**
Operation & Maintenance				
Annual Sampling of Groundwater	$17,900.00	LS	1	$ 17,900
Annual Sampling of Surface Water & Sediment	$12,800.00	LS	1	$ 12,800
Data Summary Report	$ 5,000.00	LS	1	$ 5,000
Quarterly Site Inspection	$ 3,000.00	EA	4	$ 12,000
Quarterly Report	$ 1,500.00	EA	4	$ 6,000
Annual Report	$ 2,000.00	EA	1	$ 2,000
Mowing	$ 5,000.00	EA	2	$ 10,000
Annual Site Repairs	0.3%	Proj Tot	1	$ 22,298
Replacement of Gate (every 5 yrs)	$ 2,275.00	EA	0.2	$ 455
Total Annual O&M				***$ 88,453***
Present Worth O&M				***$ 1,359,733***
TOTAL PRESENT WORTH				***$ 10,354,212***

Assumptions:

Inflation Rate for Calculations	5.0%
Number of Years	30