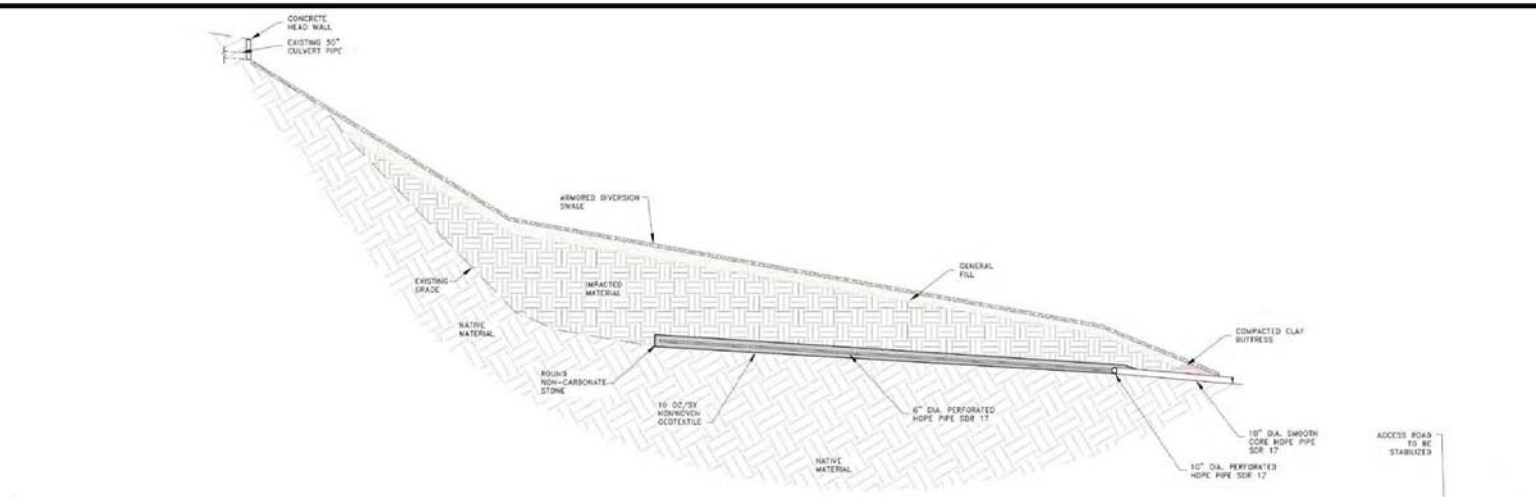
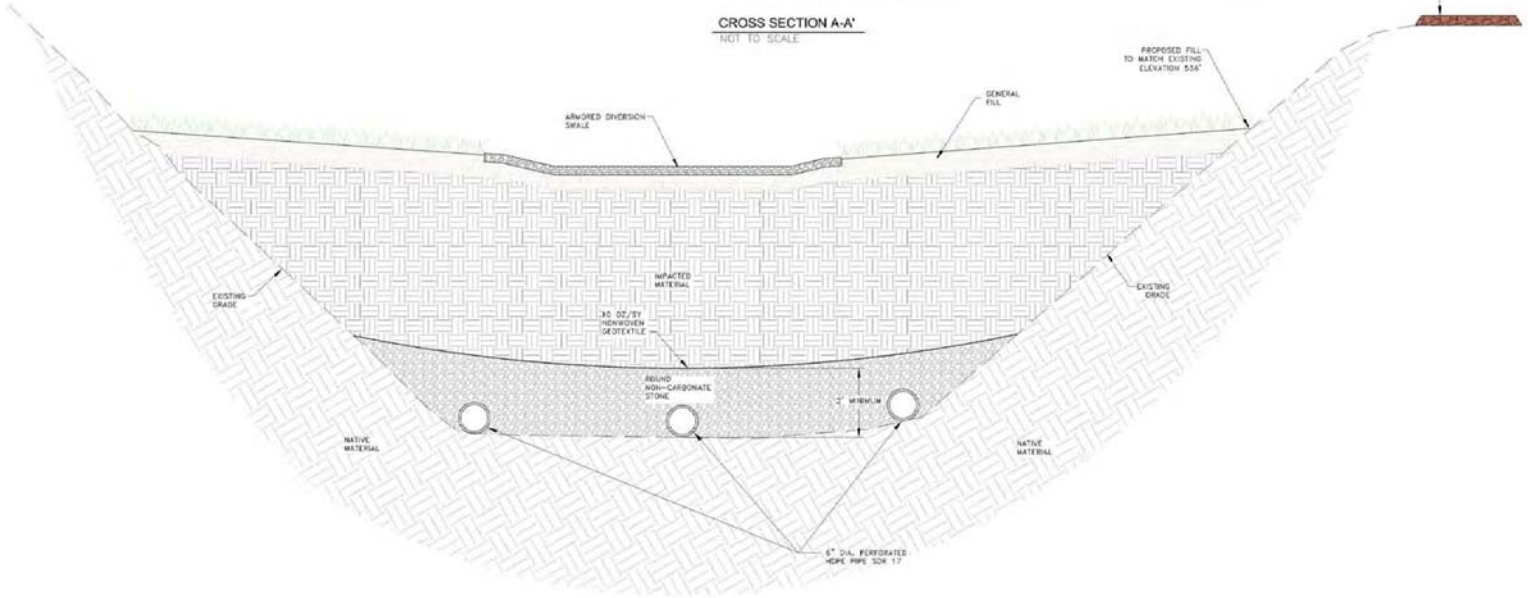


CROSS SECTION A-A'
NOT TO SCALE



CROSS SECTION B-B'
NOT TO SCALE

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FIGURE 6-5
OU 1 Alternative 5 and 6:
Cross Sections and Details

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	PROJECT NO:	DATE:	SCALE:	FILE NO:
RSC	RSC	MEM	RSC	1490705	FEBRUARY 2013	NTS	GIS\Projects\ FIGURE6-5.MXD

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FIGURE 6-6
OU1 Alternative 7:
Partial Removal and Off-Site Disposal
with In-Situ Stabilization of Shallow Waste

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RSC	MEM	MEM	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-6.MXD

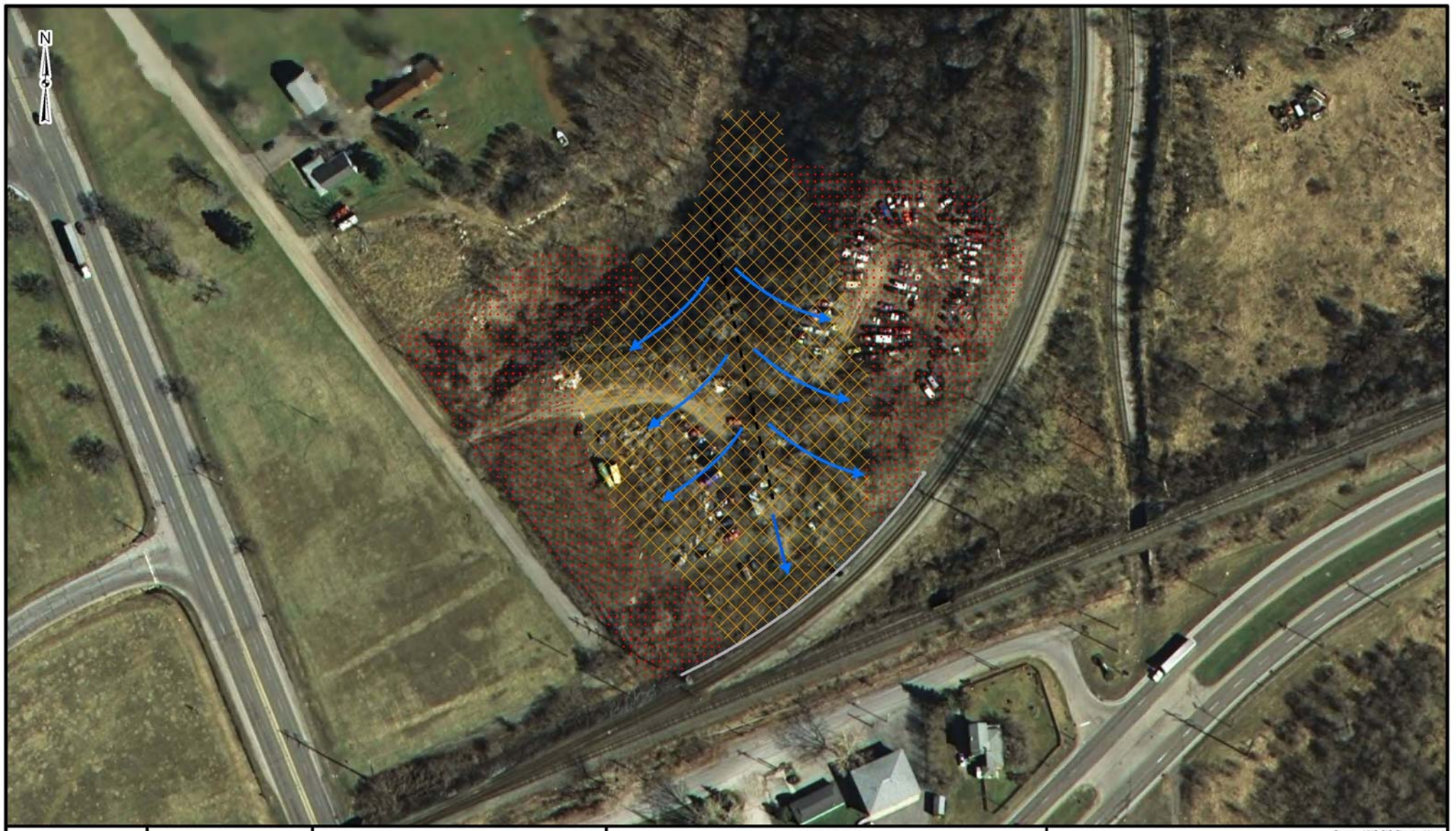

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FIGURE 6-7
OU1 Alternative 8:
Partial Removal, Ex Situ Stabilization and On-Site Placement with In Situ Stabilization of Shallow Waste

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RSC	MEM	MEM	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-7.MXD

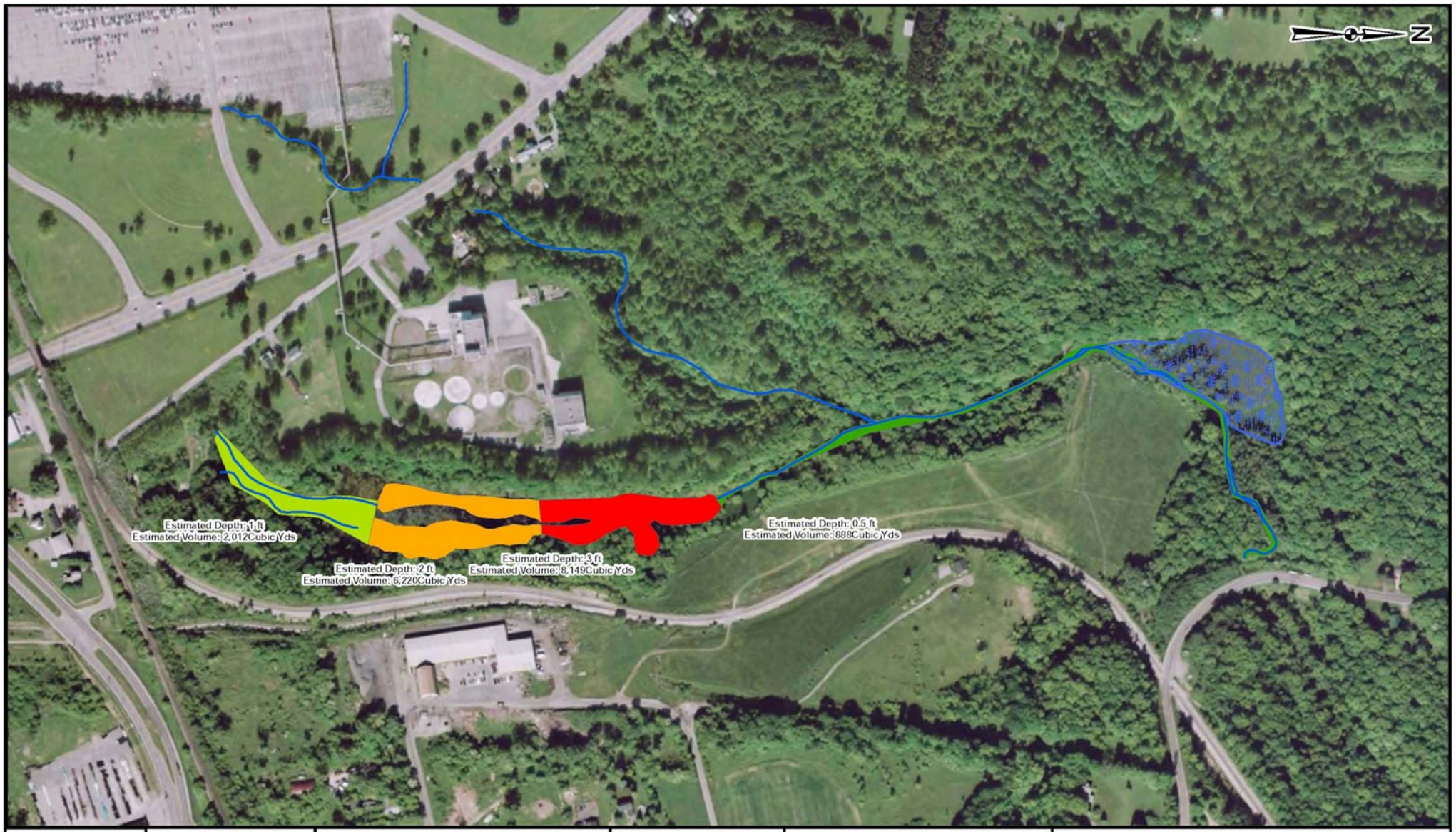

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FIGURE 6-8
OU 2 Treatment Area

0 150 300 600 Feet
1 inch = 300 feet

Source: NYS GIS Clearing House

Legend
Estimated Sediment Depth
- 0.5 ft
- 1 ft
- 2 ft
- 3 ft

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RSC	RSC	JCP	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-8.MXD

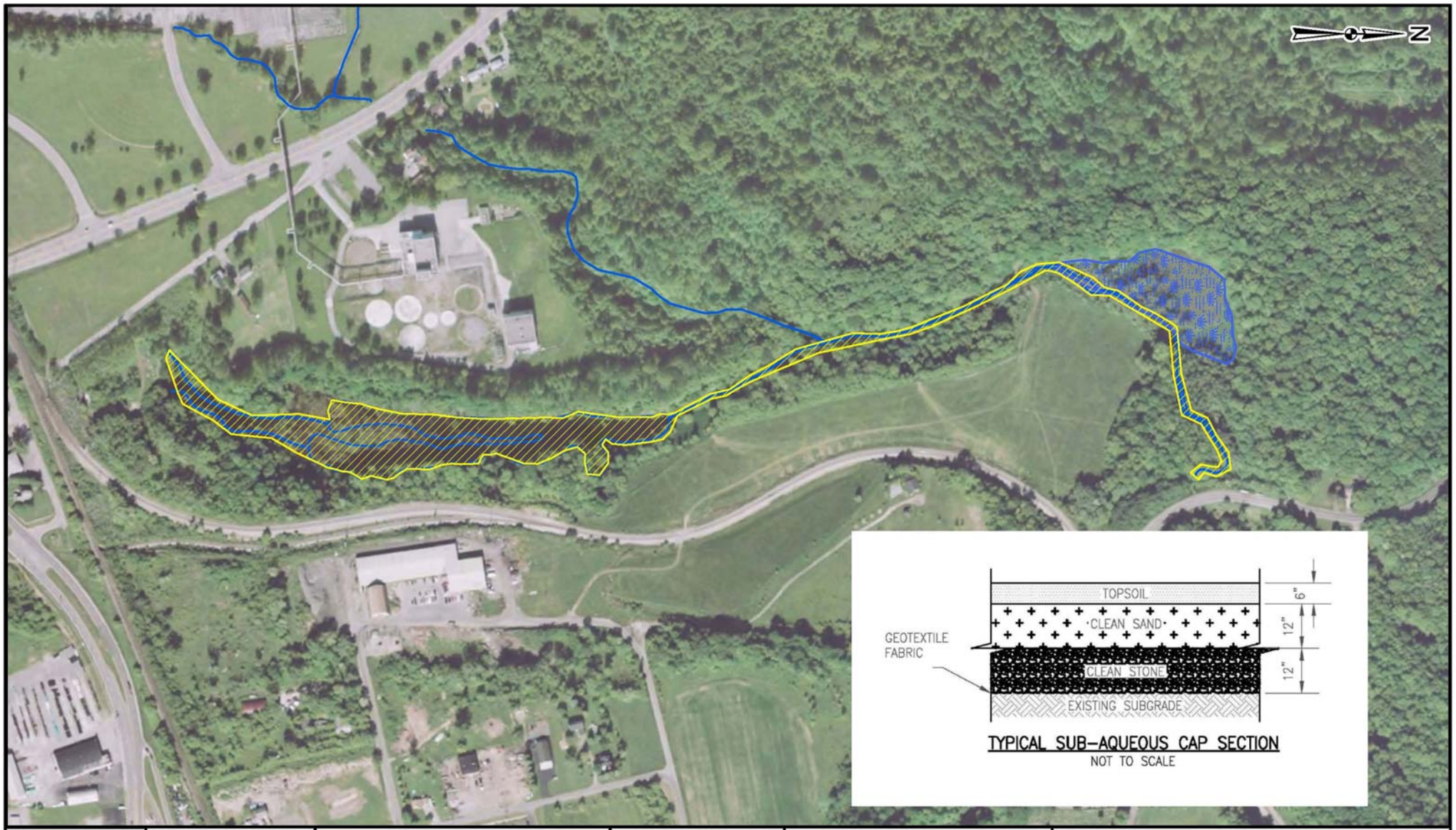

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FIGURE 6-9
OU 2 Alternative 2:
Mult-Media
Sub-Aqueous Capping

0 150 300 600 Feet
1 inch = 300 feet

Source: NYS GIS Clearing House

Legend
Multi-media Sub-aqueous Cap Area

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	PROJECT NO:	DATE:	SCALE:	FILE NO:
RSC	RSC	JCP	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-9.MXD

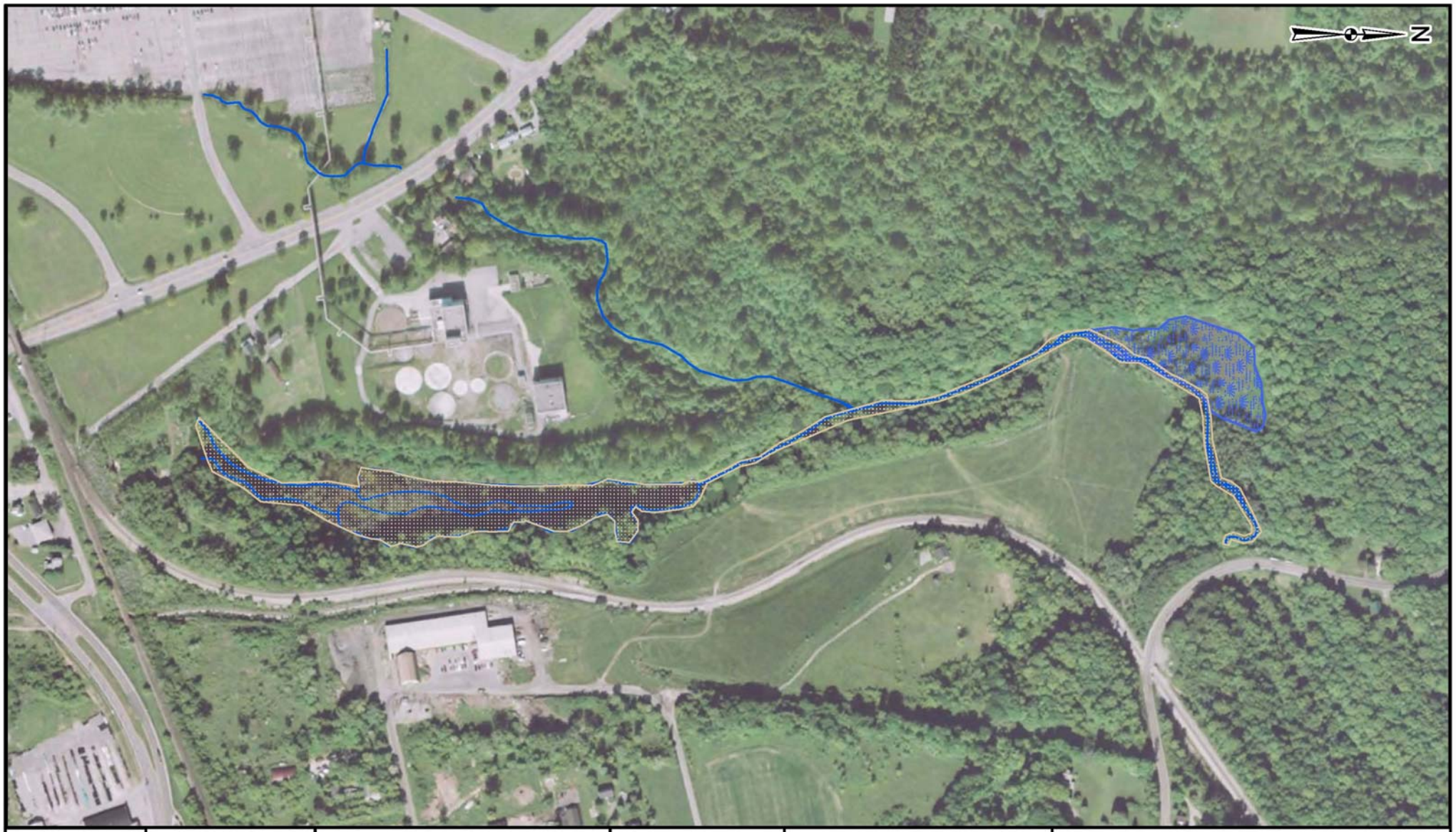

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FIGURE 6-10
OU 2 Alternative 3:
In Situ Sediment Amendment

0 150 300 600 Feet
1 inch = 300 feet

Source: NYS GIS Clearing House

Legend
Sediment Amendment Area

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	PROJECT NO:	DATE:	SCALE:	FILE NO:
RSC	RSC	JCP	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-8.MXD

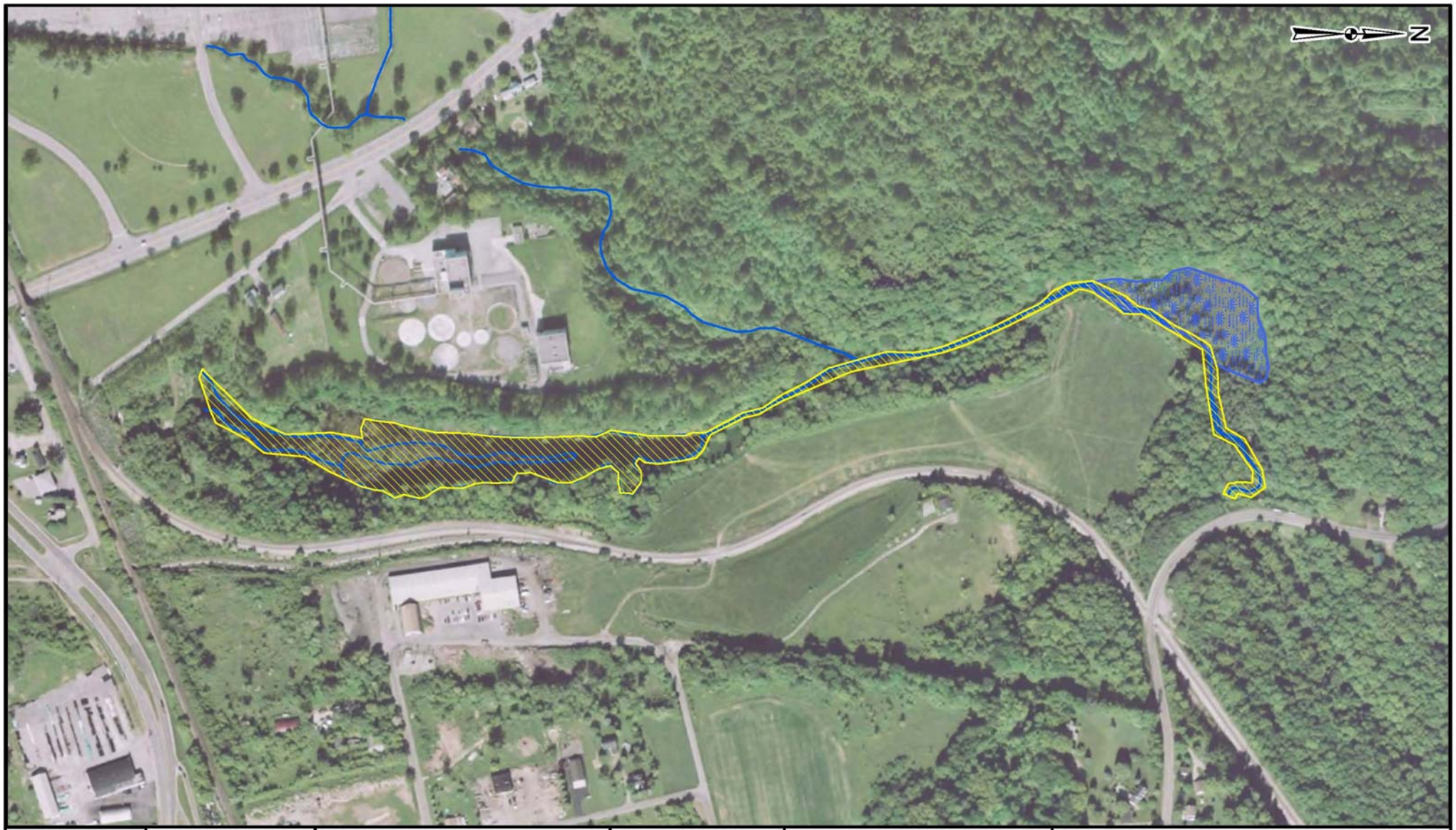

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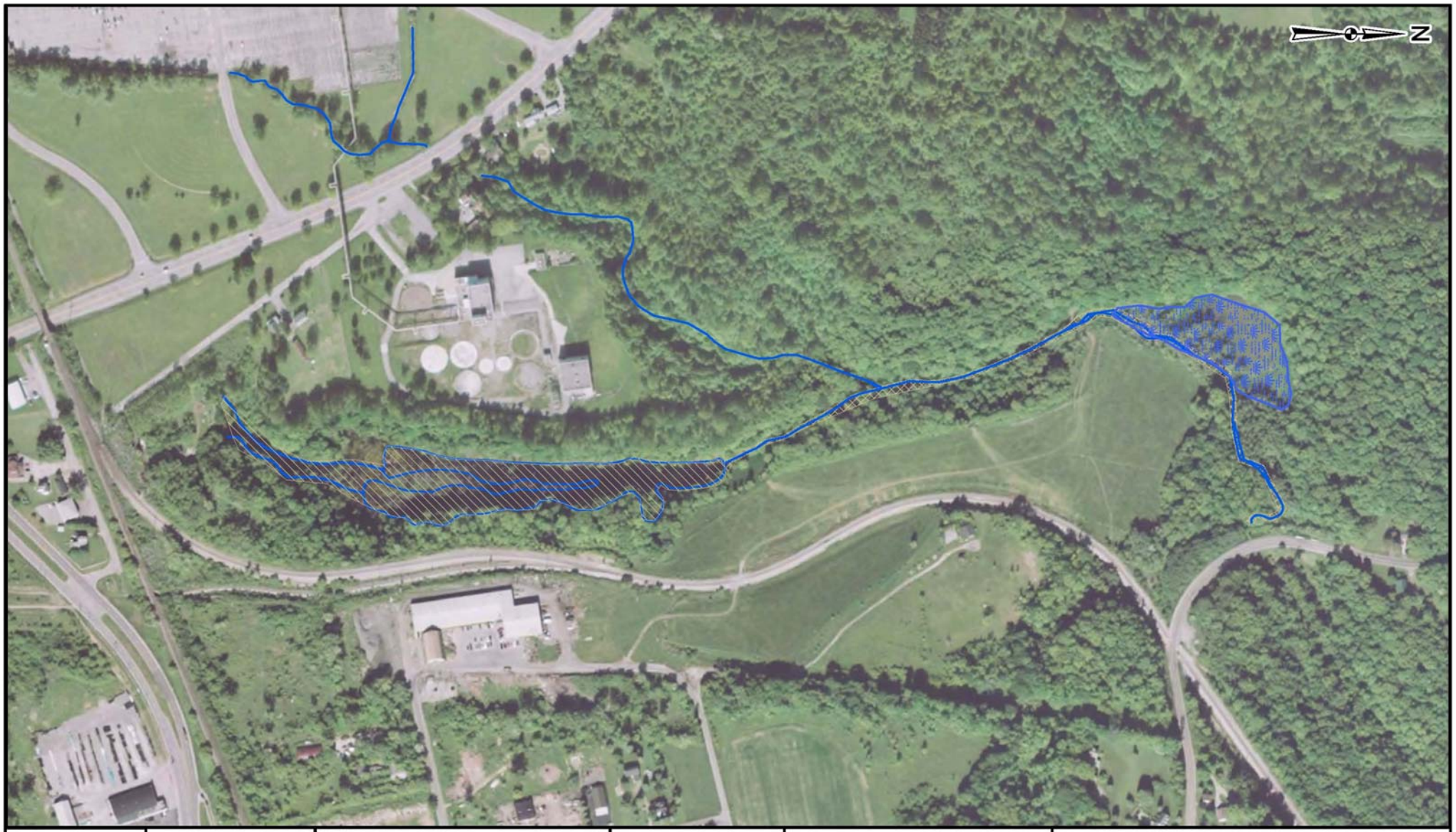
FIGURE 6-11
OU 2 Alternative 4:
Complete Removal with Disposal

0 150 300 600 Feet
1 inch = 300 feet

Source: NYS GIS Clearing House

Legend
Dredge Area

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	PROJECT NO:	DATE:	SCALE:	FILE NO:
RSC	RSC	JCP	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-11.MXD



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LOCKPORT, NEW YORK

FIGURE 6-12
OU 2 Alternative 5:
PartialRemoval with Multi-Media
Sub-Aqueous Capping

0 150 300 600 Feet
1 inch = 300 feet

Source: NYS GIS Clearing House

Legend
Residual Cap Area
Dredge Area

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	PROJECT NO:	DATE:	SCALE:	FILE NO:
RSC	RSC	JCP	RSC	1490705	FEBRUARY 2013	AS SHOWN	GIS\Projects\ FIGURE6-12.MXD

TABLE 5-1 TECHNOLOGY SCREENING MATRIX

SOIL/FILL MATERIAL (OPERABLE UNIT 1)						
Technology	**Process Options**	**Effectiveness in Addressing RAOs**	**Implementability**	**Key Factors**	**Cost**	**Status**
No Action						
No Action	NA	Ineffective	Easily implemented	NA	None	Retained per NCP
Site Management						
Engineering and Institutional Controls	Land use restrictions	Effective for human health risk RAOs associated with contact of fill	Easily implemented	Requires regulatory and public acceptance of restricted/diminished resource use.	Low	Retained for potential combination with other technologies.
***In-situ* Biological Treatment**						
Phytoremediation	Reliance on natural processes and chemical change	Ineffective due to thickness of fill impacts	Easily implemented; requires demonstration of natural processes causing attenuation and subsequent monitoring	Appropriate only for sites where chemical contamination is relatively shallow. Requires regulatory and public acceptance of short term restrictions on resource use.	Low	Not retained due to depths of soil/fill contamination.
Containment						
Landfill Capping	Multi-media cap	Effectively addresses RAOs associated with contact of fill.	Moderately difficult to implement; requires import of sand, stone, clay placement; monitoring of cap thickness; periodic maintenance and monitoring; steepness of ravine would require substainial earthwork design.	Would require site grading changes and/or consolidation of waste; effective in long term source control; would require long-term groundwater treatment technology.	Moderate	Not retained.
	Impermeable Liner (e.g., clay, plastic, etc.)	Effectively addresses RAOs associated with contact of fill.	Moderately difficult to implement; requires periodic maintenance and monitoring, and steepness of ravine would require substainial earthwork design.	Would require site grading changes and/or consolidation of waste; effective in long term source control; would require long-term groundwater treatment technology.	Moderate	Retain for consideration.
***In Situ* Physical/Chemical Treatment**						
In-situ Stabilization	Addition of amendments/reagents to soil/fill to convert contaminants to stable compounds with reduced or eliminated leaching potential; requires *in-situ* mixing	Effective for risk-based RAOs and partially effective for source control; would require leachability testings to measure the immobility of contaminants	Depth of contaminants significantly limit the effectiveness of in-situ process; requires import and availability of suitable materials/reagents (e.g.,activated carbon, gypsum, apatite, etc.); stabilization below groundwater table is difficult; periodic monitoring.	Causes significant disturbance to site that may hinder future use; volume increase with bulk can be significant.	Moderate for Shallow Soils (~$60/yd^3) High at Depth (~$250/yd^3)	Retained for potential combination with other technology.
Soil Flushing	Extraction of contaminants from soil with water or other suitable aqueous solutions; soil flushing process includes injection or infiltration process of extraction fluid through soil *in-situ* .	Thickness and permeability of fill may hinder effectiveness	Considered an emerging technology, has not been widely implemented; Moderately difficult to implement; addition of environmentally compatible solvents may be used to increase effective solubility of some COCs; however, flushing solution may alter the physical/chemical properties of the soil system; technology offers the potential for recovery of metals and can mobilize a wide range of organic and inorganic contaminants from coarse-grained soils;	Capture of groundwater and flushing fluids with desorbed contaminants may need treatment to meet appropriate discharge standards prior to release to local, publicly owned wastewater treatment works or receiving streams; separation of solvents from recovered flushing fluid, for reuse in the process, is a major factor in the cost of soil flushing. Treatment of the recovered fluids results in process sludges and residual solids, such as spent carbon and spent ion exchange resin, which must be appropriately treated before disposal. Residual flushing additives in soil may be a concern.	High	Not retained.
Removal						
Excavation	Mechanical excavation used to remove soil/fill material	Will address relevant RAOs, assuming use of handling treatment/disposal options discussed below	Implementable; moderately difficult to implement; requires ravine access by excavation equipment; potential for dewatering needs once GW is encountered; staging/access/mobility at base of ravine will be limiting; base of ravine will need to be stabilized for excavation equipment	Could require establishment of dewatering facilities which could slow process.	High	Retain for consideration
***Ex-situ* Physical/Chemcial Treatment**						
Solidification or Stabilization	Amendments added to modify physical and chemical properties of material to facilitate handling and disposal	Effective at immobilizing inorganics within fill.	Relatively easy to implement; can be performed on small batches as material is staged for transport; requires import and addition of amendments; result is decreased water content and toxicity and mobility of contaminants; volume increase.	Requires use of amendments to achieve stabilization	Moderate	Retain for consideration.
Ex-situ chemical treatment	Acid leaching used to remove inorganics from soil/fill	Permeability of fill may hinder effectiveness.	Difficult to implement; requires establishment of a designated treatment facility using potentially hazardous chemicals to remove inorganics from fill.	Requires long term use of facilities for soil/fill treatment and disposal or recycling of leached fluids; rate of treatment may limit rate of excavation and disposal; requires use and maintenance of specialized equipment and chemicals	High	Not retained.
	Vitrification used to convert inorganic contaminants to inert forms	Permeability of fill may hinder effectiveness.	Difficult to implement; requires establishment of a designated treatment facility using high temperature processes to vitrify soil/fill	Requires long term use of facilities for soil/fill treatment and disposal; rate of treatment may limit rate of excavation and disposal; requires use and maintenance of specialized equipment	High	Not retained.
Disposal						
Off-site Disposal	Off-site commercial landfill	May be required for excavation options to meet RAOs	Low degree of difficulty to implement; requires identification of landfills capable of accepting material; landfill capacity and permitting may limit excavation and disposal rates.	Material may require dewatering, stabilization, or treatment to meet criteria for acceptance. Long range transport may be required dependent on landfill capacity/location; extensive site work and earthwork to accommodate transportation of material;	High	Retain for consideration
	Adjacent City of Lockport closed landfill	May be required for excavation options to meet RAOs	Moderately difficult to implement; requires design of a landfill capable of accepting material.	Requires permission and approval from City of Lockport for redesign of landfill; access roads would need to be constructed connecting excavation area to landfill; extensive site work and earthwork to accommodate excavation of material.	Moderate	Not retained, volume to large for available space at local site.
On-site Disposal	On-site landfill	May be required for excavation options to meet RAOs	Difficult to implement; requires designation and design of a landfill area capable of placing material.	Identification of landfill area at the site and subsequent design and construction; limited to avaiable size of site.	High	Not retained, volume to large for available space onsite.

NOTE: RAO = Remedial Action Objective
NA = Not Applicable
NCP = National Contigency Plan

TABLE 5-1 TECHNOLOGY SCREENING MATRIX

GROUNDWATER (OPERABLE UNIT 1)						
Technology	**Process Options**	**Effectiveness in Addressing RAOs**	**Implementability**	**Key Factors**	**Cost**	**Status**
No Action						
No Action	NA	Ineffective	Easily implemented	NA	None	Retained per NCP
Institutional Controls						
Engineering and Institutional Controls	Groundwater use restrictions; and long-term monitoring program	Effective for human health risk RAOs	Easily implemented	Requires regulatory and public acceptance of restricted/diminished resource use.	Low	Retained for use with other technologies
Containment						
Physical Barriers	A slurry wall is installed from the ground surface to a confining layer; contains contaminated groundwater; may also divert contaminated groundwater from drinking water intakes or toward a treatment system.	May be required for landfill capping options to meet RAOs	Easily implementable; requires the design/construction of engineered slurry wall or other type of physical barrier	Most effective when barrier is able to be keyed into a low permeability layer; cost increases greatly when installed deeper than 100 ft	Low	Retained for use with other technologies
***Ex Situ* Physical/Chemical Treatment**						
Filtration (Adsorption/Absorption)	Isolates solid particles by running a fluid stream through a porous medium; Utilizes gravity or a pressure differential across the filtration medium; chemicals are not destroyed; they are merely concentrated, making reclamation possible.	May be required for landfill capping options to meet RAOs	Moderate difficulty for implementation; would require design/construction of treatment process and facility; treatment building would be permanant and treatment times are extensive; requires long-term operation, maintence, and monitoring; hydrogeological data would be needed to determine flows rates and treatment process parameters	High concentrations of contaminants would require frequent replacement of adsorbent unit; chemicals are not destroyed, thereby requiring proper treatment, disposal, or reclamation	Moderate to High	Retained for use with other technologies
Precipitation/Flocculation	Pumping or capture of ground water through extraction wells or collection trench and then treatment to precipitate lead and other heavy metals. Metals removal employs precipitation with hydroxides, carbonates, or sulfides; Precipitating agent is added to water in a mixing tank along with flocculating agents; mixture then flows to a flocculation chamber that agglomerates particles, which are then separated from the liquid phase in a sedimentation chamber. Other physical processes, such as filtration, may follow.	May be required for landfill capping options to meet RAOs	Well designed treatment process for metals; Moderate difficulty for implementation; would require design/construction of treatment process and facility; treatment building would be permanant and treatment times are extensive; requires long-term operation, maintence, and monitoring; hydrogeological data would be needed to determine flows rates and treatment process parameters	Presence of a variety of metals may make removal of all constituents difficult, thereby requiring further treatment; resulting sludge requires TCLP testing prior to disposal; treated water may require pH adjustment	Moderate to High	Retained for use with other technologies
Ion Exchange	Groundwater is pumped through ion exchange resins. Resin is made of synthetic or natural materials the size of a grain of sand with the opposite charge of the contaminated ion. Resin can be regenerated for re-use after resin capacity has been exhausted.	May be required for landfill capping options to meet RAOs	Well designed treatment process for metals; moderate difficulty for implementation; would require design/construction of treatment process and facility; treatment building would be permanent and treatment times are extensive; requires long term operation, maintence, and monitoring; hydrogeological data would be needed to determine flows rates and treatment process parameters	High concentrations of suspended solid may cause resin blinding; groundwater pH needs to be considered when selecting the ion exchange resin; oxidants in groundwater may damage the ion exchange resin; may require additional treatment	Moderate to High	Retained for use with other technologies

TABLE 5-1 TECHNOLOGY SCREENING MATRIX

SEDIMENT (OPERABLE UNIT 2)						
Technology	**Process Options**	**Effectiveness in Addressing RAOs**	**Implementability**	**Key Factors**	**Cost**	**Status**
No Action						
No Action	NA	Ineffective	Easily implemented	NA	None	Retained per NCP
Site Management						
Engineering and Institutional Controls	Land use restrictions	Effective for human health risk RAOs associated with contact of fill	Easily implemented	Requires regulatory and public acceptance of restricted/diminished resource use.	Low	Retained for potential combination with other technologies
Containment						
In-situ Subaqueous Capping - Physical Barrier	Thin layer capping with armor material (gravel or stone, less than 1-ft thick)	Effective for risk-based RAOs; effectiveness for source control uncertain	Moderately difficult to implement; requires import of stone; placement in water; monitoring of cap thickness; periodic maintenance & monitoring.	May require filling shallow areas & may alter habitat; long term source control effective only if contaminant is of limited solubility; requires access easement for sewer.	Moderate	Not retained.
	Multi-media cap	Effectively addresses RAOs	Moderately difficult to implement; requires import of sand, stone, clay placement in water; monitoring of cap thickness; periodic maintenance and monitoring.	May require changes in bottom topography/habitat; effective in long term source control unless inorganic are soluble and upwelling is substantial; requires acceess easement for sewer.	Moderate	Retained for use
	Impermeable Liner (e.g., clay, plastic, etc.)	Effectively addresses RAOs	Implementable only for small areas because liners would destroy habitat; moderately difficult to implement; requires import of liners; placement in water; periodic maintenance and monitoring.	Covers over habitat but effectively blocks transport; requires access easement for sewer.	Moderate	Not retained.
In-situ Subaqueous Capping - Reactive Cap	Capping using activated carbon/organo-carbon in a thin layer (less than 3 in.)or mixed with sand	Effective for risk-based RAOs and partially effective for source control	Moderately difficult to implement; requires import of special materials (i.e. Sedi-mite, activated carbon, organic carbon, or similar products); placement in water; monitoring of cap thickness; periodic maintenance and monitoring.	May require filling some areas and substantial changes in bottom topography/habitat; effective in long term source control unless inorganics are soluble and upwelling is substantial; requires access easement for sewer.	Moderate	Not retained.
	Capping using sulfide complexed minerals (Mackinawite, gypsum, phosphogypsum), biopolymers (chitin/chitosan), or other compounds (zeolite, organoclay, apatite) in a thin layer (less than 3 in.) or mixed with sand	Effective for risk-based RAOs and partially effective for source control	Moderately difficult to implement; requires import of special materials (i.e. amendments); placement in water; monitoring of cap thickness; periodic maintenance and monitoring.	Causes minimal changes in bottom topography/habitat; long term effectiveness is still subject to evaluation; binding likely to decrease toxicity and dissolved phase mobility but does not inhibit physical transport; requires access easement for sewer.	Moderate	Not retained.
***In-situ* Biological Treatment**						
Phytoextraction	Reliance on natural processes for contaminant removal	Effective for risk-based RAOs and source control	Difficult to implement; limited to areas that will support wetland plant growth; requires planting of appropriate species and subsequent harvest for disposal. May require long time frames, and effectiveness may be limited.	Would require alteration of site wetland habitats; would not provide short-term risk reduction and overall effectiveness may be limited	Moderate	Retain for consideration.
***In Situ* Physical/Chemical Treatment**						
In-situ Chemical Treatment	Addition of amendments to sediment; may require *in situ* mixing	Effective for risk-based RAOs and partially effective for source control	Difficult to implement; requires import of special materials (e.g., Sedi-mite, activated carbon, gypsum, apatite, etc.); placement in water; mixing of upper layers of sediment; periodic monitoring.	Causes significant disturbance to habitat; effective long term source control for dissolved phase, but does not prevent physical transport	Moderate to high	Not retained.
In-situ Physical/Chemical Treatment	Solidification/stabilization	Effective for risk-based RAOs and source control	Difficult to implement; requires import of stabilization amendments; placement in water; mixing of upper layers of sediment; periodic monitoring.	Causes significant disturbance to habitat and long term change in sediment properties; effective long term source control	Moderate to high	Not retained.
Removal						
Hydraulic Dredging	Hydraulic excavation used to remove sediment	Will address relevant RAOs, assuming use of handling treatment/disposal options discussed below	Modertaley difficult to implement; requires waterway access by hydraulic dredging equipment; requires subsequent dewatering to remove water added by hydraulic conveyance and the addition of material amendments to facilitate handling and disposal; buried debris, rocks, or bedrock may limit dredging implementation.	Requires establishment of dewatering facilities; rate may be limited by distance to and capacity of dewatering facility; rate may also be affected by sediment type; dredging typically requires water quality monitoring and resuspension/residuals controls	High	Not retained.
Mechanical Dredging	Mechanical excavation used to remove sediment	Will address relevant RAOs, assuming use of handling treatment/disposal options discussed below	Moderately difficult to implement; requires waterway access by dredging equipment; less dewatering required than for hydraulic dredging; may require the addition of material amendments to facilitate handling and disposal; buried debris, rocks, or bedrock may limit dredging implementation.	Requires establishment of dewatering facilities; rate may be limited by dewatering practices; rate may also be affected by presence of debris or obstacles to dredging; dredging typically requires water quality monitoring and resuspension/residuals controls	High	Retained for consideration.
Disposal						
Off-site Disposal	Off-site commercial landfill	May be required for dredging options to meet RAOs	Modrately difficult to implement; requires identification of landfills capable of accepting material; landfill capacity may limit dredging and disposal rates.	Material may require dewatering, stabilization, or treatment to meet criteria for acceptance. Long range transport may be required dependent on landfill capacity.	High	Retained for consideration.
	Adjacent City of Lockport closed landfill	May be required for dredging options to meet RAOs	Moderately difficult to implement; requires design of a landfill capable of accepting material.	Material may require dewatering, stabilization, or treatment prior to placement; requires permission and approval from City of Lockport for redesign of landfill; access roads would need to be constructed connecting excavation area to landfill; extensive site work and earthwork to accommodate excavation of material.	Moderate	Retained for consideration.
On-site Disposal	On-site landfill	May be required for dredging options to meet RAOs	Difficult to implement; requires designation and design of a landfill area capable of accepting material.	Facility would require designation of landfill area and subsequent design and construction.	High	Retained for consideration.

TABLE 6-1 ALTERNATIVES SCREENING

OPERABLE UNIT 1: SOIL					
	Alternative 1A	**Alternative 1B**	**Alternative 2**	**Alternative 3**	**Alternative 4**
	No Action	**Site Management**	**Complete Removal with Off-Site Disposal**	***Ex Situ* Stabilization with Off-Site Disposal**	**Landfill Capping with a Part 360 Cap-Existing Landfill Footprint**
Size and Configuration of Process Options	NA	An environmental easement would be implemented at the site to limit the use of the property and groundwater. Groundwater monitoring would be conducted on an annual basis. A fence would be installed and maintained for site security.	Approximately 199,000 yd^3 of fill would be excavated from the site, to a 80 ft maximum depth. 119,000 tons of the excavated fill (assumed to be hazardous) would be disposed of at a permitted hazardous waste landfill. Remaining fill and debris would be transported to a general waste landfill. An approved source of fill would be used to construct 3:1 slopes into the existing ravine.	Approximately 199,000 yd^3 of fill would be excavated and treated on-site with a stabilizing amendment to be disposed of at a non-hazardous permitted disposal facility. An approved source of fill would be used to construct 3:1 slopes into the existing ravine.	Approximately165,000 yd^3 of fill would be excavated from the site to reduce the near vertical ravine walls to a 3:1 slope for the purpose of capping. Remaining fill would be covered with a full Part 360 cap.
Time for Remediation	NA	NA	Approximately 40 months	Approximately 40 months	Approximately 21 months
Spatial Requirements	None	None	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation activities. Area for equipment storage and loading and unloading for contaminated/clean soil (~100 X 400 ft).	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and backfill activities. Area for treatment and utilities equipment (~100 X 400 ft).	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and capping activities. Area for equipment storage and loading and unloading of contaminated soil (~100 X 400 ft).
Options for Disposal	NA	NA	Off-site disposal through approved hazardous waste and general waste facilities. Consideration for treatment and reuse of soils would be handled by the facility.	Off-site disposal for treated soil through approved facilities.	Off-site disposal for ravine slope fill through approved hazardous waste and general waste facilities.
Substantive Technical Permit Requirements	None	None	None	None	None
Limitations or Other Factors Necessary to Evaluate Alternatives	None	None	Disposal facilities will require TCLP analysis for waste characterization prior to acceptance.	Pilot test will be required for full evaluation.	Disposal facilities will require TCLP analysis for waste characterization prior to acceptance.
Public Impacts	Will not reduce exposure to contaminants.	Will not physically reduce exposure to contaminants.	Noise, dust, and traffic may disturb local residents.	Noise, dust, and traffic may disturb local residents.	Noise, dust, and traffic may disturb local residents.
Beneficial and/or Adverse Impacts on Fish and Wildlife Resources	Because soil would be left untreated, the soil could contribute to further groundwater contamination.	Because the soil would be left untreated, the soil could contribute to further groundwater contamination	No known impacts on fish and wildlife resources. The potential source of groundwater contamination will be removed.	No known impacts on fish and wildlife resources. The potential source of groundwater contamination will be removed.	No known impacts on fish and wildlife resources. The potential source of groundwater contamination will be removed.
Net Present Worth	$0.00	$160,000	$43,609,000	$40,509,000	$26,975,000

NOTE: NA = Not Applicable
TCLP = Toxicity Characteristic Leaching Procedure

TABLE 6-1 ALTERNATIVES SCREENING

OPERABLE UNIT 1: SOIL				
	Alternative 5	**Alternative 6**	**Alternative 7**	**Alternative 8**
	Landfill Capping with a Part 360 Cap-Extended Landfill Footprint	**Landfill Capping with a Clean Soil Cover-Extended Landfill Footprint**	**Partial Removal and Off-Site Disposal with *In Situ* Stabilization of Shallow Waste**	**Partial Removal, *Ex Situ* Stabilization and On-Site Placement with *In Situ* Stabilization of Shallow Waste**
Size and Configuration of Process Options	Approximately 51,000 yd^3 of soil would be re-graded to convert the near vertical ravine walls to a 3:1 slope for the purpose of capping. Re-graded fill would be covered with a full Part 360 cap.	Approximately 51,000 yd^3 of soil would be re-graded to convert the near vertical ravine walls to a 3:1 slopefor the purpose of capping. Re-graded fill would be covered with a soil cap.	Approximately 152,000 yd^3 of soil would be excavated from the deepest areas of fill ranging from 20 to 80 ft bgs to be disposed of at permitted disposal facilities. An approved source of fill would be used to construct 2:1 slopes into the existing ravine. Shallow fill would be mixed with stabilizing amendment *in situ* to prevent leaching.	Approximately 152,000 yd^3 of fill would be excavated from the deepest areas of fill ranging from 20 to 80 ft bgs to be treated on-site with a stabilizing amendment to be placed back into the excavation and into the existing ravine to allow for 3:1 slopes. Shallow fill would be treated in situ with the same stabilizing amendment. Stabilized soil would be covered with a clean soil cap, topsoil and seed.
Time for Remediation	Approximately 9 months	Approximately 9 months	Approximately 34 months	Approximately 44 months
Spatial Requirements	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and capping activities. Area for equipment storage and loading and unloading of contaminated soil (~100 X 400 ft).	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and capping activities. Area for equipment storage and loading and unloading of contaminated soil (~100 X 400 ft).	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and backfill activities. Area for equipment storage (~100 X 400 ft).	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation and backfill activities. Area for equipment storage (~100 X 400 ft).
Options for Disposal	All material will remain on-site.	All material will remain on-site.	Off-site disposal for deep fill through approved hazardous waste and general waste facilities.	All material will remain on-site.
Substantive Technical Permit Requirements	None	None	None	None.
Limitations or Other Factors Necessary to Evaluate Alternatives	None.	None.	Disposal facilities will require TCLP analysis for waste characterization prior to acceptance. Pilot test will be required for full evaluation.	Pilot test will be required for full evaluation.
Public Impacts	Noise, dust, and traffic may disturb local residents.	Noise, dust, and traffic may disturb local residents.	Noise, dust, and traffic may disturb local residents.	Noise, dust, and traffic may disturb local residents.
Beneficial and/or Adverse Impacts on Fish and Wildlife Resources	No known impacts on fish and wildlife resources. The potential source of groundwater contamination will be removed.	No known impacts on fish and wildlife resources. The potential source of groundwater contamination will be removed.	No known impacts on fish and wildlife resources. The potential sources of groundwater contamination will be removed and treated	No known impacts on fish and wildlife resources. The potential sources of groundwater contamination will be treated.
Net Present Worth	$5,974,000	$4,208,000	$41,721,000	$23,557,000

NOTE: NA = Not Applicable
TCLP = Toxicity Charact

TABLE 6-1 ALTERNATIVES SCREENING

OPERABLE UNIT 2: SEDIMENT						
	Alternative 1A	**Alternative 1B**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
	No Action	**Site Management**	**Multi-Media Sub-Aqueous Capping**	***In Situ* Sediment Amendment**	**Complete Removal with Disposal**	**Partial Removal with Multi-Media Sub-Aqueous Capping**
Size and Configuration of Process Options	NA	A deed restriction would be implemented at the site to limit the use of the property and groundwater. Surface water monitoring would be conducted on an annual basis. A fence would be installed and maintained for site security.	Approximnately 9 acres would be cleared, graded and capped with a protective media designed to not be mobile by flood flows when vegetated. Approximately 3,600 linear feet of stream would be restored overtop of the cap.	Approximately 9 acres would be cleared, grubbed and excavated to amend with chitin. Approximately 26,000 tons of sediment would be ammended. 3,300 linear feet of stream would be restored in the disturbed floodplain.	Approximately 21,000 yd^3 of contaminated materials covering 9 acres would be dredged and dewatered for on-site disposal.	Approximately 20,000 yd^3 of contaminated materials covering 6.5 acres would be dredged and dewatered for on-site disposal. Remaining sediments would be capped with a multimedia cap designed to withstand flood flows.
Time for Remediation	NA	2 Months	24 Months	24 Months	12 Months	12 Months
Spatial Requirements	None	None	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation activities. Area for equipment storage and loading /unloading cap materials (~100 X 400 ft). Staging would be staggered in order to minimize disturbance and potential for contamination of clean materials. Work would progress upstream to downstream. Significant disturbance for pipe diversion activities would be required.	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation activities. Area for equipment storage and loading and unloading and mixing soils (~100 X 400 ft). Staging would be staggered in order to minimize disturbance and potential for contamination of clean materials. Work would progress upstream to downstream. Significant disturbance for pipe diversion activities would be required.	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation activities. Area for equipment storage and stockpiling(~100 X 400 ft). Staging would be staggered in order to minimize disturbance and potential for contamination of clean materials. Work would progress upstream to downstream. Significant disturbance for pipe diversion activities would be required.	Area of excavation will be inaccessible during remedial activities. Access road into the existing ravine will be necessary to accommodate excavation activities. Area for equipment storage and stockpiling(~100 X 400 ft). Staging would be staggered in order to minimize disturbance and potential for contamination of clean materials. Work would progress upstream to downstream. Significant disturbance for pipe diversion activities would be required.
Options for Disposal	NA	NA	NA	N/A	On-site disposal in accordance with Part 360 requirements for a full cap or a soil cap.	On-site disposal in accordance with Part 360 requirements for a full cap or soil cap.
Substantive Technical Permit Requirements	None	None	Water quality monitoring to ensure no contamination moves downstream required. 404/401 permitting requirements for stream and wetland impacts. Mitigation and annual monitoring required.	Water quality monitoring to ensure no contamination moves downstream required. 404/401 permitting requirements for stream and wetland impacts. Mitigation and annual monitoring required.	Water quality monitoring to ensure no contamination moves downstream required. 404/401 permitting requirements for stream and wetland impacts. Mitigation and annual monitoring required.	Water quality monitoring to ensure no contamination moves downstream required. 404/401 permitting requirements for stream and wetland impacts. Mitigation and annual monitoring required.
Limitations or Other Factors Necessary to Evaluate Alternatives	None	None	Hydraulic and Hydrologic analysis required to evaluate potential for having a stable cap.	Pre-design characterization study required to determine extents of ammendment and contamination.	Pre-design characterization study required to determine extents of dredging.	Hydraulic and Hydrologic analysis required to evaluate potential for having a stable cap. Pre-design characterization study required to determine extents of contamination.
Public Impacts	Will not reduce exposure to contaminants.	Will not physically reduce exposure to contaminants.	Noise, dust, and traffic may disturb local residents. Existing recreation opportunities in Gulf Creek would be temporarily impacted.	Noise, dust, and traffic may disturb local residents. Existing recreation opportunities in Gulf Creek would be temporarily impacted.	Noise, dust, and traffic may disturb local residents. Existing recreation opportunities in Gulf Creek would be temporarily impacted.	Noise, dust, and traffic may disturb local residents. Existing recreation opportunities in Gulf Creek would be temporarily impacted.
Beneficial and/or Adverse Impacts on Fish and Wildlife Resources	Because soil would be left untreated, the soil could contribute to further groundwater contamination.	Because the soil would be left untreated, the soil could contribute to further groundwater contamination	Potential for surface contact would be removed. Complete restoration of the benthic community would be required. Potential for future exposure due to tree falls and burrowing activity would be present.	Potential for surface contact would be removed, however monitoring would be required to ensure effectiveness of ammendment. Complete restoration of the benthic community would be required.	Potential for surface contact would be removed. Complete restoration of the benthic community would be required.	Potential for surface contact would be removed. Complete restoration of the benthic community would be required. Potential for future exposure due to tree falls and burrowing activity would be present.
Net Present Worth	$0.00	$87,000.00	$2,889,000	$2,334,000	$4,638,000	$3,887,000

TABLE 6-2 ALTERNATIVE EVALUATION SUMMARY

OPERABLE UNIT 1: SOIL					
	Alternative 1A	**Alternative 1B**	**Alternative 2**	**Alternative 3**	**Alternative 4**
	No Action	**Site Management**	**Complete Removal with Off-Site Disposal**	**Ex Situ Stabilization with Off-Site Disposal**	**Landfill Capping with a Part 360 Cap- Existing Landfill Footprint**
(1) Overall Protection of the Public Health and the Environment					
	There is no reduction of risk with this alternative. The soil pathways would continue to pose unacceptable risk to all receptors.	Implementation of this alternative would serve to prevent ingestion or direct contact with contaminated soil and groundwater.	Removal of source reduces potential migration of contaminants to groundwater and surface water.	Removal of source reduces potential migration of contaminants to groundwater and surface water.	Capping of impacted area reduces potential migration of contaminants to groundwater.
(2) Standards, Criteria and Guidance (SCGs)					
	Does not meet SCG criterion.	Does not meet SCG criterion	Will meet SCG criteria.	Will meet SCG criteria.	Will meet SCG criteria.
(3) Long-Term Effectiveness and Permanence					
	This alternative will not provide long-term effectiveness or permanence. This alternative offers no controls.	This alternative would effectively address RAOs if implemented in conjunction with another alternative. As a stand-alone alternative, it is only moderately effective, as contamination will remain in place and no physical barriers would prevent contact or ingestion of soil or groundwater.	When designed and implemented properly, effectively eliminates exposure and prevents transport, permanently removes some habitat , eliminates need for groundwater monitoring, RAOs are achieved in short time frame.	When designed and implemented properly, effectively eliminates exposure and prevents transport, permanently removes some habitat , eliminates need for groundwater remedy, RAOs are achieved in short time frame.	Effectively addresses RAOs associated with contact of fill in short time frame, long-term monitoring of effectiveness of slurry wall, effectiveness of medium used in slurry wall will decrease with time and require replacement; Institutional (Deed Restrictions) and Engineering Controls would need to be in-place.
(4) Reduction of Toxicity, Mobility, or Volume of Contamination					
Amount of Hazardous Materials Destroyed, Treated, or Removed	None	None	Excavation will remove soil exceeding allowable risks at the impacted area.	Excavation will remove soil exceeding allowable risks at the impacted area.	Capping fill materials will not remove or destroy hazardous materials.
Degree of Expected Reductions in Toxicity, Mobility, or Volume	None	None	Contaminated soil will be disposed of in permitted facilities that use measures to reduce or eliminate the risk of toxic mobility.	Contaminant toxicity and volume will be reduced.	Contaminant mobility and volume will be reduced.
Irreversible Treatment?	No	No	Yes	Yes	Partially reversible. Remaining fill could be un-capped.
Residuals Remaining After Treatment	Yes	Yes	Trace residuals may remain after excavation is complete.	Residuals may remain in areas outside of the excavation area.	Residuals will remain under cap.
(5) Short-Term Impact and Effectiveness					
Community Protection	There is no action and therefore, no additional risk to the community.	There is no physical action and therefore, no additional risk to the community.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation activities. These can be mitigated through standard construction practices. Some habitats will be temporarily disturbed and/or removal.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust may be produced during mixing activities. These can be mitigated through standard construction practices.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation and grading activities. These can be mitigated through standard construction practices.
Worker Protection	There is no action and therefore no workers will be present on site.	There is no physical action and therefore, no workers will be present at the site	Workers can potentially be exposed to contaminated media during excavation activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during activities. Work around heavy equipment and electrical power carries potential risk to workers. Risks can be minimized by implementing controls.	Workers can potentially be exposed to contaminated media during excavation and grading activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.
Environmental Impacts	There are no short-term impacts associated with this alternative.	There are no short-term impacts associated with this alternative.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.
Time Until Action Complete (Field Construction Time)	No action taken	Approximately 2 months for the deed restriction to be in effect.	Approximately 40 months	Approximately 40 months	Approximately 27 months
(6) Implementability					
Ability to Construct and Operate	Not Applicable.	Institutional controls can be implemented, and have been used nationally.	Excavation alternatives can be implemented, and have been used nationally.	Excavation and treatment alternatives can be implemented, and have been used nationally.	Landfill capping alternatives can be implemented, and have been used nationally.
Monitoring Requirements	Not Applicable.	Not Applicable.	Soil shall be sampled and analyzed to confirm removal of impacted area.	Soil shall be sampled and analyzed to confirm removal of impacted area.	Soil shall be sampled and analyzed to confirm removal of impacted area.
Availability of Equipment and Specialists	Not Applicable.	Specialists are available for the implementation of institutional controls.	Equipment and specialists are available for the implementation of all of these technologies.		
Ability to Obtain Approvals and Coordinate with Other Agencies	Not Applicable.	Ability to obtain approvals and coordinate with other agencies assumed to be possible.	Ability to obtain approvals and coordinate with other agencies assumed to be possible.		
(7) Cost Effectiveness					
Cost	**$0**	**$160,000**	**$43,609,000**	**$40,509,000**	**$26,975,000**
(8) Land Use					
	NA	Restricted	Unrestricted	Unrestricted	Unrestricted
(9) Community Acceptance					
	TBD	TBD	TBD	TBD	TBD

NOTE: PPE = Personal protective equipment
ARAR = Applicable or Relevant and Appropriate Requirement
NA = Not Applicable
TBD = To be determined

TABLE 6-2 ALTERNATIVE EVALUATION SUMMARY

	OPERABLE UNIT 1: SOIL			
	Alternative 5	**Alternative 6**	**Alternative 7**	**Alternative 8**
	Landfill Capping with a Part 360 Cap-Extended Landfill Footprint	**Landfill Capping with a Clean Soil Cover-Extended Landfill Footprint**	**Partial Removal and Off-Site Disposal with In Situ Stabilization of Shallow Waste**	**Partial Removal, Ex Situ Stabilization and On-Site Placement with In Situ Stabilization of Shallow Waste**
(1) Overall Protection o				
	Capping of impacted area reduces potential migration of contaminants to groundwater and surface water.	Capping of impacted area reduces potential migration of contaminants to groundwater and surface water.	Treatment of impacted area reduces potential migration of contaminants to groundwater and surface water.	Treatment of impacted fill reduces potential migration of contaminants to groundwater and surface water
(2) Standards, Criteria				
	Will meet SCG criteria.	Will meet SCG criteria.	Will meet SCG criteria.	Will meet SCG criteria.
(3) Long-Term Effectiv				
	Effectively addresses RAOs associated with contact of fill in short time frame, long-term monitoring of groundwater and surface water; Institutional (Deed Restrictions) and Engineering Controls would need to be in-place.	Effectively addresses RAOs associated with contact of fill in short time frame, long-term monitoring of groundwater and surface water; Institutional (Deed Restrictions) and Engineering Controls would need to be in-place.	Effectively addresses RAOs associated with contact of fill in short time frame; Institutional (Deed Restrictions) and Engineering Controls would need to be in-place; assumes that soi/fill would be removed from areas in contact with groundwater and shallow fill would be treated via in-situ stabilization.	Effectively addresses RAOs associated with contact of fill in short time frame; Institutional (Deed Restrictions) and Engineering Controls would need to be in-place; assumes that soi/fill would be removed from areas in contact with groundwater and shallow fill would be treated via in-situ stabilization.
(4) Reduction of Toxicit				
Amount of Hazardous Materials Destroyed, Treated, or Removed	Capping fill materials will not remove or destroy hazardous materials.	Capping fill materials will not remove or destroy hazardous materials.	Partial excavation will remove most of the soil exceeding allowable risks. Treatment will reduce toxicity of the remaining soil.	Treatment will reduce toxicity in all fill
Degree of Expected Reductions in Toxicity, Mobility, or Volume	Contaminant mobility will be reduced.	Contaminant mobility will be reduced.	Contaminant toxicity and volume will be reduced.	Contaminant toxicity will be reduced
Irreversible Treatment?	Partially reversible. Remaining fill could be un-capped.	Partially reversible. Remaining fill could be un-capped.	Yes	Yes
Residuals Remaining After Treatment	Residuals will remain under cap.	Residuals will remain under cap.	Residuals will remain in treatment area, but will be less mobile.	Residuals will remain in treated fill, but will be less mobile.
(5) Short-Term Impact				
Community Protection	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation and grading activities. These can be mitigated through standard construction practices.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation and grading activities. These can be mitigated through standard construction practices.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation and mixing activities. These can be mitigated through standard construction practices.	Increased short-term risks to the public during excavation activities and transport of equipment and materials to and from site. Dust will be produced during excavation and mixing activities. These can be mitigated through standard construction practices.
Worker Protection	Workers can potentially be exposed to contaminated media during excavation and grading activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during excavation and grading activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.
Environmental Impacts	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions.
Time Until Action Complete (Field Construction Time)	Approximately 9 months	Approximately 9 months	Approximately 34 months	Approximately 44 months
(6) Implementability				
Ability to Construct and Operate	Landfill capping alternatives can be implemented, and have been used nationally.	Landfill capping alternatives can be implemented, and have been used nationally.	Excavation and treatment alternatives can be implemented, and have been used nationally.	Excavation and treatment alternatives can be implemented, and have been used nationally.
Monitoring Requirements	Not Applicable.	Not Applicable.	Not Applicable.	Not Applicable.
Availability of Equipment and Specialists	Equipment and specialists are available for the implementation of all of these technologies.			
Ability to Obtain Approvals and Coordinate with Other Agencies	Ability to obtain approvals and coordinate with other agencies assumed to be possible.			
(7) Cost Effectiveness				
Cost	**$5,974,000**	**$4,208,000**	**$41,721,000**	**$23,557,000**
(8) Land Use				
	Unrestricted	Unrestricted	Unrestricted	Unrestricted
(9) Community Accepta				
	TBD	TBD	TBD	TBD

TABLE 6-2 ALTERNATIVE EVALUATION SUMMARY

OPERABLE UNIT 2: SEDIMENT						
	Alternative 1A	**Alternative 1B**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
	No Action	**Site Management**	**Multi-Media Sub-Aqueous Capping**	**In Situ Sediment Amendment**	**Complete Removal with Disposal**	**Partial Removal with Multi-Media Sub-Aqueous Capping**
(1) Overall Protection of the Public Health and the Environment						
	There is no reduction of risk with this alternative. The soil pathways would continue to pose unacceptable risk to all receptors.	Implementation of this alternative would serve to prevent ingestion or direct contact with contaminated sediment and surface water.	Capping reduces potential for an exposure pathway via surface contact. Continued potential risk of movement of contaminants through sediment bed mobility and surface water if sediment chemistry becomes acidic.	Will reduce risk of exposure through bonding contaminants into stable, non-leaching forms. Will reduce risk of transport of contaminants offsite or through surface water or sediment transport.	Removal of source reduces potential migration of contaminants to surface water or through surface contact. Subsequent capping will reduce potential for an exposure pathway via surface contact.	Removal reduces potential migration of contaminants to surface water or through surface contact. Capping reduces potential for an exposure pathway via surface contact. Continued potential risk of movement of remaining underlying contaminated sediment constituents through surface water if sediment chemistry becomes acidic.
(2) Standards, Criteria and Guidance (SCGs)						
	Does not meet SCG criterion.	Does not meet SCG criterion	Will meet SCG criteria.	Will meet SCG criteria.	Will meet SCG criteria.	Will meet SCG criteria.
(3) Long-Term Effectiveness and Permanence						
	This alternative will not provide long-term effectiveness or permanence. This alternative offers no controls.	This alternative would effectively address RAOs if implemented in conjunction with another alternative. As a stand-alone alternative, it is only moderately effective, as contamination will remain in place and no physical barriers would prevent contact or ingestion of sediment or surface water.	Cap would need to be maintained against breach through dredging, tree falls, burrowing animals. Site management and perimeter controls are required.	When designed and implemented properly, effectively eliminates exposure and prevents transport, permanently removes some habitat , RAOs are achieved in short time frame.	When designed and implemented properly, effectively reduces exposure and prevents transport, permanently removes some habitat , RAOs are achieved in short time frame.	When designed and implemented properly, effectively eliminates exposure and prevents transport. Permanently removes some habitat. RAOs are achieved in short time frame. Cap would need to be maintained against breach through excavation, tree falls, and burrowing animals. Site management and perimeter controls are required.
(4) Reduction of Toxicity, Mobility, or Volume of Contamination						
Amount of Hazardous Materials Destroyed, Treated, or Removed	None	None	None	Amendment will remove most bio-available contamination and reduce overall exposure risks.	Dredging will remove sediment exceeding allowable risks at the impacted area.	Dredging and capping will remove sediment exceeding allowable risks at the impacted area and reduce surface exposure risks.
Degree of Expected Reductions in Toxicity, Mobility, or Volume	None	None	Reduced mobility due to surface exposure. Potential risk remains with surface water and sediment bed mobility transport.	Significant reductions of mobility of contaminants expected.	Contaminated sediment will be disposed of on-site using stabilization amendments to reduce or eliminate the risk of toxic mobility.	Contaminated sediment will be disposed of on-site using stabilization amendments to reduce or eliminate the risk of toxic mobility.
Irreversible Treatment?	No	No	No	Yes	Yes	Yes
Residuals Remaining After Treatment	Yes	Yes	Yes.	Yes, particularly if improper amounts of amendments are utilized or improper mixing.	Trace residuals may remain after dredging is complete. Contaminated sediment will remain when landfilled on-site.	Residual contamination present below cap. Contaminated sediment will also remain when landfilled on-site.
(5) Short-Term Impact and Effectiveness						
Community Protection	There is no action and therefore, no additional risk to the community.	There is no physical action and therefore, no additional risk to the community.	As no material will leave the site, only risks due to constuction access, dust, etc are present. No risks to public from contaminted materials.	Increased short-term risks to the public during transport of equipment and materials to and from site. Dust/residuals will be produced during amendment activities. These can be mitigated through standard construction practices. Some adjacent habitats will be temporarily disturbed.	Increased short-term risks to the public during dredging activities and transport of equipment and materials to site. Dust/residuals will be produced during dredging/amendment activities. These can be mitigated through standard construction practices. Some adjacent habitats will be temporarily disturbed.	Increased short-term risks to the public during dredging activities and transport of equipment and materials to and from site. Dust/residuals will be produced during dredging/amendment activities. These can be mitigated through standard construction practices. Some adjacent habitats will be temporarily disturbed.
Worker Protection	There is no action and therefore no workers will be present on site.	There is no physical action and therefore, no workers will be present at the site	Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during amendment activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during dredging activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.	Workers can potentially be exposed to contaminated media during dredging activities. Work around heavy equipment carries potential risk to workers. Risks can be minimized by implementing health and safety controls.
Environmental Impacts	There are no short-term impacts associated with this alternative.	There are no short-term impacts associated with this alternative.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions. Significant impacts to stream, wetland and riparian habitats expected.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions. Significant impacts to stream, wetland and riparian habitats expected.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions. Significant impacts to stream, wetland and riparian habitats expected.	Wastes produced will include contaminated PPE. Wastes will be managed in compliance with ARARs. Limited short term environmental impacts associated with implementation and air emissions. Significant impacts to stream, wetland and riparian habitats expected.
Time Until Action Complete (Field Construction Time)	No action taken	Approximately 2 months for the deed restriction to be in effect.	Approximately 24 Months	Approximately 24 Months	Approximately 12 Months	Approximately 12 Months
(6) Implementability						
Ability to Construct and Operate	Not Applicable.	Institutional controls can be implemented, and have been used nationally.	Capping in riparian / stream or floodplain areas must be designed to resist transport. Able to be implemnted with specialty contractors and appropriate equipment.	Amendments are utilized nationally and proven effective.	Dredging and landfilling alternatives can be implemented, and have been used nationally.	Dredging, capping and landfilling are proven alternatives and utilized nationally.
Monitoring Requirements	Not Applicable.	Not Applicable.	Perimeter monitoring and initial characterization recommended. Cap must be monitored for stability.	Sediment shall be sampled and analyzed to confirm reduction of available contaminants.	Sediment shall be sampled and analyzed to confirm removal of impacted area.	Perimeter monitoring and initial characterization recommended. Cap must be monitored for stability.
Availability of Equipment and Specialists	Not Applicable.	Specialists are available for the implementation of institutional controls.	Equipment and specialists are available for the implementation of all of these technologies.			
Ability to Obtain Approvals and Coordinate with Other Agencies	Not Applicable.	Ability to obtain approvals and coordinate with other agencies assumed to be possible.	Ability to obtain approvals and coordinate with other agencies assumed to be possible.			
(7) Cost Effectiveness						
Cost	**$0**	**$87,000**	**$2,889,000**	**$2,334,000**	**$4,638,000**	**$3,887,000**
(8) Land Use						
	NA	Restricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted
(9) Community Acceptance						
	TBD	TBD	TBD	TBD	TBD	TBD

APPENDIX A

TECHNOLOGY SCREENING LETTER AND COMMENTS

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Avenue, Buffalo, New York 14203-2915
Phone: (716) 851-7220 • **Fax:** (716) 851-7226
Website: www.dec.ny.gov

Joe Martens
Commissioner

July 13, 2011

Mr. Robert Casey
6712 Brooklawn Parkway - Suite 104
Syracuse, New York 13211-2158

Dear Mr. Casey:

Remedial Action Objectives and Feasibility Study
Technology Screening
Old Upper Mountain Road Site, Site No. 932112
Lockport (C), Niagara County

The New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH) have completed a detailed review of the draft Remedial Action Objectives and Feasibility Study Technology Screening letter submitted to the NYSDEC via e-mail on June 21, 2011. This letter summarizes the results of the Remedial Investigation (RI) and Supplemental RI for the three operable units of the site, discusses the remedial action objectives for each contaminated media identified, and presents the initial screening of remedial alternatives. The initial screening of alternatives, and the alternatives retained for evaluation in the Feasibility Study (FS), appears reasonably given the physical constraints of the site. The Departments, however, have a number of comments concerning the Technology Screening Matrix tables. These comments are summarized as follows:

1. **Table 2, Soil/Fill, Monitored Natural Attenuation, Page 1:** This technology is generally associated with volatile organic compounds. For soil/fill at the Old Upper Mountain Road Site, is this technology being evaluated for metals?

2. **Table 2, Groundwater, Page 2:** If MNA was evaluated and retained for soil/fill and sediment, should it be evaluated and retained for groundwater?

3. **Table 2, Sediment, Page 3:**

   A. **Monitored Natural Attenuation:** For sediment at the Old Upper Mountain Road Site, is this technology being evaluated for metals?

B. **Containment:** It is not clear from the information given why some of the containment options were not retained for evaluation. For example, a multi-media cap was retained while a thin layer cap was not. From the description given, it appears to us that a thin layer cap would be easier and less disruptive to construct than a multi-media cap.

C. **Removal:** For the Eighteenmile Creek Corridor Site, the selected ROD remedy for creek sediment included excavation following creek diversion. This alternative was selected, in part, due to the difficulties in dredging a shallow, rocky creek. A similar alternative should be evaluated for Gulf Creek sediment.

D. **Dredged Material Handling and Treatment:** It is not clear from the information given why ex-situ chemical treatment was not retained for evaluation.

4. **Table 3:** The text for Alternative 4 on page 1 and Alternative 2 on page 2 is cut-off.

Should you have any questions regarding any of the above, please feel free to contact me at (716) 851-7220.

Sincerely yours,

Glenn M May

Glenn M. May, CPG
Environmental Geologist II

GMM:sz

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APPENDIX B

COST ESTIMATES

OU1

Option		Total NPV Cost	Capital Cost	Lifetime Monitoring	Lifetime O&M	Time to Complete	
1B	Site Management	$160,000	$99,000	$61,490	NA	2	months
2	Complete Removal (Excavation) and Disposal Off-site (Commercial)	$43,609,000	$43,609,000	NA	NA	40	months
3	Ex situ Stabilization and Disposal Off-site	$40,509,000	$40,509,000	NA	NA	40	months
4	Partial Removal, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring	$26,975,000	$26,552,000	423300	NA	21	months
5	Re-grading, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring	$5,974,000	$5,693,000	$280,600	NA	9	months
6	Re-grading, Landfill Capping with a Soil Cap, and Groundwater Monitoring	$4,208,000	$3,927,000	$280,600	NA	9	months
7	Partial Removal (Deeper Fill) and Off-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	$41,721,000	$41,500,000	$221,100	NA	34	months
8	Partial Removal (Deeper Fill) with Ex Situ Stabilization and On-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	$23,557,000	$23,336,000	$221,100	NA	43	months

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$160,000
Soil/Fill Material Alternative 1B Site Management	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time:	2 months
			Operation Time:	- months
			Post Remediation Monitoring	0 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$99,000**
Site Management Activities		**1**			**$0**		**$0**		**$0**	**$114,199**	**$ 84,199**
Surveyor- monument installation		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,000	$ 10,000
Lawyer		1	ls				$ -		$ -	$ 15,000	$ 15,000
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Signage, assume small signs attached to perimeter fencing		1.00	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000	$ 5,000
Professional/Technical Services											**$ 14,314**
5% Project Management										$84,199	$ 4,210
6% Remedial Design											$ 5,052
6% Construction Management											$ 5,052
LONG TERM ANNUAL MONITORING AND MAINTENANCE									**ANNUAL LTM COST (YRS 1-30)**		**$ 4,000**
									LIFETIME LTM (NPV)		**$61,490**
Monitoring and Maintenance											
Site Monitoring											**$ 4,398**
Groundwater sampling for 1 event - Includes collection of field parameters		5	well	$ -	$ -	$ 340	$ 1,700.00	$ 92	$ 458.13	$ -	$ 2,158
Materials		1	event	$ 50	$ 50	$ -	$ -	$ -	$ -	$ -	$ 50
Mobilization/Demobilization of Inspector		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$ 680
Reporting		6	hr	$0	$ -	$ 85	$ 510.00	$ -	$ -	$ -	$ 510
Maintenance- Fence Maintenance											
Repair fence	*Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000.00	$ 1,000
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Semi-Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$160,000**

Assumptions:

Labor
Cost per hr **$85**

Weighted Average of city cost index (Buffalo, NY) **101.4%**
Inflation **3%**

Hours per working day **10**
workers per event **2**
hours travel per event **5**
for materials (gloves, notebooks, etc.) **$50**
2 hrs/GW sample
0.5 hrs/SW sample

Typical Rental Rates - Includes G&A and 10% Profit

Truck/SUV (1/2 ton or smaller)	**$70.74**	per day
Water Quality Analyzer	**$159.00**	per day
Water Level Meter	**$31.80**	per day
Submersible Pump	**$113.91**	per day
Generators: 220 Volt	**$82.68**	per day
Multi-gas meter	**$75.00**	

Analytical Costs

Metals	**$75.00**	per sample
VOCs	**$90.00**	per sample

2 hrs/GW sample — **$85** Labor cost per hr
0.5 hrs/SW sample
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$43,609,000
Soil/Fill Material Alternative 2 **Complete Removal (Excavation) and Disposal Off-site (Commercial)**	**Old Upper Mountain Road** **Lockport, NY**	**Soil/Fill - OU1**	**Construction Time:** 40 months **Operation Time:** - months **Post Remediation Monitoring:** 0 years	

		Quantities		Cost Breakdown (if available)							
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$43,609,000**
Construction Activities		**1**			**$767,619**		**$326,044**		**$234,326**	**$889,795**	**$32,592,606**
Pre-Design Characterization Study											
Driller											
Mob/Demob	*quote- SJB*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 874	$ 874
Geoprobe/Crew for Soil Borings	*quote- SJB*	41	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,273	$ 52,196
Sample Collection		410	hr	$ -	$ -	$ 85.00	$ 34,850	$ -	$ -		$ 34,850
Sample Analysis for TCLP Lead and Zinc	*Life Science Laboratories*	418	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 593	$ 248,075
Reporting	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000	$ 20,000
Site Preparation											
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475	$ 1,238
Erosion & Sediment Control Plan		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	2,500	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.68	$ 1,700
Sewer Relocation											
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, wit	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 139.74	$ 559	$ -	$ 16,542
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	276	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22	$ 6,072
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre		$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Sheetpiling Along RR Tracks (40' deep, drive, extract and salvage)	*31 41 16.10 1000*	509	ton	$ 551.66	$ 280,905	$ 263.83	$ 134,342	$ 305.97	$ 155,800	$ -	$ 571,047
Sheetpiling Along OUMR (20' deep, drive, extract and salvage)	*31 41 16.10 1600*	7,220	sf	$ 8.07	$ 58,265	$ 6.65	$ 48,013	$ 7.70	$ 55,594	$ -	$ 161,872
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	4	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,097.50	$ 60,390
Dust Control, Heavy, assume 10 days per month	*31 23 23.20 2510*	400	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 693,760
Grading of embankment, by dozer	*31 23 23.20 2300*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 416,507
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	199,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 230,840
34 CY off-road 20 min. wait 2,000 ft cycle	*31 23 23.20 6300*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 736,897
Haul Road Maintenance	*31 23 23.20 2600*	400	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 456,416
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	199,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 334,320
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 260,889
Spotter at Loadout	*31 23 23.20 2310*	4,000	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 183,840
Confirmation Soil Sampling											
Grab Samples- 12 per acre plus 20% QA/QC		86	sample	$ -	$ 50	$ 21	$ 1,836	$ 67	$ 5,765	$ -	$ 7,651
Lab Analyses - TAL Metals	*Life Science Laboratories*	86	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 82.50	$ 7,128
Hazardous Soil Disposal											
Soil Characterization Sampling (1 sample per 500 CY, per CWM)	*Life Science Laboratories*	398	sample	$ -	$ -	$ -	$ -	$ -	$ -	$593.48	$ 236,205
Hazardous Soil Disposal	*CWM*	119,400	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 140.00	$ 16,716,000
Transportation using dumps	*CWM*	119,400	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 19.50	$ 2,328,300
Demurrage (assume 1 hour per week of loading)	*CWM*	109	hour	$ -	$ -	$ -	$ -	$ -	$ -	$ 85.00	$ 9,226
Fuel Surcharge- 36% of Transportation	*CWM*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 838,188.00	$ 838,188
Non-Hazardous Soil Disposal											
Soil transportation and disposal	*Recent quote- ESG plus 10%*	179,100	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 37.68	$ 6,747,593
Backfill and Compaction											
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	9,680	lcy	$ 28	$ 266,200	$ -	$ -	$ -	$ -	$ -	$ 266,200
Backfill 300HP Dozer, 150' haul	*31 23 23.14 5220*	9,680	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.20	$ 11,616
Finishing grading slopes, steep	*31 22 16.10 3310*	29,040	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 6,098
Compacting backfill, 12" lift, 2 passes w/ vibrating roller	*31 23 23.23 5060*	8,417	ecy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.20	$ 1,683
Site Restoration											
Topsoil	*Recent quote- ESG from Seven Springs*	9,680	cy	$ 45	$ 430,760	$ -	$ -	$ -	$ -	$ -	$ 430,760
Finishing grading slopes, gentle	*31 22 16.10 3300*	44,000	sy	$ -	$ -	$ 0.09	$ 3,960	$ 0.08	$ 3,520	$ -	$ 7,480
Utility mix, 70%M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	396	msf	$ 68.11	$ 26,972	$ 8.90	$ 3,524	$ 8.39	$ 3,322	$ -	$ 33,818
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Mobilization and Demobilization											**$ 509,872**
5% of Total Costs of Site Work, Treatment										$ 10,197,438	$ 509,872
Contingency											**$ 4,965,372**
15% of Total Construction Activities										$ 33,102,478	$ 4,965,372
Professional/Technical Services											**$ 5,540,743**
5% Project Management										$ 32,592,606	$ 1,629,630
6% Remedial Design											$ 1,955,556
6% Construction Management											$ 1,955,556
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$43,609,000**

Assumptions:

Working condition is Safety Level: **D** (Labor productivity: **82%**; Equipment productivity: **100%**)
Weighted Average of city cost index (Buffalo, NY): **101.4%** (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor: **10%**
Inflation: **3%** per year

Estimated number of soil samples: **72** samples; **1** times sampled; **0.25** hrs/sample; **$85** Labor Cost per hr
20% added for QA/QC samples; **1** worker sampling

Characterization Cost (Table A (per CWM)): **$593.48** per sample
Analytical cost (TAL Metals): **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal

Lead contaminated soil as a "listed" waste- incineration: **$275** per ton; **119,400** tons soil hazardous (assume 43% hazardous)
22 tons per load; **5,427** loads for haz disposal
Lead contaminated soil as non-haz: **$39.87** per ton; **179,100** tons soil for non-haz disposal; **8,141** loads for non-haz disposal
Concrete: **3,300** lbs per cy; **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit

Mini-Rae Survey Mode PID: **$96.08** per day
Truck/SUV (1/2 ton or smaller): **$70.74** per day

Work day consists of: **10** hrs

Excavation With Concrete and Asphalt:

Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **261,360** sf
Excavation Volume: **199,000** cy; **228,850** lcy
Excavated Weight: **298,500** tons
Roll-off dumpster can hold approximately: **12** tons

20 loads per day
20 working days per month
10 hours per working day
3 months for pre-design characterization
3 months for site prep/restoration
34 months to completion
150 ft/day drilling

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$40,509,000
Soil/Fill Material Alternative 3 Ex situ Stabilization and Disposal Off-site	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: 40 months Operation Time: - months Post Remediation Monitoring: 0 years	

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$40,509,000**
Construction Activities		**1**			**$767,799**		**$743,683**		**$425,854**	**$35,709**	**$30,645,843**
Pre-Design Pilot Study											
Pilot Study Treatment	*MT2 Estimate*	5	ton							$ 33.24	$ 166
Sample analysis	*MT2 Estimate*	1	sample							$ 550.00	$ 550
Site Preparation											
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to remove sewer pipe, 10' to 14' deep, 1.5 CY excavator	*31 23 16.13 1000*	2,113	bcy	$ -	$ -	$ 1.59	$ 3,360	$ 1.93	$ 4,079	$ -	$ 7,439
Pipe removal, sewer, no excavation, 18" diameter	*02 41 13.33 2930*	1,019	lf	$ -	$ -	$ 8.16	$ 8,315	$ 11.94	$ 12,167	$ -	$ 20,482
Remove existing manhole	*02 41 13.33 0020*	4	ea	$ -	$ -	$ 297.07	$ 1,188	$ 90.80	$ 363	$ -	$ 1,551
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, with t	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 9,742.50	$ 38,970	$ -	$ 54,953
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	276	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 6,072
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre	$ -	$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Sheetpiling Along RR Tracks (40' deep, drive, extract and salvage)	*31 41 16.10 1000*	509	ton	$ 551.66	$ 280,905	$ 263.83	$ 134,342	$ 305.97	$ 155,800	$ -	$ 571,047
Sheetpiling Along OUMR (20' deep, drive, extract and salvage)	*31 41 16.10 1600*	7,220	sf	$ 8.06	$ 58,193	$ 6.65	$ 48,013	$ 7.70	$ 55,594	$ -	$ 161,800
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	40	mo	$ -	$ -	$ 55	$ 439,061	$ 3,420	$ 136,508		$ 575,569
Dust Control, Heavy	*31 23 23.20 2510*	399.15	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 692,280
Grading of embankment, by dozer	*31 23 23.20 2300*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 416,507
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	199,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 230,840
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 736,897
Haul Road Maintenance	*31 23 23.20 2600*	399	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 455,442
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	199,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 334,320
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	228,850	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 260,889
Spotter at Loadout	*31 23 23.20 2310*	3,991	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 183,448
Confirmation Soil Sampling											
Grab Samples- 12 per acre plus 20% QA/QC		86	sample	$ -	$ 50	$ 21	$ 1,836	$ 67	$ 5,765	$ -	$ 7,651
Lab Analyses - TAL Metals	*Life Science Laboratories*	86	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 82.50	$ 7,128
EcoBond Treat											
Treat w/ EcoBond, load and dispose off-site	*MT2 est*	324,849	ton							$ 76.05	$ 24,704,766
Backfill and Compaction											
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	9,680	lcy	$ 28	$ 266,200	$ -	$ -	$ -	$ -	$ -	$ 266,200
Backfill 300HP Dozer, 150' haul	*31 23 23.14 5220*	9,680	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.20	$ 11,616
Finishing grading slopes, steep	*31 22 16.10 3310*	29,040	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 6,098
Compacting backfill, 12" lift, 2 passes w/ vibrating roller	*31 23 23.23 5060*	8,417	ecy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.20	$ 1,683
Site Restoration											
Topsoil	*Recent quote- ESG from Seven Springs*	9,680	cy	$ 45	$ 430,760	$ -	$ -	$ -	$ -	$ -	$ 430,760
Finishing grading slopes, gentle	*31 22 16.10 3300*	44,000	sy	$ -	$ -	$ 0.09	$ 3,960	$ 0.08	$ 3,520	$ -	$ 7,480
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	396	msf	$ 68.11	$ 26,972	$ 8.90	$ 3,524	$ 8.39	$ 3,322	$ -	$ 33,818
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Mobilization and Demobilization											**$ 49,288**
5% of Total Costs of Site Work, Treatment										$985,769	$ 49,288
Contingency											**$ 4,604,270**
15% of Total Construction Activities										$30,695,131	$ 4,604,270
Professional/Technical Services											**$ 5,209,793**
5% Project Management										$30,645,843	$ 1,532,292
6% Remedial Design											$ 1,838,751
6% Construction Management											$ 1,838,751
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$40,509,000**

Assumptions:

Working condition is Safety Level: **D** (Labor productivity: **82%**; Equipment productivity: **100%**)
Weighted Average of city cost index (Buffalo, NY) **101.4%** (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor **10%**
Inflation **3%** per year

Estimated number of soil samples **72** samples; **1** times sampled; **0.25** hrs/sample; **$85** Labor Cost per hr
20% added for QA/QC samples; **1** worker sampling

Characterization Cost (Table A (per CWM)) **$593.48** per sample
Analytical cost (TCLP Metals) **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal

Lead contaminated soil **$275** per ton; **119,400** tons soil hazardous (assume 43% hazardous)
22 tons per load
Lead contaminated soil as non-haz **$39.87** per ton; **179,100** tons soil for non-haz disposal; **14,766** loads for disposal
324,849 tons for treatment and disposal
Concrete **3,300** lbs per cy; **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit
Mini-Rae Survey Mode PID **$96.08** per day
Truck/SUV (1/2 ton or smaller) **$70.74** per day

Work day consists of: **10** hrs

1000 tons per day for treatment
20 loads per day
20 working days per month
10 hours per working day
3 months for site prep/restoration
37 months to completion

Excavation With Concrete and Asphalt:
Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **261,360** sf
Excavation Volume: **199,000** cy; **228,850** lcy
Excavated Weight: **298,500** tons
Roll-off dumpster can hold approximately: **12** tons

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$26,975,000
Soil/Fill Material Alternative 4 Partial Removal, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: Operation Time: Post Remediation Monitoring	21 months - months 30 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$26,552,000**
Construction Activities		**1**			**$947,482**		**$350,716**		**$166,740**	**$473,433**	**$ 19,387,715**
Pre-Design Characterization Study											
Driller											
Mob/Demob	*quote- SJB*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 800	$ 800
Geoprobe/Crew for Soil Borings	*quote- SJB*	21	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200	$ 25,200
Sample Collection		210	hr	$ -	$ -	$85	$ 17,850	$ -	$ -	**$0**	$ 17,850
Sample Analysis for TCLP Lead and Zinc	*Life Science Laboratories*	209	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 330	$ 68,970
Reporting	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000	$ 15,000
Site Preparation				$ -	$ -	$ -	$ -	$ -	$ -	$0	$ -
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to remove sewer pipe, 10' to 14' deep, 1.5 CY excavator	*31 23 16.13 1000*	2,113	bcy	$ -	$ -	$ 1.59	$ 3,360	$ 1.93	$ 4,079	$ -	$ 7,439
Pipe removal, sewer, no excavation, 18" diameter	*02 41 13.33 2930*	1,019	lf	$ -	$ -	$ 8.16	$ 8,315	$ 11.94	$ 12,167	$ -	$ 20,482
Remove existing manhole	*02 41 13.33 0020*	4	ea	$ -	$ -	$ 297.07	$ 1,188	$ 90.80	$ 363	$ -	$ 1,551
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, with t	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 14,938.50	$ 59,754	$ -	$ 75,737
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	240	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 5,280
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	21	mo	$ -	$ -	$ 55	$ 226,750	$ 3,420	$ 70,499	$ -	$ 297,249
Dust Control, Heavy, assumes 10 days per working month	*31 23 23.20 2510*	206	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 357,523
Grading of embankment, by dozer	*31 23 23.20 2300*	190,133	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 346,043
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	165,333	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 191,787
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	190,133	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 612,229
Haul Road Maintenance	*31 23 23.20 2600*	206	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 235,210
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	103,333	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 173,600
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	118,833	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 135,470
Spotter at Loadout	*31 23 23.20 2310*	2,061.36	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 94,740
Hazardous Soil Disposal											
Soil Characterization Sampling (1 sample per 500 CY, per CWM)	*Life Science Laboratories*	83	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 593.48	$ 49,061
Hazardous Soil Disposal	*CWM*	62,000	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 140.00	$ 8,680,000
Transportation using dumps	*CWM*	62,000	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 19.50	$ 1,209,000
Demurrage (assume 1 hour per week of loading)	*CWM*	56	hour	$ -	$ -	$ -	$ -	$ -	$ -	$ 85.00	$ 4,791
Fuel Surcharge- 36% of Transportation	*CWM*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 435,240.00	$ 435,240
Non-Hazardous Soil Disposal											
Soil transportation and disposal	*Recent quote- ESG plus 10%*	93,000	ton	$ -	$ -	$ -	$ -	$ -	$ -	$37.68	$ 3,503,775
Capping 3:1 Side Slope (Ravine)											
Finishing grading slopes, steep	*31 22 16.10 3310*	17,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 3,570
Polymeric Liner Anchor Trench 3'x1.5' (level B)	*ECHOS 2006 33 08 0503*	2,300	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.87	$ 4,299
Deploy 10oz/sy mil Nonwoven Geotextile (level C)	*ECHOS 2006 33 08 0533*	17,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.40	$ 40,766
60 mil HDPE Liner (level C)	*ECHOS 2006 33 08 0572*	153,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.02	$ 615,094
Drainage Netting, Geotextile Fabric Heat Bonded (2 sides) (level E)	*ECHOS 2006 33 08 0513*	153,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.67	$ 102,516
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	11,333	cy	$ 28	$ 311,667	$ -	$ -	$ -	$ -	$ -	$ 311,667
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	11,333	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 103,382
Topsoil	*Recent quote- ESG from Seven Springs*	2,833	cy	$ 45	$ 126,083	$ -	$ -	$ -	$ -	$ -	$ 126,083
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,833	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 26,711
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	153	msf	$ 68.11	$ 10,421	$ 8.90	$ 1,362	$ 8.39	$ 1,284	$ -	$ 13,066
Capping											
Finishing grading slopes, gentle	*31 22 16.10 3300*	12,778	sy	$ -	$ -	$ 0.09	$ 1,150	$ 0.08	$ 1,022	$ -	$ 2,172
Deploy 10oz/sy mil Nonwoven Geotextile (level C)	*ECHOS 2006 33 08 0533*	12,778	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.40	$ 30,641
60 mil HDPE Liner (level C)	*ECHOS 2006 33 08 0572*	115,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.02	$ 462,326
Drainage Netting, Geotextile Fabric Heat Bonded (2 sides) (level E)	*ECHOS 2006 33 08 0513*	115,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.67	$ 77,054
Gas Vents	*Recent quote- Modern Environmental*	7	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,715.58	$ 12,009
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	8,519	cy	$ 28	$ 234,259	$ -	$ -	$ -	$ -	$ -	$ 234,259
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	8,519	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 77,705
Topsoil	*Recent quote- ESG from Seven Springs*	2,130	cy	$ 45	$ 94,769	$ -	$ -	$ -	$ -	$ -	$ 94,769
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,130	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 20,077
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	115	msf	$ 68.11	$ 7,833	$ 8.90	$ 1,024	$ 8.39	$ 965	$ -	$ 9,821
											$ -
Site Restoration											$ -
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Monitoring Well Installation	*recent quote- EnviroTrac*	330	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 94.00	$ 31,020
Mobilization and Demobilization											**$ 834,918**
5% of Total Costs of Site Work, Treatment										$16,698,365	$ 834,918
Contingency											**$ 3,033,395**
15% of Total Construction Activities										$20,222,633	$ 3,033,395
Professional/Technical Services											**$ 3,295,912**
5% Project Management										$19,387,715	$ 969,386
6% Remedial Design											$ 1,163,263
6% Construction Management											$ 1,163,263

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$26,975,000
Soil/Fill Material Alternative 4 **Partial Removal, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring**	**Old Upper Mountain Road** **Lockport, NY**	**Soil/Fill - OU1**	**Construction Time:** 21 months **Operation Time:** - months **Post Remediation Monitoring:** 30 years	

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
LONG TERM ANNUAL MONITORING AND MAINTENANCE										**ANNUAL LTM COST (YRS 1-5)**	**$34,000**
										ANNUAL LTM COST (YRS 6-30)	**$25,000**
										LIFETIME LTM (NPV)	**$423,300**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 80% of combined sampling event for OU1 and OU3											$8,947
Site Monitoring											
Groundwater sampling for 1 event - Includes collection of field parameters		5	well	$ -	$ -	$ 340	$ 1,700.00	$ 92	$ 458.13	$ -	$2,158
Surface water sampling for 1 event		4	samples			$ 85	$ 340.00	$ -	$ -	$ -	$340
Materials		1	event	$ 40	$ 40	$ -	$ -	$ -	$ -	$ -	$40
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$680
Reporting		40	hr	$85	$ 3,400.00	$ -	$ -	$ -	$ -	$ -	$3,400
monitoring event		1	ea	$ -	$ -	$340	$ 340.00	$75.00	$ 75.00	$ -	$415
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	11	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$1,914
Maintenance- Cap Maintenance											
Mowing brush, tractor with rotary mower, Medium density 2x per year	*32 01 90.19 1670*	153	msf	$ -	$ -	$ 28.51	$ 4,362	$ 24.74	$ 3,786	$ -	$8,147
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring) **$26,975,000**

Assumptions:

Working condition is Safety Level: **D** (**Labor productivity:** **82%**; **Equipment productivity:** **100%**)
Weighted Average of city cost index (Buffalo, NY) **101.4%** **(not applicable for costs derived from vendor quotes).**
Costs are loaded with a profit factor **10%**
Inflation **3%** per year
Estimated number of soil samples **72** samples | **1** times sampled | **0.25** hrs/sample | **$85** Labor Cost per hr
20% added for QA/QC samples | **1** worker sampling

Characterization Cost — Table A (per CWM) — **$593.48** per sample
Analytical cost — TCLP Metals — **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal
Lead contaminated soil as a "listed" waste- incineration: **$275** per ton | **62,000** tons soil hazardous (assume 43% hazardous)
22 tons per load | **2,818** loads for haz disposal
Lead contaminated soil as non-haz: **$39.87** per ton | **93,000** tons soil for non-haz disposal | **4,227** loads for non-haz disposal

Concrete: **3,300** lbs per cy | **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit
Mini-Rae Survey Mode PID: **$96.08** per day
Truck/SUV (1/2 ton or smaller): **$70.74** per day
Work day consists of: **10** hrs

Iron Filings change-out Assumptions
180 lb/cf iron filings
400 cy/day iron filings changeout
#REF! days for iron filing removal
3 workers for iron filing removal

Disposal Assumptions
20 loads per day
20 working days per month
10 hours per working day
3 months for site prep/restoration
18 months to completion
150 ft/day

Excavation:
Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **261,360** sf
Excavation Volume: **165,333** cy | **190,133** lcy
Excavated Weight: **248,000** tons
Roll-off dumpster can hold approximately: **12** tons
Volume fill remaining onsite: **62,000** cy

Groundwater Monitoring
Typical Rental Rates - Includes G&A and 10% Profit
Truck/SUV (1/2 ton or smaller) **$70.74** per day
Water Quality Analyzer **$159.00** per day
Water Level Meter **$31.80** per day
Submersible Pump **$113.91** per day
Generators: 220 Volt **$82.68** per day
Multi-gas meter **$75.00**

Analytical Costs
Metals **$75.00** per sample
VOCs **$90.00** per sample
2 hrs/GW sample | **$85** Labor cost per hr
0.5 hrs/SW sample
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$5,974,000
Soil/Fill Material Alternative 5	Old Upper Mountain Road	Soil/Fill - OU1	Construction Time:	9 months
Re-grading, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring	Lockport, NY		Operation Time:	- months
			Post Remediation Monitoring	30 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$5,693,000**
Construction Activities		**1**			**$983,371**		**$292,189**		**$147,220**	**$37,311**	**$ 4,256,899**
Site Preparation				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to remove sewer pipe, 10' to 14' deep, 1.5 CY excavator	*31 23 16.13 1000*	2,113	bcy	$ -	$ -	$ 1.59	$ 3,360	$ 1.93	$ 4,079	$ -	$ 7,439
Pipe removal, sewer, no excavation, 18" diameter	*02 41 13.33 2930*	1,019	lf	$ -	$ -	$ 8.16	$ 8,315	$ 11.94	$ 12,167	$ -	$ 20,482
Remove existing manhole	*02 41 13.33 0020*	4	ea	$ -	$ -	$ 297.07	$ 1,188	$ 90.80	$ 363	$ -	$ 1,551
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, with t	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 14,938.50	$ 59,754	$ -	$ 75,737
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	240	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 5,280
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre	$ -	$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Landfill Base Drainage Layer											
Removal of Sediment in Drainage Layer Area											
Soil-Excavator, hydraulic, crawler mtd. 2 CY cap = 165 CY/hr	*31 23 16.42 0260*	4,222.22	bcy	$ -	$ -	$ 0.65	$ 2,744	$ 1.03	$ 4,349	$ -	$ 7,093
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	4,855.56	lcy	$ -	$ -	$ 1.83	$ 8,886	$ 3.11	$ 15,101		$ 23,986
Supply 6" perf pipe (used PVC cost)	*Recent quote*	1,125.00	lf		$ -		$ -	$ -	$ -	$ 14.54	$ 16,358
Supply and transport gravel for drainage layer, 13 cy load, 2 hr haul	*Engineer's Estimate*	4,222.22	cy	$ 8.50	$ 35,889	$ 13.07	$ 55,184	$ -	$ -	$ -	$ 91,073
Placement of gravel for drainage layer, 24" thickness	*Engineer's Estimate*	4,222.22	cy		$ -		$ -		$ -	$ 18.24	$ 77,013
Deploy 10oz/sy mil Nonwoven Geotextile (Level C)	*ECHOS 2006 33 08 0533*	6,333.33	sy		$ -		$ -		$ -	$ 2.40	$ 15,200
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	9	mo	$ -	$ -	$ 55	$ 101,409	$ 3,420	$ 31,529	$ -	$ 132,937
Dust Control, Heavy, assumes 10 days per working month	*31 23 23.20 2510*	92.19	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 159,894
Grading of embankment, by dozer	*31 23 23.20 2300*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 106,743
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	51,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 59,160
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 188,853
Haul Road Maintenance	*31 23 23.20 2600*	92	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 105,192
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	14,663	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 24,633
Landfill Placement											
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 66,861
12 CY truck, 15 mph average, cycle 1 mile, 15 min wait/ld/unld	*31 23 23.20 1016*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.38	$ 198,237
Compaction, riding, vibrating roller, 2 passes, 12" lifts	*31 23 23.23 5060*	51,000	ecy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.26	$ 13,260
Finishing grading slopes, steep	*31 22 16.10 3310*	12,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,520
Capping 3:1 Side Slope (Ravine)											
Finishing grading slopes, steep	*31 22 16.10 3310*	17,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 3,570
Polymeric Liner Anchor Trench 3'x1.5' (level B)	*ECHOS 2006 33 08 0503*	2,300	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.87	$ 4,299
Deploy 10oz/sy mil Nonwoven Geotextile (level C)	*ECHOS 2006 33 08 0533*	17,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.40	$ 40,766
60 mil HDPE Liner (level C)	*ECHOS 2006 33 08 0572*	153,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.02	$ 615,094
Drainage Netting, Geotextile Fabric Heat Bonded (2 sides) (level E)	*ECHOS 2006 33 08 0513*	153,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.67	$ 102,516
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	11,333	cy	$ 28	$ 311,667	$ -	$ -	$ -	$ -	$ -	$ 311,667
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	11,333	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 103,382
Topsoil	*Recent quote- ESG from Seven Springs*	2,833	cy	$ 45	$ 126,083	$ -	$ -	$ -	$ -	$ -	$ 126,083
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,833	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 26,711
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	153	msf	$ 68.11	$ 10,421	$ 8.90	$ 1,362	$ 8.39	$ 1,284	$ -	$ 13,066
Capping											
Finishing grading slopes, gentle	*31 22 16.10 3300*	12,778	sy	$ -	$ -	$ 0.09	$ 1,150	$ 0.08	$ 1,022	$ -	$ 2,172
Deploy 10oz/sy mil Nonwoven Geotextile (level C)	*ECHOS 2006 33 08 0533*	12,778	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.40	$ 30,641
60 mil HDPE Liner (level C)	*ECHOS 2006 33 08 0572*	115,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.02	$ 462,326
Drainage Netting, Geotextile Fabric Heat Bonded (2 sides) (level E)	*ECHOS 2006 33 08 0513*	115,000	sf	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.67	$ 77,054
Gas Vents	*Recent quote- Modern Environmental*	7	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,715.58	$ 12,009
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	8,519	cy	$ 28	$ 234,259	$ -	$ -	$ -	$ -	$ -	$ 234,259
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	8,519	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 77,705
Topsoil	*Recent quote- ESG from Seven Springs*	2,130	cy	$ 45	$ 94,769	$ -	$ -	$ -	$ -	$ -	$ 94,769
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,130	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 20,077
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	115	msf	$ 68.11	$ 7,833	$ 8.90	$ 1,024	$ 8.39	$ 965	$ -	$ 9,821
											$ -
Site Restoration											$ -
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Monitoring Well Installation	*recent quote- EnviroTrac*	330	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 94.00	$ 31,020
Mobilization and Demobilization											**$ 64,367**
5% of Total Costs of Site Work, Treatment										$1,287,344	$ 64,367
Contingency											**$ 648,190**
15% of Total Construction Activities										$4,321,266	$ 648,190
Professional/Technical Services											**$ 723,673**
5% Project Management										$4,256,899	$ 212,845
6% Remedial Design											$ 255,414
6% Construction Management											$ 255,414

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$5,974,000
Soil/Fill Material Alternative 5 Re-grading, Landfill Capping with a Part 360 Cap, and Groundwater Monitoring	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: Operation Time: Post Remediation Monitoring:	9 months - months 30 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
LONG TERM ANNUAL MONITORING AND MAINTENANCE										**ANNUAL LTM COST (YRS 1-5)**	**$24,000**
										ANNUAL LTM COST (YRS 6-30)	**$16,000**
										LIFETIME LTM (NPV)	**$280,600**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 80% of combined sampling event for OU1 and OU2											$8,085
Site Monitoring											
Groundwater sampling for 1 event - Includes collection of field parameters		5	well	$ -	$ -	$ 340	$ 1,700.00	$ 92	$ 458.13	$ -	$2,158
Materials		1	event	$ 40	$ 40	$ -	$ -	$ -	$ -	$ -	$40
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$680
Reporting		40	hr	$85	$ 3,400.00	$ -	$ -	$ -	$ -	$ -	$3,400
Landfill Cap Inspection, 4 hrs each event, mob/demob with monitoring event		1	ea	$ -	$ -	$340	$ 340.00	$75.00	$ 75.00	$ -	$415
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	8	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$1,392
Maintenance- Cap Maintenance											
Mowing brush, tractor with rotary mower, Medium density 1x per year	*32 01 90.19 1670*	153	msf	$ -	$ -	$ 28.51	$ 4,362	$ 24.74	$ 3,786	$ -	$8,147
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring) **$5,974,000**

Assumptions:

Working condition is Safety Level: **D** (Labor productivity: **82%**; Equipment productivity: **100%**)
Weighted Average of city cost index (Buffalo, NY) **101.4%** (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor **10%**
Inflation **3%** per year
Estimated number of soil samples **72** samples | **1** times sampled | **0.25** hrs/sample | **$85** Labor Cost per hr
20% added for QA/QC samples | **1** worker sampling

Characterization Cost (Table A (per CWM)) **$593.48** per sample
Analytical cost (TCLP Metals) **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal
Lead contaminated soil as a "listed" waste- incineration **$275** per ton
Lead contaminated soil as non-haz **$39.87** per ton
Concrete **3,300** lbs per cy | **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit
Mini-Rae Survey Mode PID **$96.08** per day
Truck/SUV (1/2 ton or smaller) **$70.74** per day

Work day consists of: **10** hrs

Disposal Assumptions
20 loads per day
20 working days per month
10 hours per working day
3 months for site prep/restoration
6 months to completion
150 ft/day

Iron Filings change-out Assumptions
400 cy/day iron filings changeout
#REF! days for iron filing removal
3 workers for iron filing removal

Excavation:
Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **261,360** sf
Excavation Volume: **51,000** cy | **58,650** lcy
Excavated Weight: **76,500** tons
Roll-off dumpster can hold approximately: **12** tons
Volume fill remaining onsite **51,000** cy

Groundwater Monitoring
Typical Rental Rates - Includes G&A and 10% Profit
Truck/SUV (1/2 ton or smaller) **$70.74** per day
Water Quality Analyzer **$159.00** per day
Water Level Meter **$31.80** per day
Submersible Pump **$113.91** per day
Generators: 220 Volt **$82.68** per day
Multi-gas meter **$75.00**

Analytical Costs
Metals **$75.00** per sample
VOCs **$90.00** per sample
2 hrs/GW sample | **$85** Labor cost per hr
0.5 hrs/SW sample
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$4,208,000
Soil/Fill Material Alternative 6	Old Upper Mountain Road	Soil/Fill - OU1	Construction Time:	9 months
Partial Removal, Landfill Capping with a Soil Cap, and Groundwater Monitoring	Lockport, NY		Operation Time:	- months
			Post Remediation Monitoring	30 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$3,927,000**
Construction Activities		**1**			**$1,025,105**		**$302,426**		**$149,447**	**$1,204,080**	**$ 2,924,203**
Site Preparation											
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to remove sewer pipe, 10' to 14' deep, 1.5 CY excavator	*31 23 16.13 1000*	2,113	bcy	$ -	$ -	$ 1.59	$ 3,360	$ 1.93	$ 4,079	$ -	$ 7,439
Pipe removal, sewer, no excavation, 18" diameter	*02 41 13.33 2930*	1,019	lf	$ -	$ -	$ 8.16	$ 8,315	$ 11.94	$ 12,167	$ -	$ 20,482
Remove existing manhole	*02 41 13.33 0020*	4	ea	$ -	$ -	$ 297.07	$ 1,188	$ 90.80	$ 363	$ -	$ 1,551
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, wit	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 14,938.50	$ 59,754	$ -	$ 75,737
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	240	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 5,280
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre	$ -	$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Landfill Base Drainage Layer											
Removal of Sediment in Drainage Layer Area											
Soil-Excavator, hydraulic, crawler mtd. 2 CY cap = 165 CY/hr	*31 23 16.42 0260*	4,222	bcy	$ -	$ -	$ 0.65	$ 2,744	$ 1.03	$ 4,349	$ -	$ 7,093
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	4,856	lcy	$ -	$ -	$ 1.83	$ 8,886	$ 3.11	$ 15,101		$ 23,986
Supply 6" perf pipe (used PVC cost)	*Recent quote*	1,125	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 14.54	$ 16,358
Supply and transport gravel for drainage layer, 13 cy load, 2 hr haul	*Engineer's Estimate*	4,222	cy	$ 8.50	$ 35,889	$ 13.07	$ 55,184	$ -	$ -	$ -	$ 91,073
Placement of gravel for drainage layer, 24" thickness	*Engineer's Estimate*	4,222	cy		$ -		$ -		$ -	$ 18.24	$ 77,013
Deploy 10oz/sy mil Nonwoven Geotextile (Level C)	*ECHOS 2006 33 08 0533*	6,333	sy		$ -		$ -		$ -	$ 2.40	$ 15,200
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	9	mo	$ -	$ -	$ 55	$ 101,409	$ 3,420	$ 31,529	$ -	$ 132,937
Dust Control, Heavy, assumes 10 days per working month	*31 23 23.20 2510*	92.19	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 159,894
Grading of embankment, by dozer	*31 23 23.20 2300*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 106,743
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	51,000	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 59,160
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 188,853
Haul Road Maintenance	*31 23 23.20 2600*	92	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 105,192
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	14,663	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 24,634
Landfill Placement											
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 66,861
12 CY truck, 15 mph average, cycle 1 mile, 15 min wait/ld/unld	*31 23 23.20 1016*	58,650	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.38	$ 198,237
Compaction, riding, vibrating roller, 2 passes, 12" lifts	*31 23 23.23 5060*	51,000	ecy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.26	$ 13,260
Finishing grading slopes, steep	*31 22 16.10 3310*	12,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,520
Capping 3:1 Side Slope (Ravine)											
Finishing grading slopes, steep	*31 22 16.10 3310*	17,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 3,570
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	11,333	cy	$ 28	$ 311,667	$ -	$ -	$ -	$ -	$ -	$ 311,667
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	11,333	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 103,382
Topsoil	*Recent quote- ESG from Seven Springs*	2,833	cy	$ 45	$ 126,083	$ -	$ -	$ -	$ -	$ -	$ 126,083
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,833	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 26,711
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	153	msf	$ 68.11	$ 10,421	$ 8.90	$ 1,362	$ 8.39	$ 1,284	$ -	$ 13,066
Capping											
Finishing grading slopes, gentle	*31 22 16.10 3300*	12,778	sy	$ -	$ -	$ 0.09	$ 1,150	$ 0.08	$ 1,022	$ -	$ 2,172
Gas Vents	*Recent quote- Modern Environmental*	7	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,715.58	$ 12,009
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	8,519	cy	$ 28	$ 234,259	$ -	$ -	$ -	$ -	$ -	$ 234,259
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	8,519	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 77,705
Topsoil	*Recent quote- ESG from Seven Springs*	2,130	cy	$ 45	$ 94,769	$ -	$ -	$ -	$ -	$ -	$ 94,769
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	2,130	cy		$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 20,077
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	115	msf	$ 68.11	$ 7,833	$ 8.90	$ 1,024	$ 8.39	$ 965	$ -	$ 9,821
											$ -
Site Restoration											$ -
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Monitoring Well Installation	*recent quote- EnviroTrac*	330	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 94.00	$ 31,020
Mobilization and Demobilization											**$ 58,335**
5% of Total Costs of Site Work, Treatment										$1,166,691	$ 58,335
Contingency											**$ 447,381**
15% of Total Construction Activities										$2,982,537	$ 447,381
Professional/Technical Services											**$ 497,114**
5% Project Management										$2,924,203	$ 146,210
6% Remedial Design											$ 175,452
6% Construction Management											$ 175,452

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$4,208,000
Soil/Fill Material Alternative 6 Partial Removal, Landfill Capping with a Soil Cap, and Groundwater Monitoring	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: 9 months Operation Time: - months Post Remediation Monitoring 30 years	

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs	Option Total Cost
LONG TERM ANNUAL MONITORING AND MAINTENANCE								**ANNUAL LTM COST (YRS 1-5)**			**$24,000**
								ANNUAL LTM COST (YRS 6-30)			**$16,000**
								LIFETIME LTM (NPV)			**$280,600**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 80% of combined sampling event for OU1 and OU2											$8,013
Site Monitoring											
Groundwater sampling for 1 event - Includes collection of field parameters		5	well	$ -	$ -	$ 340	$ 1,700.00	$ 92	$ 458.15	$ -	$2,158
Materials		1	event	$ 40	$ 40	$ -	$ -	$ -	$ -	$ -	$40
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$680
Reporting		40	hr	$85	$ 3,400.00	$ -	$ -	$ -	$ -	$ -	$3,400
Landfill Cap Inspection, 4 per year, 4 hrs each event, mob/demob witl monitoring event		1	ea	$ -	$ -	$340	$ 340.00	$75.00	$ 75.00	$ -	$415
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	8	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 165.00	$1,320
Maintenance- Cap Maintenance											
Mowing brush, tractor with rotary mower, Medium density 1x per year	*32 01 90.19 1670*	153	msf	$ -	$ -	$ 28.51	$ 4,362	$ 24.74	$ 3,786	$ -	$8,147
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring) **$4,208,000**

Assumptions:

Working condition is Safety Level: D (Labor productivity: 82%; Equipment productivity: 100%)
Weighted Average of city cost index (Buffalo, NY) 101.4% (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor 10%
Inflation 3% per year
Estimated number of soil samples 72 samples; 1 times sampled; 0.25 hrs/sample; $85 Labor Cost per hr
20% added for QA/QC samples; 1 worker sampling

Characterization Cost (Table A (per CWM)) $593.48 per sample
Analytical cost (TCLP Metals) $75.00 per sample
For each sampling event, assumed: $50 for materials (gloves, notebooks, etc.)

Disposal

Lead contaminated soil as a "listed" waste- incineration $275 per ton
Lead contaminated soil as non-haz $39.87 per ton
Concrete 3,300 lbs per cy; - tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit

Mini-Rae Survey Mode PID $96.08 per day
Truck/SUV (1/2 ton or smaller) $70.74 per day

Work day consists of: 10 hrs

Disposal Assumptions

180 lb/cf iron filings
20 loads per day
20 working days per month
Iron Filings change-out Assumptions
400 cy/day iron filings changeout
10 hours per working day
#REF! days for iron filing removal
3 months for site prep/restoration
3 workers for iron filing removal
6 months to completion
150 ft/day

Excavation:

Concrete and Asphalt: 0.0% % of excavation volume
Excavation Area: 261,360 sf
Excavation Volume: 165,333 cy; 190,133 lcy
Excavated Weight: 248,000 tons
Roll-off dumpster can hold approximately: 12 tons
Volume fill remaining onsite 62,000 cy

Groundwater Monitoring

Typical Rental Rates - Includes G&A and 10% Profit

Truck/SUV (1/2 ton or smaller)	$70.74 per day
Water Quality Analyzer	$159.00 per day
Water Level Meter	$31.80 per day
Submersible Pump	$113.91 per day
Generators: 220 Volt	$82.68 per day
Multi-gas meter	$75.00

Analytical Costs

Metals	$75.00 per sample
VOCs	$90.00 per sample

2 hrs/GW sample
0.5 hrs/SW sample
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)
$85 Labor cost per hr

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$41,721,000
Soil/Fill Material Alternative 7 Partial Removal (Deeper Fill) and Off-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: Operation Time: Post Remediation Monitoring	34 months - months 30 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$41,500,000**
Construction Activities		**1**			**$288,229**		**$536,265**		**$201,473**	**$725,750**	**$ 30,615,329**
Pre-Design Pilot Study											
Pilot Study Treatment	*MT2 Estimate*	5	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 33.24	$ 166
Sample analysis	*MT2 Estimate*	1	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 550.00	$ 550
Pre-Design Characterization Study											
Driller											
Mob/Demob	*quote- SJB*	1	ls							$ 800	$ 800
Geoprobe/Crew for Soil Borings	*quote- SJB*	21	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,273	$ 26,735
Sample Collection		210	hr	$ -	$ -	$ 85.00	$ 17,850	$ -	$ -	$ -	$ 17,850
Sample Analysis for TCLP Lead and Zinc	*Life Science Laboratories*	161	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 593	$ 95,550
Reporting	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000	$ 15,000
											$ -
Site Preparation											$ -
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, with	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 129.90	$ 520	$ -	$ 16,503
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	240	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 5,280
Monitoring Well Installation	*recent quote- EnviroTrac*	330	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 94.00	$ 31,020
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre	$ -	$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Sheetpiling Along RR Tracks (40' deep, drive, extract and salvage)	*31 41 16.10 1000*	228	ton	$ 551.66	$ 125,778	$ 263.83	$ 60,153	$ 305.97	$ 69,761	$ -	$ 255,693
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	34	mo	$ -	$ -	$ 55	$ 368,545	$ 3,420	$ 114,584		$ 483,130
Dust Control, Heavy	*31 23 23.20 2510*	335	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 581,096
Grading of embankment, by dozer	*31 23 23.20 2300*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 318,575
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	152,210	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 176,564
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 563,633
Haul Road Maintenance	*31 23 23.20 2600*	335	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 382,296
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	152,210	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 255,713
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 199,547
Spotter at Loadout	*31 23 23.20 2310*	3,350	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 153,985
Hazardous Soil Disposal											
Soil Characterization Sampling (1 sample per 500 CY, per CWM)	*Life Science Laboratories*	398	sample	$ -	$ -	$ -	$ -	$ -	$ -	$593.48	$ 236,205
Hazardous Soil Disposal	*CWM*	98,175	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 140.00	$ 13,744,556
Transportation using dumps	*CWM*	98,175	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 19.50	$ 1,914,420
Demurrage (assume 1 hour per week of loading)	*CWM*	89	hour	$ -	$ -	$ -	$ -	$ -	$ -	$ 85.00	$ 7,586
Fuel Surcharge- 36% of Transportation	*CWM*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 689,191.32	$ 689,191
Non-Hazardous Soil Disposal											
Soil transportation and disposal	*Recent quote- ESG plus 10%*	130,139	ton	$ -	$ -	$ -	$ -	$ -	$ -	$37.68	$ 4,903,005
Stabilization with Ecobond											
Treat w/ EcoBond, 5% volume added	*MT2 est*	70,185	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 39.93	$ 2,802,491
Site Restoration											
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	76,105	lcy	$ 27.50	$ 2,092,886	$ -	$ -	$ -	$ -	$ -	$ 2,092,886
Soil-Excavator, 3.5 CY cap, earthwork of clean backfill	*31 23 16.42 5500*	76,105	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 88,282
Finishing grading slopes, steep (Treated fill)	*31 22 16.10 3310*	11,516	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,418
Topsoil	*Recent quote- ESG from Seven Springs*	1,919	cy	$ 45	$ 85,407	$ -	$ -	$ -	$ -	$ -	$ 85,407
Finishing grading slopes, gentle	*31 22 16.10 3300*	11,516	sy	$ -	$ -	$ 0.09	$ 1,036	$ 0.08	$ 921	$ -	$ 1,958
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	104	msf	$ 68.11	$ 7,059	$ 8.90	$ 922	$ 8.39	$ 870	$ -	$ 8,851
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Mobilization and Demobilization											**$ 946,200**
5% of Total Costs of Site Work, Treatment										$ 18,923,996	$ 946,200
Contingency											**$ 4,734,229**
15% of Total Construction Activities										$ 31,561,529	$ 4,734,229
Professional/Technical Services											**$ 5,204,606**
5% Project Management										$ 30,615,329	$ 1,530,766
6% Remedial Design											$ 1,836,920
6% Construction Management											$ 1,836,920
LONG TERM ANNUAL MONITORING AND MAINTENANCE								**ANNUAL LTM COST (YRS 1-5)**			**$23,000**
								ANNUAL LTM COST (YRS 6-30)			**$11,000**
								LIFETIME LTM (NPV)			**$221,100**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 80% of combined sampling event for OU1 and OU3											$11,388
Site Monitoring											
Groundwater sampling for 1 event - includes collection of field parameters		8	well	$ -	$ -	$ 340	$ 2,720.00	$ 92	$ 733.01	$ -	$3,453
Surface water sampling for 1 event		4	samples			$ 340	$ 1,360.00	$ 92	$ 366.50	$ -	$1,727
Materials		1	event	$ 40							$40
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$680
Reporting		40	hr	$85	$ 3,400.00	$ -	$ -	$ -	$ -	$ -	$3,400
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	12	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$2,088
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$41,721,000**

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$41,721,000
Soil/Fill Material Alternative 7 Partial Removal (Deeper Fill) and Off-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: Operation Time: Post Remediation Monitoring	34 months - months 30 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
Assumptions:											
Working condition is Safety Level:		D	(Labor productivity:		82%	; Equipment productivity:		100%	)		
Weighted Average of city cost index (Buffalo, NY)		101.4%	(not applicable for costs derived from vendor quotes).								
Costs are loaded with a profit factor		10%									
Inflation		3%	per year								Labor
Estimated number of soil samples		0	samples	1	times sampled		0.25	hrs/sample		$85	Cost per hr
				20%	added for QA/QC samples		1	worker sampling			
Characterization Cost	Table A (per CWM)	$593.48	per sample								
Analytical cost	TAL Metals	$75.00	per sample								
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)								
Disposal											
Lead contaminated soil as a "listed" waste- incineration		$275	per ton		98,175	tons soil hazardous (assume 43% hazardous)					
					22	tons per load		4,463	loads for haz disposal		
Lead contaminated soil as non-haz		$39.87	per ton		130,139	tons soil for non-haz disposal		5,915	loads for non-haz disposal		
								70,185	tons for treatment		
Concrete		3,300	lbs per cy								
Typical Rental Rates - Includes G&A and 10% Profit							150 ft/day drilling		1000 tons per day for treatment		
Mini-Rae Survey Mode PID		$96.08	per day						20 loads per day		
Truck/SUV (1/2 ton or smaller)		$70.74	per day						20 working days per month		
									10 hours per working day		
Work day consists of:		10	hrs						1 months for pre-design activities		
									3 months for site prep/restoration		
Excavation With Concrete and Asphalt:									29 months of construction		
Concrete and Asphalt:	0.0%	% of excavation volume									
Excavation Area:	0	sf									
Excavation Volume:	152,210	cy	175,041	lcy							
Excavated Weight:	228,315	tons									
Roll-off dumpster can hold approximately:	12	tons									

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$23,557,000
Soil/Fill Material Alternative 8 Partial Removal (Deeper Fill) with Ex Situ Stabilization and On-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: Operation Time: Post Remediation Monitoring	43 months - months 30 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$23,336,000**
Construction Activities		**1**			**$558,377**		**$710,752**		**$253,454**	**$37,333**	**$ 17,667,109**
Pre-Design Pilot Study											
Pilot Study Treatment	*MT2 Estimate*	5	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 33.24	$ 166
Sample analysis	*MT2 Estimate*	1	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 550.00	$ 550
Site Preparation											$ -
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Erosion & Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 30,000
Stabilization Measures for Erosion and Sedimentation Control											
Silt Fence, 3' high, adverse conditions	*31 25 14.16 1000*	1,200	lf	$ 0.21	$ 252	$ 0.47	$ 564	$ -	$ -	$ -	$ 816
Sewer Relocation											
Excavating Trench to install sewer pipe, 10' to 14' deep, 1.5 CY excavator, with	*31 23 16.13 1000*	2,785	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 8.96	$ 24,958
PVC sewer pipe, 13' lengths, 18" diameter	*33 31 13.25 2300*	1,400	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 28.74	$ 40,236
Install manholes- concrete, precast, 4' ID, 10' deep	*33 49 13.10 0600 and 0700*	4	ea	$ 1,358.94	$ 5,436	$ 2,636.87	$ 10,547	$ 129.90	$ 520	$ -	$ 16,503
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	2,698	cy	$ 28	$ 74,184	$ -	$ -	$ -	$ -	$ -	$ 74,184
Haul Road Upgrades											
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Monitoring Well Abandonment	*recent quote- EnviroTrac*	240	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 22.00	$ 5,280
Monitoring Well Installation	*recent quote- EnviroTrac*	330	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 94.00	$ 31,020
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	6	acre	$ -	$ -	$ 3,323	$ 19,939	$ 2,295	$ 13,769	$ -	$ 33,707
Stockpile Pad Construction											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Sheetpiling Along RR Tracks (40' deep, drive, extract and salvage)	*31 41 16.10 1000*	228	ton	$ 551.66	$ 125,778	$ 263.83	$ 60,153	$ 305.97	$ 69,761	$ -	$ 255,693
Excavation											
Community Air Monitoring (Dust)	*recent quote - Pine Environmental*	43	mo	$ -	$ -	$ 55	$ 476,227	$ 3,420	$ 148,063		$ 624,290
Dust Control, Heavy	*31 23 23.20 2510*	433	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,734.40	$ 750,879
Grading of embankment, by dozer	*31 23 23.20 2300*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.82	$ 318,575
Soil-Excavator, hydraulic, crawler mtd. 3.5 CY cap = 350 CY/hr	*31 23 16.42 5500*	152,210	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 176,564
34CY off-road 20min. Wait 2,000ft cycle	*31 23 23.20 6300*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.22	$ 563,633
Haul Road Maintenance	*31 23 23.20 2600*	433	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 493,994
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	152,210	bcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.68	$ 255,713
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 199,547
Spotter at Loadout	*31 23 23.20 2310*	4,329	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 198,976
Stabilization with Ecobond											
Treat w/ EcoBond In Situ, 5% volume added	*MT2 est*	70,185	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 39.93	$ 2,802,491
Treat w/ EcoBond Ex Situ, 5% volume added	*MT2 est*	228,315	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 39.93	$ 9,116,614
Landfill Base Drainage Layer											
Removal of Sediment in Drainage Layer Area											
Soil-Excavator, hydraulic, crawler mtd. 2 CY cap = 165 CY/hr	*31 23 16.42 0260*	4,222.22	bcy	$ -	$ -	$ 0.65	$ 2,744	$ 1.03	$ 4,349	$ -	$ 7,093
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	4,222.22	lcy	$ -	$ -	$ 1.83	$ 7,727	$ 3.11	$ 13,131		$ 20,858
Supply 6" perf pipe (used PVC cost)	*Recent quote*	1,125.00	lf		$ -		$ -	$ -	$ -	$ 14.54	$ 16,358
Supply and transport gravel for drainage layer, 13 cy load, 2 hr haul	*Engineer's Estimate*	4,222.22	cy	$ 8.50	$ 35,889	$ 13.07	$ 55,184	$ -	$ -	$ -	$ 91,073
Placement of gravel for drainage layer, 24" thickness	*Engineer's Estimate*	4,222.22	cy		$ -		$ -		$ -	$ 18.24	$ 77,013
Deploy 10oz/sy mil Nonwoven Geotextile (Level C)	*ECHOS 2006 33 08 0533*	6,333.33	sy		$ -		$ -		$ -	$ 2.40	$ 15,200
Treated Soil Placement											
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 199,547
12 CY truck, 15 mph average, cycle 1 mile, 15 min wait/ld/unld	*31 23 23.20 1016*	175,041	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.38	$ 591,640
Compaction, riding, vibrating roller, 2 passes, 12" lifts	*31 23 23.23 5060*	152,210	ecy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.26	$ 39,575
Finishing grading slopes, steep	*31 22 16.10 3310*	12,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,520
Capping											
Finishing grading slopes, gentle	*31 22 16.10 3300*	12,778	sy	$ -	$ -	$ 0.09	$ 1,150	$ 0.08	$ 1,022	$ -	$ 2,172
Gas Vents	*Recent quote- Modern Environmental*	3	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,570.00	$ 4,710
Supply and Transportation of NYS Certified Clean Back Fill Material	*Recent quote- ESG from Seven Springs*	8,519	cy	$ 28	$ 234,259	$ -	$ -	$ -	$ -	$ -	$ 234,259
Spreading and Compaction of General Fill	*ECHOS 2006 17 03 0422*	8,519	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Restoration											
Topsoil	*Recent quote- ESG from Seven Springs*	1,919	cy	$ 45	$ 85,407	$ -	$ -	$ -	$ -	$ -	$ 85,407
Finishing grading slopes, gentle	*31 22 16.10 3300*	11,516	sy	$ -	$ -	$ 0.09	$ 1,036	$ 0.08	$ 921	$ -	$ 1,958
Utility mix, 7#/M.S.F., Hydro or air seeding, with mulch and fertilizer	*32 92 19.14 5400*	104	msf	$ 68.11	$ 7,059	$ 8.90	$ 922	$ 8.39	$ 870	$ -	$ 8,851
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	2,100	lf	$ 19.64	$ 41,244	$ 4.55	$ 9,555	$ 0.99	$ 2,079	$ -	$ 52,878
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Mobilization and Demobilization											**$ 13,701**
5% of Total Costs of Site Work, Treatment										$ 274,017	$ 13,701
Contingency											**$ 2,652,121**
15% of Total Construction Activities										$ 17,680,810	$ 2,652,121
Professional/Technical Services											**$ 3,003,409**
5% Project Management										$ 17,667,109	$ 883,355
6% Remedial Design											$ 1,060,027
6% Construction Management											$ 1,060,027
LONG TERM ANNUAL MONITORING AND MAINTENANCE								**ANNUAL LTM COST (YRS 1-5)**			**$23,000**
								ANNUAL LTM COST (YRS 6-30)			**$11,000**
								LIFETIME LTM (NPV)			**$221,100**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 80% of combined sampling event for OU1 and OU2											$11,388
Site Monitoring											
Groundwater sampling for 1 event - Includes collection of field parameters		8	well	$ -	$ -	$ 340	$ 2,720.00	$ 92	$ 733.01	$ -	$3,453
Surface water sampling for 1 event		4	samples			$ 340	$ 1,360.00	$ 92	$ 366.50	$ -	$1,727
Materials		1	event	$ 40							$40
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$680
Reporting		40	hr	$85	$ 3,400.00	$ -	$ -	$ -	$ -	$ -	$3,400
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	12	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$2,088
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$23,557,000
Soil/Fill Material Alternative 8 Partial Removal (Deeper Fill) with Ex Situ Stabilization and On-site Disposal, with In Situ Stabilization (Shallow Fill 0-14 ft Depth)	Old Upper Mountain Road Lockport, NY	Soil/Fill - OU1	Construction Time: 43 months Operation Time: - months Post Remediation Monitoring 30 years	

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$23,557,000**

Assumptions:

Working condition is Safety Level: **D** (**Labor productivity:** **82%**; **Equipment productivity:** **100%**)
Weighted Average of city cost index (Buffalo, NY) **101.4%** **(not applicable for costs derived from vendor quotes).**
Costs are loaded with a profit factor **10%**
Inflation **3%** per year

Estimated number of soil samples **0** samples; **1** times sampled; **0.25** hrs/sample; **$85** Labor Cost per hr
20% added for QA/QC samples; **1** worker sampling

Characterization Cost	Table A (per CWM)	$593.48	per sample								
Analytical cost	TAL Metals	$75.00	per sample								
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)								
Disposal											
Lead contaminated soil as a "listed" waste- incineration		$275	per ton		228,315	tos soil treated ex situ for onsite disposal					
					22	tons per load			10,378	loads for haz disposal	
Lead contaminated soil as non-haz		$39.87	per ton		130,139	tons soil for non-haz disposal			5,915	loads for non-haz disposal	
									70,185	tons for in situ treatment	
Concrete		3,300	lbs per cy						600	CY per day for excavation	
Typical Rental Rates - Includes G&A and 10% Profit							150	ft/day drilling	1000	tons per day for treatment	
Mini-Rae Survey Mode PID		$96.08	per day						20	loads per day	
Truck/SUV (1/2 ton or smaller)		$70.74	per day						20	working days per month	
									10	hours per working day	
Work day consists of:		10	hrs								
									3	months for site prep/restoration	
Excavation With Concrete and Asphalt:									40	months of construction	
Concrete and Asphalt:	0.0%	% of excavation volume									
Excavation Area:	0	sf									
Excavation Volume:	152,210	cy	175,041 lcy								
Excavated Weight:	228,315	tons									
Roll-off dumpster can hold approximately:	12	tons									

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

OU2

Option		Total NPV Cost	Capital Cost	Lifetime Monitoring	Lifetime O&M	Time to Complete	
1B	Site Management	$87,000	$41,000	$46,117	NA	2	months
2	In situ Multi-media Sub-aqueous Capping	$2,889,000	$2,775,000	$113,900	NA	24	months
3	In Situ Sediment Amendment	$2,334,000	$2,295,000	$39,400	NA	24	months
4	Complete Removal Dredging (Mechanical) with Dewatering and On-site Disposal	$4,638,000	$4,638,000	NA	NA	12	months
5	Mass Removal Dredging with On-site Disposal and Multi-Media Residual Capping	$3,887,000	$3,875,000	NA	NA	12	months

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$87,000
OU 2 Alternative 1B **Site Management**	**Old Upper Mountain Road** **Lockport, NY**	**Sediment - OU2**	**Construction Time:**	**2** months
			Operation Time:	**-** months
			Post Remediation Monitoring	**30** years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$41,000**
Site Management Activities		**1**			**$0**		**$0**		**$0**	**$65,433**	**$ 35,433**
Surveyor- monument installation		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,000	$ 10,000
Lawyer		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000	$ 15,000
Fence, chain link, 9 ga. Wire, in concrete, 6' H	*32 31 13.20 0200*	200	lf	$ 15.92	$ 3,184	$ 3.53	$ 706	$ 1.11	$ 222	$ -	$ 4,112
Double swing gates, 6' H, 12' open, in concrete	*32 31 13.20 5060*	2	Opng	$ 245.25	$ 491	$ 341.36	$ 683	$ 74.03	$ 148	$ -	$ 1,321
Signage, assume small signs attached to perimeter fencing		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000	$ 5,000
Professional/Technical Services											**$ 6,024**
5% Project Management										$35,433	$ 1,772
6% Remedial Design											$ 2,126
6% Construction Management											$ 2,126
LONG TERM ANNUAL MONITORING AND MAINTENANCE								**ANNUAL LTM COST (YRS 1-30)**			**$3,000**
								LIFETIME LTM (NPV)			**$46,117**
Monitoring and Maintenance											
Site Monitoring											**$ 2,766**
Mobilization/Demobilization of Inspector		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 340	$ 340
Surface water sampling for 1 event		4	samples	$ -	$ -	$ 42.50	$ 170	$ -	$ -	$ -	$ 170
Materials		1	event	$ 50.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 50
Reporting		6	hr	$ -	$ -	$ 85.00	$ 510	$ -	$ -	$ -	$ 510
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	4	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174	$ 696
Maintenance- Fence Maintenance											
Repair fence	*32 01 90.19 1670*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000	$ 1,000
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$87,000**

Assumptions:

Labor
Cost per hr **$85**

Weighted Average of city cost index (Buffalo, NY) **101.4%**
Inflation **3%**

Analytical Costs
Metals **$75.00** per sample
VOCs **$90.00** per sample

workers per event **1**
hours travel per event **5**
for materials (gloves, notebooks, etc.) **$50**
0.5 hrs/SW sample

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$2,889,000
OU 2 Alternative 2 In situ Multi-media Sub-aqueous Capping	Old Upper Mountain Road Lockport, NY	Sediment - OU2	Construction Time: Operation Time: Post Remediation Monitoring	24 months - months 30 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$2,775,000**
Construction Activities		**1**			**$51,912**		**$45,019**		**$13,032**	**$62,744**	**$ 2,023,017**
Pre-Construction											
Apply for wetland permits	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 15,000	$ -	$ -	$ -	$ 15,000
Hydrology and Hydraulics study, no FEMA LOMR	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ 40,000
Fluvial Geomorph Investigation	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 10,000
Site Preparation											
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Survey 1-foot contours	*Recent bids*	10.0	acres	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,400.00	$ 44,000
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	9.5	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,617.88	$ 53,370
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
2 laborers, 2 hrs per day, 10 days for controlled release of beaver dams	*Means labor costs p 481*	40	hrs	$ -	$ -	$ 52.67	$ 2,107	$ -	$ -	$ -	$ 2,107
Dewatering											
Installation of gravity pipe (2x18"corr metal pipe)	*31 23 19.20 1400*	3,600	lf	$ 14.42	$ 51,912	$ 11.92	$ 42,912	$ 3.62	$ 13,032	$ -	$ 107,856
Outlet protection (Class II rip-rap for slope and channel protection)	*Recent Bids*	20	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 78.75	$ 1,575
Misc erosion and sediment control (silt fences, stockpiles, etc)	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,000.00	$ 50,000
Capping											
Deploy 10oz/sy mil Nonwoven Geotextile (Level C)	*ECHOS 2006 33 08 0533*	28,848	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.40	$ 69,178
Supply and Transportation of Clean Sand to Site - Triaxel 13CY.load, 85/HR trucl	*Recent Bids*	9,616	cy	$ 8.50	$ -	$ 13.07	$ -	$ -	$ -	$ 23.73	$ 228,159
Supply and Transportation Clean Graded Armor Stone	*Recent Bids*	9,616	cy	$ 27.50	$ -	$ 13.07	$ -	$ -	$ -	$ 44.63	$ 429,133
Spreading and Compaction of Sand 1' thick		9,616	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 87,716
Spreading and Compaction of Stone 1' thick		9,616	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.12	$ 87,716
Haul Road Maintenance	*31 23 23.20 2600*	104	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$118,668
Restoration											
Topsoil 6"	*Recent quote- ESG from Seven Springs*	4,808	cy	$ 44.50	$ -	$ -	$ -	$ -	$ -	$ 44.50	$ 213,956
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	4,808	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 45,328
Wetland Seeding by hydroseeder with feritilizer and lime	*32 92 19.14 5800 with adjustment for native species*	260	msf	$ 61.30	$ 15,914	$ 8.90	$ 2,311	$ 8.39	$ 2,178	$ -	$ 20,403
Riffle Grade Controls for Cap Stability and Habitat Restoration	*Recent Bids*	5	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,740.00	$ 103,700
Grade Stream Channel Through Cap	*Recent Bids*	3,300	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 21.00	$ 69,300
Sod and Log Structures to maintain stream pattern	*Recent Bids*	25	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,500.00	$ 187,500
Mobilization and Demobilization											**$ 91,178**
5% of Total Costs of Site Work, Treatment										$ 1,823,559	$ 91,178
Contingency											**$ 317,129**
15% of Total Construction Activities										$ 2,114,195	$ 317,129
Professional/Technical Services											**$ 343,913**
5% Project Management										$ 2,023,017	$ 101,151
6% Remedial Design											$ 121,381
6% Construction Management											$ 121,381
LONG TERM MONITORING									**ANNUAL LTM COST (YRS 1-5)**		**$ 11,000**
									ANNUAL LTM COST (YRS 6-30)		**$ 6,000**
									LIFETIME LTM (NPV)		**$113,900**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for OU1 and OU2											$ 5,507
Site Monitoring											
Surface water sampling for 1 event		4	samples	$ -	$ -	$ 22.91	$ 92	$ -	$ -	$ -	$ 92
Materials		1	event	$ 50	$ 50	$ -	$ -	$ -	$ -	$ -	$ 50
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 680.00	$ 680
Reporting		40	hr	$ 85.00	$ 3,400	$ -	$ -	$ -	$ -	$ -	$ 3,400
Cap Inspection, 4 hrs each event, mob/demob with monitoring event		1	ea	$ -	$ -	$340	$ 340.00	$75.00	$ 75.00	$ -	$ 415
Laboratory analysis											
Metals and VOCs, plus 20% QA/QC	*Life Science Laboratories*	5	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$ 870
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring) **$2,889,000**

Assumptions:

Working condition is Safety Level: **D** (Labor productivity: **82%**; Equipment productivity: **100%**)
Weighted Average of city cost index (Buffalo, NY): **101.4%** (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor: **10%**
Inflation: **3%** per year
Estimated number of soil samples: **38** samples; **1** times sampled; **0.25** hrs/sample; **$85** Labor Cost per hr
20% added for QA/QC samples; **1** worker sampling
Characterization Cost (Table A (per CWM)): **$507.00** per sample
Analytical cost (TCLP Metals): **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal

Lead contaminated sediment as a "listed" waste- incineration: **$275** per ton; **-** tons soil hazardous (assume 43% hazardous)
22 tons per load; **0** loads for haz disposal
Lead contaminated sediment as non-haz: **$39.87** per ton; **-** tons soil for non-haz disposal; **0** loads for non-haz disposal
Concrete: **3,300** lbs per cy; **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit

Mini-Rae Survey Mode PID: **$96.08** per day
Truck/SUV (1/2 ton or smaller): **$70.74** per day

Work day consists of: **10** hrs

Disposal Assumptions

20 loads per day
20 working days per month
10 hours per working day
2 months for site prep/restoration
22 months to completion

Excavation:

Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **138,294** sf
Excavation Volume: **0** cy; **0** lcy
Excavated Weight: **0** tons
Roll-off dumpster can hold approximately: **12** tons

Groundwater Monitoring

Typical Rental Rates - Includes G&A and 10% Profit

Truck/SUV (1/2 ton or smaller): **$70.74** per day
Water Quality Analyzer: **$159.00** per day
Water Level Meter: **$31.80** per day
Submersible Pump: **$113.91** per day
Generators: 220 Volt: **$82.68** per day

Analytical Costs

Metals: **$75.00** per sample
VOCs: **$90.00** per sample
2 hrs/GW sample; **$85** Labor cost per hr
0.5 hrs/SW sample
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)

Notes

sy square yard
cy cubic yard
lcy loose cubic yard
bcy bank cubic yard
lf linear feet
sf square feet
msf 1,000 square feet
mo month
ls lump sum
O&M Operation and maintenance
H&S Health and Safety

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$2,334,000
OU 2 Alternative 3 In Situ Sediment Amendment	Old Upper Mountain Road Lockport, NY	Sediment - OU2	Construction Time:	24 months
			Operation Time:	- months
			Post Remediation Monitoring	30 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$2,295,000**
Construction Activities		**1**			**$51,912**		**$46,312**		**$13,032**	**$67,735**	**$ 1,692,432**
Pre-Construction											
Apply for wetland permits	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 5,000	$ -	$ -	$ -	$ 5,000
Hydrology and Hydraulics study, no FEMA LOMR	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ 40,000
Fluvial Geomorph Investigation	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 10,000
Bench-scale and Pilot Study Amendment Testing	*Engineer's Estimate*	1	LS	$ -	$ 15,000	$ -	$ 20,000	$ -	$ -	$ -	$ 35,000
Site Preparation											
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Survey 1-foot contours	*Recent bids*	10.0	acres	$ -	$ -		$ -	$ -	$ -	$ 4,400.00	$ 44,000
Cut and chip medium, trees to 12" dia.	*31 11 10.10 0200*	9.5	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,617.88	$ 53,370
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
2 laborers, 2 hrs per day, 10 days for controlled release of beaver dams		20	hrs	$ -	$ -	$170	$ 3,400	$ -	$ -	$ -	$ 3,400
Dewatering											
Installation of gravity pipe (2x18"corr metal pipe)	*31 23 19.20 1400*	3,600	lf	$ 14.42	$ 51,912	$ 11.92	$ 42,912	$ 3.62	$ 13,032	$ -	$ 107,856
Outlet protection (Class II rip-rap for slope and channel protection)	*Recent Bids*	20	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 78.75	$ 1,575
Misc erosion and sediment control (silt fences, stockpiles, etc)	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,000.00	$ 50,000
Amendment											
Eco-Bond® or similar Gypsum/Apetite Amendment	*Engineer's Estimate - Recent Bids*	25,905	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 29.95	$ 775,783
Spread amendment (via hydroseeder and mulch)		260	msf	$ -	$ -	$ -	$ -	$ -	$ -	$ 49.50	$ 12,852
Chisel plow/rip ammendment into soil, 4 passes, assume a cubic yard per square yard depth	*Ripping, adverse conditions, 31 23 16.32 2800 till, boulder and clay*	28,848	SY	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.37	$ 10,674
Subgrade preparation (muddy or otherwise inaccessable areas)	*Allowance*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ 5,000
Haul Road Maintenance	*31 23 23.20 2600*	104	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 118,668
Stabilization of Site											
Wetland Seeding by hydroseeder with feritilizer and lime	*32 92 19.14 5800 with adjustment for native species*	260	msf	$ 61.30	$ 15,914	$ 8.90	$ 2,311	$ 8.39	$ 2,178	$ -	$ 20,403
Riffle Grade Controls for Stability and Habitat Restoration	*Recent Bids*	5	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,740	$ 103,700
Grade Stream Channel Through Cap	*Recent Bids*	3,300	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 21.00	$ 69,300
Sod and Log Structures to maintain stream pattern	*Recent Bids*	25	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,500.00	$ 187,500
Mobilization and Demobilization											**$ 53,055**
5% of Total Costs of Site Work, Treatment										$1,061,108	$ 53,055
Contingency											**$ 261,823**
15% of Total Construction Activities										$1,745,487	$ 261,823
Professional/Technical Services											**$ 287,713**
5% Project Management										$1,692,432	$ 84,622
6% Remedial Design											$ 101,546
6% Construction Management											$ 101,546
LONG TERM MONITORING											
										ANNUAL LTM COST (YRS 1-5)	**$4,000**
										ANNUAL LTM COST (YRS 6-30)	**$2,000**
										LIFETIME LTM (NPV)	**$39,400**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for OU1 and OU2											$1,804
Site Monitoring											
Surface water sampling for 1 event		4	samples	$ -	$ -	$ -	$ -	$ 22.91	$ 91.63	$ -	$92
Materials		1	event	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$10
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 17.00	$17
Reporting		10	hr	$ 85.00	$ 850	$ -	$ -	$ -	$ -	$ -	$850
Laboratory analysis											
Metals and VOCs	*Life Science Laboratories*	5	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 174.00	$835
Lifetime Long Term Monitoring (Net Present Value)											
5 Years of Semi-Annual Monitoring											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$2,334,000**

Assumptions:

Working condition is Safety Level: **D** (Labor productivity: **82%**; Equipment productivity: **100%**)
Weighted Average of city cost index (Buffalo, NY): **101.4%** (not applicable for costs derived from vendor quotes).
Costs are loaded with a profit factor: **10%**
Inflation: **3%** per year

Estimated number of soil samples: **13** samples; **-** times sampled; **0.25** hrs/sample; **$85** Labor Cost per hr
20% added for QA/QC samples; **1** worker sampling

Characterization Cost (Table A (per CWM)): **$507.00** per sample
Analytical cost (TAL Metals): **$75.00** per sample
For each sampling event, assumed: **$50** for materials (gloves, notebooks, etc.)

Disposal
Lead contaminated soil as a "listed" waste- incineration: **$275** per ton; **-** tons soil hazardous (assume 43% hazardous); **22** tons per load; **0** loads for haz disposal
Lead contaminated soil as non-haz: **$39.87** per ton; **-** tons soil for non-haz disposal; **0** loads for non-haz disposal
Concrete: **3,300** lbs per cy; **-** tons concrete for disposal

Typical Rental Rates - Includes G&A and 10% Profit
Mini-Rae Survey Mode PID: **$96.08** per day
Truck/SUV (1/2 ton or smaller): **$70.74** per day

Work day consists of: **10** hrs

20 loads per day
20 working days per month
10 hours per working day
1 months for site prep/restoration
1 months to completion

Excavation With Concrete and Asphalt:
Concrete and Asphalt: **0.0%** % of excavation volume
Excavation Area: **47,997** sf
Excavation Volume: **889** cy; **1,022** lcy
Excavated Weight: **1,333** tons
Roll-off dumpster can hold approximately: **12** tons

Groundwater Monitoring
Typical Rental Rates - Includes G&A and 10% Profit
Truck/SUV (1/2 ton or smaller): **$70.74** per day
Water Quality Analyzer: **$159.00** per day
Water Level Meter: **$31.80** per day
Submersible Pump: **$113.91** per day
Generators: 220 Volt: **$82.68** per day

Analytical Costs
Metals: **$75.00** per sample
VOCs: **$90.00** per sample
0.5 hrs/ SW sample; **$85** Labor cost per hr
2 workers per event
5 hours travel per event
$50 for materials (gloves, notebooks, etc.)

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$4,638,000
			Estimated Cost for Off-Site Disposal	$5,239,000
OU 2 Alternative 4	Old Upper Mountain Road Lockport, NY	Sediment - OU2	Construction Time	12 months
			Operation Time	- months
Complete Removal Dredging (Mechanical) with Dewatering and On-site Disposal			Post Remediation Monitoring	0 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means' or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$4,638,000**
Construction Activities		**1**			**$1,571,652**		**$209,826**		**$133,765**	**$80,430**	**$ 3,482,346**
Pre-Construction											
Apply for wetland permits	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 5,000	$ -	$ -	$ -	$ 5,000
Hydrology and Hydraulics study, no FEMA LOMR	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ 40,000
Fluvial Geomorph Investigation	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 10,000
Apply for discharge permits		1	LS	$ -	$ -	$ -	$ 25,000	$ -	$ -	$ -	$ 25,000
Site Preparation											
Survey 1-foot contours	*Recent bids*	10.0	acres	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,400.00	$ 44,000
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Grub stumps, trees to 12" diameter along creek for dredging	*31 11 10.10 0200*	10	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,617.88	$ 53,370
Cut and chip light trees to 6" dia. Along road and in staging area	*31 11 10.10 0020*	1	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,945.16	$ 3,945
Debris Removal by excavator (2 cy)- separation into trash and woody debris	*ECHOS Crew CODE1*	40	hours	$ -	$ -	$ 46	$ 1,845	$ 139	$ 5,567	$ -	$ 7,412
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Beaver Trapping and Relocation		20	hours	$ -	$ -	$ 85	$ 1,700	$ -	$ -	$ -	$ 1,700
Controlled release of beaver dams by hand		20	hours	$ -	$ -	$ 85	$ 1,700	$ -	$ -	$ -	$ 1,700
Preparation of streamside staging area (50' x 50')											
Silt Fence	*31 25 13.10 1000*	200	lf	$ 0.23	$ 46	$ 0.45	$ 90	$ -	$ -	$ -	$ 136
30 mil HDPE Liner	*33 47 13.53 1100*	2,500	sf	$ 0.30	$ 750	$ 0.85	$ 2,125	$ -	$ -	$ -	$ 2,875
3/4" Gravel Fill	*ECHOS 17 03 0300*	46	cy	$ 26.26	$ 1,216	$ 3.63	$ 168	$ 1.28	$ 59	$ -	$ 1,443
Downstream Silt Curtain	*www.silt-barriers.com, labor from 31 25 13.10 1000*	250	lf	$ 6.50	$ 1,625	$ 0.45	$ 113	$ -	$ -	$ -	$ 1,738
Stream Dewatering											
Installation of gravity pipe (2x18"corr metal pipe)	*31 23 19.20 1400*	3,600	lf	$ 14	$ 51,912	$ 11.92	$ 42,912	$ 3.62	$ 13,032		$ 107,856
Outlet protection (Class II rip-rap for slope and channel protection)	*Recent Bids*	20	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 78.75	$ 1,575
Misc erosion and sediment control (silt fences, stockpiles, etc)	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,000.00	$ 50,000
Dredging											
Haul Road Upgrades (During sediment dredging, where possible)	*01 55 23.50 0100*	2,222	sy	$ 8.61	$ 19,124	$ 2.93	$ 6,502	$ 0.59	$ 1,315	$ -	$ 26,942
Crane mats (for narrow lower reach) 4- 20' mats	*Hanes Supply*	4	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 850.00	$ 3,400
Track excavator loadout into dumps											
Soil-Excavator, hydraulic, crawler mtd. 2 CY cap = 165 CY/hr	*31 23 16.42 0260*	18,133	bcy	$ -	$ -	$ 0.65	$ 18,677.32	$ 1.03	$ 18,677.32	$ -	$ 37,355
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	20,853	lcy	$ -	$ -	$ 1.83	$ 38,162	$ 3.11	$ 64,854	$ -	$ 103,015
Addition of stabilizer/dewatering agent	*32 01 16.71 5400, 03 05 13.30 0240*	18,133	cy	$ 78	$ 1,414,399	$ 0.09	$ 1,632	$ 0.07	$ 1,269	$ -	$ 1,417,301
Haul Road Maintenance	*31 23 23.20 2600*	119	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 135,784
Sediment Stockpiling for Dewatering											
Stockpile Pad with Sump - 40,000 SF											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 26.26	$ 58,349	$ 3.63	$ 8,066	$ 1.28	$ 2,839	$ -	$ 69,255
Pumping, 8 hr., attended 2 hrs. per day, including 20 lf of suction hose and 100 lf discharge hose, 4" diaphragm pump	*31 23 19.20 0650*	79	day	$ -	$ -	$ 119.18	$ 9,415	$ 33.56	$ 2,651	$ -	$ 12,066
2- 20,000 gallon tanks	*rain4rent*	79	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 92.00	$ 7,268
Water Treatment facility	*Engineer's Estimate*	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$1,250	$ 4,938
Water Treatment facility- mob/demob	*Engineer's Estimate*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$10,000	$ 10,000
Carbon	*Engineer's Estimate*	15,000	lbs	$ -	$ -	$ -	$ -	$ -	$ -	$1.00	$ 15,000
Bag filter housing	*Grainger*	3	ea	$ -	$ -	$ -	$ -	$ -	$ -	$275	$ 825
Bag filters, pack of 20	*Grainger*	8	ea	$ -	$ -		$ -	$ -	$ -	$175	$ 1,396
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	10,880	bcy	$ -	$ -	$ 0.16	$ 1,740.80	$ 1.52	$ 16,537.59	$ -	$ 18,278
FEL, wheel mount, 2 1/4 CY cap. loadout into dumps from stockpiles	*31 23 16.42 1600*	10,880	bcy	$ -	$ -	$ 0.60	$ 6,528	$ 0.64	$ 6,963	$ -	$ 13,491
Spotter at Loadout	*31 23 23.20 2310*	500	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 22,980
Landfill Placement and Sediment Stabilization											
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	12,512	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 14,264
12 CY truck, 15 mph average, cycle 1 mile, 15 min wait/ld/unld	*31 23 23.20 1016*	12,512	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.35	$ 41,915
Portland Cement, for sediment stabilization prior to compaction	*03 05 13.30 0300*	41,164	Cwt	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.01	$ 370,892
Mixing material in windrow, 180 H.P. grader, including added 15% for portland cement	*32 01 16.71 5400*	14,389	cy							$ 0.16	$ 2,302
Compaction, riding, vibrating roller, 2 passes, 12" lifts	*31 23 23.23 5060*	12,512	ecy							$ 0.55	$ 6,882
Finishing grading slopes, steep	*31 22 16.10 3310*	12,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,520
Confirmation Sediment Sampling											
Grab Samples- 12 per acre plus 20% QA/QC		86	sample	$ -	$ 50	$ 21	$ 1,824	$ 67	$ 5,727	$ -	$ 7,601
Lab Analyses - TAL Metals	*Life Science Laboratories*	86	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 82.50	$ 7,081
Stabilization of Site											
Topsoil 6"	*Recent quote- ESG from Seven Springs*	4,808	CY	$ 45.00	$ 216,360	$ -	$ -	$ -	$ -	$ -	$ 216,360
Spreading Topsoil 6" Lifts	*ECHOS 2006 18 05 0301*	4,808	CY	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.43	$ 45,339
Wetland Seeding by hydroseeder with feritilizer and lime	*32 92 19.14 5800 with adjustment for native species*	237	msf	$ 61.30	$ 14,520	$ 8.90	$ 2,108	$ 8.39	$ 1,987	$ -	$ 18,615
Riffle Grade Controls for Stability and Habitat Restoration	*Recent Bids*	5	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,740	$ 103,700
Grade Stream Channel Through Cap	*Recent Bids*	3,300	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 21.00	$ 69,300
Sod and Log Structures to maintain stream pattern	*Recent Bids*	25	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,500.00	$ 187,500
Mobilization and Demobilization											**$ 36,338**
5% of Total Costs of Site Work, Treatment										$726,765	$ 36,338
Contingency											**$ 527,803**
15% of Total Construction Activities										$3,518,684	$ 527,803
Professional/Technical Services											**$ 591,999**
5% Project Management										$3,482,346	$ 174,117
6% Remedial Design											$ 208,941
6% Construction Management											$ 208,941

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$4,638,000
			Estimated Cost for Off-Site Disposal	$5,239,000
OU 2 Alternative 4	Old Upper Mountain Road	Sediment - OU2	Construction Time:	12 months
	Lockport, NY		Operation Time:	- months
Complete Removal Dredging (Mechanical) with Dewatering and On-site Disposal			Post Remediation Monitoring:	0 years

		Quantities		Cost Breakdown (if available)							
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$4,638,000**
Assumptions:											
Working condition is Safety Level:		D	(Labor productivity:	82%	; Equipment productivity:	100%	)				
Weighted Average of city cost index (Buffalo, NY)		101.4%	(not applicable for costs derived from vendor quotes).								
Costs are loaded with a profit factor		10%									
Inflation		3%	per year								
Estimated number of sediment samples		72	samples	1	times sampled		0.25	hrs/sample		$85	Labor Cost per hr
				20%	added for QA/QC samples		1	worker sampling			
Characterization Cost	Table A (per CWM)	$507.00	per sample								
Analytical cost	TAL Metals	$75.00	per sample								
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)								
Disposal											
Lead contaminated sediment as a "listed" waste- incineration		$275	per ton		1,387	tons soil hazardous (assume 43% hazardous)					
					22	tons per load		63	loads for haz disposal		
Lead contaminated sediment as non-haz		$39.87	per ton		12,485	tons soil for non-haz disposal		599	loads for non-haz disposal		
					691	tons debris for non-haz disposal					
Typical Rental Rates - Includes G&A and 10% Profit											
Mini-Rae Survey Mode PID		$96.08	per day								
Truck/SUV (1/2 ton or smaller)		$70.74	per day								
Work day consists of:		10	hrs								
Dredging Area											
Excavation Area:		259,632	sf								
Excavation Volume:		17,270	cy	19,860	lcy						
Excavated Weight:		25,905	tons								
Roll-off dumpster can hold approximately:		22	tons								

15	loads per day		
20	working days per month		
10	hours per working day		
3	months for site prep/restoration		
11	months to completion		
79	Days sediment loadout for dewatering		
40	Days sediment loadout for disposal		
10	Days debris loadout for disposal		

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$3,887,000
			Estimated Cost for Off-Site Disposal	$4,603,000
OU 2 Alternative 5 Mass Removal Dredging with On-site Disposal and Multi-Media Residual Capping	Old Upper Mountain Road Lockport, NY	Sediment - OU2	Construction Time:	12 months
			Operation Time:	- months
			Post Remediation Monitoring	0 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$3,875,000**
Construction Activities		**1**			**$1,433,875**		**$152,574**		**$105,467**	**$13,076**	**$ 2,908,058**
Pre-Construction											
Apply for wetland permits	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 5,000	$ -	$ -	$ -	$ 5,000
Hydrology and Hydraulics study, no FEMA LOMR	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ 40,000
Fluvial Geomorph Investigation	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 10,000
Apply for discharge permits	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ 2,500
Site Preparation											
Survey 1-foot contours	*Recent bids*	10.0	acres	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,400.00	$ 44,000
Utility Locator (based on recent bids)	*recent quote*	0.5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,475.00	$ 1,238
Grub stumps, trees to 12" diameter along creek for dredging	*31 11 10.10 0200*	10	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,617.88	$ 56,179
Cut and chip light trees to 6" dia. Along road and in staging area	*31 11 10.10 0020*	1	acre	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,945.16	$ 3,945
Debris Removal by excavator (2 cy)- separation into trash and woody debris	*ECHOS Crew CODE1*	40	hours	$ -	$ -	$ 46	$ 1,845	$ 139	$ 5,567	$ -	$ 7,412
Haul Road Upgrades, Roads. 8" gravel (From ravine to upper staging area)	*01 55 23.50 0100*	917	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.86	$ 12,705
Install Guard Rails along Haul Road, corr steel, steel box beam	*34 71 13.26 1120*	350	lf	$ -	$ -	$ -	$ -	$ -	$ -	$ 69.74	$ 24,409
Beaver Trapping and Relocation		20	hours	$ -	$ -	$ 85	$ 1,700	$ -	$ -	$ -	$ 1,700
Controlled release of beaver dams by hand		20	hours	$ -	$ -	$ 85	$ 1,700	$ -	$ -	$ -	$ 1,700
Preparation of streamside staging area (50' x 50')											
Silt Fence	*31 25 13.10 1000*	200	lf	$ 0.23	$ 46	$ 0.45	$ 90	$ -	$ -	$ -	$ 136
30 mil HDPE Liner	*33 47 13.53 1100*	2,500	sf	$ 0.30	$ 750	$ 0.85	$ 2,125	$ -	$ -	$ -	$ 2,875
3/4" Gravel Fill	*ECHOS 17 03 0300*	46	cy	$ 26.26	$ 1,216	$ 3.63	$ 168	$ 1.28	$ 59	$ -	$ 1,443
Downstream Silt Curtain	*www.silt-barriers.com, labor from 31 25 13.10 1000*	250	lf	$ 6.50	$ 1,625	$ 0.45	$ 113	$ -	$ -	$ -	$ 1,738
Stream Dewatering											
Installation of gravity pipe (2x18"corr metal pipe)	*31 23 19.20 1400*	1,700	lf	$ 14	$ 24,514	$ 11.92	$ 20,264	$ 3.62	$ 6,154		$ 50,932
Outlet protection (Class II rip-rap for slope and channel protection)	*Recent Bids*	20	cy	$ -	$ -	$ -	$ -	$ -	$ -	$ 78.75	$ 1,575
Misc erosion and sediment control (silt fences, stockpiles, etc)	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ 50,000.00	$ 50,000
Dredging											
Haul Road Upgrades (During sediment dredging, where possible)	*01 44 23.50 0100*	2,222	sy	$ 8.61	$ 19,124	$ 2.93	$ 6,502	$ 0.59	$ 1,315	$ -	$ 26,942
Track excavator loadout into dumps											
Soil-Excavator, hydraulic, crawler mtd. 2 CY cap = 165 CY/hr	*31 23 16.42 0260*	17,200	bcy	$ -	$ -	$ 0.65	$ 17,716.05	$ 1.03	$ 17,716.05	$ -	$ 35,432
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	19,780	lcy	$ -	$ -	$ 1.83	$ 36,198	$ 3.11	$ 61,516	$ -	$ 97,713
Addition of stabilizer/dewatering agent	*32 01 16.71 5400, 03 05 13.30 0240*	17,200		$ 78	$ 1,341,604	$ 0.09	$ 1,548	$ 0.07	$ 1,204	$ -	$ 1,344,356
Haul Road Maintenance	*31 23 23.20 2600*	75	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,141.04	$ 85,578
Sediment Stockpiling for Dewatering											
Stockpile Pad with Sump - 40,000 SF											
Silt Fence	*31 25 13.10 1000*	1,000	lf	$ 0.23	$ 230	$ 0.45	$ 450	$ -	$ -	$ -	$ 680
30 mil HDPE Liner	*33 47 13.53 1100*	80,000	sf	$ 0.30	$ 24,000	$ 0.85	$ 68,000	$ -	$ -	$ -	$ 92,000
3/4" Gravel Fill (9")	*ECHOS 17 03 0300*	2,222	cy	$ 21.99	$ 48,867	$ 3.04	$ 6,756	$ 1.07	$ 2,378	$ -	$ 58,000
Pumping, 8 hr., attended 2 hrs. per day, including 20 lf of suction hose and 100 lf discharge hose, 4" diaphragm pump	*31 23 19.20 0650*	75	day	$ -	$ -	$ 119.18	$ 8,939	$ 33.56	$ 2,517	$ -	$ 11,456
2- 20,000 gallon tanks	*rain4rent*	75	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 92.00	$ 6,900
Water Treatment facility	*Engineer's Estimate*	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$1,250	$ 4,688
Water Treatment facility- mob/demob	*Engineer's Estimate*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$10,000	$ 10,000
Carbon	*Engineer's Estimate*	15,000	lbs	$ -	$ -	$ -	$ -	$ -	$ -	$1	$ 15,000
Bag filter housing	*Grainger*	3	ea	$ -	$ -	$ -	$ -	$ -	$ -	$275	$ 825
Bag filters, pack of 20	*Grainger*	8	ea	$ -	$ -	$ -	$ -	$ -	$ -	$175	$ 1,396
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	6,552	bcy	$ -	$ -	$ 0.16	$ 1,048.38	$ 1.52	$ 9,959.65	$ -	$ 11,008
FEL, wheel mount, 2 1/4 CY cap. loadout into dumps from stockpiles	*31 23 16.42 1600*	6,552	bcy	$ -	$ -	$ 0.60	$ 3,931	$ 0.64	$ 4,194	$ -	$ 8,125
Spotter at Loadout	*31 23 23.20 2310*	500	hrs	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.96	$ 22,980
Landfill Placement and Sediment Stabilization											
Excavator Loadout, 4.5 CY bucket, 80% fill factor	*31 23 16.43 4700*	7,535	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.14	$ 8,590
12 CY truck, 15 mph average, cycle 1 mile, 15 min wait/ld/unld	*31 23 23.20 1016*	7,535	lcy	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.35	$ 25,243
Portland Cement, for sediment stabilization prior to compaction	*03 05 13.30 0300*	24,791	Cwt	$ -	$ -	$ -	$ -	$ -	$ -	$ 9.01	$ 223,367
Mixing material in windrow, 180 H.P. grader, including added 15% for portland cement	*32 01 16.71 5400*	8,666	cy							$ 0.16	$ 1,386
Compaction, riding, vibrating roller, 2 passes, 12" lifts	*31 23 23.23 5060*	7,535	ecy							$ 0.55	$ 4,144
Finishing grading slopes, steep	*31 22 16.10 3310*	12,000	sy	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.21	$ 2,520
Confirmation Soil Sampling											
Grab Samples- 12 per acre plus 20% QA/QC		70	sample	$ -	$ 50	$ 21	$ 1,487	66.73	$ 4,668	$ -	$ 6,205
Lab Analyses - TAL Metals	*Life Science Laboratories*	70	sample	$ -	$ -	$ -	$ -	$ -	$ -	$ 82.50	$ 5,772
Site Restoration											
Topsoil	*Recent quote- ESG from Seven Springs*	889	cy	$ 45	$ 39,554	$ -	$ -	$ -	$ -	$ -	$ 39,554
Residuals Cap											
3" Sand Layer	*Recent bids*	444	cy	$ 9	$ 3,778	$ 13	$ 5,809	$ -	$ -	$ -	$ 9,586
3" Gravel Layer	*Recent bids*	444	cy	$ 28	$ 12,222	$ 13	$ 5,809	$ -	$ -	$ -	$ 18,030
Excavator for cap placement- assume three full weeks	*ECHOS Crew CODE1*	120	hours	$ -	$ -	$ 46	$ 5,536	$ 139	$ 16,701	$ -	$ 22,237
Laborer for grade stake placement	*ECHOS Crew COELD*	40	hours	$ -	$ -	$ 33	$ 1,327	$ -	$ -	$ -	$ 1,327
12 CY truck, 15 mph average, cycle 2 miles, 10 min wait/ld/unld	*31 23 23.20 1218*	1,067	lcy	$ -	$ -	$ 1.83	$ 1,952	$ 4.94	$ 5,269	$ -	$ 7,221
Maintain Stockpile, 700HP Dozer, 50ft Haul	*31 23 16.46 6010*	711	bcy	$ -	$ -	$ 0.16	$ 113.77	$ 1.52	$ 1,080.84	$ -	$ 1,195
Stabilization of Site											
Wetland Seeding by hydroseeder with feritilizer and lime	*32 92 19.14 5800 with adjustment for native species*	237	msf	$ 61	$ 14,520	$ 9	$ 2,108.23	$ 8	$ 1,987.42	$ -	$ 18,615
Riffle Grade Controls for Cap Stability and Habitat Restoration	*Recent Bids*	5	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,740	$ 103,700
Grade Stream Channel Through Cap	*Recent Bids*	3,300	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 21.00	$ 69,300
Sod and Log Structures to maintain stream pattern	*Recent Bids*	25	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,500.00	$ 187,500
Mobilization and Demobilization											**$ 31,310**
5% of Total Costs of Site Work, Treatment										$626,200	$ 31,310
Contingency											**$ 440,905**
15% of Total Construction Activities										$2,939,368	$ 440,905
Professional/Technical Services											**$ 494,370**
5% Project Management										$2,908,058	$ 145,403
6% Remedial Design											$ 174,483
6% Construction Management											$ 174,483
LONG TERM MONITORING									**ANNUAL LTM COST (YRS 1-30)**		**$760**
									LIFETIME LTM (NPV)		**$11,700**
Cap Inspection, 4 per year, 4 hrs each event, mob/demob with monitoring event		1	ea	$ -	$ -	$340	$ 340.00	$75.00	$ 75.00	$ -	$415
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ -	$ -	$ -	$ -	$ 340.00	$ 340
Lifetime Long Term Monitoring (Net Present Value)											
25 Years of Annual Monitoring											
5% Discount Factor (per NYSDEC)											

REMEDIAL ALTERNATIVE	LOCATION	MEDIA	Estimated Cost to Implement	$3,887,000
			Estimated Cost for Off-Site Disposal	$4,603,000
OU 2 Alternative 5 Mass Removal Dredging with On-site Disposal and Multi-Media Residual Capping	Old Upper Mountain Road Lockport, NY	Sediment - OU2	Construction Time:	12 months
			Operation Time:	- months
			Post Remediation Monitoring:	0 years

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											$3,887,000
Assumptions:											
Working condition is Safety Level:		D	(Labor productivity:	82%	; Equipment productivity:	100%	)				
Weighted Average of city cost index (Buffalo, NY)		101.4%	(not applicable for costs derived from vendor quotes).								
Costs are loaded with a profit factor		10%									
Inflation		3%	per year								Labor
Estimated number of soil samples		58	samples	1	times sampled		0.25	hrs/sample		$85	Cost per hr
				20%	added for QA/QC samples		1	worker sampling			
Characterization Cost	Table A (per CWM)	$507.00	per sample								
Analytical cost	TAL Metals	$75.00	per sample								
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)								
Disposal											
Lead contaminated soil as a "listed" waste- incineration		$275	per ton		1,316	tons soil hazardous (assume 43% hazardous)					
					22	tons per load		60	loads for haz disposal		
Lead contaminated soil as non-haz		$39.87	per ton		11,842	tons soil for non-haz disposal		568	loads for non-haz disposal		
Concrete		3,300	lbs per cy		655	tons debris for non-haz disposal					
Typical Rental Rates - Includes G&A and 10% Profit											
Mini-Rae Survey Mode PID		$96.08	per day						15 loads per day		
Truck/SUV (1/2 ton or smaller)		$70.74	per day						20 working days per month		
									10 hours per working day		
Work day consists of:		10	hrs						2 months for site prep/restoration		
									9 months to completion		
Excavation With Concrete and Asphalt:					**Backfill 2:1 Slopes**				75 Days sediment loadout for dewatering		
Concrete and Asphalt:	0.0%	% of excavation volume			0 cy				40 Days sediment loadout for disposal		
Excavation Area:	211,635	sf			0 lcy				10 Days debris loadout for disposal		
Excavation Volume:	16,381	cy	18,838	lcy							
Excavated Weight:	24,572	tons									
Roll-off dumpster can hold approximately:	22	tons									

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		