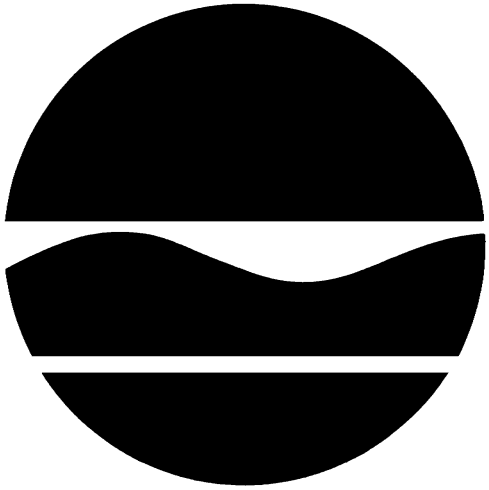
PROPOSED REMEDIAL ACTION PLAN

WILLSBORO BLACK ASH POND

Environmental Restoration Project
Willsboro, Essex County, New York
Site No. E516009

February 2007



Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

A 1996 Clean Water/Clean Air Bond Act
Environmental Restoration Project

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Willsboro Black Ash Pond Site. The presence of hazardous substances has created threats to human health and/or the environment that are addressed by this proposed remedy.

The 1996 Clean Water/ Clean Air Bond Act provides funding to municipalities for the investigation and cleanup of brownfields. Brownfields are abandoned, idled, or under-used properties where redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. Brownfields often pose not only environmental, but legal and financial burdens on communities. Under the Environmental Restoration Program, the state provides grants to municipalities to reimburse up to 90 percent of eligible costs for site investigation and remediation activities. Once remediated, the property can then be reused.

As more fully described in Sections 3 and 5 of this document, the discharge of industrial wastes to a lagoon constructed adjacent to the Boquet River have resulted in the disposal of hazardous substances, including heavy metals. These hazardous substances have contaminated the soils at the site, and have resulted in:

- an environmental threat associated with the potential impacts of contaminants to the Boquet River and its sediments. The Boquet River is part of the salmonid restoration program in Lake Champlain.

- a human health threat associated with potential direct contact and ingestion of the black ash in the former lagoon.

To eliminate or mitigate these threats, the Department proposes to consolidate and regrade the fill and stabilize the stream bank to decrease or eliminate the erosion of the black ash material into the Boquet River.

Remediation of this site would also consider the Town of Willsboro's proposed development of a Constructed Wetland as Tertiary Treatment for the Willsboro Waste Water Treatment Plant.

Some of the criteria for evaluating sites in the Environmental Restoration Program include providing a benefit to the environment and a potential for public or recreational use of the cleaned up property. In addition to mitigating the environmental impacts of this site on the river, this project will provide an open space near the river, available for public recreation. Remediation of the site would also provide better access to the Boquet River for recreational activities.

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

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

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the November 2006, "Black Ash Pond" Site Investigation (SI) Report, the February 2007 " Black Ash Pond Site - Remedial Alternatives Report" (RAR)}, and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Documents may be found at the following repositories:

NYSDEC Region 5 Headquarters
Route 86
Raybrook, New York
518-897-1241
Monday through Friday, 8:30 to 4:30
Please contact: Russell Huyck

Willsboro Town Hall
1 Farrell Road
Willsboro, New York
518-963-8668
Monday through Friday, 9:00 to 4:00

NYSDEC Central Office
625 Broadway
Albany, New York
518-402-9620
Monday through Friday, 8:30 to 4:30
Please contact: Daniel Eaton, NYSDEC project manager

The Department seeks input from the community on all PRAPs. A public comment period has been set from February 16, 2007 to March 30, 2007 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for February 28, 2007 at the Willsboro Town Hall beginning at 7:00 pm.

At the meeting, the results of the SI/RAR will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to the NYSDEC project manager at:

Mr. Daniel Eaton,
NYSDEC
625 Broadway
Albany, New York 12233-7015
djeaton@gw.dec.state.ny.us

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

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

SECTION 2: SITE LOCATION AND DESCRIPTION

The Willsboro Black Ash Pond site is located at the end of School Street in the Town of Willsboro, County of Essex. The Boquet River is found on the north and west sides of the site. Lands owned by the Adirondack Nature Conservancy (ANC) are found to the east and lands owned by the Town and the ANC are found to the south. The 26.65 acre property was deeded to the Town in 1966 by the Georgia-Pacific Corporation. The Town waste water treatment plant is located on the property south of the site. A Department fishing access parking area is located to the west of the site and along the river and a boat launch is located on the Boquet River to the east of the site. See Figure 1.

The site is located within the floodplain of the Boquet River, approximately 50 feet above mean sea level and approximately 2 miles west of Lake Champlain. River sediment type soils were found beneath the waste materials at the site. Regional geologic mapping of the bedrock indicates that the soils are underlain by the Potsdam Sandstone.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

From 1884 until 1964, the Champlain Fibre Company, later known as the Willsboro Pulp Mill, operated a pulp mill on the opposite side of the Boquet River from the black ash pond site. In 1964 the mill property was purchased by Georgia Pacific. In 1966 the Town of Willsboro acquired the black ash pond property from Georgia Pacific.

The black ash pond area was used as a deposition area for spent black liquor used in the making of paper pulp. The black liquor was a combination of soda ash, chemical lime, wood fiber and soft coal. The black ash is the residue of spent black liquor combustion dumped in a basin area approximately 900 ft long and 400 ft wide. The waste accumulated to a depth of up to 16 feet within the basin during the years of paper mill operation. Over time, the dike constructed to retain the waste has eroded away in some locations exposing the ash to the river. The ash is eroding directly into the river.

During the paper pulp mill operations, the mill was located on the north side of the River. The lagoon was created on the south side of the River by constructing a crescent shaped dike, 12 to 15 feet high along the river bank. Black ash materials were first trucked, then piped to the south side of the river and deposited within the lagoon created by the dike. The investigation found that the waste material varied in thickness from 4 feet to 20 feet below existing surface. The waste consisted of black ash materials underlain in many locations by a white sludge like material. The wastes were saturated at the ash/sludge interface. The riverine soils encountered below the sludge were also saturated.

3.2: Remedial History

No remedial activities have been undertaken at this site.

SECTION 4: ENFORCEMENT STATUS

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

There are currently no ongoing enforcement actions. However, legal action may be initiated at a future date by the state to recover state response costs should PRPs be identified. The Town of Willsboro will assist the state in its efforts by providing all information to the state which identifies PRPs. The Town will also not enter into any agreement regarding response costs without the approval of the Department.

SECTION 5: SITE CONTAMINATION

The Town of Willsboro has recently completed a site investigation/remedial alternatives report (SI/RAR) to determine the nature and extent of any contamination by hazardous substances at this environmental restoration site.

5.1: Summary of the Site Investigation

The purpose of the SI was to define the nature and extent of any contamination resulting from previous activities at the site. The SI was conducted between May 2005 and November 2006. The field activities and findings of the investigation are described in the SI report.

The Site Investigation included a review of existing information and interviews with numerous residents of the area. Subsurface test trenches were completed within the site to identify areas of environmental concern. Soil borings were completed to define the vertical limits of the black ash and or sludge material. Samples of the waste were collected for laboratory analysis. A number of borings were completed as groundwater monitoring wells to assess potential impacts to the shallow groundwater. Sediment samples were collected from the Boquet River to assess potential impacts from the black ash. Test trench, monitoring well, and sample locations are presented on Figure 2.

5.1.1: Standards, Criteria, and Guidance (SCGs)

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

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

- Soil SCGs are based on the Department's Cleanup Objectives ("Technical and Administrative Guidance Memorandum [TAGM] 4046; Determination of Soil Cleanup Objectives and Cleanup Levels." and 6 NYCRR Subpart 375-6 - Remedial Program Soil Cleanup Objectives)."

- Sediment SCGs are based on the Department's "Technical Guidance for Screening Contaminated Sediments."

- For the Site Investigation, background soil samples were taken from 2 locations. These locations were upgradient of the site, and were unaffected by historic or current site operations. Background sediment samples were collected from two locations. These locations were upgradient of the site. The samples were analyzed for volatile organic compounds, semivolatile organic compounds, PCBs and pesticides, and metals. The results of the background sample analysis were compared to relevant SI data to determine appropriate site remediation goals.

Based on the SI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the SI report.

5.1.2: Nature and Extent of Contamination

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

As described in the SI report, many soil, groundwater and sediment samples were collected to characterize the nature and extent of contamination. Images of the Black Ash Pond site can be found on Photo Page 1. A photo of the ash exposed to the River can be found on Photo Page 2. The main categories of contaminants that exceed their SCGs are inorganics (metals). For comparison purposes, where applicable, SCGs are provided for each medium.

Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for waste, soil, and sediment. Samples collected during the investigation were analyzed for the Target Compound List (TCL) parameters. TCL parameters include Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), PCBs and Pesticides, and Metals.

Within the 25 acres of the site, water was found in the monitoring wells at various depths ranging from 7 to 16 feet. In general, the flow of groundwater in the vicinity of the site is from the higher elevations south of the site toward the Boquet River. See Figure 3.

Figure 4 shows the extent of the black ash waste on the property. The waste contains levels of metals which exceed the clean up goals established in TAGM 4046. For metals, the clean up goal is often established as equivalent to site background levels. The following are the media which were investigated and a summary of the findings of the investigation.

Waste Materials

During the site investigation, the former lagoon was characterized during the excavation of 37 test trenches and 13 soil borings. After visual examination of the materials exposed during the excavation of trenches and advancement of borings, 16 subsurface samples were sent to the lab for analysis. With the exception of acetone and methylene chloride, VOCs were not identified in any of the samples. Acetone and methlyene chloride are believed to be laboratory artifacts and not a result activities at the site.

SVOCs were detected at low levels in the several samples. One SVOC, benzo(a)pyrene was detected above the recommended soil cleanup objectives (RSCO) in two samples at levels of 630 ppb and 84 ppb. From TAGM 4046, the RSCO for benzo(a)pyrene is 61 ppb. The 6 NYCRR Part 375 Soil Cleanup Objective (SCO) for benzo(a)pyrene, for both unrestricted use and protection of ecological resources is 1,000 ppb. The pesticides methoxychlor and alpha-BHC were detected in one sample, both at levels below the RSCO.

Metals analysis of the waste materials identified aluminum, arsenic, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, vanadium, and zinc at levels above the RSCOs in TAGM 4046. None of the metals identified in the waste materials exceeded the SCOs for those metals with SCOs established in the 6 NYCRR Part 375, for both unrestricted use and protection of ecological resources .

Wastes identified during the SI/RAR would be addressed in the remedy selection process.

Groundwater

Seven monitoring wells were installed and sampled to gather water quality data. VOCs were not detected in any of the groundwater samples. SVOCs were not detected in 5 of the 7 wells. Ddiethlyphthalate, di-n-butylphthalate, and butlybenzylphthalate were detected in two wells, MW-1 and MW-2 at levels below the drinking water standard of 50 ppb. PCBs and pesticides were not detected in any of the groundwater samples.

Aluminum, antimony, chromium, iron, magnesium, manganese, sodium, and thallium were detected in the groundwater samples collected within the footprint of the black ash pond at levels exceeding the class GA standards for groundwater.

Groundwater contamination identified during the SI/RAR would be addressed in the remedy selection process.

Surface Water

Additional sampling of the surface water recommended during an agency review of the SI would take place as part of a supplemental data collection activity.

Sediments

Sediment samples were collected at two depths at 2 upgradient and 4 downgradient locations. The depth of the sediment samples at each location was 6 inches and 18 inches. Although the low level presence of acetone was detected within 3 of the 12 samples, acetone was also detected in the trip blank indicating the presence of acetone occurred as an inadvertent result of laboratory cross contamination. SVOCs were not identified within the majority of sediment samples collected, with the exception of dimethylphthalate and 2,6-dinitrotoluene and pyrene. Levels of VOCs and SVOCs found in the sediments were compared with the criterion in the NYSDEC Technical Guidance for Screening Contaminated Sediment, reprinted in January of 1999. Each of the VOC or SVOC parameters detected were identified at concentrations significantly below one or more of the three parameter specific sediment criteria categories in the NYSDEC guidance.

PCBs and pesticides were not detected in the sediment samples.

Metals analysis of the sediments identified elevated concentrations of aluminum, antimony, barium, calcium, iron, magnesium, manganese, nickel, potassium, sodium, and zinc. Of the metals identified at elevated concentrations, only antimony and nickel were found at levels which exceed guidance levels in the NYSDEC Technical Guidance for Screening Contaminated Sediments.

Sample ID	Metal	Concentration	Lowest Effect Level	Severe Effect Level
SD-5 18" (downgradient)	Antimony	68.5 mg/kg	2.0 mg/kg	25.0 mg/kg
SD-2 18" (upgradient)	Antimony	7.2 mg/kg	2.0 mg/kg	25.0 mg/kg
SD-4 06" (downgradient)	Antimony	16.5 mg/kg	2.0 mg/kg	25.0 mg/kg
SD-4 18" (downgradient)	Antimony	6.0 mg/kg	2.0 mg/kg	25.0 mg/kg
SD-5 18" (downgradient)	Nickel	16.6	16.0 mg/kg	50.0 mg/kg

Additional sampling of the sediments recommended during an agency review of the SI would take place as part of a supplemental data collection activity. Sediment contamination identified during the SI/RAR would be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor/Air

No VOCs were identified during the SI. No site-related soil vapor and/or indoor air contamination of concern was identified during the SI/RAR. Therefore, no remedial alternatives need to be evaluated for this medium.

5.2: Interim Remedial Measures

There were no IRMs performed at this site during the SI/RAR.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 3.6, Qualitative Human Health Risk Assessment, of the SI report. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

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

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

Potential exposure pathways exist at the Black Ash Pond site. These pathways include direct contact, inhalation or ingestion of contaminated ash and ash dust by trespassers or persons accessing the Town boat launch and fishing access site. Town employees could also come into contact with contaminated ash that may enter nearby sewers. Recreational use of the Boquet River could lead to exposures via direct contact or ingestion, due to the migration of the ash into the surface water and sediments adjacent to and downgradient of the site. If construction were to occur on the site, construction workers could come into contact with the contaminated ash.

Public water serves the area surrounding the site, making contact with contaminated groundwater unlikely. In addition, the site and adjacent areas, with the exception of a wastewater treatment plant, are vacant. The nearest residences are upgradient of the site. Site contaminants have not impacted soil vapor.

5.4: Summary of Environmental Assessment

The wastes disposed of within the former black ash lagoon can be characterized as metal contaminated industrial wastes. The berm which used to separate the wastes from the river has deteriorated and no longer functions to contain the waste mass. The black ash is directly exposed to the river and erosion of the material is impacting the river. The extremely fine grained nature of the waste makes it readily subject to transport and erosion.

The Fish and Wildlife Impact Analysis, which is included in the SI report (Appendix F) presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The following environmental exposure pathways and ecological risks have been identified:

- Fish spawning habitat: Siltation from the eroding ash deposit could reduce and even eliminate trout and salmon spawning habitat. Female trout and salmon reproduce by building a “redd” or nest in clean gravel. Deposition of fine sediments from the ash beds appears to be reducing the suitable spawning habitat. Reducing siltation is the most effective way to encourage additional natural fish reproduction in the Boquet River.

- Egg Incubation and Early Development of Fish: If the erosion of the ash deposit results in high levels of siltation during spawning season the result can be a loss of developing eggs and sac fry.

This includes the very critical early development stage (approximately 90 days) when fish eggs are incubating in the stream bed and when young fish are not fully developed.

- Physical Abrasion to Gill Breathing Aquatic Life: Siltation from the black ash could lead to excessive abrasion to the gills of fish, some aquatic insects, and amphibians. This will decrease their vitality and can contribute to mortality during periods of stress, such as the early spring recovery period (from winter stress), spawning periods, and late summer low dissolved oxygen periods.

- Interruption of Aquatic Food Chains: Black ash eroding into the river will contribute to increased sedimentation which can interrupt food chains in the river. Macroinvertebrates, such as the larvae of craneflies, mayflies, stoneflies, caddisflies, and beetles require clean, oxygen rich water to develop in the interstitial spaces of the gravel and stone of the stream bed.

- Transport of Chemical Contaminants: Erosion of the materials from the ash beds and sludge lagoons will increase the transport of chemical contaminants to the Boquet River.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS AND PROPOSED USE OF THE SITE

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

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

- the migration of contaminants of concern: specific (non-native) heavy metals, including: antimony, arsenic, cadmium, chromium, copper, iron, lead, magnesium, vanadium, and zinc as identified during the SI;

- the human health exposure pathway (via ingestion and direct contact) to contaminated waste media, exceeding NYSDEC TAGM 4046 recommended soil cleanup objectives and background soil conditions;

- environmental exposures of flora or fauna to fine grained sedimentation and metals contamination in the Boquet River water and sediments;

- the release of contaminants from the waste area into the Boquet River through erosion.

- the potential for migration and leaching of contaminated waste media and dissolved heavy metals to the adjacent river and groundwater environment;

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

- ambient groundwater quality standards; and

- improve access to and the quality of the recreational resource which is the Boquet River.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements. Potential remedial alternatives for the Black Ash Pond were identified, screened and evaluated in the RA report which is available at the document repositories established for the site.

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

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated waste media deposited in the former lagoon at the site.

Alternative 1: No Action

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

Present Worth: $0
Capital Cost: $0

Alternative 2: Restricting Access and Monitoring

Alternative 2 consists of implementing limited action items. The limited action items consist of constructing a perimeter fence around the Black Ash Pond, posting warning signs, an environmental easement, conducting groundwater and/or leachate monitoring, and conducting a review of the site every five (5) years to evaluate current conditions.

Present Worth: $222,000
Capital Cost: $81,800

Alternative 3 – Clay Soil Cover (Including Waste Consolidation, Grading, Surface Controls) and Limited Action Items

Alternative 3 would include consolidating the black ash then covering the black ash material with a layer of clean soil. Black Ash material identified on the adjacent ANC property would be consolidated into the waste mass on the site. Black Ash materials on the site would be moved to an area of reduced foot print away from the river. Regrading of the site would be combined with construction of diversion berms and lined drainage ways to control storm water flow and infiltration. The black ash material would be covered with an 18" layer of clean soil of low permeability (projected 10^{-5}). Six inches of soil capable of supporting vegetation would be placed on top of the 18" layer of soil cover. Soil cover would comply with the requirements provided in 6 NYCRR Part 375, 6.7 (d).
The primary purpose of this alternative would be to isolate the black ash waste media from the surface environment. Other benefits of this alternative would include minimizing erosion of the ash, re-directing surface runoff over and around the waste mass, and minimizing ash contact/transport to the river environment.
Additionally, institutional controls such as an environmental easement would be implemented as part of this alternative.

Present Worth: . . . . . *$*618,200
Capital Cost: . . . . . *$*472,900

Alternative 4 – Soil Cover, Including Grading to Control Storm Water Flow and Infiltration, Riverbank Stabilization Features with Limited Actions

Alternative 4 would include consolidation of the black ash, then covering the black ash material with a layer of clean soil combined with the construction of riverbank stabilization features. Black Ash material identified on the adjacent ANC property would be consolidated into the waste mass on the site. Black Ash materials on the site would be moved to an area of reduced foot print away from the river. Regrading of the site would be combined with construction of diversion berms and lined drainage ways to control storm water flow and infiltration. The black ash material would be covered with an 18" layer of clean soil of low permeability (projected 10^{-5}). Six inches of soil capable of supporting vegetation would be placed on top of the 18" layer of soil cover. Soil cover would comply with the requirements provided in 6 NYCRR Part 375, 6.7 (d). The riverbank stabilization would include construction of an earthen dike to an elevation which would prevent the river from coming in contact with the constructed black ash area and the constructed wetland treatment system proposed by the Town. The earthen dike would be reinforced with rip rap on a 2.5 to 1 slope and underlain with a geotextile fabric. Natural plants, such as willow stakes, would be used on the face of the riverbank to provide a transition zone which would support the natural ecology but be resistant to erosion. It may be necessary to include some short sheet piling at the east end of the project near the boat launch to stabilize the bank without impacting the boat launch.
The primary purpose of this alternative would be to isolate the black ash waste media from the surface environment. Other benefits of this alternative would include minimizing erosion of the ash, re-directing surface runoff around and over the waste mass, minimizing ash contact/transport to the river environment, and stabilizing the river bank to prevent the ash from being exposed to the river.
Additionally, institutional controls such as an environmental easement would be implemented as part of this alternative.

Present Worth: . . . . . *$*3,718,100
Capital Cost: . . . . . *$*3,572,800

Alternative 5 - Engineered Cap, Upgradient Groundwater Collection/Diversion Trench and Limited Action Items

Alternative 5 would include construction of an engineered cap over the consolidated ash, combined with construction of riverbank stabilization features. The engineered cap would be generally consistent with 6 NYCRR Part 360 regulations. Regrading of the site would be combined with construction of diversion berms and lined drainage ways to control storm water flow and infiltration. The black ash material would be covered with an engineered cap. Six inches of soil capable of supporting vegetation would be placed on top of the constructed cap. Soil cover would comply with the requirements provided in 6 NYCRR Part 375, 6.7 (d). The riverbank stabilization would include construction of an earthen dike to an elevation which would prevent the river from coming in contact with the constructed black ash area and the constructed wetland treatment system proposed by the Town. The earthen dike would be reinforced with rip rap on a 2.5 to 1 slope and underlain with a geotextile fabric. Natural plants, such as willow stakes, would be used on the face of the riverbank to provide a transition zone which would support the natural ecology but be resistant to erosion. It may be necessary to include some short sheet piling at the east end of the project near the boat launch to stabilize the bank without impacting the boat launch.
The primary purpose of this alternative would be to isolate the black ash from the surface environment and minimize the generation of ash related leachate and transport thereof to shallow groundwater and the near river environment. Other benefits of this alternative would include minimizing the erosion of the ash, re-directing surface runoff over and around the waste mass, minimizing ash contact/transport to the river, and stabilizing the river bank to prevent the ash from being exposed to the river.
Additionally, institutional controls such as an environmental easement would be implemented as part of this alternative.

Present Worth: $5,402,100
Capital Cost: $5,256,900

Alternative 6 - Engineered Cap, Upgradient Groundwater Cutoff/Diversion Wall, Limited Action Items, and Supplemental Remedial Measures

Alternative 6 consists of constructing an engineered cap over the Black Ash Pond, constructing an upgradient slurry wall to minimize (almost eliminate) the flow of groundwater through the black ash, combined with construction of riverbank stabilization features. The primary difference between alternatives 5 & 6 is; alternative 6 includes the construction of 1,800 feet of slurry wall along the south and west sides of the waste mass.
The primary purpose of this alternative would be to isolate the black ash waste media from the surface environment and significantly minimize the generation of ash related leachate and transport of such leachate to the local shallow groundwater and the Boquet River. Other benefits of this alternative would include minimizing erosion of the ash waste, directing surface runoff over and around the Black Ash Pond, minimizing black ash contact/transport to the river environment, and stabilizing the river bank to prevent the ash from being exposed to the river.
Additionally, institutional controls such as an environmental easement would be implemented as part of this alternative.

Present Worth: . . . . . *$*5,568,320
Capital Cost: . . . . . *$*5,423,100

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of environmental restoration projects in New York A detailed discussion of the evaluation criteria and comparative analysis is included in the RA report.

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

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

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

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

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

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

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

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

7. Cost-Effectivness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 1 at the end of the PRAP.

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

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

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 4, Soil Cover (including grading to control storm water and infiltration), Riverbank Stabilization Features with Limited Actions as the remedy for this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the SI and the evaluation of alternatives presented in the RAR.

Alternative 4 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by providing a barrier to the waste, eliminating direct contact. Consolidating the waste mass, regrading the property, and decreasing the severity of the slope along the river bank, would decrease the erosional forces currently exposing and transporting the ash to the river. This would reduce the impact of the ash and the contaminants in the ash on the River. Precipitation and runoff both infiltrate into the waste mass as it exists today. Regrading the surface of the site and the proposed storm water control would divert the water which currently infiltrates into the waste mass and reduce the contaminant impact on the groundwater. Stabilizing the stream bank would eliminate the impact of the ash on the river and the fish and wildlife ecosystems associated with the river. Regrading the site and stabilizing the stream bank would also increase the access to the Boquet River enhancing the recreational opportunities in this area.

Alternatives 1 and 2 do not satisfy the threshold criteria.

Alternative 3 would reduce the direct contact with the waste material, but does not provide long term effective means to reduce the stream bank erosion. The ash could be exposed to the river again in the future.

Because Alternatives 4, 5, and 6 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site. Each of these alternatives would involve regrading and providing a cover for the site, and stabilizing the stream bank. To eliminate direct contact with the waste, Alternative 4 would provide for a soil cover, Alternatives 5 & 6 would provide for an engineered cap. To control water infiltration into the waste, Alternatives 4 & 5 would provide for storm water controls, alternative 6 would provide for a slurry wall to eliminate groundwater movement into the waste mass. Each of these combinations of methods would achieve the criteria for remediation at this site. The cost of the

alternatives varies significantly. Alternative 4 satisfies the threshold criteria and the other criteria and is significantly less expensive than Alternative 5 or 6. Alternative 4 is the recommended alternative.

The estimated present worth cost to implement the remedy is $3,718,100. The cost to construct the remedy is estimated to be $3,572,800 and the estimated average annual costs for 30 years is $12,900.

The elements of the proposed remedy are as follows:

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

2. Establish erosion and sediment controls consistent with a Storm Water Pollution Prevention Plan to be developed for this site to protect the Boquet River during the remedial activities.

3. Clear the trees and vegetation from the site. In order to consolidate the ash and regrade the site to meet the design requirements, it will be necessary to remove the existing trees and vegetation.

4. Consolidate the black ash waste, including the black ash identified on the Adirondack Nature Conservancy property. Black ash wastes found on the ANC property during the SI would be moved to the black ash lagoon area. Wastes within the lagoon, particularly those adjacent to the river, would be consolidated away from the river to achieve the designed contours of the remedial project. The site would be graded to mitigate the infiltration of water by diverting storm water flow around the waste mass and eliminate ponding on the waste mass.

5. Construct the stream bank stabilization features. Construct an earthen dike to an elevation which would prevent the river from coming in contact with the constructed black ash area and the constructed wetland treatment system proposed by the Town. The earthen dike would be reinforced with rip rap on a 2.5 to 1 slope and underlain with a geotextile fabric. Natural plants, such as willow stakes, would be used on the face of the riverbank to provide a transition zone which would support the natural ecology but be resistant to erosion. It may be necessary to include some short sheet piling at the east end of the project near the boat launch to stabilize the bank without impacting the boat launch.

6. A soil cover would be constructed over all of the combined black ash to prevent exposure to contaminated soils. Diversion berms and lined drainage ways would be constructed to control storm water flow and infiltration. The surface of the cover would be graded to provide proper storm water control, drainage, and enhanced recreational opportunities. The 2-foot thick cover would consist of 18 inches soil cover and 6 inches of soil of sufficient quality to support vegetation chosen to protect the cover and enhance the recreational opportunities along the river. Soil cover would comply with the requirements provided in 6 NYCRR Part 375, 6.7 (d). Non-vegetated areas (buildings, roadways, parking lots, etc.) would be covered by a paving system or concrete at least 6 inches thick.

7. Imposition of an institutional control in the form of an environmental easement that would require (a) limiting the use and development of the area of the black ash to restricted residential use (restricted residential use as defined in 6 NYCRR Part 375 would include recreational activities); (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

8. Development of a site management plan which would include the following institutional and engineering controls: (a) management of the final cover system to restrict excavation below the soil layer, pavement, or buildings. Excavated soil would be properly handled to protect the health and safety of workers and the nearby community, and would be properly managed in a manner acceptable

to the Department; (c) identification of any use restrictions on the site; (d) provisions for the continued proper operation and maintenance of the components of the remedy.

9. The municipality (or other property owner) will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the municipality in writing that this certification is no longer needed. This submittal would:(a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

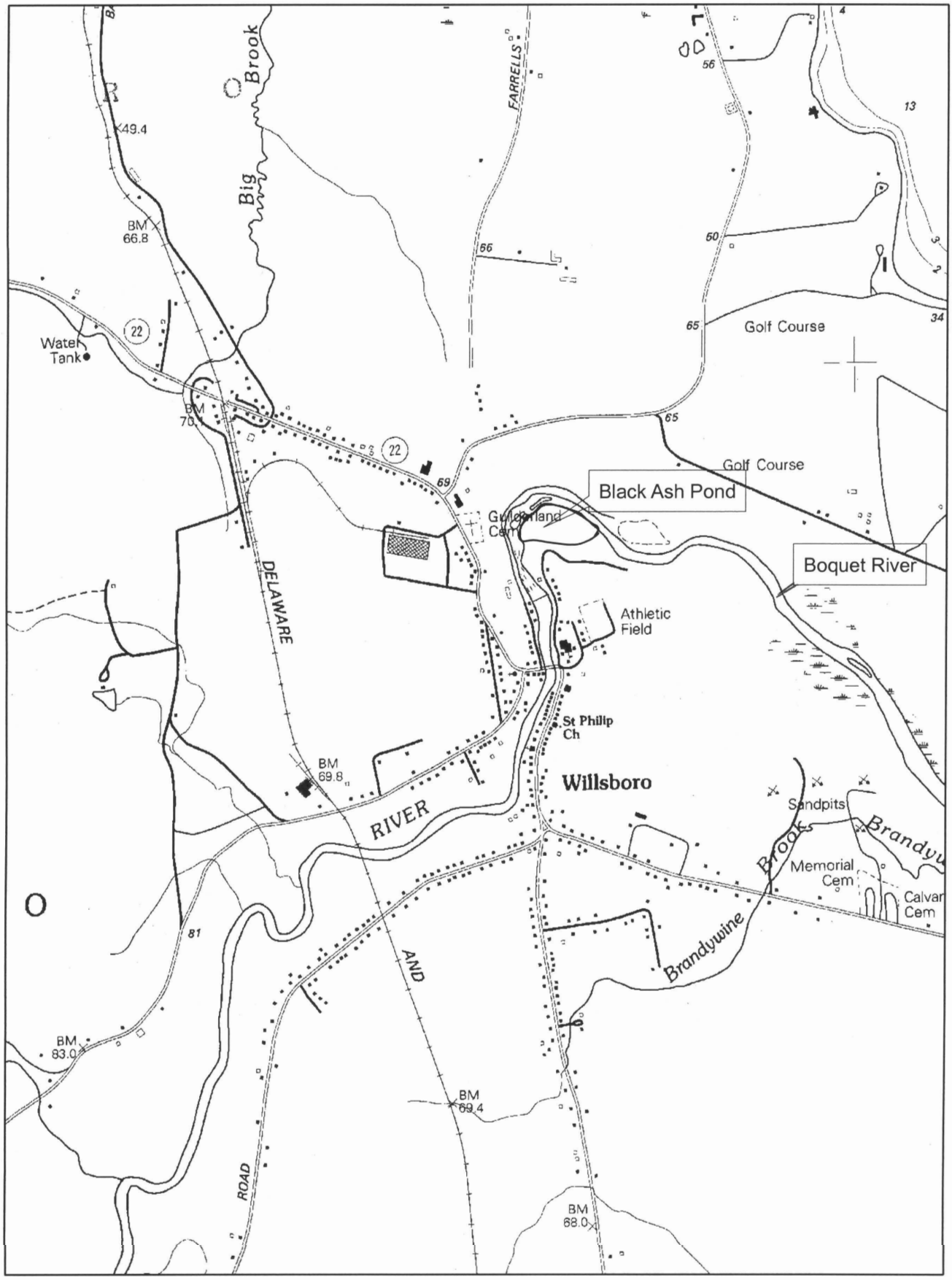

Figure 1
Willsboro Black Ash Pond
Site Location Map

Note:

Map of Survey Prepared for Town of Willsboro and Earth Science Engineering, P.C. By Kevin A. Hall, L.S., Dated August 29, 2005.

~ SAMPLING LEGEND ~

- TT-18 — TEST TRENCH AND ELEVATION
- MW-5 — MONITORING WELL AND ELEVATION
- B-10 — BORING AND ELEVATION
- WM-2 — WASTE MEDIA SAMPLE (APPROX. LOCATION)
- SD-1 — RIVER SEDIMENT SAMPLE (APPROX. LOCATION)

Note:
Waste Media Sampling Location WM-2, 3 and 4 and upstream River Sediment Sampling Location SD-6 are shown offset from their actual location due to the scale of the Sampling Location Plan. Downstream River Sediment Sampling Locations SD-4 and 5 are not shown due to their greater offset from the map scale.

WM-2 WM-3 WM-4 WM-1

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-10 B-11 B-12

TT-1 TT-2 TT-3 TT-4 TT-5 TT-8 TT-9 TT-10 TT-11 TT-12 TT-13 TT-14 TT-15 TT-16 TT-17 TT-18 TT-19 TT-20 TT-21 TT-23 TT-24 TT-25 TT-26 TT-27 TT-28 TT-29 TT-30 TT-31 TT-32 TT-33 TT-34 TT-35 TT-36 TT-37 TT-38 TT-39 TT-40

SD-1 SD-2 SD-3 SD-6

APPROXIMATE LIMITS OF BLACK ASH

Figure 2
Sample Locations

SITE INVESTIGATION REPORT
BLACK ASH POND

TOWN OF WILLSBORO — ESSEX COUNTY NEW YORK

ESE
Earth Science Engineering, P.C.
P.O. Box 226
Willsboro, New York 12996
Tel. (518) 963-8133
Fax (518) 963-7490

SAMPLING LOCATION PLAN

SCALE 1" = 150'

Figure 3
Groundwater Flow Direction

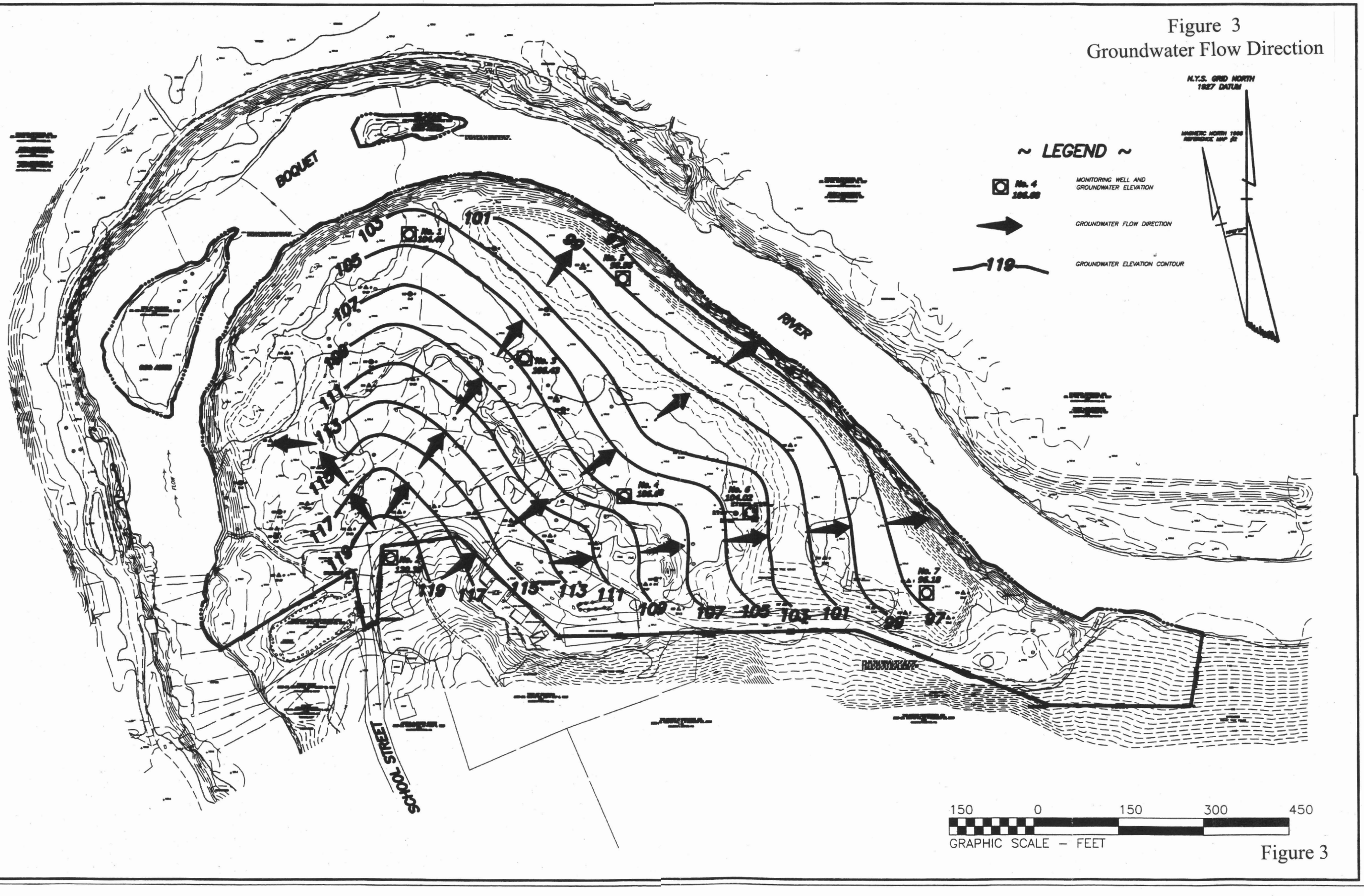

Figure 3

Note:

Map of Survey Prepared for Town of Willsboro and Earth Science Engineering, P.C. By Kevin A. Hall, L.S., Dated August 29, 2005.

~ SAMPLING LEGEND ~

- TT-18 — TEST TRENCH AND ELEVATION
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Note:
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Figure 4
Extent of the Waste

WM-2
WM-3
WM-4
WM-1
SD-1
SD-2
SD-3
SD-6
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-10
B-11
B-12
TT-1
TT-2
TT-3
TT-4
TT-5
TT-7
TT-8
TT-9
TT-10
TT-11
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TT-34
TT-35
TT-36
TT-37
TT-38
TT-39
TT-40
Extent of the Waste
APPROXIMATE LIMITS OF BLACK ASH

SITE INVESTIGATION REPORT
BLACK ASH POND
TOWN OF WILLSBORO ESSEX COUNTY NEW YORK

ESE
Earth Science Engineering, P.C.
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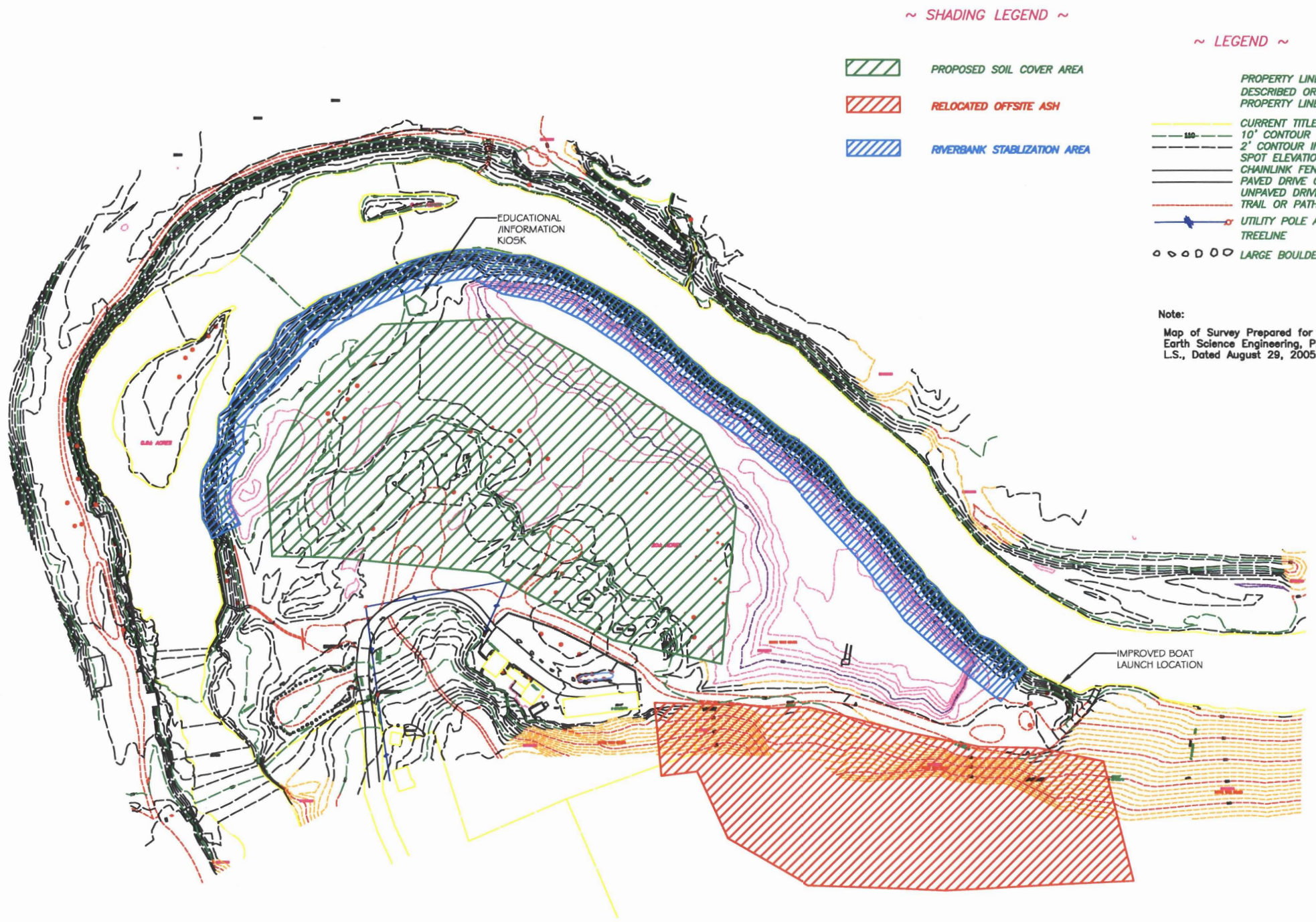
Willsboro, New York 12996
Tel. (518) 963-8133
Fax (518) 963-7490

SAMPLING LOCATION PLAN
SCALE 1" = 150'

Figure 5



~ SHADING LEGEND ~

PROPOSED SOIL COVER AREA

RELOCATED OFFSITE ASH

RIVERBANK STABILIZATION AREA

~ LEGEND ~

PROPERTY LINE AND CORNER MARKER AS DESCRIBED OR C.P. = COMPUTED POINT

PROPERTY LINE ALONG EDGE OF RIVER

CURRENT TITLE LINE

10' CONTOUR INTERVAL

2' CONTOUR INTERVAL

SPOT ELEVATION

CHAINLINK FENCELINE

PAVED DRIVE OR ROAD

UNPAVED DRIVE OR ROAD

TRAIL OR PATH

UTILITY POLE AND OVERHEAD WIRES

TREELINE

LARGE BOULDERS

Note:

Map of Survey Prepared for Town of Willsboro and Earth Science Engineering, P.C. By Kevin A. Hall, L.S., Dated August 29, 2005.

ALTERNATIVE 4
CONCEPTUAL DESIGN
BLACK ASH POND

TOWN OF WILLSBORO ESSEX COUNTY NEW YORK

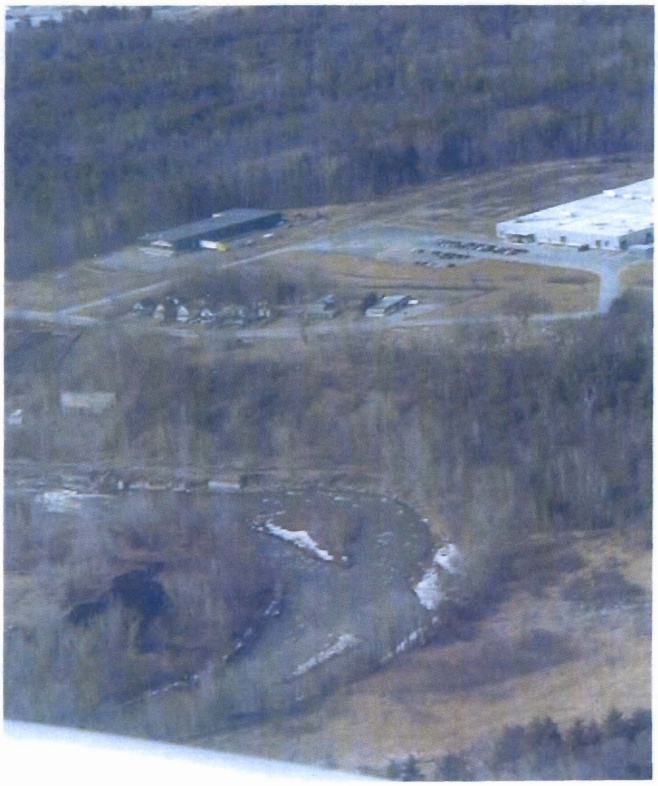
ESE

Earth Science Engineering, P.C.
P.O. Box 226
Willsboro, New York 12996
Tel. (518) 963-8133
Fax (518) 963-7490

PLAN
DATE: 1/26/07
Scale: NTS

Figure 5

Black Ash Pond, looking west



Black Ash Pond and Sludge Lagoon, looking west

Town Waste Water Treatment Plant with Black Ash Pond in foreground

Former Pulp Mill

View from the river of the eroded bank

Black ash collapsing into the river

Table 1
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Action	0	0	0
Restricting Access and Monitoring	$81,800	$12,900	$222,000
Soil Cover, Limited Actions	$472,900	$6,000	$618,200
Soil Cover, River bank stabilization	$3,572,800	$6,000	$3,718,100
Engineered Cap, Stabilization	$5,256,900	$6,000	$5,402,100
Engineered Cap, Stabilization, Groundwater cutoff	$5,423,100	$6,000	$5,568,300