FINAL
FEASIBILITY STUDY REPORT
OLD ERIE CANAL
SITE NO. 622006

WORK ASSIGNMENT NO. D004434-09

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

MACTEC Engineering and Consulting, P.C.
Portland, ME

MACTEC: 3650070085

AUGUST 2009

FINAL
FEASIBILITY STUDY REPORT
OLD ERIE CANAL
SITE NO. 622006

WORK ASSIGNMENT NO. D004434-09

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

MACTEC Engineering and Consulting, P.C.
Portland, ME

MACTEC: 3650070085

AUGUST 2009

Submitted by:

Sara E. Wright
Project Engineer

Approved by:

STATE OF NEW YORK
MARK JAMES STELMACK
080317
LICENSED PROFESSIONAL ENGINEER

8-27-09

Mark J. Stelmack, P.E.
Principal Engineer

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

Figure

LIST OF TABLES

Table

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

BBL	Blasland, Bouck, & Lee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	contaminants of concern
DCE	dichloroethene
FS	feasibility study
FWIA	Fish and Wildlife Impact Analysis
GAC	granular activated carbon
Hg	mercury
Koc	organic carbon partition coefficient
MACTEC	MACTEC Engineering and Consulting, P.C.
mg/kg	milligram(s) per kilogram
NRCS	Natural Resources Conservation Service
NYCRR	New York Codes, Rules, and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance
OEC	Old Erie Canal
OMB	Office of Management and Budget
PAHs	polycyclic aromatic hydrocarbons

GLOSSARY OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCB	polychlorinated biphenyl
PID	photoionization detector
PRP	potentially responsible party
PW	present worth
QA	quality assurance
QC	quality control
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
Report	Old Erie Canal Feasibility Study Report
RGs	remediation goals
RI	remedial investigation
SCGs	standards, criteria, and guidance
SCOs	Soil Cleanup Objectives
SI	Site Investigation
Site	Old Erie Canal site
SVOC	semivolatile organic compound
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TOGS	Technical and Operational Guidance Series
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WA	work assignment

1.0 INTRODUCTION

MACTEC Engineering and Consulting, P.C. (MACTEC), under contract to the New York State Department of Environmental Conservation (NYSDEC), is submitting this Feasibility Study (FS) Report (FS Report) for the Old Erie Canal site (Site) in Frankfort, Herkimer County, New York (Figures 1.1 and 1.2). The Site is listed as a Class 2 hazardous waste site, site No. 6-22-006, in the Registry of Hazardous Waste Sites in New York State (NYS). This FS Report has been prepared in accordance with the requirements of the NYSDEC as identified in Work Assignment (WA) No. D003826-14, dated October 25, 2004 (NYSDEC, 2004), under the July 1997 Superfund Standby Contract between MACTEC and the NYSDEC.

The FS for the Site has been conducted in accordance with the WA, as well as with applicable portions of the following documents:

- NYSDEC Draft DER-10 "Technical Guidance for Site Investigation and Remediation" (NYSDEC, 2002)
- 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 "Environmental Remediation Programs"(NYSDEC, 2006)
- United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (USEPA, 1988).

A Remedial Investigation (RI) has been completed for the Site. The purpose of the RI is to characterize the nature and distribution of contamination at the Site, and to qualitatively assess the human health and ecological risks associated with site-specific contamination. During completion of the RI field investigation, groundwater, surface water, sediment, and soil samples were collected from the Site, as well as from upgradient and downgradient areas in the immediate vicinity. Results of the RI, including a Qualitative Human Health Exposure Assessment (QHHEA) and a Fish and Wildlife Impact Analysis (FWIA) are presented in the RI Report for the Site (MACTEC, 2008).

2.0 PURPOSE

The purpose of this FS Report is to develop and evaluate options for remedial action at the Site (see Figure 1.2). The RI Report identified the Chemical-Specific Standards, Criteria, and Guidance (SCGs) which apply to the contaminants and environmental media (e.g., sediment) present at the Site and the immediate vicinity. Contamination identified during the RI at concentrations in excess of Chemical-Specific SCGs upgradient of the Site, as discussed herein, is outside the scope of this FS.

The approach to the FS involves integration of data and conclusions presented in the RI report (MACTEC, 2008), with development, screening, and evaluation of proposed remedial alternatives from engineering, environmental, public health, and economic perspectives. This FS Report is organized into the following sections.

- Section 1.0 – Introduction
- Section 2.0 – Purpose
- Section 3.0 – Site Description and History
- Section 4.0 – Summary of Remedial Investigation and Exposure Assessment
- Section 5.0 – Development of Remedial Action Goals and Objectives
- Section 6.0 – Identification of General Response Actions and Contamination Requiring Remedial Action
- Section 7.0 – Identification and Screening of Technologies
- Section 8.0 – Development and Screening of Alternatives
- Section 9.0 – Detailed Analysis of Alternatives
- Section 10.0 – Comparative Analysis of Alternatives

3.0 SITE DESCRIPTION AND HISTORY

The Site is an abandoned section of the Erie Canal which begins just east of Turner Street in the City of Utica, Oneida County, and extends approximately 4,200 feet in an easterly direction into the Town of Frankfort, Herkimer County, New York (Figure 1.2). The canal property itself consists of the Town of Frankfort Parcel 104.3-1-20 and is owned by Niagara Mohawk (National Grid), which also operated a substation adjacent to the property, along the southwestern corner of the canal. The canal section (i.e., the Site) is bounded as follows:

- to the north by Route 5S, residential areas, and several businesses
- to the east by Ferguson Road (dirt), a self storage facility, and then Dyke Road
- to the south by Remet Corporation, vacant grassy land, and a sand and gravel company
- to the west by Turner Street and a vacant commercial property.

The Watertown Business Complex is located south of the Remet Corporation property. Land use in the vicinity of the Site is primarily commercial and industrial; however several residential properties are located on the north side of Route 5S.

The canal varies in width from approximately seven to 60 feet and is heavily vegetated with cattails and various other wetland species. The depth of water ranges between one and 6.5 feet. The banks of the Site are heavily vegetated with trees and shrubs. Portions of the Site contain standing water while other areas are nearly completely filled with miscellaneous material, including granular to fine soil, sediment, and rocks. The main source of surface water within the canal is due to the result of a hydraulic connection with groundwater and storm water drainage. Storm water from adjacent manufacturing facilities reportedly flows into the west end of the canal through a 30-inch storm sewer. Surface water flows to the east toward a culvert at the eastern end of the canal which is the apparent surface water outlet from the Site. This surface water outlet that extends beneath Route 5S drains to a small tributary stream that flows eventually to the Mohawk River. Figure 3.1 presents surface drainage in vicinity of the Site.

Numerous species of wildlife have been observed at the canal, as described in the FWIA presented in the RI. However, public access to the canal is discouraged/limited, due to the steep banks and presence of dense, thick vegetation.

The section of the canal which comprises the Site (reportedly built between 1817 and 1825), is a portion of the 117-mile section of the canal constructed alongside the Mohawk River, and was later abandoned and replaced by the river itself (Microsoft Encarta, 1999). After the closure of the canal, which was believed to be in the early 1900s when the construction of the new Barge Canal (consisting largely of the Mohawk River) was completed, the area was used as a drainage area for storm water flow. In addition, the canal was used for wastewater disposal since before 1950 to approximately 1981 by up-gradient manufacturing facilities, which include electroplating facilities, arms/munitions factories, and a substation. Reported disposal included plating wastes, industrial solvents, and polychlorinated biphenyl (PCB)-contaminated tars. These facilities discharged wastewater and perhaps storm water directly into the canal through a 30-inch storm sewer. Several feet of thick, oily sludge have accumulated in the canal bed. An area of oily sludge/sediment exists at the western (upstream) end of the canal. In 1983, a section of the canal banks gave way, allowing waste to escape from the Site and flow into a residential area to the north. The break in the canal was repaired and the released waste material removed.

Although the canal is still used as a discharge point for storm water, it is no longer used for waste water disposal.

The property (Town of Frankfort Parcel 104.3-1-20) is presently owned by Niagara Mohawk (National Grid), which also operated a substation adjacent to the Site. Industries that have operated adjacent to or near the canal include:

- Remet Chemical Corporation (1979-1999) (Tax Lot 104.3-1-19)
- Former occupants of the Watertown Business Complex (Tax Lot 104.3-1-21)
  - Savage Arms Company (pre-WWI to 1956)
  - Unisys Corporation (operated as Sperry Rand Corporation between 1956-1977)
  - Empire Circuits (1977-1981)
- Chicago Pneumatic Tool Company (1947-1997) (Tax Lot 104.3-1-24.2)

The NYSDEC conducted a Phase I investigation in 1983. Additional sediment sampling was conducted by Niagara Mohawk in 1984. The NYSDEC then proceeded with a Phase II investigation in 1986. Based on these investigations, Town of Frankfort Section of the Site was listed as a Class 2 site on the NYS Registry of Inactive Hazardous Waste Disposal Sites in 1986.

The 1986 Phase II Site Investigation (SI) results indicated that the contaminated sediments (estimated in 1986 at 15,000 cubic yards) in the canal had PCB levels ranging from 0.19 to 9.5 milligrams per kilogram (mg/kg). The 1986 SI also determined the presence of elevated levels of polycyclic aromatic hydrocarbons (PAHs), and metals, particularly lead. Contaminants detected in surface water consisted predominately of volatile organic compounds (VOCs), including trichloroethene (TCE), 1,1,1-trichloroethane (TCA), tetrachloroethene, chloroform, and methylene chloride.

From 1986 to 2002, the NYSDEC concentrated its efforts on trying to identify and determine the Potentially Responsible Party (PRP) for the Site. Based on those efforts, in August 2002, a PRP group was formed, consisting of Savage Arms Company, Chicago Pneumatic Tool Company, Unisys Corporation (Sperry Rand Corporation), Remet Chemical Corporation, and Niagara Mohawk. This PRP group agreed to perform additional investigations, which consisted of sediment sampling and surface water sampling. These additional investigations, completed by Blasland, Bouck, & Lee (BBL), were initiated in December 2002 and completed in April 2003. A summary report was prepared and submitted by the PRP group to the NYSDEC in June 2003.

The results of the BBL investigation indicated that approximately 20,000 cubic yards of PCB-contaminated sediments exist within the canal at concentrations ranging from 0.5 to 22 mg/kg. The 2003 summary report also confirmed the presence of bis(2-ethylhexyl) phthalate and PAHs in sediment, and TCE and cis-1,2-dichloroethene (DCE) in surface water sample results reported in June 2003. From 1986 to 2003, the detected contaminants and their respective concentrations have remained relatively consistent in canal sediments, and have diminished slightly in canal surface water.

In October of 2003, after unsuccessful attempts by the NYSDEC to commit the PRP group to enter into an Order of Consent and conduct a RI/FS, the Site was referred to State Superfund program for the purpose of conducting an RI/FS.

4.0 SUMMARY OF REMEDIAL INVESTIGATION AND EXPOSURE ASSESSMENT

The purpose of the RI field investigation was to:

1. identify, to the extent possible, the source(s) of sediment and surface water contamination, and to identify if groundwater adjacent to the Site has been impacted by those sources;
2. further characterize the vertical and areal distribution of sediment contamination;
3. further characterize the vertical and areal distribution of groundwater contamination;
4. evaluate the distribution and nature of contamination in surface water to determine the potential risk posed to human health and the environment; and
5. evaluate migration pathways, and actual or potential receptors.

The following subsections present a summary of the RI field investigation activities, the nature and extent of contamination in the various site media, and the results of the QHHEA and FWIA.

4.1 RI FIELD INVESTIGATION ACTIVITIES

MACTEC conducted the RI field activities between June and September 2005. Figure 4.1 presents the location of samples collected during the RI field investigation, including the 18 sampling transects within the canal that were established by BBL in 2002. These transects are spaced approximately 250 feet apart, start at the northwest end of the former canal, and are numbered 1 through 17, with one background location (Transect B). Additional sediment sampling transects established by MACTEC for this investigation are located between the BBL transects, and are numbered 0.0 through 16.5, and represent sampling locations spaced midway between the original transects. This resulted in transects approximately every 125 feet apart. The RI field investigation included the following sampling activities:

1. collection of 11 surface water samples
2. collection of 100 sediment samples from 85 locations within the canal
3. collection of one sediment sample from West Pond, East Pond, and at the northern roadside ditch of Route 5S, respectively
4. collection of 14 soil samples from 7 soil boring locations

5. collection of two rounds of groundwater samples from six permanently-installed monitoring wells.

Surface water and sediment sampling of the West Pond (former fire pond), East Pond, and Route 5S point were conducted to evaluate conditions in surface water bodies in the vicinity of the Site, including: 1) upstream of the canal (West Pond), downstream of the canal (Route 5S point), and adjacent to the canal and also upstream of the Route 5S point (East Pond). None of these sample locations are at the Site. Table 4.1 presents a summary of the sampling locations from the RI field activities.

In November 2008, a Supplemental RI Investigation was conducted to addresses data gaps identified by the NYSDEC Division of Fish, Wildlife, and Marine Resources. These data gaps included detection limits for off-site surface water and sediment samples that were in excess of applicable standards and/or screening criteria, and lack of data for potential upgradient off-site sources and for potentially impacted downgradient locations (no on-site samples were collected). Results from the supplemental investigation as reported in the RI suggest that there are contaminants entering the Old Erie Canal upstream. The results also suggests that there are contaminants contributing to off-site contamination mainly East Pond. Figure 4.2 presents the location of samples collected during the Supplemental Investigation. Supplemental sample locations are summarized in Table 4.2.

To determine whether the off-site laboratory data associated with the Supplemental Investigation met the project-specific criteria for data quality and data use, a Data Usability Summary Report (DUSR) was prepared in accordance with the "Guidance for the Development of Data Usability Reports" (NYSDEC, 1997). The DUSR and validated off-site laboratory results are included in Appendix A. As indicated in the Appendix A, no data was rejected, but a subset of results was qualified as estimated during completion of the DUSR. Based on the information summarized in Appendix A, the Supplemental Investigation data used in this FS Report meets the data quality project-specific objectives.

4.2 NATURE AND DISTRIBUTION OF CONTAMINATION

4.2.1 Distribution of Contamination

This subsection presents the distribution of contamination identified during the RI and Supplemental Investigations, as well as historical investigations conducted at the Site, and is organized by the various environmental media that were sampled.

Groundwater

The RI data indicate that groundwater at, and in the immediate vicinity of, the Site contains concentrations of iron, magnesium, manganese, and sodium above NYS ambient water quality standards or guidance.

Surface Water

Previous investigations conducted at the Site indicated that surface water in the canal had detectable concentrations of di-n-butyl phthalate, several chlorinated solvents (including TCE, 1,2-DCE, 1,1,1-TCA), and metals. Analytical results from this RI indicate that surface water exceeds NYS ambient water quality standards or guidance for the use of surface water as a source of drinking water for several chlorinated VOCs. Additionally, several metals and one semivolatile organic compound (SVOC) analyte slightly exceed NYS ambient water quality standards or guidance for fish and wildlife intake. From 1986 to the present, the detected contaminants and their respective concentrations have remained relatively consistent.

Sediment

During the RI field investigation, sediment within the canal at the Site was observed to consist of black, fine-to-medium sand. A black oily sludge was observed in sediment throughout the canal, and, in some areas of the western (upstream) end of the canal, this oily sludge was several feet thick. PCBs, metals, and/or SVOCs (primarily PAHs) were generally detected in sediments throughout the canal at concentrations above sediment screening criteria.

Soil

Soil samples collected during the RI were compared to the 6 NYCRR Part 375 soil cleanup objectives (SCOs). In general, soil concentrations of contaminants were below the Commercial

Use SCOs, except one detection of a PAH. PCBs detected in Site soils outside of the canal were detected at concentrations below the Residential Use SCO. Visual evidence of soil contamination and elevated photoionization detector (PID) readings were not noted during the field investigation; therefore, test pitting was not conducted.

4.2.2 Fate and Transport

Historical documentation and analytical data collected from sediment at the Site indicate that VOCs, SVOCs (primarily PAHs), PCBs, and metals that were released from various historical industrial discharges have resulted in contamination of this medium above SCGs. Lower concentrations of the same constituents were detected in soils from the banks of the canal, but bank soil is not interpreted to be a source of the sediment contamination.

The primary contamination at the Site consists of PCBs and metals in sediments within the canal. There are no known natural sources of PCBs. PCBs are commercially manufactured mixtures of up to 209 individual chlorinated compounds (known as congeners) (ASTDR, 2001). PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs generally have no smell or taste. Many commercial PCB mixtures are known in the United States by the trade name Aroclor and have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they do not burn easily and are good insulators. PCBs were not manufactured in the U.S. after 1977; products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

The primary PCB detected in soil and sediment at the Site is Aroclor 1254. The last two digits of the Aroclor names indicate the average chlorine content, in percent. Aroclor 1254 exhibits a solubility at 24 degrees Celsius of 0.057 milligrams per liter (Hutzinger et al., 1974), Log Kow of 6.5 (Hutzinger et al., 1974), and vapor pressure at 25 degrees Celsius of 7.71×10^{-5} millimeters of mercury (Hg) (USEPA, 1979). Aroclor 1254 is characterized as a light yellow viscous liquid, with a mild hydrocarbon odor (NIOSH, 1997).

PAHs are typically found in fuels/oils, asphalt, and partially burned material (i.e., wood, coal, etc). The metals are likely the result of discharge of metal laden waste water.

PCBs, and to a lesser extent PAHs, do not readily break down in the environment. Organic compounds with high adsorption characteristics (i.e., high organic carbon partition coefficient [Koc] values) such SVOCs and PCBs (Koc on order of 5.3 x 105 milliliters per gram [Mabey, et al., 1984]), and many inorganics tend to bind strongly to soils/sediments, limiting the transport from sediments to groundwater (although some metals may dissolve more readily). The majority of these contaminants tend to adsorb to organic particles and bottom sediments. The contaminants in bottom sediments can be dissolved back into the water column, or be transported bound to sediment particles that are mobilized with stream flow. Depending on flow velocity, this could result in continuous transport of contaminants, primarily PCBs adsorbed to sediments, within the surface water bodies at, and downstream, of the Site.

Chemicals in sediment, particularly chemicals that are soluble in water and/or do not adsorb to carbon-rich sediments, can partition to surface water and/or migrate via leaching to groundwater. A review of surface water data for the Site shows that VOCs and metals are present in surface water, indicating that some partitioning between sediment and surface water has occurred. In addition, although PCBs were not detected in surface water, historic documentation indicates contaminated sediments have migrated off-site with surface water flow in the past (canal breach) (EA, 1984). Groundwater data collected at the Site indicate that metals and low levels of VOCs are present in groundwater, suggesting that some amount of leaching may have occurred.

VOCs may be released from surface water and soil to ambient air. VOCs in groundwater may partition to soil gas, migrate through the soil column, and be drawn into above ground buildings. Based on the low concentrations detected in surface water and groundwater, the air pathway is not anticipated to be a significant transport mechanism at the Site.

Chemicals adsorbed to particulates may migrate to air if the particulates become liberated as dust. The soil along the canal banks is moist and highly vegetated, representing conditions which prevent liberation of dust. Therefore, migration of chemicals in soil-derived dust is not a complete migration pathway at the Site. VOCs in sediment would migrate to surface water prior to being released to air; consequently, migration of VOCs from sediment is not a migration pathway of concern for human receptors. Similarly, dust cannot be liberated from moist or submerged sediment.

4.2.3 Site Conceptual Model

Based on the historical data review and results of the RI, a conceptual site model has been developed. This conceptual model presents a succinct description of the media affected, the source(s) of contamination, types of contamination, contaminants of potential concern, primary or secondary release mechanisms, migration pathways, and potential receptors.

Wastewater, and potentially sludge, from industrial facilities located near the Site were released through storm water lines or other piping to the canal. These discharges contained metals, VOCs, SVOCs, and PCBs which were deposited over time into the sediments in the canal. These contaminants were likely re-distributed over time through sedimentation, erosion, and dissolution.

Soil contamination potentially related to underground storage tanks, waste storage areas, or contaminated fill was not identified in the vicinity of the Site and is, therefore, not anticipated to be a current source of contamination. Based on groundwater analytical results, contamination does not appear to be leaching to groundwater at concentrations of concern (i.e., above SCGs).

The primary media of concern are contaminated sediments and, to a lesser extent, contaminated surface water. The potential receptors of on-site contaminants include aquatic-life, semi-aquatic life, terrestrial wildlife, adult workers, and/or area residents (trespassers) that might come in contact with contaminated sediments or surface water.

4.3 FISH AND WILDLIFE IMPACT ANALYSIS

Steps I (Site Description) and II (Contaminant-Specific Impact Assessment) of a FWIA have been completed for the Site in accordance with NYSDEC guidance (NYSDEC, 1994), and are presented in their entirety in the RI Report (MACTEC, 2008). The purpose of this assessment was to:

- identify fish and wildlife resources in the vicinity of the Site
- determine the potential impacts of site-related contaminants on fish and wildlife resources
- provide information necessary for identifying and evaluating remedial alternatives to address the potentially complete ecological exposure pathways.

Step III (Ecological Effects of Remedial Alternatives), Step IV (Fish and Wildlife Requirements for Implementation of Remedial Actions), and Step V (Monitoring Program) are incorporated into the development and evaluation of remedial alternatives in this FS Report.

Results of the criteria specific analysis indicate that severe impacts to fish and wildlife resources are likely from sediment-related exposures to PCBs and metals; detected concentrations of metals in sediments were highest for copper, chromium, cadmium, lead, mercury, and silver relative to their respective sediment screening criteria at the Site.

A toxic effect analysis is normally completed as the next step in the contaminant-specific impact assessment; however, this analysis was not performed given the extent and magnitude of sediment contamination at the Site, which indicates aquatic and semi-aquatic life are likely being severely impacted.

4.4 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

A QHHEA was performed in accordance with NYSDEC Technical Guidance for SI and Remediation (NYSDEC, 2002), and is presented in its entirety in the RI Report (MACTEC, 2008). Consistent with this guidance, the QHHEA evaluated the populations of humans that may potentially occur at and in the vicinity of the Site, the mechanisms or exposure pathways by which those humans may be potentially exposed to contamination associated with the Site, and the significance of exposure that may occur through the potential exposure pathways. This process involves three steps:

1. Characterization of the exposure setting in terms of physical characteristics, current and future uses of the Site, and the populations that may be potentially exposed to site-related contamination under the current and future land uses
2. Identification of potential exposure pathways and exposure points to which the populations may be exposed
3. Screening of potentially complete exposure pathways to identify the pathways and site-related constituents of greatest concern from a health risk perspective.

The QHHEA concluded that human exposures to site media are unlikely and would be of low frequency and intensity under the current and foreseeable land use conditions. Site groundwater

contains concentrations of iron, magnesium, manganese, and sodium above Technical and Operational Guidance Series (TOGS) 1.1.1; however, these analytes are not interpreted to be site-related contaminants. Groundwater in close proximity to the Site is not known to be used as a potable water source. According to the Public Health Engineer in Utica, the entire Site lies within the service area of the Mohawk Valley Water Authority, which provides municipally-supplied drinking water (Oneida County Health Department, 2006).

Based on data collected during the RI, soil at the Site does not appear to constitute a health risk, and this exposure pathway is not expected to be complete - the potential for direct contact exposures to soil at the Site is low, given the difficult accessibility (thick vegetation) and unattractive nature of the Site that would not be expected to attract workers or area residents.

Surface water at the Site is not used as a source of drinking water, is not used for recreational purposes, and does not support recreationally important fish species; therefore, the potential for human exposure to contaminated surface water is minimal and not considered an exposure pathway of significance.

The most significant potentially complete exposure pathway, from a human health perspective, is direct human contact with PCBs and metals (chromium, copper, lead, and mercury present the greatest risk to human receptors) in the former canal sediments. While this exposure pathway is not considered complete at this time, the magnitude of contamination in Site sediments is significant, and therefore poses a significant potential future risk.

5.0 DEVELOPMENT OF REMEDIAL ACTION GOALS AND OBJECTIVES

Remedial Action Objectives (RAOs) form the basis for identifying remedial technologies and developing remedial alternatives. RAOs are medium-specific or operable unit-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific SCGs (NYSDEC, 2002).

Site-specific contaminants of concern (COCs) were determined by comparison of contaminant levels to Chemical-Specific SCGs, which include the 6 NYCRR Parts 700-706 Water Quality Standards (NYSDEC, 1998), TOGS 1.1.1 Ambient Water Quality Standards and Guidance Value and Groundwater Effluent Limitations (NYSDEC, 1998), the Technical Guidance for Screening of Contaminated Sediments (NYSDEC, 1998), and the 6 NYCRR Part 375 Remedial Program SCOs (NYSDEC, 2006).

The RI results indicate groundwater, surface water, sediment, and soil contamination exceeds Chemical-Specific SCGs at or in the vicinity of the Site.

The following RAOs have been developed consistent with the remedy selection process set forth in 6 NYCRR Part 375 (NYSDEC, 2006) and DER-10 (NYSDEC, 2002). The goal for remedial action is to restore the Site to pre-disposal/pre-release conditions, to the extent practicable. At a minimum, the remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contaminants disposed at the Site through the proper application of scientific and engineering principles (NYSDEC, 2002).

5.1 REMEDIAL ACTION OBJECTIVES FOR GROUNDWATER

Groundwater in close proximity to the Site is not known to be used as a potable water source - according to the Public Health Engineer in Utica, the entire site lies within the service area of the Mohawk Valley Water Authority, which provides municipally-supplied drinking water (Oneida County Health Department, 2006). Therefore, RAOs have not been developed for groundwater.

5.2 REMEDIAL ACTION OBJECTIVES FOR SURFACE WATER

Surface water at the Site contains concentrations of di-n-butyl phthalate and several metals (including lead and copper) that exceed surface water criteria published in TOGS 1.1.1. Surface water is not considered a complete exposure pathway for human health, and is considered a low risk to fish and wildlife. Therefore, RAOs have not been developed for surface water.

5.3 REMEDIAL ACTION OBJECTIVES FOR SEDIMENT

The QHHEA concluded that under current and projected future use scenarios, potentially complete exposure pathways include commercial/industrial workers and area residents who may visit or access the Site as trespassers/recreational visitors and contact PCBs and metals in sediments. The FWIA criteria-specific analysis indicated that significant impacts to fish and wildlife resources are likely from sediment-related exposures to PCBs and metals at the Site. Detected concentrations of metals in sediments were highest for copper, chromium, cadmium, lead, mercury, and silver relative to their respective sediment screening criteria; the QHHEA identified chromium, copper, lead, and mercury as the metals which present the greatest risk to human receptors. Table 5.1 summarizes the contaminants of concern for sediment and their respective SCGs.

Therefore, the RAOs for sediment at the Site are:

- prevent direct contact with contaminated sediments by potential human health receptors
- prevent surface water contamination from sediments that would result in surface water levels that may result in fish advisories
- prevent releases of contaminants from sediments that would result in surface water levels in excess of Ambient Water Quality Standards and Guidance Values
- prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through aquatic food chain.

5.4 REMEDIAL ACTION OBJECTIVES FOR SOIL

The RI results indicate concentrations of lead and several PAHs in soil above the Residential Use SCOs; one of these PAHs also exceeds the Commercial Use SCOs. The primary site contaminants, PCBs, were detected at concentrations above the Unrestricted Use SCOs, but below the Restricted

Residential SCOs in soil. Based on groundwater analytical results, contamination does not appear to be leaching to groundwater at concentrations of concern (i.e., above SCGs). Visual evidence of soil contamination and elevated PID readings were not noted during the field investigation; therefore, test pitting was not conducted. Based on visual inspection and the limited sampling conducted to date, soil in the vicinity of the Site is not anticipated to pose a health risk to human and ecological receptors. Therefore, RAOs have not been developed for soil.

6.0 IDENTIFICATION OF GENERAL RESPONSE ACTIONS AND DISTRIBUTION OF CONTAMINATION REQUIRING REMEDIAL ACTION

General response actions describe those actions that will satisfy the RAOs (USEPA, 1988). General response actions may include treatment, containment, excavation, disposal, institutional actions, or a combination of these. Like RAOs, general response actions are medium-specific. The general response actions presented in the following subsections have been developed to address sediment contamination at the Site, which has been identified as a potential threat to human health and the environment.

Site-specific RAOs were developed to address the contamination requiring remedial action for sediment.

6.1 GENERAL RESPONSE ACTIONS

The following general response actions would address the RAOs identified for sediment:

- No Action
- Access Restrictions
- Containment
- In-Situ Treatment
- Removal
- Ex-Situ Treatment

These general response actions are appropriate for site-specific sediment contamination requiring remediation.

6.2 CONTAMINATION REQUIRING REMEDIAL ACTION

This subsection identifies the distribution of contaminated media to which the RAOs and general response actions identified above, and the remedial alternatives to be developed in Section 5.0, will apply. Figure 6.1 presents the distribution of PCB sediment contamination exceeding the sediment

screening criteria of 0.35 mg/kg used in the risk assessment. Figure 6.2 presents the distribution of mercury contaminated sediments exceeding the sediment screening criteria of 0.15 mg/kg used in risk assessment. Figure 6.3 presents the distribution of Benzo(a)anthracene contaminated sediments exceeding the sediment screening criteria of 0.21 mg/kg used in the risk assessment. Screening criteria for organic analytes in the Old Erie Canal (OEC) were adjusted using an averaged measured TOC content of 1.79 percent. Organic screening criteria for organic analytes in East Pond were adjusted using an estimated TOC content of 11.4 percent, which was calculated by multiplying the average percentage of organic matter in the samples by a correction factor of 0.15 (since TOC data were not available). The 0.15 conversion factor is based on the ratio of TOC to organic matter measured for samples collected from the OEC. Organic screening criteria used for the West Pond were adjusted based on an estimated TOC content of 4.35 percent (i.e., the average percent organic matter multiplied by the correction factor of 0.15).

In Section 8.0 remedial alternatives will be developed with consideration for the distribution of the contaminants, both horizontally and vertically, and co-location of various types of contaminants.

7.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

This section identifies and screens potential remedial technologies. Technologies are identified for the purpose of attaining the RAOs established in Section 5.0. Identified technologies correspond to the categories of general response actions described in Subsection 6.1.

Following identification, candidate technologies are screened based on their applicability to site- and contaminant-limiting characteristics. The purpose of the screening is to produce an inventory of suitable technologies that can be assembled into remedial alternatives capable of mitigating actual or potential risks at the Site. Potential technologies representing a range of general response actions (e.g., no action, containment, removal, and treatment) are considered. The result of technology screening is a list of potential remedial technologies that may be combined to form remedial alternatives.

7.1 TECHNOLOGY IDENTIFICATION

Remedial technologies and specific process options applicable to hazardous waste sites are identified in USEPA's guidance for Conducting RI/FS (USEPA, 1988). This guidance was used to generate the list of applicable remedial technologies and associated process options identified for each general response action presented in Table 7.1. General response actions were developed for sediment in Subsection 6.1.

7.2 TECHNOLOGY SCREENING

The technology screening process reduces the number of potentially applicable technologies and process options by evaluating factors that may influence process-option effectiveness and implementability. This overall screening is consistent with guidance for conducting an FS under CERCLA (USEPA, 1988). Effectiveness and implementability are incorporated into two screening criteria: waste- and site-limiting characteristics. Waste-limiting characteristics consider the suitability of a technology based on contaminant types, individual compound properties (e.g., volatility, solubility, specific gravity, adsorption potential, and biodegradability), and interactions that may occur between mixtures of compounds. Site-limiting characteristics consider the effect of

site-specific physical features on the implementability of a technology, such as site topography and geology, the location of buildings and underground utilities, available space, and proximity to sensitive operations. Technology screening serves a two-fold purpose of screening out technologies whose applicability is limited by site-specific waste or site considerations, while retaining as many potentially applicable technologies as possible.

Table 7.1 presents the technology-screening process. Technologies and process options judged ineffective or prohibitively difficult to implement were eliminated from further consideration. The technologies retained following screening (see Table 7.1) represent an inventory of technologies considered most suitable for remediation of soil and groundwater at the Site and may be used alone or integrated with other technologies to develop remedial alternatives. Pilot-scale treatability studies may be required prior to final technology selection to confirm the effectiveness of a given technology.

8.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

The retained technologies identified in Table 7.1 are considered technically feasible and applicable to the waste types and physical conditions at the Site. These medium-specific technologies were assembled into potential site-specific remedial alternatives capable of achieving the RAOs for the contaminated media requiring remediation.

8.1 DEVELOPMENT OF REMEDIAL ALTERNATIVES FOR THE SITE

The retained remedial technologies presented in Table 7.1 have been combined into the following remedial alternatives:

8.1.1 Alternative 1: No Action

This alternative would include no actions to address contaminated sediments at the Site. This alternative includes a Site Management Plan which would include land-use restrictions and the construction of stormwater control features to prevent stormwater from mobilizing contaminated sediments left in place. Periodic site inspections would be conducted to evaluate the integrity of the stormwater controls and to identify the need for repair or enhancement. This alternative would not allow for use of the Site as the site would remain classified as a hazardous waste site.

8.1.2 Alternative 2: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 50 mg/kg, Excavation and Off-site Treatment/Disposal of 0-3 feet of Remaining PCB Contaminated Sediments Greater than or equal to 0.35 mg/kg.

Alternative 2 has been developed based on future land use and regulatory requirements. The most stringent of the cleanup levels of the COCs were used in the development of this alternative. Therefore, the PCB remediation goals (RGs) were used as the limiting factor for remedial action and would include removal of metals. The sediment screening criteria for PCBs is 0.35 mg/kg for the canal. Alternative 2 includes excavation and off-site disposal of PCB contaminated sediments greater than or equal to 50 mg/kg as well as excavation and off-site disposal of up to three feet of PCB contaminated sediments greater than or equal the sediment screening criteria of 0.35 mg/kg.

This alternative also includes a Site Management Plan which would include land-use restrictions and the construction of stormwater control features to prevent stormwater from mobilizing contaminated sediments left in place. Periodic site inspections would be conducted to evaluate the integrity of the stormwater controls and to identify the need for repair or enhancement. Implementation of this alternative would allow for commerical use of the Site.

Alternative 2 includes of the following key components:

1. pre-design investigations and studies
2. mobilization and temporary facilities and controls
3. excavation and off-site treatment/disposal of approximately 2,523 cubic yards (CY) of PCB contaminated sediments greater than or equal to 50 mg/kg
4. excavation and off-site treatment/disposal of 0-3 feet for an approximate volume of 15,513 CY of remaining PCB contaminated sediments greater than or equal to 0.35 mg/kg, and construction of a two foot barrier cover and a one-foot restoration layer;
5. Institutional controls
6. Long-term monitoring
7. Annual institutional control inspections and reporting.

8.1.3 Alternative 3: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 10 mg/kg, Excavation and Off-Site Treatment/Disposal of 0-3 feet of Remaining Sediments that are Less than 10 mg/kg but Greater than or equal to 0.35 mg/kg.

Alternative 3 has been developed based on future land use and regulatory requirements. The most stringent of the cleanup levels of the COCs were used in the development of this alternative. Therefore, the PCB RGs were used as the limiting factor for remedial action as described for Alternative 2. Alternative 3 proposes excavation and off-site treatment/disposal of PCB contaminated sediments within three feet of remaining sediments that are less than 10 mg/kg but greater than or equal to 0.35 mg/kg will be disposed of off-site. This alternative would also include a Site Management Plan and site inspections as described for Alternative 2. Implementation of this alternative would allow for commerical use of the Site.

Alternative 3 includes of the following key components:

1. pre-design investigations and studies
2. mobilization and temporary facilities and controls
3. excavation and off-site treatment/disposal of approximately 14,011 CY of PCB contaminated sediments greater than or equal to 10 mg/kg followed by placement of clean backfill to return the OEC back to original grade
4. excavation and off-site treatment/disposal within remaining 0-3 feet for an approximate volume of 5,177 CY of sediments that are less than 10 mg/kg but greater than or equal to the sediment screening criteria of 0.35 mg/kg followed by placement of 2 feet of clean backfill and a one-foot restoration layer
5. institutional controls
6. long-term monitoring
7. annual institutional control inspections and reporting.

8.1.4 Alternative 4: Excavation and Off-site Treatment/Disposal of PCB and Metal Contaminated Sediments to meet Sediment Screening Criteria

Alternative 4 would include the excavation and off-site treatment/disposal of contaminated sediments above 0.35 m/kg at the Site. This alternative would also include site inspections as described for Alternative 2. Implementation of this alternative would allow for unrestricted use of the Site.

Alternative 4 includes of the following key components:

1. pre-design investigations and studies
2. mobilization and temporary facilities and controls
3. excavation and off-site treatment/disposal of all contaminated sediments with an approximate volume of 23,791 CY followed by regrading the canal to provide adequate drainage
4. long-term monitoring.

8.2 SCREENING OF ALTERNATIVES

This Subsection presents a screening of the remedial alternatives developed for sediment. Consistent with DER-10, the developed medium-specific remedial alternatives are screened on the basis of whether they are technically implementable (Implementability) for the Site and whether they can meet the RAOs (Effectiveness). Based upon available information, the relative cost of each remedial alternative is also evaluated. Those remedial alternatives which are not technically implementable, would not achieve RAOs for the Site, or would incur costs significantly higher than other remedial alternatives without providing greater effectiveness or implementability are not evaluated further in this FS Report.

The medium-specific screening of remedial alternatives is present in Table 8.1. The No Action alternative is not evaluated according to the screening criteria; it passes through screening to be evaluated during the detailed analysis as a baseline for other retained alternatives.

As indicated in Table 8.1, Alternatives 1, 2, 3 and 4 have been retained for detailed analysis in Section 9.0.

9.0 DETAILED ANALYSIS OF ALTERNATIVES

This section presents the detailed analyses of remedial action alternatives for sediment at the Site. The detailed analysis is intended to provide decision-makers with the relevant information with which to aid in selection of a site remedy. The detailed description of technologies or processes used for each alternative includes, where appropriate, a discussion of limitations, assumptions, and uncertainties for each component. The descriptions provide a conceptual design of each alternative and are intended to support alternatives-comparison and cost-estimation.

The detailed analysis of each alternative consists of evaluation using the first eight evaluation criteria identified in DER-10 (NYSDEC, 2002) and §375-1.8(f) (NYSDEC, 2006), as presented in the following paragraphs. Table 9.1 summarizes the list of applicable SCGs used in the evaluation of alternatives.

Compliance with Standards, Criteria, and Guidance. Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. SCGs for the Site will be listed and whether or not the remedy will achieve compliance will be discussed. For those SCGs that will not be met, there will be a discussion and evaluation of the impacts of each, and whether waivers are necessary. Chemical-specific SCGs were previously identified in this FS Report. Location- and action-specific SCGs will be identified for each alternative in this section.

Overall Protection of Public Health and the Environment. This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs will be evaluated.

Short-term Effectiveness. The potential short-term adverse impacts and risks of the remedy upon the community, workers, and environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the Site will be controlled, and the effectiveness of the controls, will be presented, along

with a discussion of engineering controls that will be used to mitigate short-term impacts (e.g., dust control measures). The length of time needed to achieve the remedial objectives will be estimated.

Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items will be evaluated:

1. the magnitude of the remaining risks
2. the adequacy of the engineering and institutional controls intended to limit the risk
3. the reliability of these controls
4. the ability of the remedy to continue to meet RAOs in the future.

Effectiveness of alternatives in protecting human health and the environment after RAOs are met will be evaluated. This will include an evaluation of the permanence of the alternative, the magnitude of residual risk, and the adequacy and reliability of controls required to manage wastes or residuals remaining at the Site.

Reduction of Toxicity, Mobility, or Volume with Treatment. The remedy's ability to reduce the toxicity, mobility or volume of site contamination will be evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.

Implementability. The technical and administrative feasibility of implementing the remedy will be evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material will be evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, or other issues.

Cost. Capital, operation and maintenance (O&M) costs will be estimated for the remedy and presented on a present worth (PW) basis.

Community Acceptance. The public's comments, concerns and overall perception of the remedy will be evaluated following a public meeting presenting the proposed remedial action plan in a

format that responds to questions that are raised (e.g., the responsiveness summary). This criterion is not evaluated in this FS Report.

Land Use. The current, intended, and reasonably anticipated future land uses of the Site and its surroundings will be considered in the evaluation of remedial alternatives.

9.1 COST ANALYSIS PROCEDURES

Estimated costs presented in this FS Report are intended to be within the target accuracy range of minus 30 to plus 50 percent of actual cost (USEPA, 1988). Costs are presented as a PW and as a total cost for up to a 30-year period.

A summary of the costs for each alternative identifying capital and PW costs are included in each alternative's cost description. Each cost estimate includes a PW analysis to evaluate expenditures that occur over different time periods. The analysis discounts future costs to a PW and allows the cost of remedial alternatives to be compared on an equal basis. PW represents the amount of money that, if invested now and disbursed as needed, would be sufficient to cover costs associated with the remedial action over its planned life. A discount rate of 3.1 percent, as published by the Office of Management and Budget (OMB), was used to prepare the cost estimates (OMB, 2008).

Consistent with USEPA FS cost estimating guidance (USEPA, 2000), the remedial alternative cost estimates include costs for project management, remedial design, construction management, technical support, and scope contingency.

Project management includes planning and reporting, community relations support during construction or O&M (Operations & Maintenance, bid or contract administration, permitting [not already provided by the construction or O&M contractor], and legal services outside of institutional controls.

Remedial design applies to capital cost and includes services to design the remedial action. Activities that are part of remedial design include pre-design collection and analysis of field data, engineering survey for design, treatability study/pilot-scale testing, and the various design components such as design analysis, plans, specifications, cost estimate, and schedule.

Construction management applies to capital cost and includes services to manage construction or installation of the remedial action, except any similar services provided as part of regular construction activities. Activities include review of submittals, design modifications, construction observation or oversight, engineering survey for construction, preparation of O&M manual, documentation of quality control (QC)/quality assurance (QA), and record drawings.

Technical support during O&M includes services to monitor, evaluate, and report progress of remedial action. This includes oversight of O&M activities, update of O&M manual, and progress reporting and is generally between 10 and 20 percent of total annual O&M costs depending on complexity of the remedial action (USEPA, 2000).

Scope contingency represents project risks associated with the feasibility-level of design presented in this FS Report. This type of contingency represents costs, unforeseeable at the time of estimate preparation, which are likely to become known as the remedial design proceeds. Scope contingency ranges from 10 to 25 percent, with higher values appropriate for alternatives with greater levels of cost growth potential (USEPA, 2000).

Project management, remedial design, and construction management costs presented in this FS Report are based upon the following matrix presented in the USEPA FS cost estimating guidance (USEPA, 2000).

Professional and Technical Costs as Percentage of Direct Costs					
Indirect Cost	< $100K (%)	$100K-$500K (%)	$500K-$2M (%)	$2M-$10M (%)	>$10M (%)
Project Management	10	8	6	5	5
Remedial Design	20	15	12	8	6
Construction Management	15	10	8	6	6

9.2 GENERAL ASSUMPTIONS

Details and assumptions pertaining to the cost estimates are included in each alternative's cost description. In addition to the alternative-specific assumptions, the following cost assumptions were applied, as applicable:

- Long-term activities would be conducted for no more than 30 years.
- Twenty (20) percent of long-term monitoring samples would be collected in duplicate, or for QA/QC purposes, and analyzed off-site.
- Institutional control inspections would be conducted every year up to a total of 30 years.

The following remedial alternatives developed in Section 8.0 were retained for detailed analysis.

- Alternative 1: No Action
- Alternative 2: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 50 mg/kg, Excavation and Off-site Treatment/Disposal of 0-3 feet of Remaining PCB Contaminated Sediments Greater than or equal to 0.35 mg/kg
- Alternative 3: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 10 mg/kg, Excavation and Off-Site Treatment/Disposal of 0-3 feet of Remaining Sediments that are Less than 10 mg/kg but Greater than or equal to 0.35 mg/kg
- Alternative 4: Excavation and Off-site Treatment/Disposal of PCB and Metal Contaminated Sediments to meet Sediment Screening Criteria

The following subsections present a conceptual design and cost estimate for each of these remedial alternatives and a discussion of each alternative relative to the first eight of the evaluation criteria as set forth in DER-10 (NYSDEC, 2002).

9.3 ALTERNATIVE 1: NO ACTION

This alternative would include no actions to address contaminated sediments at the Site. This alternative includes a Site Management Plan which would include land-use restrictions and the construction of stormwater control features to prevent stormwater from mobilizing contaminated sediments left in place. Periodic site inspections would be conducted to evaluate the integrity of the stormwater controls and to identify the need for repair or enhancement. This alternative would not allow for use of the Site as the site would remain classified as a hazardous waste site.

Institutional Controls. Institutional controls would be implemented to restrict future use of the Site as part of an environmental easement. Implementation of the environmental easement would include the development of a Site Management Plan which would set forth the institutional controls necessary to manage exposure to contamination remaining at a Site. Institutional controls are anticipated to include implementation of land-use restrictions restricting subsurface activity, prohibiting residential use and installation of potable water wells at the Site. Land-use restrictions would be implemented through legal instruments such as deeds and/or water well permitting processes. The deed restriction would include a notation that PCB waste was disposed of on-site and that the use restrictions that apply to all future owners so long as onsite concentrations exceed regulatory and protective levels.

Compliance with Standards, Criteria, and Guidance. This alternative would not meet Chemical-specific RGs because it would not address sediment contamination in excess of the screening criteria established in the Technical Guidance for Screening of Contaminated Sediments (NYSDEC, 1998); the Site-specific sediment RG for PCBs of 0.35 mg/kg. This alternative would not trigger any location- or action-specific SCGs.

Overall Protection of Public Health and the Environment. This remedial alternative would minimally protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through institutional controls. This remedial alternative would not achieve the RAOs for sediment.

Short-term Effectiveness. Because no direct actions would be taken, this alternative would not result in short-term adverse impacts and risks to the community, site workers, and the environment.

Long-term Effectiveness and Permanence. This alternative would not include direct actions to address contaminated sediments at and in the vicinity of the Site. This remedy does not currently meet RAOs for sediment and, due to the properties of the Site-specific COCs (e.g., longevity of PCBs), would not be expected to meet RAOs in the future.

Reduction of Toxicity, Mobility, or Volume with Treatment. This alternative would not result in the reduction of toxicity, mobility, or volume of sediment contamination through treatment.

Implementability. There are no technical difficulties associated with this alternative. However, obtaining regulatory and/or public approval of this alternative would be difficult.

Land Use. The current and reasonably anticipated future land use of the Site is for commercial purposes; however, residential property is located to the north of the Site. No direct actions would be taken as part of this alternative. There would be restrictions placed on future use; therefore this alternative would be protective of potential occupants/visitors to the Site and the immediate vicinity.

Cost. The capital cost of this Alternative is $16,000. The PW of this Alternative is $103,000. A summary of the costs associated with this alternative is presented in Table 9.2. Detailed cost analysis backup is provided in Appendix C.

9.4 ALTERNATIVE 2: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 50 mg/kg, Excavation and Off-site Treatment/Disposal of 0-3 feet of Remaining PCB Contaminated Sediments Greater than or equal to 0.35 mg/kg.

Alternative 2 has been developed based on anticipated future land use and regulatory requirements. The most stringent of the cleanup levels of the COCs were used in the development of this alternative. Therefore, the PCB RGs were used as the limiting factor for remedial action. Alternative 2 includes excavation and off-site disposal of PCB contaminated sediments greater than or equal to 50 mg/kg as well as excavation and off-site disposal of up to three feet of PCB contaminated sediments greater than or equal the sediment screening criteria of 0.35 mg/kg. This alternative also includes a Site Management Plan which would include land-use restrictions and the construction of stormwater control features to prevent stormwater from mobilizing contaminated sediments left in place. Periodic site inspections would be conducted to evaluate the integrity of the stormwater controls and to identify the need for repair or enhancement. This alternative would allow for commerical use of the Site.

Alternative 2 includes of the followng key components:

- pre-design investigations and studies
- mobilization and temporary facilities and controls

- excavation and off-site treatment/disposal of PCB contaminated sediments greater than or equal to 50 mg/kg followed by 2 feet of clean backfill and a one-foot restoration
- excavation and off-site treatment/disposal of 0-3 feet of remaining PCB contaminated sediments greater than or equal to the sediment screening criteria of 0.35 mg/kg
- institutional controls
- long-term monitoring
- annual institutional control inspections and reporting.

9.4.1 Detailed Description of Alternative 2

Pre-Design Investigation and Studies. Pre-design investigations and/or studies would be conducted to support the remedial design, and would include, but not be limited to:

- survey and characterization of the OEC alignment and habitat
- stormwater and hydraulic modeling.

The survey and characterization of the OEC alignment and habitat will include characterization of existing conditions, including surveying the slope, sinuosity and embedment of the canal, bank and canal bed characterization, wetland delineation and photo documentation. The wetlands on site will be delineated following the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1).

Mobilization and Temporary Facilities and Controls. Site preparation, mobilization, and temporary facilities and controls would include activities required to prepare the Site for construction, including, but not limited to:

- delivery and setup of site trailers
- installation of temporary utilities
- temporary diversion of the OEC
- construction of material lagoon areas
- construction of wastewater treatment facilities and equipment decontamination facilities
- implementation of erosion and sediment control measures
- site clearing and grubbing;
- survey layout of the various work extents.

Flow to on-site portions of the OEC from off-site (to the west) would be temporarily diverted during the duration of excavation of canal sediments by piping influent around the canal to discharge outside the limits of the work. Observations made during completion of the RI and other site work, suggest the OEC appears, for the most part, to be a stagnate water feature. For cost estimating purposes, it has been assumed that construction would occur during dry conditions, and that the canal would be dewatered in approximately 1000 foot sections using pumps, flexible piping, and inflatable dams. Additionally, erosion and sediment control measures, including temporary stabilized berms, would be implemented as described below. In addition to base flow of the OEC, stormwater runoff and shallow groundwater intrusion are anticipated during completion of this work, which will require dewatering during excavation of the OEC sediments.

Two material stockpile lagoon areas would be constructed on vacant property directly south of the to segregate the excavated materials into stockpiles which consist of sediments containing PCB concentrations greater than or equal to 50 mg/kg and sediments with PCBs less than 50 mg/kg. The dewatering areas would consist of lined bermed areas with a stone-lined sump to allow for pumping of accumulated water to the wastewater treatment facility.

Mobile wastewater treatment units would be provided on-site for each of the dewatering areas to handle wastewater generated during excavation dewatering, dewatering of stockpiled materials, and equipment decontamination. The systems would consist of an influent flow equalization tank, electrically driven pumps, solids settling units, particulate filtration consisting of bag filtration (four bag filters in series/parallel configuration to allow for continual operation), and granular activated carbon (GAC) filtration (in series/lead-lag configuration). A flowmeter would be provided to measure flow rate and total flow. Sample valves/taps would be provided before and after each bag filter and GAC vessel. Daily treated effluent samples would be collected and analyzed for PCBs, SVOCs, VOCs, and metals.

Erosion and sediment control measures would consist of the use of siltation fence, temporary stabilized berms, siltation curtains, and air/dust monitoring in accordance with local, state, and federal requirements, and in accordance with a site-specific erosion and sedimentation control plan and community air monitoring plan.

Site clearing and grubbing would be conducted to facilitate access to proposed work areas. It is assumed that approximately 10 acres of medium brush and/or medium trees would require clearing and grubbing and hauling off-site.

Excavation and off-site treatment/disposal of PCB contaminated sediments that are greater than or equal to 50 mg/kg followed by placement of 2 feet of clean backfill and a one-foot restoration.

Contaminated sediments containing PCBs at concentrations greater than or equal to 50 mg/kg would be excavated to depth, stockpiled together, and allowed to dewater prior to transportation off-site for treatment and/or disposal. Based upon interpretation of the existing analytical data, the extent of source area materials consists of approximately 2,523 cubic yards of sediment (refer to Appendix B – Calculations).

Due to site-specific conditions, construction sequencing will be a critical component of remedial action at the Site. It is anticipated that dewatering of the canal will be the initiation of the work. The work will begin at the western most portion of the canal. Approximately 1000 foot sections will be dewatered by segregating the section with inflatable dams. Wider sections of the canal will require construction of access pads to accommodate equipment limitations. Water removed from the canal will be treated by one of the on-site wastewater treatment units. Treated water will be placed back into the canal upon completion of canal restoration activities. Access to the canal would be maintained via a temporary access road from Turner Street and two access road crossings to be built at the wider sections of the canal. Excavated sections of sediment would be stockpiled, dewatered, and/or stabilized prior to transportation and off-site treatment/disposal. Confirmation sampling would be conducted at a rate of one sample per 30 linear feet of sidewall and one per 900 square feet of excavation bottom in accordance with DER-10. Waste characterization sampling would be conducted at a rate of one sample per 500 cubic yards, or more frequently if required by the disposal facility.

Following excavation of contaminated sediments to the final limits, the canal would be restored in accordance with state and federal regulations and available guidance documents including, but not limited to, the US Department of Agriculture, Natural Resources Conservation Service (NRCS), Part 654 National Engineering Handbook, Stream Restoration Design, August 2007 (NRCS, 2007).

The OEC will be reconstructed to the extent practicable, to match the existing flow path and bathymetry. This will be achieved through the placement of two feet of backfill and a one-foot restoration layer, as described herein. The banks of the OEC will be restored and erosion control measures such as erosion control blankets will be installed. The canal bed (restoration layer) will consist of material (i.e., gravel, cobble, and boulders) of the same size and distribution as the existing canal bed. It is recommended that the excavation and restoration of the OEC should occur during the period of lowest annual flow. During the mitigation and restoration, the OEC will be dewatered utilizing pumps, flexible piping and inflatable dams allowing the work to be done in the dry. The restoration of the OEC will include constructing riffle and run habitat as well as shallow pools, consistent with existing conditions.

Excavation and off-site treatment/disposal within 0-3 feet of sediments that are greater than or equal to the sediment screening criteria of 0.35 mg/kg followed by placement of 2 feet of clean backfill and a one-foot restoration.

Remaining contaminated sediments containing PCBs at concentrations greater than the sediment screening criteria of 0.35 mg/kg would be excavated to a maximum depth of three feet, stockpiled together, and allowed to dewater prior to transportation off-site for treatment and/or disposal. Based upon interpretation of the existing analytical data, the extent of PCB contaminated sediments consists of approximately 15,513 cubic yards of sediment (refer to Appendix B – Calculations). Handling of these sediments would be similar to the PCB contaminated sediments as discussed above.

Institutional Controls. Institutional controls would be implemented to restrict future use of the Site as part of an environmental easement. Implementation of the environmental easement would include the development of a Site Management Plan which would set forth the institutional controls necessary to manage exposure to contamination remaining at a Site. Institutional controls are anticipated to include implementation of land-use restrictions restricting subsurface activity, prohibiting residential use and installation of potable water wells at the Site. Land-use restrictions would be implemented through legal instruments such as deeds and/or water well permitting processes. The deed restriction would include a notation that PCB waste was disposed of on-site

and that the use restrictions that apply to all future owners so long as onsite concentrations exceed regulatory and protective levels.

Long-term Monitoring. Long-term monitoring would be implemented to evaluate effectiveness of the remediation and restoration of the OEC. This monitoring would include annual inspection of vegetation and other features of the restoration, as well as sampling and analysis of sediment, surface water, and biota from the OEC. A report would be prepared for each long-term monitoring event. It is assumed that long-term monitoring would be required for five years.

Annual institutional control inspections and reporting. Annual inspections would be conducted to ensure deed and land-use restrictions are being enforced. An annual report would be prepared documenting the inspection and the conditions observed.

9.4.2 Detailed Evaluation of Alternative 2

Compliance with Standards, Criteria, and Guidance. Alternative 2 would meet chemical-specific SCGs by removing sediment contamination in excess of the NYSDEC sediment screening criteria of 0.35 mg/kg. This Alternative includes a component where PCB contaminated sediments less than 50 mg/kg are to remain on site beneath a barrier and restoration layer allowing for commercial use of this site. Institutional controls would also be implemented under this component as part of the TSCA requirements.

Alternative 2 would likely trigger action-specific SCGs associated with dust control, erosion and sediment control, transportation and disposal of hazardous wastes, and canal restoration. Table 9.1 presents a summary of action-specific SCGs associated with remedial alternatives evaluated in this Section.

Overall Protection of Public Health and the Environment. This remedial alternative would protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through removal, treatment and/or disposal, engineering controls, or institutional controls. This remedial alternative would achieve the RAOs for sediment. Alternative 2 would allow for protection of ecological receptors and reducing the risk of exposure to human receptors by providing a three foot cover consisting of a two-foot barrier and one-foot restoration

layer. This alternative would not meet requirements for unrestricted use as sediments to remain beneath the three foot restoration cover would be greater than the sediment screening criteria of 0.35 mg/kg.

Short-term Effectiveness. This alternative would result in short-term adverse impacts and risks to the community, site workers, and environment as a result of implementation. Implementation of this alternative would include preparation of and adherence to a construction work plan and health and safety plan. It is estimated that this alternative could be fully implemented in less than one year, at which time Alternative 2 would meet the RAOs for sediment.

Long-term Effectiveness and Permanence. This alternative would provide long-term effectiveness and permanence by removing and disposing off-site of PCB contaminated sediments greater than 50 mg/kg as well as removing off-site a maximum of three feet of PCB contaminated sediments greater than 0.35 mg/kg. Remaining sediments would then be covered by a two foot barrier and one-foot restoration layer. Institutional controls would limit future use of the Site and adjacent properties, thereby limiting potential future exposure to sediment contamination. Institutional control inspections would be conducted to ensure that unacceptable exposure at the Site does not occur. These actions would remain effective as long as the capped sediments are not exposed and institutional controls are adhered to.

Reduction of Toxicity, Mobility, or Volume with Treatment. This alternative would result in the reduction of mobility and volume of sediment contamination at the Site through excavation and off-site disposal and on-site capping. Remedial actions will not reduce the toxicity of contaminants remaining on-site.

Implementability. There would be limited technical issues with implementing excavation and restoration of the OEC. However, access to the Site and adequate space to perform the remedial actions proposed for this alternative is limited and permission to use adjacent properties would be required.

Land Use. The current and reasonably anticipated future land use of the Site is for commercial purposes, and residential property is located to the north of the Site. This alternative would be compatible with current land use and reasonably anticipated future land use. It includes

institutional controls to restrict future use that could result in potential exposure to residual contamination.

Cost. The capital cost of this Alternative is $10,371,000. The PW of this Alternative is $10,645,000. A summary of the costs associated with this alternative is presented in Table 9.3. Detailed cost analysis backup is provided in Appendix C.

9.5 ALTERNATIVE 3: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 10 mg/kg, Excavation and Off-Site Treatment/Disposal of 0-3 feet of Remaining Sediments that are Less than 10 mg/kg but Greater than or equal to 0.35 mg/kg.

Alternative 3 has been developed based on the same anticipated future land use and regulatory requirements of Alternative 2. The most stringent of the cleanup levels of the COCs were used in the development of this alternative. Therefore, the PCB RGs were used as the limiting factor for remedial action. Unlike Alternative 2, Alternative 3 proposes excavation and off-site treatment/disposal of PCB contaminated sediments greater than or equal to 10 mg/kg. This alternative also varies from Alternarive 2 such that PCB contaminated sediments that are less than 10 mg/kg but greater than or equal to 0.35 mg/kg that will be excavated to a maximum of three feet and disposed of off-site. This alternative would also include a Site Management Plan and site inspections as described for Alternative 2. This alternative would allow for commerical use of the Site.

Alternative 3 includes of the following key components:

- pre-design investigations and studies
- mobilization and temporary facilities and controls
- excavation and off-site treatment/disposal of PCB contaminated sediments greater than or equal to 10 mg/kg followed by placement of clean backfill to return the OEC back to original grade
- excavation and off-site treatment/disposal within the remaining 0-3 feet of sediments that are less than 10 mg/kg but greater than or equal to the sediment screening criteria of 0.35 mg/kg followed by placement of 2 feet of clean backfill and a one-foot restoration layer
- institutional controls

- long-term monitoring
- annual institutional control inspections and reporting.

9.5.1 Detailed Description of Alternative 3

Pre-Design Investigations and Studies. Pre-design investigations and/or studies would be conducted similar to Alternative 2 to support remedial design.

Mobilization and Temporary Facilities and Controls. Site preparation, mobilization, and temporary facilities and controls would be implemented as described for Alternative 2.

Excavation and off-site treatment/disposal of PCB contaminated sediments greater than or equal to 10 mg/kg followed by placement of clean backfill to return the Old Erie Canal back to original grade.

Contaminated sediments containing PCBs at concentrations greater than or equal to 10 mg/kg would be excavated to depth, stockpiled together, and allowed to dewater prior to transportation off-site for treatment and/or disposal. Based upon interpretation of the existing analytical data, the extent of PCB contaminated sediments consists of approximately 14,011 cubic yards of sediment (refer to Appendix B – Calculations). Handling of these sediments would be similar to the PCB Contaminated sediments as discussed in Alternative 2.

Excavation and off-site treatment/disposal within remaining 0-3 feet of sediments that are less than 10 mg/kg but greater than or equal to the sediment screening criteria of 0.35 mg/kg followed by placement of 2 feet of clean backfill and a one-foot restoration. Remaining contaminated sediments containing PCBs at concentrations less than 10 mg/kg but greater than the sediment screening criteria of 0.35 mg/kg would be excavated to a maximum depth of three feet, stockpiled together, and allowed to dewater prior to transportation off-site for treatment and/or disposal. Based upon interpretation of the existing analytical data, the extent of PCB contaminated sediments consists of approximately 5,177 cubic yards of sediment (refer to Appendix B – Calculations). Handling of these sediments would be similar to the PCB contaminated sediments as discussed in Alternative 2.

Institutional Controls. Institutional controls would be implemented similar to Alternative 2.

Long-term Monitoring. Long-term monitoring would be implemented similar to Alternative 2.

Annual Institutional Control Inspections and Reporting. Annual institutional control inspections and reporting would be implemented similar to Alternative 2.

9.5.2 Detailed Evaluation of Alternative 3

Compliance with Standards, Criteria, and Guidance. Alternative 3 would meet chemical-specific SCGs by removing sediment contamination in excess of the NYSDEC sediment screening criteria of 0.35 mg/kg. This Alternative includes a component where PCB contaminated sediments less than 10 mg/kg are to remain on site beneath a barrier and restoration cover allowing for commercial use of this site. Institutional controls would also be implemented under this component as part of the TSCA requirements.

Alternative 3 would likely trigger action-specific SCGs associated with dust control, erosion and sediment control, transportation and disposal of hazardous wastes, and stream restoration. Table 9.1 presents a summary of action-specific SCGs associated with remedial alternatives evaluated in this Section.

Overall Protection of Public Health and the Environment. This remedial alternative would protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through removal, treatment and/or disposal, engineering controls, or institutional controls. This remedial alternative would achieve the RAOs for sediment. Alternative 3 would allow for protection of ecological receptors and reducing the risk of exposure to human receptors by providing a three foot cover consisting of a two-foot barrier and one-foot restoration layer. This alternative would not meet requirements for unrestricted use as sediments to remain beneath the three foot restoration cover would be greater than the sediment screening criteria of 0.35 mg/kg.

Short-term Effectiveness. This alternative would result in short-term adverse impacts and risks to the community, site workers, and the environment as a result of implementation. Implementation

of this alternative would include preparation of and adherence to a construction work plan and health and safety plan. It is estimated that this alternative could be fully implemented in less than one year, at which time Alternative 4 would meet the RAOs for sediment.

Long-term Effectiveness and Permanence. This alternative would provide long-term effectiveness and permanence by removing and disposing off-site of PCB contaminated sediments greater than 10 mg/kg as well as removing off-site a maximum of three feet of PCB contaminated sediments less than 10 mg/kg but greater than or equal to 0.35 mg/kg. Remaining sediments would then be covered by a two foot barrier and one-foot restoration layer. Institutional controls would limit future use of the Site and adjacent properties, thereby limiting potential future exposure to sediment contamination. Institutional control inspections would be conducted to ensure that unacceptable exposure at the Site does not occur. These actions would remain effective as long as the capped sediments are not exposed and institutional controls are adhered to.

Reduction of Toxicity, Mobility, or Volume with Treatment. This alternative would result in the reduction of mobility and volume of sediment contamination at the Site through excavation and off-site disposal and on-site capping. Remedial actions will not reduce the toxicity of contaminants remaining on-site.

Implementability. There would be limited technical issues with implementing excavation and restoration of the OEC. However, access to the Site and adequate space to perform the remedial actions proposed for this alternative is limited and permission to use adjacent properties would be required.

Land Use. The current and reasonably anticipated future land use of the Site is for commercial purposes, and residential property is located to the north of the Site. This alternative would be compatible with current land use and reasonably anticipated future land use. It includes institutional controls to restrict future use that could result in potential exposure to residual contamination.

Cost. The capital cost of this Alternative is $11,145,000. The PW of this Alternative is $11,419,000. A summary of the costs associated with this alternative is presented in Table 9.4. Detailed cost analysis backup is provided in Appendix C. To assess the potential for cost savings if

an unrestricted depth RG of 25 mg/kg were used instead 10 mg/kg, an estimate of contaminated sediment volume was made and costs re-estimated. No other changes were assumed, and the Site would still be suitable for commercial use. Implementation of this assumption results in an estimated capital cost of $10,780,000 and PW of $10,857,000, for capital cost saving of $365,000 and PW saving of $562,000 each compared to the base alternative. This represents an approximate 4 percent cost reduction.

9.6 ALTERNATIVE 4: Excavation and Off-site Treatment/Disposal of PCB and Metal Contaminated Sediments to meet Sediment Screening Criteria

Alternative 4 includes of the following key components:

- pre-design investigations and studies
- mobilization and temporary facilities and controls
- excavation and off-site treatment/disposal of PCB and metal contaminated sediments to meet sediment screening criteria followed by regrading of the canal to provide adequate drainage
- long-term monitoring

9.6.1 Detailed Description of Alternative 4

Pre-Design Investigation and Studies. Pre-design investigations and/or studies would be conducted similar to Alternative 2 to support remedial design.

Mobilization and Temporary Facilities and Controls. Site preparation, mobilization, and temporary facilities and controls would be implemented as described for Alternative 2.

Excavation and Off-site Treatment/Disposal of PCB- and metal-contaminated Sediments to meet Sediment Screening Criteria. Excavation and off-site disposal of contaminated sediments in the canal at an estimated 23,791 cubic yards would be conducted. Excavation of sediments will be followed by placement of clean backfill to bring the canal back to original grade

Long-term Monitoring. Long-term monitoring would be implemented similar to Alternative 2.

Annual inspections and reporting. Annual inspections and reporting would be implemented similar to Alternative 2.

9.6.2 Detailed Evaluation of Alternative 4

Compliance with Standards, Criteria, and Guidance. Alternative 4 would meet chemical-specific SCGs by removing sediment contamination in excess of the NYSDEC sediment screening criteria for PCBs (0.35 mg/kg), copper (16 mg/kg) and chromium (26 mg/kg).

Alternative 4 would likely trigger action-specific SCGs associated with dust control, erosion and sediment control, transportation and disposal of hazardous wastes, and stream restoration. Table 9.1 presents a summary of action-specific SCGs associated with remedial alternatives evaluated in this Section.

Overall Protection of Public Health and the Environment. This remedial alternative would protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through removal, treatment and/or disposal, or engineering controls. This remedial alternative would achieve the RAOs for sediment. Alternative 4 would achieve protection of ecological receptors and protection of public health by removing sediments greater than the sediment screening criteria.

Short-term Effectiveness. This alternative would result in short-term adverse impacts and risks to the community, site workers, and the environment as a result of implementation. Implementation of this alternative would include preparation of and adherence to a construction work plan and health and safety plan. It is estimated that this alternative could be fully implemented in less than one year, at which time Alternative 4 would meet the RAOs for sediment.

Long-term Effectiveness and Permanence. This alternative would provide long-term effectiveness and permanence by removing contaminated sediments exceeding the sediment screening criteria which would allow for unrestricted use of the Site.

Reduction of Toxicity, Mobility, or Volume with Treatment. This alternative would result in the reduction of mobility and volume of sediment contamination at the Site through excavation and off-site disposal. Remedial actions would not reduce the toxicity of contaminants on-site.

Implementability. There would be limited technical issues with implementing excavation and restoration of the OEC. However, access to the Site and adequate space to perform the remedial actions proposed for this alternative is limited and permission to use adjacent properties would be required.

Land Use. The current and reasonably anticipated future land use of the Site is for commercial purposes, and residential property is located to the north of the Site. This alternative would be compatible with current land use and reasonably anticipated future land use.

Cost. The capital cost of this Alternative is $12,401,000. The PW of this Alternative is $12,531,000. A summary of the costs associated with this alternative is presented in Table 9.5. Detailed cost analysis backup is provided in Appendix C.

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

The comparative analysis evaluates the relative performance of each alternative using the same criteria by which the detailed analysis was conducted. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another to aid in selecting an overall remedy for the Site.

The comparative analysis includes a narrative discussion of the strengths and weaknesses of the alternatives relative to one another with respect to each criterion, and how reasonable variations of key uncertainties could change the expectations of their relative performance, as applicable. The comparative analysis presented in this document uses a qualitative approach to comparison, with the exceptions of comparing alternative costs and the required time to implement each alternative.

A comparison of the capital and long-term costs associated with the remedial alternatives is presented in Table 10.1. Detailed cost analysis backup is provided in Appendix C.

Compliance with Standards, Criteria, and Guidance.

Alternative 1 would not meet Chemical-specific SCGs because it would not directly address contamination at and in the vicinity of the Site which exceeds applicable SCG values.

Alternative 2 would remove PCB contaminated sediment greater than or equal to 50 mg/kg. Alternative 2 would meet Chemical-specific SCGs by removing sediment contamination in excess of 0.35 mg/kg to within three feet of the PCB contaminated sediments. Remaining sediments would be capped with a 2 foot barrier and one-foot restoration cover layer. Alternative 2 would allow for commercial use of the Site. Alternative 3 is similar in that PCB contaminated sediments less than 10 mg/kg but greater than the sediment screening criteria of 0.35 mg/kg would be removed to a maximum of depth of three feet. Remaining sediment contamination in the canal would be covered with a cover system similar to Alternative 2. Alternative 3 includes disposal of sediments greater than or equal to 10 mg/kg off-site whereas in Alternative 2 only sediments greater than or equal to 50 mg/kg would be disposed of off-site. These alternatives would rely upon, to various extents, maintenance of an engineering control, consisting of a soil cover, to

prevent future exposure to on-site contamination not removed from the Site. Alternatives 2 and 3 will not ensure removal of sediments exceeding sediment screening criteria, although it is anticipated that the majority of sediments exceeding those criterion will be removed along with the PCB contamination.

Alternative 4 would meet Chemical-specific SCGs by removing sediment contamination in excess of the PCB and metals sediment screening criteria allowing for unrestricted use of the Site (the anticipated future use of the Site is commercial use) as well as the future use of the adjacent properties (commercial use).

Alternatives 2 and 3 would require that institutional controls be implemented to prevent future exposure to contaminated soils and sediments left in-place and/or capped at and in the vicinity of the Site.

Alternatives 2 through 4 would likely trigger action-specific SCGs associated with dust control, erosion and sediment control, transportation and disposal of hazardous wastes, and stream restoration. Table 9.1 presents a summary of action-specific SCGs associated with remedial alternatives evaluated in this Section.

Overall Protection of Public Health and the Environment. Alternative 1 would minimally protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through institutional controls. This remedial alternative would not achieve the RAOs for sediment.

Alternatives 2 through 4 would protect public health and the environment through eliminating, reducing, or controlling existing or potential exposure pathways through removal, treatment and/or disposal, engineering controls, or institutional controls. These remedial alternatives would all achieve RAOs for sediment.

Alternatives 2 and 3 would allow for commercial use of the Site but would not allow for unrestricted use of the Site because sediments containing contaminants in excess of the sediment screening criteria for PCBs and metals would be left in place beneath a three foot cover system.

Alternative 4 would provide the greatest protection of public health and the environmental by returning the Site to pre-disposal conditions to the extent practicable. Alternative 4 would allow for unrestricted future use of the Site.

Short-term Effectiveness. Because no direct actions would be taken, Alternative 1 would not result in short-term adverse impacts and risks to the community, site workers, and the environment.

Alternatives 2 through 4 would result in short-term adverse impacts and risks to the community, site workers, and the environment as a result of implementation. Implementation of these alternatives would include preparation of and adherence to a construction work plan and health and safety plan. It is estimated that these alternatives could be fully implemented in less than one year, at which time they would achieve the RAOs for soil and sediment.

Long-term Effectiveness and Permanence. Alternative 1 would not include direct actions to address contaminated sediments at and in the vicinity of the Site. This remedy does not currently meet RAOs for sediment and, due to the properties of the Site-specific COCs (e.g., longevity of PCBs), would not be expected to meet RAOs in the future.

Both Alternatives 2 and 3 would provide long term effectiveness and permanence by removing and disposing of PCB contaminated sediments. Alternative 2 proposes that PCB contaminated sediments greater than or equal to 50 mg/kg would be removed and disposed of off-site and remaining PCB contaminated sediments less than 50 mg/kg but greater than or equal to 0.35 mg/kg would be excavated to would remain on site under a three foot cover system. Alternative 3 differs from Alternative 2 such that Alternative 3 would remove and dispose PCB contaminated sediments greater than 10 mg/kg off-site and remaining PCB contaminated sediments less than 10 mg/kg but greater than or equal to 0.35 mg/kg would be removed to a maximum of three feet and disposed of off-site and then covered with a three foot cover system. Alternative 3 would result in less potential exposure to ecological and human receptors as more contaminated material is removed making this alternative slightly more effective than Alternative 2. Alternatives 2 and 3 include a component whereby contaminated sediments remain on-site. As a result, these alternatives would not allow for unrestricted use of the Site, and would rely upon institutional controls and cover inspections and maintenance to prevent potential future public health or environmental exposure.

Alternative 4 would allow for unrestricted use of the Site and would not require the use of engineering or institutional controls to prevent future exposure to sediments exceeding protective concentrations.

Reduction of Toxicity, Mobility, or Volume with Treatment. Alternative 1 would not result in the reduction of toxicity, mobility, or volume of sediment contamination through treatment.

Alternatives 2 through 4 would result in the reduction of mobility and volume of sediment contamination at and in the vicinity of the Site through excavation and off-site disposal or on-site capping. These alternatives would not result in a reduction in the toxicity of contamination remaining on-site.

Implementability. Alternative 1 includes no direct actions, therefore there are no technical difficulties associated with this alternative. However, obtaining regulatory and/or public approval of this alternative would be difficult.

Technical issues associated with implementability for Alternatives 2 through 4 are similar, and are related to the excavation and restoration of the OEC. Access to the Site and adequate space to perform the remedial actions proposed for Alternatives 2 through 4 is limited and permission to use adjacent properties would be required.

Land Use. The current and reasonably anticipated future land use of the Site is for commercial purposes; however, residential property is located to the north of the Site. Because no direct actions would be taken as part of Alternative, but restrictions would be placed on future use, this alternative would be minimally protective of potential occupants/visitors to the Site and the immediate vicinity.

Alternatives 2 through 4 would be compatible with current land use and reasonably anticipated future land use. Alternatives 2 and 3 include institutional controls to restrict future use that could result in potential exposure to residual contamination. Alternative 4 would allow for unrestricted use of the Site.

Cost. A comparison of the capital and long-term costs associated with the remedial alternatives is presented in Table 10.1.

11.0 REFERENCES

ASTDR, 2001; ToxFAQs™ for Polychlorinated Biphenyls (PCBs) February 2001 http://www.atsdr.cdc.gov/tfacts17.html

Ecological Analysts, Inc. (EA), 1984. "Preliminary Investigation of the Old Erie Canal Site, Town of Frankfort, Herkimer County, New York, Phase I Summary Report". Prepared for New York State Department of Environmental Conservation. September, 1984.

Hutzinger O, Safe S, Zitko V, eds. 1974. The chemistry of PCBs. Boca Raton, FL: CRC Press.

Mabey, et al., 1984. Aquatic Fate Process for Organic Priority Pollutants, prepared by SRI International, EPA Contract Nos. 68-01-3867 and 68-03-2981, prepared for Monitoring and Data Support Division, Office of Water Regulations and Standards, Washington, D.C., 1984.

MACTEC, 2008. MACTEC Engineering and Consulting, P.C., Final Remedial Investigation Report, Old Erie Canal, May 2008.

Microsoft Encarta, 1999. "Erie Canal," Microsoft® Encarta® Online Encyclopedia 2007. http://encarta.msn.com © 1997-2007 Microsoft Corporation. All Rights Reserved.

National Institute of Occupational Safety and Health (NIOSH), 1997. NIOSH pocket guide to chemical hazards. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute of Occupational Safety and Health.

Natural Resources Conservation Service, United States Department of Agriculture (NRCS, 2007), Part 654 National Engineering Handbook, Stream Restoration Design, August 2007.

New York State Department of Environmental Protection (NYSDEC), 1994. New York State Department of Environmental Conservation. Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA); October 1994.

New York State Department of Environmental Protection (NYSDEC), 1998. New York State Department of Environmental Conservation, Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. October 1998 (revised).

New York State Department of Environmental Protection (NYSDEC), 2002. New York State Department of Environmental Conservation, Draft DER-10, Technical Guidance for Site Investigation and Remediation. December 2002.

New York State Department of Environmental Protection (NYSDEC), 2004. New York State Department of Environmental Conservation, Superfund Standby Contract, Work Assignment # D003826-14, Old Erie Canal, Site 6-22-006, West Frankfort, Herkimer County. October 25, 2004.

New York State Department of Environmental Protection (NYSDEC), 2006. New York Codes, Rules, and Regulations, Title 6, Part 375- Inactive Hazardous Waste Disposal Sites Remedial Program. Amended 2006.

Office of Management and Budget (OMB), 2008. Circular No. A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, Appendix C: Discount Rates for Cost-Effectiveness, Lease-Purchase, and Related Analyses, Office of Management and Budget, The Executive Office of the President, January.

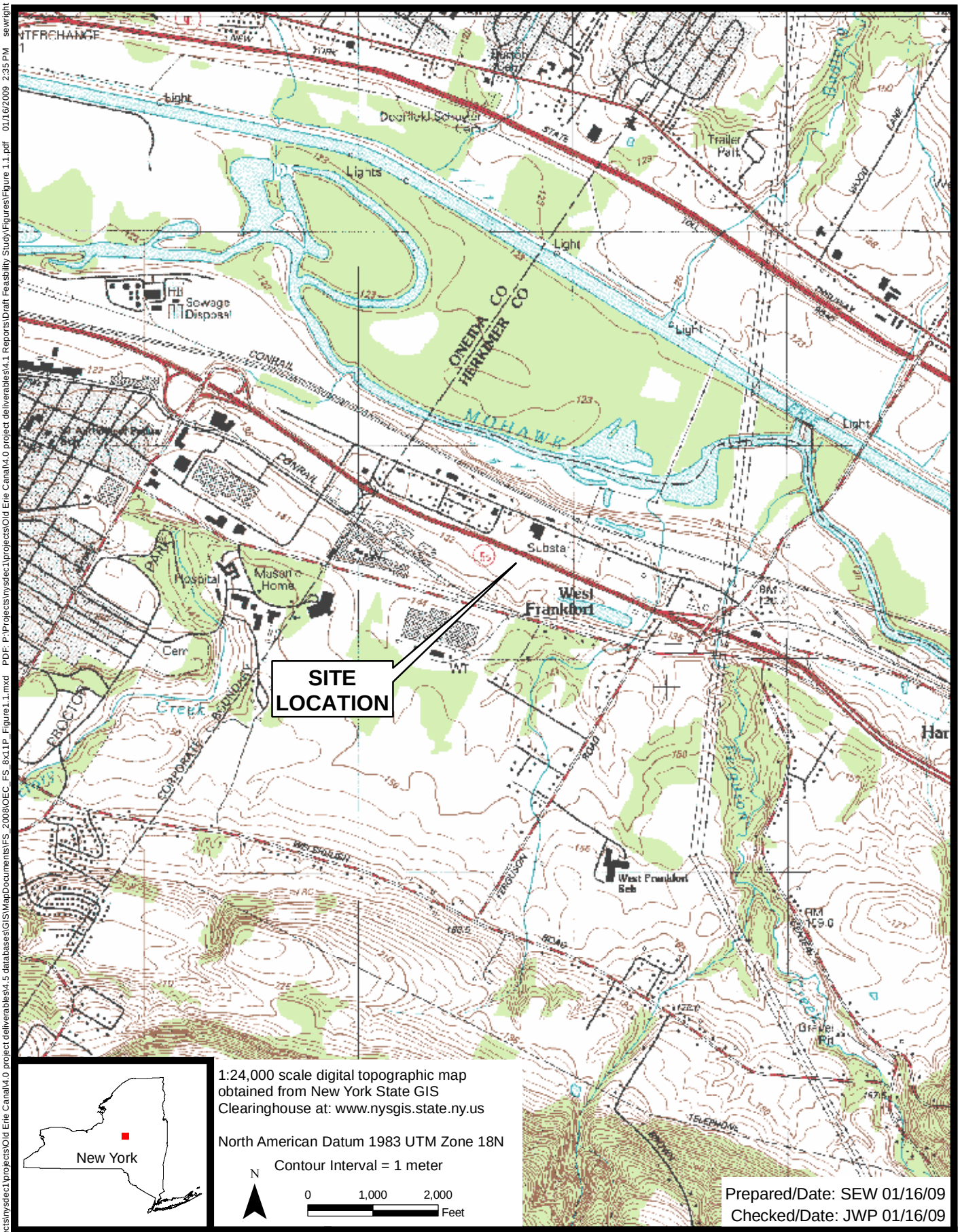
Oneida County Health Department, 2006. FOIL Request of February 10, 2006, Old Erie Canal from Turner Street (Oneida County) to Dyke Road, Herkimer County, Foil Request #369. February 13, 2006.

United States Environmental Protection Agency (USEPA), 1979. Water-related environmental fate of 129 priority pollutants, Vol. II. Washington, DC: U.S. Environmental Protection Agency, 40-2 to 43-10. EPA 440/4-79-029a.

United States Environmental Protection Agency (USEPA), 1988. United States Environmental Protection Agency, 1988. "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (Interim Final); EPA/540/G-89/004; October 1988.

United State Environmental Protection Agency (USPEA), 2000. "A guide for Developing and Documenting Cost Estimates During the Feasibility Study"; EPA 540-R-00-002, OSWER 9355.0-75; U.S. Environmental Protection Agency; Washington, D.C., July 2000.

FIGURES



1:24,000 scale digital topographic map obtained from New York State GIS Clearinghouse at: www.nysgis.state.ny.us

North American Datum 1983 UTM Zone 18N

Contour Interval = 1 meter

N

0 1,000 2,000 Feet

Prepared/Date: SEW 01/16/09
Checked/Date: JWP 01/16/09

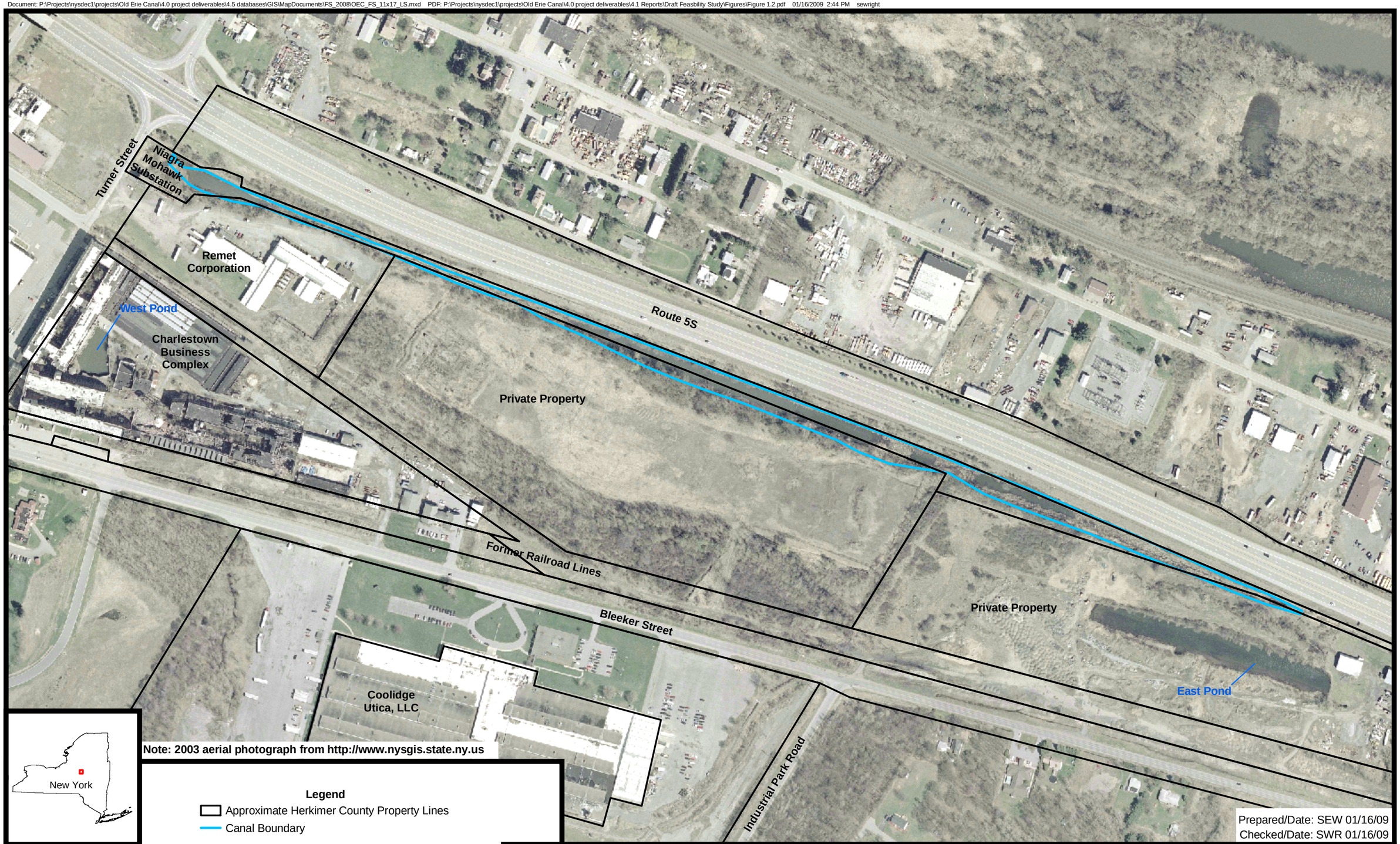
NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Site Location
Project 3650-07-0085
Figure 1.1

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_8x11P_Figure1.1.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\Draft Feasibility Study\Figures\Figure 1.1.pdf 01/16/2009 2:35 PM sewright

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_11x17_LS.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\Draft Feasbility Study\Figures\Figure 1.2.pdf 01/16/2009 2:44 PM sewright

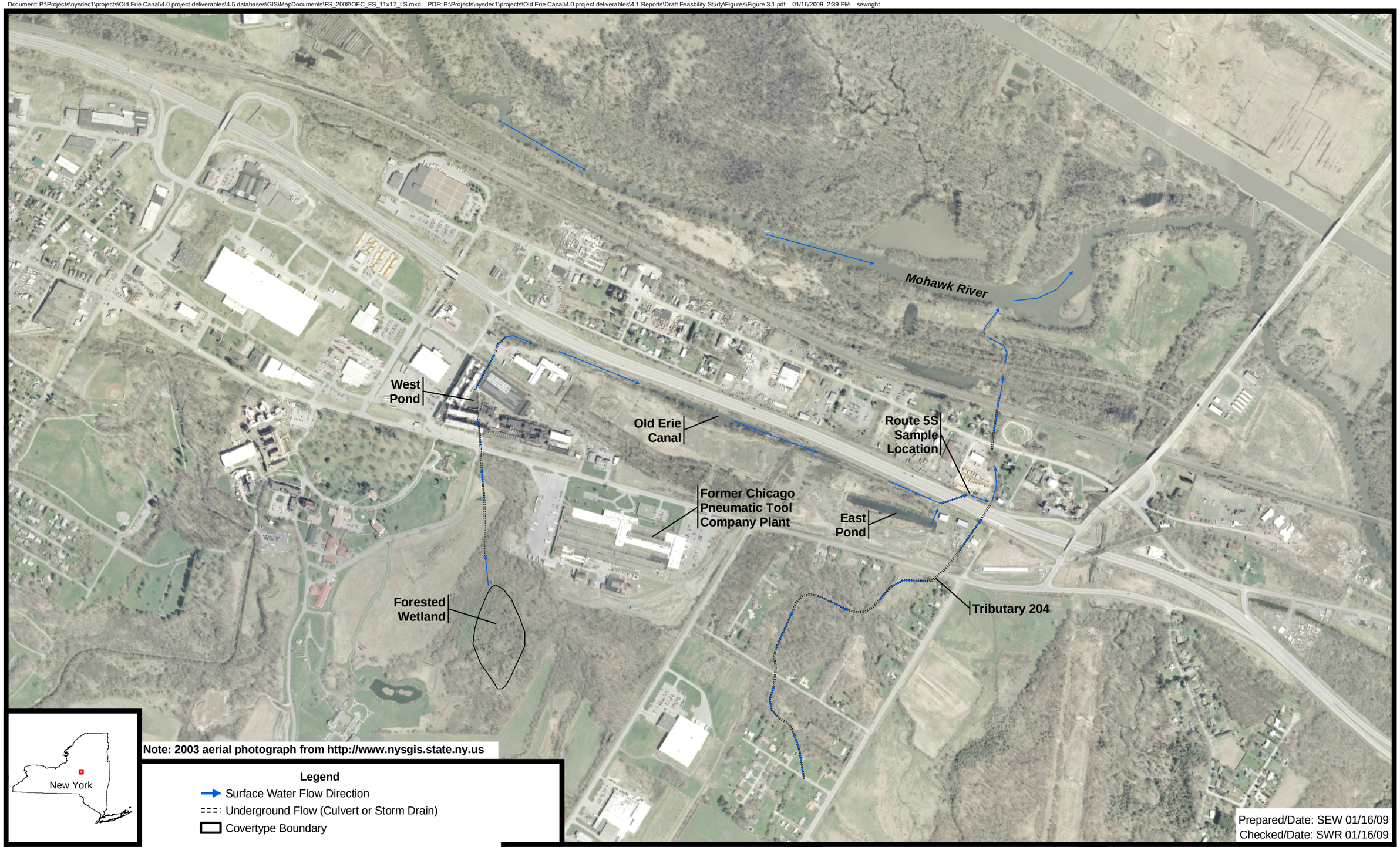


NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Site Features

Project 3650-07-0085 Figure 1.2



NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Drainage Features

Project 3650-07-0085 Figure 3.1

Legend

- Surface Water Sample Location
- Sediment Sample Location
- Sediment Sample Location
- Transect & Transect ID (bolded)
- Canal Center
- Canal Edge

Canal edge and transects surveyed for MACTEC by:
Om P. Popli, PE LS PC, Consulting Engineers and Surveyors
555 Pembrooke Drive, Penfield, New York 14526

Herkimer County color digital orthoimagery (2003) obtained from New York State GIS Clearinghouse at http://www.nysgis.state.ny.us

Prepared/Date: SEW 06/25/09
Checked/Date: JWP 06/25/09

NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

RI Sediment and Surface Water Sample Locations
Project 3640-04-0027 Figure 4.1

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_22x34LS_Fig4.1_6.1_to_6.3.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\FS Report\Final Feasibility Study\Figures\Figure 4.1 (revised).pdf 06/25/2009 1:25 PM sewright

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_11x17_LS.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\Draft Feasbility Study\Figures\Figure 4.2.pdf 01/16/2009 3:51 PM sewright

Note: 2003 aerial photograph from http://www.nysgis.state.ny.us

Legend

▲ Supplemental Samples - Sediment and Surface Water

Underground Flow (Culvert or Storm Drain)

N

0 250 500 Feet

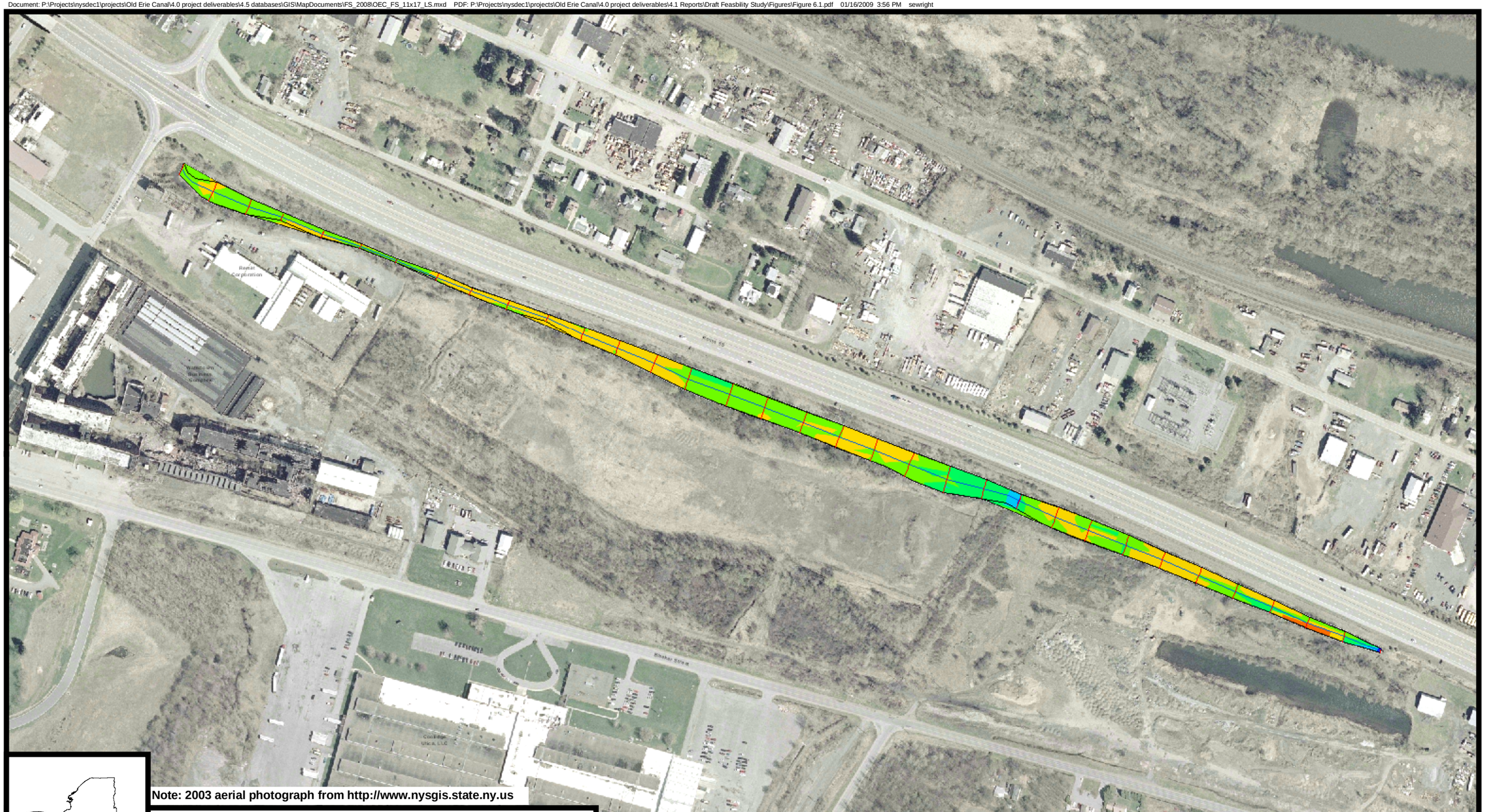
NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Supplemental Sample Locations

Project 3650-07-0085 Figure 4.2

Prepared/Date: SEW 01/16/09
Checked/Date: SWR 01/16/09



NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Distribution of PCB Contaminated Sediments

Project 3650-07-0085 Figure 6.1

Notes:
1) Mercury results have been compared to Sediment Screening Criteria (0.15 mg/Kg), Unrestricted Use (0.18 mg/Kg), Residential and Residential Restricted Use (both 0.81 mg/Kg) and Commercial (2.8 mg/Kg) Soil Cleanup Objectives (6 NYCRR 375).
2) Sediment screening criteria based on NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife and Marine Resources, Jan. 25 1999; Chronic Freshwater Sediment Criteria for Benthic Aquatic Life.

Legend

Transect Features

- Canal Edge
- Transect

- Exceeds Commercial Criteria >= 2.8 mg/Kg
- Exceeds Residential >= 0.81 and < 2.8 mg/Kg
- Exceeds Unrestricted >= 0.18 and < 0.81 mg/Kg
- Exceeds Sediment Criteria >= 0.15 and < 0.18 mg/Kg
- Less than Sediment Criteria or Non-Detect

N

0 75 150 Feet

Canal edge and transects surveyed for MACTEC by:
Om P. Popli, PE LS PC, Consulting Engineers and Surveyors
555 Pembrooke Drive, Penfield, New York 14526

Herkimer County color digital orthoimagery (2003) obtained from New York State GIS Clearinghouse at http://www.nysgis.state.ny.us

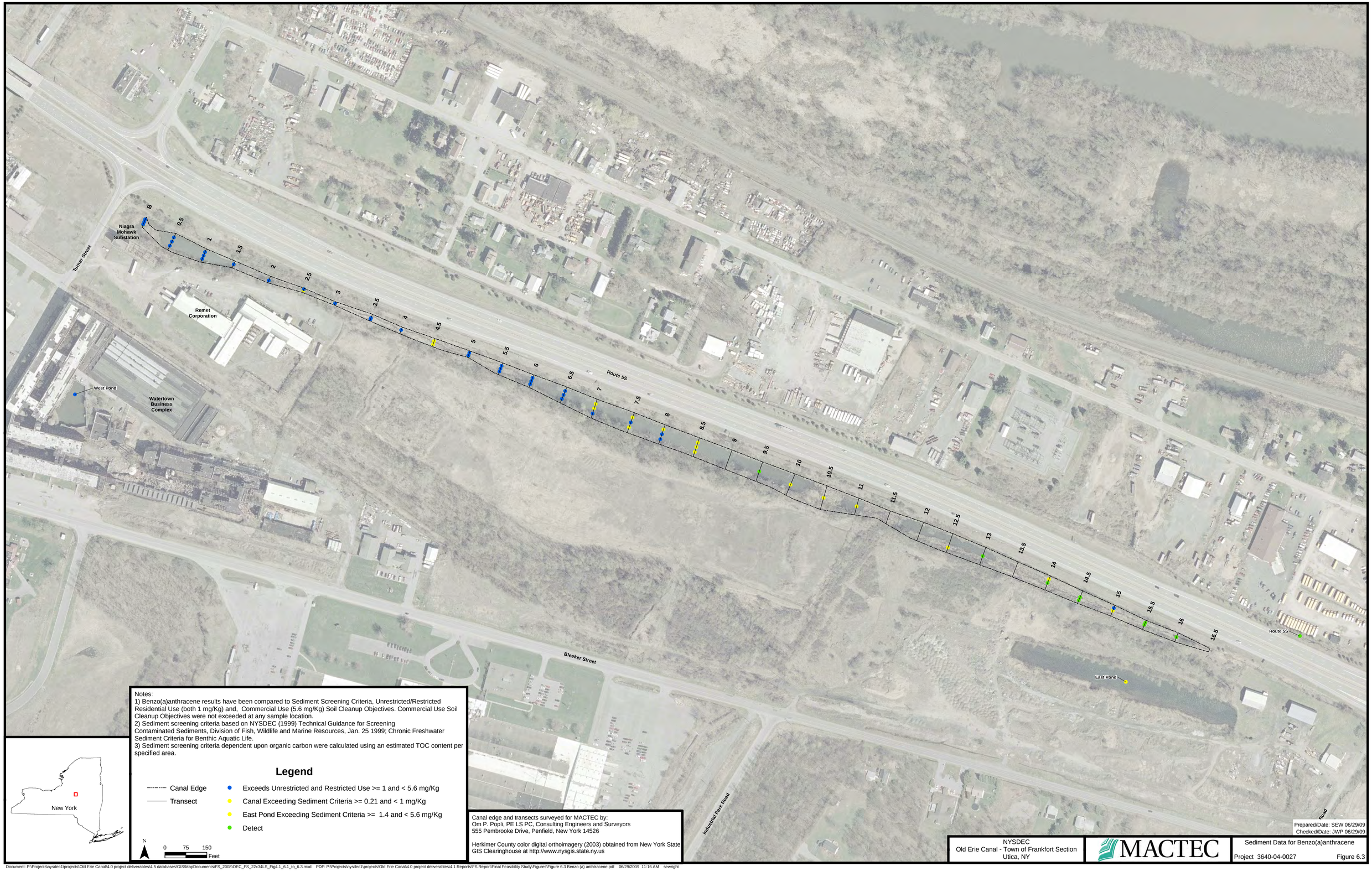
Prepared/Date: SEW 06/29/09
Checked/Date: JWP 06/29/09

NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Sediment Data for Mercury
Project 3640-04-0027 Figure 6.2

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_22x34LS_Fig4.1_6.1_to_6.3.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\FS Report\Final Feasibility Study\Figures\Figure 6.2 -Mercury.pdf 06/29/2009 11:06 AM sewright



Notes:
1) Benzo(a)anthracene results have been compared to Sediment Screening Criteria, Unrestricted/Restricted Residential Use (both 1 mg/Kg) and, Commercial Use (5.6 mg/Kg) Soil Cleanup Objectives. Commercial Use Soil Cleanup Objectives were not exceeded at any sample location.
2) Sediment screening criteria based on NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife and Marine Resources, Jan. 25 1999; Chronic Freshwater Sediment Criteria for Benthic Aquatic Life.
3) Sediment screening criteria dependent upon organic carbon were calculated using an estimated TOC content per specified area.

Legend

- Canal Edge
- Transect
- Exceeds Unrestricted and Restricted Use >= 1 and < 5.6 mg/Kg
- Canal Exceeding Sediment Criteria >= 0.21 and < 1 mg/Kg
- East Pond Exceeding Sediment Criteria >= 1.4 and < 5.6 mg/Kg
- Detect

N
0 75 150
Feet

Canal edge and transects surveyed for MACTEC by:
Om P. Popli, PE LS PC, Consulting Engineers and Surveyors
555 Pembrooke Drive, Penfield, New York 14526

Herkimer County color digital orthoimagery (2003) obtained from New York State GIS Clearinghouse at http://www.nysgis.state.ny.us

Prepared/Date: SEW 06/29/09
Checked/Date: JWP 06/29/09

NYSDEC
Old Erie Canal - Town of Frankfort Section
Utica, NY

MACTEC

Sediment Data for Benzo(a)anthracene

Project 3640-04-0027 Figure 6.3

Document: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.5 databases\GIS\MapDocuments\FS_2008\OEC_FS_22x34LS_Fig4.1_6.1_to_6.3.mxd PDF: P:\Projects\nysdec1\projects\Old Erie Canal\4.0 project deliverables\4.1 Reports\FS Report\Final Feasibility Study\Figures\Figure 6.3 Benzo (a) anthtracene.pdf 06/29/2009 11:16 AM sewright

TABLES

TABLE 4.1
REMEDIAL INVESTIGATION SAMPLING SUMMARY

Sample ID	Transect	Transect/Boring No.	Sample LOC	Sample Depth Begin (ft.)	Sample Depth End (ft.)	Sample Date
SEDIMENT SAMPLING						
OEGS005004050C	0.5		C	0	4	06/09/05
OEGS005004050N	0.5		N	0	4	06/09/05
OEGS005004050S	0.5		S	0	4	06/09/05
OEGS010004050C	1.0		C	0	4	06/09/05
OEGS010004050N	1.0		N	0	4	06/09/05
OEGS010004050S	1.0		S	0	4	06/09/05
OEGS015004050C	1.5		C	0	4	06/09/05
OEGS020004050N	2.0		N	0	4	06/09/05
OEGS020004050S	2.0		S	0	4	06/09/05
OEGS025004050C	2.5		C	0	4	06/09/05
OEGS025004050N	2.5		N	0	4	06/16/05
OEGS030004050C	3.0		C	0	4	06/09/05
OEGS035004050C	3.5		C	0	4	06/09/05
OEGS035004050S	3.5		S	0	4	06/15/05
OEGS040004050C	4.0		C	0	4	06/09/05
OEGS045004050N	4.5		N	0	4	06/08/05
OEGS045004050S	4.5		S	0	4	06/08/05
OEGS050004050N	5.0		N	0	4	06/08/05
OEGS050004050S	5.0		S	0	4	06/08/05
OEGS055004050C	5.5		C	0	4	06/08/05
OEGS055004050N	5.5		N	0	4	06/08/05
OEGS055004050S	5.5		S	0	4	06/08/05
OEGS060004050C	6.0		C	0	4	06/08/05
OEGS060004050N	6.0		N	0	4	06/08/05
OEGS060004050S	6.0		S	0	4	06/08/05
OEGS065004050C	6.5		C	0	4	06/08/05
OEGS065004050N	6.5		N	0	4	06/08/05
OEGS065004050S	6.5		S	0	4	06/08/05
OEGS070004050C	7.0		C	0	4	06/08/05
OEGS070004050N	7.0		N	0	4	06/08/05
OEGS070004050S	7.0		S	0	4	06/08/05
OEGS075004050C	7.5		C	0	4	06/07/05
OEGS075004050N	7.5		N	0	4	06/07/05
OEGS075004050S	7.5		S	0	4	06/07/05
OEGS080004050C	8.0		C	0	4	06/07/05
OEGS080004050N	8.0		N	0	4	06/07/05
OEGS080004050S	8.0		S	0	4	06/07/05
OEGS085004050C	8.5		C	0	4	06/07/05

TABLE 4.1
REMEDIAL INVESTIGATION SAMPLING SUMMARY

Sample ID	Transect	Transect/Boring No.	Sample LOC	Sample Depth Begin (ft.)	Sample Depth End (ft.)	Sample Date
OEGS085004050N	8.5		N	0	4	06/07/05
OEGS085004050S	8.5		S	0	4	06/07/05
OEGS090004050C	9.0		C	0	4	06/07/05
OEGS090004050N	9.0		N	0	4	06/07/05
OEGS090004050S	9.0		S	0	4	06/07/05
OEGS095004050C	9.5		C	0	4	06/07/05
OEGS095004050N	9.5		N	0	4	06/07/05
OEGS095004050S	9.5		S	0	4	06/07/05
OEGS100004050C	10.0		C	0	4	06/07/05
OEGS100004050N	10.0		N	0	4	06/07/05
OEGS100004050S	10.0		S	0	4	06/07/05
OEGS105004050C	10.5		C	0	4	06/15/05
OEGS105008050C	10.5		C	4	8	06/06/05
OEGS105004050N	10.5		N	0	4	06/06/05
OEGS105004050S	10.5		S	0	4	06/07/05
OEGS110004050C	11.0		C	0	4	06/06/05
OEGS110004050S	11.0		S	0	4	06/06/05
OEGS110008050S	11.0		S	4	8	06/06/05
OEGS115004050C	11.5		C	0	4	06/06/05
OEGS115004050S	11.5		S	0	4	06/06/05
OEGS120004050N	12.0		N	0	4	06/06/05
OEGS120004050S	12.0		S	0	4	06/06/05
OEGS120008050S	12.0		S	4	8	06/06/05
OEGS125004050C	12.5		C	0	4	06/15/05
OEGS125004050N	12.5		N	0	4	06/03/05
OEGS125004050S	12.5		S	0	4	06/15/05
OEGS130004050C	13.0		C	0	4	06/03/05
OEGS130004050N	13.0		N	0	4	06/03/05
OEGS130004050S	13.0		S	0	4	06/03/05
OEGS135004050C	13.5		C	0	4	06/15/05
OEGS135008050C	13.5		C	4	8	06/03/05
OEGS135004050S	13.5		S	0	4	06/15/05
OEGS135008050S	13.5		S	4	8	06/03/05
OEGS140004050C	14.0		C	0	4	06/15/05
OEGS140008050C	14.0		C	4	8	06/03/05
OEGS140004050N	14.0		N	0	4	06/15/05
OEGS140004050S	14.0		S	0	4	06/15/05
OEGS140008050S	14.0		S	4	8	06/03/05
OEGS145004050C	14.5		C	0	4	06/15/05

TABLE 4.1
REMEDIAL INVESTIGATION SAMPLING SUMMARY

Sample ID	Transect	Transect/Boring No.	Sample LOC	Sample Depth Begin (ft.)	Sample Depth End (ft.)	Sample Date
OEGS145008050C	14.5		C	4	8	06/02/05
OEGS145004050N	14.5		N	0	4	06/15/05
OEGS145004050S	14.5		S	0	4	06/15/05
OEGS145008050S	14.5		S	4	8	06/02/05
OEGS150004050C	15.0		C	0	4	06/02/05
OEGS150004050N	15.0		N	0	4	06/02/05
OEGS150008050N	15.0		N	4	8	06/02/05
OEGS150004050S	15.0		S	0	4	06/02/05
OEGS155004050C	15.5		C	0	4	06/15/05
OEGS155008050C	15.5		C	4	8	06/02/05
OEGS155004050N	15.5		N	0	4	06/15/05
OEGS155008050N	15.5		N	4	8	06/02/05
OEGS155004050S	15.5		S	0	4	06/15/05
OEGS155008050S	15.5		S	4	8	06/02/05
OEGS160004050C	16.0		C	0	4	06/02/05
OEGS160004050N	16.0		N	0	4	06/02/05
OEGS160008050N	16.0		N	4	8	06/15/05
OEGS160004050S	16.0		S	0	4	06/02/05
OEGS160008050S	16.0		S	4	8	06/02/05
OEGS165004050C	16.5		C	0	4	06/01/05
OEGS00B004050C	B	Transect B	C	0	4	06/09/05
OEGS00B004050N	B	Transect B	N	0	4	06/09/05
OEGS00B004050S	B	Transect B	S	0	4	06/09/05
OESD0EP0000501	East Fire Pond	Eastern end of pond		0	0.5	09/15/05
OESD05S0000501	Route 5S	North side of discharge		0	0.5	09/15/05
OESD0WP0000501	West Fire Pond	Southwestern corner of pond		0	0.5	09/15/05
SOIL SAMPLING						
OEBS1000020501	SB100			2	4	6/28/2005
OEBS1000200501	SB100			20	22	6/28/2005
OEBS1010000501	SB101			0	2	6/29/2005
OEBS1010100501	SB101			10	12	6/29/2005
OEBS1020040501	SB102			4	6	6/29/2005
OEBS1020100501	SB102			10	12	6/29/2005
OEBS1030020501	SB103			2	4	6/30/2005
OEBS1030120501	SB103			12	14	6/30/2005
OEBS1040000501	SB104			0	2	6/30/2005
OEBS1040100501	SB104			10	12	6/30/2005
OEBS1050000501	SB105			0	2	7/1/2005
OEBS1050080501	SB105			8	10	7/1/2005

TABLE 4.1
REMEDIAL INVESTIGATION SAMPLING SUMMARY

Sample ID	Transect	Transect/Boring No.	Sample LOC	Sample Depth Begin (ft.)	Sample Depth End (ft.)	Sample Date
OEBSOWT0020501	West of Turner St.			2	4	7/1/2005
OEBSOWT0080501	West of Turner St.			8	10	7/1/2005
SURFACE WATER SAMPLING						
OESW05S0000501	Route 5S					06/22/05
OESW1650000501	16.5					06/22/05
OESW1500000501	15.0					06/22/05
OESW1250000501	12.5					06/22/05
OESW1000000501	10.0					06/22/05
OESW0850000501	8.5					06/22/05
OESW0600000501	6.0					06/23/05
OESW0350000501	3.5					06/23/05
OESW00B0000501	B					06/23/05
OESW0EP0000501	Eastern Pond					06/23/05
OESW0WP0000501	Western Pond					06/23/05

Sample LOC:
C = Center
N = North
S = South

Prepared by: SEW 01/06/2009
Checked by: RTB 01/19/2009

TABLE 4.2
SUPPLEMENTAL SAMPLING SUMMARY

Sample ID	Sample LOC	Sample Date
SEDIMENT SAMPLES		
OESDUWP0000801	SD-UWP	11/11/08
OESDDWP0000801	SD-DWP	11/11/08
OESDEP0000801	SD-EP	11/11/08
OESD2040000801	SD-204	11/11/08
OESD05S0000801	SD-5S	11/11/08
OESDCON0000801	SD-CON	11/11/08
OESDCON0000801DP	SD-CON	11/11/08
OESDDG10000801	SD-DG1	11/12/08
OESDDG20000801	SD-DG2	11/12/08
OESDDG20000802	SD-DG2	11/12/08
OESDDG20000803	SD-DG2	11/12/08
SURFACE WATER SAMPLES		
OESWUWP0000801	SW-UWP	11/11/2008
OESWDWP0000801	SW-DWP	11/11/2008
OESW0EP00000801	SW-EP	11/11/2008
OESW2040000801	SW-204	11/11/2008
OESW05S0000801	SW-5S	11/11/2008
OESWCON0000801	SW-CON	11/11/2008
OESWCON0000801DP	SW-CON	11/11/2008
OESWDG20000801	SW-DG2	11/12/2008

Prepared by: SEW 01/16/2009
Checked by: RTB 01/19/2009

Table 5.1: Summary of Remediation Goals and Cleanup Criteria

					Sediment Screening Criteria (1) (mg/kg)				
Analyte	**Frequency of Detection**	**Range of Nondetects (mg/kg)**	**Range of Detected Concentrations (mg/kg)**	**Average Detected Concentration (mg/kg)**	**Lowest Effect Level**	**Severe Effect Level**	**Benthic Aquatic Life Chronic Toxicity, Freshwater**	**Remediation Goal**	**Comments**
PCBs									
Aroclor-1254	89 / 100	0.04 - 0.07	0.05 - 310	13.3	-	-	0.35	0.35	
Inorganics									
Antimony	36 / 100	0.37 - 2.1	0.43 - 3.7	0.62	2	25	-	25	avg conc. < LEL
Arsenic	100 / 100	-	2.9 - 36.6	12	6	33	-	33	
Cadmium	97 / 100	0.04 - 0.04	0.09 - 131	15	0.6	9	-	9	
Chromium	100 / 100	-	11.9 - 43500	1850	26	110	-	110	
Copper	100 / 100	-	22.9 - 42100	3315	16	110	-	110	
Lead	100 / 100	-	6.8 - 8340	563	31	110	-	110	
Mercury	85 / 100	0.04 - 0.06	0.06 - 27.9	2.6	0.15	1.3	-	1.3	
Nickel	100 / 100	-	11.5 - 1470	149	16	50	-	50	
Silver	53 / 80	0.13 - 0.36	0.32 - 277	9.3	1	2.2		2.2	
Zinc	100 / 100	-	37.4 - 4810	693	120	270	-	270	

1. NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife, and Marine Resources., Jan. 25, 1999.
Chronic Freshwater Sediment Criteria for Benthic Aquatic Life were calculated for PCBs based on a TOC content of 1.79 % (= 0.0179 x 19.3 µg/gOC).

Prepared by: RTB 4/13/2009
Checked by: JWP 4/13/2009

Table 7.1: Identification and Screening of Potential Remedial Technologies and Process Options

Environmental Media	General Response Action	Remedial Technology	Process Option	Applicability to		Screening Status	Comments
				Site-Limiting Characteristics	Waste-Limiting Characteristics		
Sediment	No Action			Not Applicable	Not Applicable	Retained.	Retained to be carried through detailed analysis of alternatives.
	Access Restrictions	Land Use Restrictions		None.	Would not reduce toxicity, mobility, or volume of contaminants.	Retained.	Viable as a component of remedial actions which do not involve remediation of all contamination above RGs.
		Fencing		Would not provide reliable ecological exposure control or human exposure control.	Would not reduce toxicity, mobility, or volume of contaminants.	Eliminated.	
	Containment	Capping	Soil Cover	The canal receives runoff from industrial/commercial properties, which would need to be re-routed/controlled.	This would not prevent leaching of sediment contaminants to groundwater.	Retained.	
			Low Permeability Cover System	The canal receives runoff from industrial/commercial properties; therefore the cover system would need to incorporate stormwater control features.	None.	Retained.	
		Vertical Barriers	Slurry wall, sheet piling	None.	None.	Eliminated.	
		Surface Controls	Diversion/collection, grading, soil stabilization	None.	This alone would not prevent direct exposure to or migration of contaminants sorbed to site sediments.	Retained.	
	In-Situ Treatment	Biological Treatment	Enhanced Biodegradation	Would require diversion of stormwater runoff or cover system to prevent erosion during the time required for biodegradation of PCBs to occur.	Biological treatment of PCBs is considered an emerging technology. Available case studies indicate varied effectiveness in destroying PCBs.	Eliminated.	
		Physical Treatment	Solidification/ Stabilization	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	Solidification/stabilization of PCBs is considered an emerging technology.	Eliminated.	
		Thermal Treatment	Vitrification	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	None.	Eliminated.	
	Removal	Excavation	Solids Excavation	None.	None.	Retained.	
		Disposal On-site	Not Applicable	On-site consolidation of contaminated sediments would require additional remedial actions to limit accessability to and leaching of consolidated sediment contaminants.	None.	Retained.	Viable for sediment containing residual contamination. Sediment containing elevated concentrations (i.e., PCBs greater than 10 mg/kg) could not be disposed on-site.
		Disposal Off-site	Not Applicable	None.	None.	Retained.	
	Ex-situ Treatment	Thermal Treatment	Incineration	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	None.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.

Table 7.1: Identification and Screening of Potential Remedial Technologies and Process Options

Environmental Media	General Response Action	Remedial Technology	Process Option	Applicability to		Screening Status	Comments
				Site-Limiting Characteristics	Waste-Limiting Characteristics		
			Thermal Desorption	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	Removes PCBs and other contaminants from the sediment but relies upon other technologies to destroy them.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.
			Vitrification	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	None.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.
		Chemical Treatment	Chemical Dehalogenation	Site sediments are submerged; this technology is adversely impacted by high moisture content. Would require dewatering/drying of sediments prior to treatment.	None.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.
			Solvent Extraction	The Site is considered inappropriate for on-site ex-situ treatment resulting in vapors or concentrated liquid waste due to proximity to commercial areas and the public.	Removes PCBs and other contaminants from the sediment but relies upon other technologies to destroy them.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.
		Physical Treatment	Soil Washing	The Site is considered inappropriate for on-site ex-situ treatment resulting in vapors or concentrated liquid waste due to proximity to commercial areas and the public.	Removes PCBs and other contaminants from the sediment but relies upon other technologies to destroy them.	Eliminated.	Not viable on-site. Viable as off-site sediment treatment option prior to disposal.

Table 8.1: Screening of Remedial Alternatives

Remedial Alternative	Effectiveness	Implementability	Relative Cost	Comments
Alternative 1: No Action	This alternative would not be effective at reducing contamination concentrations or addressing the identified exposure pathways.	There would not be any technical issues with implementing this alternative. It is unlikely that the NYSDEC or public will approve of this alternative.	Costs associated with this alternative are low	Retained as baseline for comparison of other alternatives.
Alternative 2: Limited Action – Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 50 mg/kg, Excavation and Off-site Treatment/Disposal of 0-3 feet of Remaining PCB Contaminated Sediments Greater than or equal to 0.35 mg/kg	This alternative would address identified exposure pathways at the Site through excavation, off-site transportation and disposal, engineering controls, and institutional controls.	Techical issues associated with with implementing this alternative, primarily with respect to excavation and restoration of the Old Erie Canal would be limited.	Costs for this alternative would be high. The primary cost items would include excavation and restoration of the Old Erie Canal and off-site disposal of PCB-contaminated sediment.	Retained.
Alternative 3: Excavation and Off-site Treatment/Disposal of PCB Contaminated Sediments Greater than or equal to 10 mg/kg, Excavation and Off-Site Treatment/Disposal of 0-3 feet of Remaining Sediments that are Less than 10 mg/kg but Greater than or equal to 0.35 mg/kg	This alternative would address identified exposure pathways at the Site through excavation, off-site transportation and disposal, consolidation of contaminated sediments engineering controls, and institutional controls.	Techical issues associated with with implementing this alternative, primarily with respect to excavation and restoration of the Old Erie Canal would be limited.	Costs for this alternative would be high. The primary costs items would include excavation and restoration of the Old Erie Canal and off-site disposal of PCB-contaminated sediment.	Retained.
Alternative 4: Excavation and Off-site Treatment/Disposal of All PCB Contaminated Sediments Greater than or equal to 0.35 mg/kg	This alternative would address identified exposure pathways at the Site through excavation, off-site transportation and disposal, consolidation of contaminated sediments engineering controls, and institutional controls.	Techical issues associated with with implementing this alternative, primarily with respect to excavation and restoration of the Old Erie Canal would be limited.	Costs for this alternative would be high. The primary cost items would include excavation and restoration of the Old Erie Canal and off-site disposal of all contaminated sediments.	Retained in accordance with the requirements of NYCRR Part 375.

Table 9.1: Applicable Location- and Action-Specific Standards, Criteria, and Guidance

Requirement	Consideration in the Remedial Response Process
29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response	Applicable to implementation of Health and Safety implementation, enforcement, and emergency response.
6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures	Applicable to implementation of biota sampling as part of long-term monitoring of the remedy
6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)	Applicable to the characterization, handling, transportation, and treatment/disposal of soils, sediments, and C&D debris to be removed from the Site.
6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)	Applicable to the handling, transportation, and treatment/disposal of soils, sediments, and C&D debris to be removed from the Site.
6 NYCRR Part 375 - Environmental Remediation Programs (as amended December 2006)	Applicable to the development and implementation of remedial programs.
6 NYCRR Part 376 - Land Disposal Restrictions	Applicable to disposal of hazardous wastes. Identifies those wastes that are restricted from land disposal.
19 NYCRR Part 600 - Waterfront Revitalization and Coastal Resources	Not Applicable
19 NYCRR Part 622 - Freshwater Wetlands - Interim Requirements	Not Applicable
19 NYCRR Part 622 - Freshwater Wetlands - Permit Requirements	Not Applicable
6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)	Applicable to construction in and adjacent to water bodies, temporary diversion of the Old Erie Canal, and discharge of treated wastewater.
6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS (“SPDES Regulations”)	Applicable to construction in and adjacent to water bodies, temporary diversion of the Old Erie Canal, and discharge of treated wastewater.
DRAFT DER-10 Technical Guidance for Site Investigation and Remediation	Applicable to the development and implementation of remedial programs.
Citizen Participation in New York’s Hazardous Waste Site Remediation Program: A Guidebook (June 1998)	Applicable to the development and implementation of remedial programs.
TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations	Applicable to construction in and adjacent to water bodies, temporary diversion of the Old Erie Canal, and discharge of treated wastewater.
Solidification/Stabilization and its Application to Waste Materials	Applicable to disposal of wastes generated during implementation of remedial program.

Table 9.2: Cost Summary for Alternative 1

ITEM		COST
DIRECT CAPITAL COSTS		
Institutional Controls	$	10,000
Direct Cost Subtotal	$	10,000
INDIRECT CAPITAL COSTS		
Project Management (@ 5 Percent)	$	1,000
Remedial Design (@ 8 Percent)	$	1,000
Construction Management (@ 6 Percent)	$	1,000
Contingency (@ 25 Percent)	$	3,000
Indirect Cost Subtotal	$	6,000
TOTAL CAPITAL COSTS	**$**	**16,000**
ANNUAL OPERATION AND MAINTENANCE COSTS*		
Annual Institutional Control and Cover Inspections and Reporting	$	4,000
Long-Term Monitoring (Years 1 through 5)	$	-
PRESENT WORTH OF ANNUAL AND PERIODIC COSTS (30 yrs)	**$**	**87,000**
TOTAL PRESENT WORTH OF ALTERNATIVE 2 (30 yrs)	**$**	**103,000**
TOTAL NON-DISCOUNTED COST OF ALTERNATIVE 2 (30 yrs)	**$**	**136,000**

NOTES:
Costs have been rounded to the nearest thousand.
* - Costs include additional 10 percent for technical support and 25 percent contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Table 9.3: Cost Summary for Alternative 2

ITEM		COST
DIRECT CAPITAL COSTS		
Pre-Design Investigations	$	54,000
Mobilization and Temporary Facilities and Controls	$	1,686,000
Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 50 mg/kg	$	606,000
Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Greater than the Sediment Screening Criteria of 0.35 mg/kg	$	3,377,000
Restoration of Old Erie Canal	$	1,375,000
Site Restoration	$	94,000
Institutional Controls	$	10,000
Direct Cost Subtotal	$	7,202,000
INDIRECT CAPITAL COSTS		
Project Management (@ 5 Percent)	$	360,000
Remedial Design (@ 8 Percent)	$	576,000
Construction Management (@ 6 Percent)	$	432,000
Contingency (@ 25 Percent)	$	1,801,000
Indirect Cost Subtotal	$	3,169,000
TOTAL CAPITAL COSTS	**$**	**10,371,000**
ANNUAL OPERATION AND MAINTENANCE COSTS*		
Annual Institutional Control and Cover Inspections and Reporting	$	4,000
Long-Term Monitoring (Years 1 through 5)	$	41,000
PRESENT WORTH OF ANNUAL AND PERIODIC COSTS (30 yrs)	**$**	**274,000**
TOTAL PRESENT WORTH OF ALTERNATIVE 2 (30 yrs)	**$**	**10,645,000**
TOTAL NON-DISCOUNTED COST OF ALTERNATIVE 2 (30 yrs)	**$**	**10,696,000**

NOTES:
Costs have been rounded to the nearest thousand.
* - Costs include additional 10 percent for technical support and 25 percent contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Table 9.4: Cost Summary for Alternative 3

ITEM		COST
DIRECT CAPITAL COSTS		
Pre-Design Investigations	$	54,000
Mobilization and Temporary Facilities and Controls	$	1,686,000
Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 10 mg/kg	$	3,364,000
Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Less than 10 mg/kg but Greater than the Sediment Screening Criteria of 0.35 mg/kg	$	1,157,000
Restoration of Old Erie Canal	$	1,375,000
Site Restoration	$	94,000
Institutional Controls	$	10,000
Direct Cost Subtotal	$	7,740,000
INDIRECT CAPITAL COSTS		
Project Management (@ 5 Percent)	$	387,000
Remedial Design (@ 8 Percent)	$	619,000
Construction Management (@ 6 Percent)	$	464,000
Contingency (@ 25 Percent)	$	1,935,000
Indirect Cost Subtotal	$	3,405,000
TOTAL CAPITAL COSTS	**$**	**11,145,000**
ANNUAL OPERATION AND MAINTENANCE COSTS*		
Annual Institutional Control and Cover Inspections and Reporting	$	4,000
Long-Term Monitoring (Years 1 through 5)	$	41,000
PRESENT WORTH OF ANNUAL AND PERIODIC COSTS (30 yrs)	**$**	**274,000**
TOTAL PRESENT WORTH OF ALTERNATIVE 4 (30 yrs)	**$**	**11,419,000**
TOTAL NON-DISCOUNTED COST OF ALTERNATIVE 4 (30 yrs)	**$**	**11,470,000**

NOTES:
Costs have been rounded to the nearest thousand.
* - Costs include additional 10 percent for technical support and 25 percent contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Table 9.5: Cost Summary for Alternative 4

ITEM		COST
DIRECT CAPITAL COSTS		
Pre-Design Investigations	$	54,000
Mobilization and Temporary Facilities and Controls	$	1,686,000
Excavation and Off-site Disposal of PCB and Metals Contaminated Sediments	$	5,757,000
Restoration of Old Erie Canal	$	1,020,000
Site Restoration	$	94,000
Direct Cost Subtotal	$	8,611,000
INDIRECT CAPITAL COSTS		
Project Management (@ 5 Percent)	$	431,000
Remedial Design (@ 8 Percent)	$	689,000
Construction Management (@ 6 Percent)	$	517,000
Contingency (@ 25 Percent)	$	2,153,000
Indirect Cost Subtotal	$	3,790,000
TOTAL CAPITAL COSTS	**$**	**12,401,000**
ANNUAL OPERATION AND MAINTENANCE COSTS*		
Long-Term Monitoring (Years 1 through 5)	$	28,525
PRESENT WORTH OF ANNUAL AND PERIODIC COSTS (30 yrs)	**$**	**130,000**
TOTAL PRESENT WORTH OF ALTERNATIVE 5 (30 yrs)	**$**	**12,531,000**
TOTAL NON-DISCOUNTED COST OF ALTERNATIVE 5 (30 yrs)	**$**	**12,544,000**

NOTES:
Costs have been rounded to the nearest thousand.
* - Costs include additional 10 percent for technical support and 25 percent contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Table 10.1: Summary of Remedial Alternative Costs

Item	Description	Alternative 1	Alternative 2	Alternative 3	Alternative 4
1	Capital Costs	$ 16,000.00	$ 10,371,000.00	$ 11,145,000.00	$ 12,401,000.00
2	Present Worth of Annual and Periodic Costs	$ 87,000.00	$ 274,000.00	$ 274,000.00	$ 130,000.00
3	Total Present Worth (Item 1 plus 2)	$ 103,000.00	$ 10,645,000.00	$ 11,419,000.00	$ 12,531,000.00
4	Total Nondiscounted Cost	$ 136,000.00	$ 10,696,000.00	$ 11,470,000.00	$ 12,544,000.00

Notes:

Alternative 1: No Action - Institutional Controls

Alternative 2: Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 50 mg/kg and Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Greater than the Sediment Screening Criteria of 0.35 mg/kg. Alternative 2 allows for Commerical use of the Site.

Alternative 3: Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 10 mg/kg and Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Less than 10 mg/kg but Greater than the Sediment Screening Criteria of 0.35 mg/kg. Alternative 3 allows for Commerical use of the Site.

Alternative 4: Excavation and Off-site Disposal of PCB and Metals Contaminated Sediments. Alternative 4 allows for Unrestricted use of the Site.

APPENDIX A

DATA USABILITY SUMMARY REPORT AND VALIDATED OFF-SITE LABORATORY RESULTS

DRAFT
DATA USABILITY SUMMARY REPORT
2008 SUPPLEMENTAL SAMPLING EVENT
OLD ERIE CANAL SITE
FRANKFORT, NEW YORK

1.0 Introduction:

Sediment and surface water samples were collected at the Old Erie Canal site in November 2008 and submitted for off-site laboratory analysis. Samples were analyzed by Mitkem located in Warwick, RI. Results were reported in sample delivery group (SDG): G2128. A listing of samples included in this report is presented in Table 1. A summary of the analytical results is presented in Table 2. Samples were analyzed for one or more of the following parameters:

- Polychlorinated biphenyls (PCBs) by EPA Method SW846 8082,
- Total organic carbon by Lloyd Kahn, and
- Metals by 6010B/7471.

Deliverables for the off-site laboratory analyses included a Category B deliverable as defined in the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocols (NYSDEC, 2000).

A project chemist review was completed based on NYSDEC Division of Environmental Remediation guidance for Data Usability Summary Reports (NYSDEC, 2002). Laboratory QC limits were used during the data evaluation unless noted otherwise. The project chemist review included evaluations of sample collection, data package completeness, holding times, QC data (blanks, instrument calibrations, duplicates, serial dilutions, surrogate recovery, and spike recovery), data transcription, electronic data reporting, calculations, and data qualification. With the exception of the items discussed below, results are interpreted to be usable as reported by the laboratory. The following laboratory or data validation qualifiers are used in the final data presentation.

U = target analyte is not detected at the reported detection limit
J = concentration is estimated
UJ = target analyte is not detected at the reported detection limit and is estimated
D = result reported from a dilution analysis
B = Metals result is between the MDL and the reporting limit

Results are interpreted to be usable as reported by the laboratory unless discussed in the following sections.

2.0 Sediment and Surface Water Samples

2.1 PCBs

Surrogates

Surrogate recoveries were evaluated based on the following laboratory limits:

	Percent Recovery Limits	
surrogate	aqueous	solid
TCX	32-89	27-120
DCB	40-135	60-125

Surrogate percent recoveries were outside of the lab control limits in the following surface water samples: OESWUWP0000801 (TCX = 30) and OESW05S0000801 (DCB = 37). Aroclors were qualified estimated (J/UJ) in these samples, potentially low biased.

Surrogate percent recoveries were outside of the lab control limits in the following sediment samples: OESDUWP0000801 (DCB = 47), OESDDWP0000801 (TCX = 9), OESDEP0000801 (TCX = 20, DCB = 59), OESD2040000801 (DCB = 45), OESD05S0000801 (DCB = 45), OESDCON0000801 (TCX = 21, DCB = 34), OESDDG10000801 (TCX = 26, DCB = 37), OESDDG20000801 (DCB = 41), OESDDG20000802 (DCB = 51), and OESDDG20000803 (DCB = 43). Aroclors were qualified estimated (J/UJ) in these samples, potentially low biased.

Surrogate recoveries for sample OESDOCN0000801DP were 0% (TCX) and 2% (DCB). The laboratory re-extracted (14 days out of hold time) and re-analyzed the sample extract at a 10X dilution due to an elevated concentration of aroclor-1254. The surrogate recoveries in the dilution re-analysis were with in control limits. The dilution analysis was reported in the final data set with an elevated reporting limit of 33 ug/kg for non detected aroclors. Final results for OESDOCN0000801DP were qualified estimated (UJ/J) due to exceeding the extraction hold time by 14 days.

Blanks

The soil method blank (ABLK3R) extracted on 11/21/08 and associated with all sediment samples in SDG G2128 had contamination of aroclor-1254 at a concentration of 57µg/kg. The laboratory qualified detections of aroclor-1254 in associated samples with a "B". An action level of 285µg/kg was established (five times the blank concentration level). Aroclor-1254 was reported in all the sediment samples with concentrations ranging from 38 - 1700µg/kg. Because of the contamination in the method blank, the laboratory re-extracted the method blank and all associated sediment samples on 12/9/08 (14 days after the 14 day hold time). There were no positive detections (above 3.3µg/kg) of aroclors in re-extracted method blank. Aroclor-1254 detections in the re-extracted samples were reported at concentrations similar to the original analyses from the 11/21/08 extraction. Because the result of the re-extracted method blank was non-detect for aroclor-1254 and aroclor-1254 was reported at similar concentrations in the re-extracted samples, professional judgment was used not to qualify detections below the 285µg/kg action level as non-detect. The "B" qualifier was removed from the final data set for these samples.

Laboratory Control Spikes

The laboratory control spike extracted on 11/21/08 had a percent recovery of aroclor-1260 (179) above the upper lab control limit of 130. Aroclor-1260 was qualified estimated (J) in sample OESD2040000801.

Continuing Calibration

The percent difference control limit between the initial calibration and continuing calibration area counts for aroclors is 15. The aroclor-1254 continuing calibration analyzed on 12/3/08 at 15:40 had percent differences of 18 and 25 for 2 of the 3 quantitation peaks on the primary column. Detections for aroclor-1245 were qualified estimated (J) in the following associated samples: OESDUWP0000801, OESDDWP0000801, OESDEP0000801, OESD05S0000801, OESDCON0000801DP, and OESDDG20000802.

The aroclor-1016 and aroclor-1260 continuing calibration analyzed on 11/30/08 at 22:06 had percent differences greater than 15 (ranging from -16 to -25) for all quantitation peaks on the primary column. Aroclor-1016 and aroclor-1260 were qualified estimated (J/UJ) in the following samples: OESDUWP0000801, OESDDWP0000801, OESDEP0000801, OESD2040000801, OESD05S0000801, OESDCON0000801, and OESDDG10000801.

Percent Difference Between Columns

Aroclor concentrations were reported on two chromatographic columns. The percent differences between the reported concentrations of Aroclor-1254 were above the control limit of 25 in the following samples. Aroclor-1254 was estimated (J) in these samples.

Aroclor-1254		
SDG	Sample ID	Percent Difference Between Columns
SDG G2128	OESDUWP0000801	28.0
SDG G2128	OESDDWP0000801	35.5
SDG G2128	OESD2040000801	86.4
SDG G2128	OESW05S0000801	102
SDG G2128	OESDCON0000801DPDL	26.3

Field Duplicates

Field duplicates were submitted for surface water sample OESWCON0000801 and sediment sample OESDCON0000801DP. Aroclor-1254 was detected in both samples. The relative percent difference (RPD) between the concentration of aroclor-1254 in sample OESWCON0000801 (0.067 J ug/L) and field duplicate sample OESWCON0000801 (0.16 ug/L) was 82, above the control limit of 30. Aroclor-1254 was qualified estimated in the field sample and field duplicate sample. The RPD between the sediment sample and field duplicate sample was 45, less than the control limit of 50.

2.2 Metals

Blanks

Antimony was detected in the calibration blanks at concentrations ranging from 5.9 ug/L to 8.7 ug/L. An sediment action level was established at 2.17 mg/kg. Antimony was qualified non-detect (U) in the following sediment samples: OESDDWP0000801, OESDEP0000801, OESD05S0000801, OESDCON0000801, OESDCON0000801, OESDDG10000801, and OESDDG20000801.

The method blank (solid matrix) had an elevated level of sodium, reported at 285 mg/kg. Sodium was reported in associated sediment samples at concentrations ranging from 71 mg/kg to 219 mg/kg. Sodium was qualified non-detect in associated samples:

sample_name	chemical_name	Final result_value (mg/kg)	Final qualifier
OESDUWP0000801	Sodium	127	U
OESDDWP0000801	Sodium	219	U
OESDEP0000801	Sodium	131	U
OESD2040000801	Sodium	55.8	U
OESD05S0000801	Sodium	101	U
OESDCON0000801	Sodium	147	U
OESDCON0000801DP	Sodium	138	U
OESDDG10000801	Sodium	71.3	U
OESDDG20000801	Sodium	122	U

Matrix Spikes

A matrix spike was performed on sample OESDCON0000801. Laboratory percent recovery control limits of 75-125 were used to evaluate the spike recoveries. Antimony (37) and zinc (221) were outside of the laboratory control limits. Antimony detections and non-detections were qualified estimated (J/UJ) in associated samples. Zinc detections were qualified estimated (J) in associated samples.

Laboratory Duplicates

A laboratory duplicate analysis was performed on sample OESDCON0000801. The following metals had relative percent differences (RPDs) greater than the control limit of 20 (values ≥ 5x CRDL) or differences in concentrations greater than the control limit of ±CRDL for results less than 5x the CRDL: barium (40), cadmium (> CRDL of 0.25 mg/kg), calcium (91), chromium (34), cobalt (> CRDL of 2.5 mg/kg), copper (109), lead (34.6), magnesium (30), nickel (31), potassium (31), vanadium (> CRDL of 2.5 mg/kg), and zinc (108). These metals were qualified estimated in associated samples.

Field Duplicates

A field duplicate was submitted for sediment sample OESDCON0000801. A RPD control limit of 50 was used during the data validation. The following metals had RPDs greater than 50:

Field Sample ID	Analyte	concentration (mg/kg)	Qual	RPD
OESDCON0000801	Aluminum	5590		54%
OESDCON0000801DP	Aluminum	9730		
OESDCON0000801	Antimony	0.69	UJ	133%
OESDCON0000801DP	Antimony	3.4	J	
OESDCON0000801	Calcium	83100	J	73%
OESDCON0000801DP	Calcium	38800	J	
OESDCON0000801	Chromium	23	J	153%
OESDCON0000801DP	Chromium	172	J	

OESDCON0000801	Cobalt	5.7	J	58%
OESDCON0000801DP	Cobalt	10.4	J	
OESDCON0000801	Copper	222	J	167%
OESDCON0000801DP	Copper	2480	J	
OESDCON0000801	Lead	155	J	60%
OESDCON0000801DP	Lead	287	J	
OESDCON0000801	Nickel	23	J	53%
OESDCON0000801DP	Nickel	39.5	J	
OESDCON0000801	Zinc	78.1	J	136%
OESDCON0000801DP	Zinc	408	J	

These metals were qualified estimated (J) in all sediment samples in SDG G2128.

Serial Dilutions

A serial dilution analysis was performed on sample OESDCON0000801. The following metals had a percent difference between the initial sample and dilution analysis that was greater than 15: arsenic (16),barium (17), beryllium (20), chromium (18), cobalt (25), lead (21), magnesium (17), manganese (20), nickel (23), and zinc (25). Associated sediment samples were qualified estimated (J) for these metals.

2.3 Total Organic Carbon

Sample Reporting

The following results for total organic carbon were above the instrument calibration range and were qualified (E) by the laboratory. Samples were not re-analyzed at a dilution by the lab due to the small sample size used for the original analysis. Results in the final data set were qualified estimated (J).

field_sample_id	SDG	lab_sample_id	param_name	final_result	final_qualifier	lab_qualifier
OESDUWP0000801	G2128	G2128-03A	Total Organic Carbon	21000	J	E
OESDDWP0000801	G2128	G2128-04A	Total Organic Carbon	15000	J	E

TABLE 1
SUMMARY OF SAMPLES

SDG	Field Sample ID	Type	Date Collected	Method	Parameter
G2128	OESWUWP0000801	FS	11/11/2008	8082	PCB
G2128	OESWDWP0000801	FS	11/11/2008	8082	PCB
G2128	OESDUWP0000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESDDWP0000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESW0EP00000801	FS	11/11/2008	8082	PCB

SDG	Field Sample ID	Type	Date Collected	Method	Parameter
G2128	OESDEP0000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESW2040000801	FS	11/11/2008	8082	PCB
G2128	OESD2040000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESW05S0000801	FS	11/11/2008	8082	PCB
G2128	OESD05S0000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESWCON0000801	FS	11/11/2008	8082	PCB
G2128	OESDCON0000801	FS	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESWCON0000801DP	FS	11/11/2008	8082	PCB
G2128	OESDCON0000801DP	FD	11/11/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESDDG10000801	FS	11/12/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESWDG20000801	FS	11/12/2008	8082	PCB
G2128	OESDDG20000801	FS	11/12/2008	8082, 6010B, 7471,Lloyd Kahn	PCB, Metals, TOC
G2128	OESDDG20000802	FS	11/12/2008	8082, Lloyd Kahn	PCB, TOC
G2128	OESDDG20000803	FS	11/12/2008	8082, Lloyd Kahn	PCB, TOC
G2128	EB-01 (aqueous)	EB	11/13/2008	8082	PCB

Reference:

New York State Department of Environmental Conservation (NYSDEC), 2000. "Analytical Services Protocols"; June 2000.

New York State Department of Environmental Conservation (NYSDEC), 2002. "Technical Guidance for Site Investigation and Remediation-Appendix 2B"; Draft DER-10; Division of Environmental Remediation; December 2002.

Data Validator: Tige Cunningham

Signature Date January 14, 2009

Quality Assurance Officer: Chris Ricardi, NRCC-EAC

Date:

APPENDIX B

CALCULATIONS

I. Waste Removal Summary

Wastes	Concentration (mg/Kg PCBs)	Alternative 2 (CY)	Alternative 3 (CY)	Alternative 4 (CY)	Notes:
Sediments					
Source	>= 10		14011		High occupancy area
Source	>= 50	2523			Low occupancy area
All	>=0.35			23791	Sediment screening criteria (Unrestriced use)
(0' - 3')	>=0.35 <10		5177		Sediment screening criteria & high occupancy
(0' - 3')	>=0.35 <50	15513			Sediment screening criteria & low occupancy
	Total Disposal (CY)	**18036**	**19188**	**23791**	
	Tons	**28858**	**30701**	**38066**	

Prepared by: SEW 01/12/2009
Checked by: RTB 01/19/2009

II. Calculations for Alternative 2

A. Excavation and Disposal of Sediments >= 50 mg/Kg

Parcel Item	Area (SY)	Max. Sediment Thickness (ft)	Max. Volume (CY)	Removal Volume (CY)	Tons
12	223	6	818	545	
27	274	7	1119	639	
31	166	6	720	720	
32	151	7	619	619	
		Total	**3275**	**2523**	

B. Excavation and Disposal of Sediments >= 0.35 mg/Kg

Parcel Item	Area (SY)	Max. Sediment Thickness (ft)	Volume (CY)	Tons
1	367	3	1078	
2	183	3	550	
3	110	3	135	
4	149	3	303	
5	77	3	77	
6	70	3	85	
7	115	3	81	
8	118	3	138	
9	147	3	354	
10	133	3	398	
11	189	3	566	
13	278	3	778	
14	342	3	1025	
15	364	3	710	
16	329	3	506	
17	338	3	682	
18	328	3	825	
19	326	3	489	
20	380	3	581	
21	391	3	1174	
22	276	3	827	
23	230	0	0	
24	300	3	901	
25	313	3	626	
26	310	3	655	
28	243	3	729	
29	227	3	682	
30	185	3	555	
33	49	0	0	
		Total	**15513**	

III. Calculations for Alternative 3

A. Excavation and Disposal of Sediments >= 10 mg/Kg

Parcel Item	Area (SY)	Max. Sediment Thickness (ft)	Max. Volume (CY)	Removal Volume (CY)	Tons
1	367	7	1720	983	
4	149	4	375	375	
5	77	4	153	153	
7	115	4	213	213	
8	118	4	246	246	
9	147	4	397	397	
10	133	4	414	414	
11	189	5	611	489	
12	223	6	818	545	
13	278	5	807	645	
17	338	4	848	848	
18	328	4	904	904	
19	326	3	733	733	
20	380	4	860	860	
21	391	7	1777	1777	
24	300	6	1169	780	
25	313	5	782	626	
27	274	7	1119	639	
28	243	6	882	588	
30	185	5	572	458	
31	166	6	720	720	
32	151	7	619	619	
		Total	**16738**	**14011**	

B. Limited Excavation & Disposal of Sediments>=0.35 mg/Kg <10 mg/Kg PCBs

Parcel Item	Area (SY)	Total Depth (ft)	Volume (CY)	Tons
2	183	3	550	
3	110	3	135	
6	70	3	85	
14	342	3	1025	
15	364	3	710	
16	329	3	506	
22	276	3	827	
23	230	3	0	
26	310	3	655	
29	227	3	682	
33	49	3	0	
		Total	**5177**	

Prepared by: SEW 01/12/2009
Checked by: RTB 01/19/2009

IV. Calculations for Alternative 4

A. Excavation and Disposal of Sediments >= 0.35 mg/Kg

Parcel Item	Area (SY)	Max. Sediment Thickness (ft)	Volume (CY)	Tons
1	367	7	1720	
2	183	6	616	
3	110	4	233	
4	149	4	375	
5	77	4	153	
6	70	3	85	
7	115	4	213	
8	118	4	246	
9	147	4	397	
10	133	4	414	
11	189	5	611	
12	223	6	818	
13	278	5	807	
14	342	5	1066	
15	364	4	901	
16	329	3	747	
17	338	4	848	
18	328	4	904	
19	326	3	733	
20	380	4	860	
21	391	7	1777	
22	276	5	1030	
23	230	5	803	
24	300	6	1169	
25	313	5	782	
26	310	6	792	
27	274	7	1119	
28	243	6	882	
29	227	4	700	
30	185	5	572	
31	166	6	720	
32	151	7	619	
33	49	5	79	
		Total	**23791**	

Prepared by: SEW 01/12/2009
Checked by: RTB 01/19/2009

APPENDIX C

DETAILED COST ANALYSIS BACKUP

Alternative 1
Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Task / Subtask / Assembly (1)	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Comments/ Assumptions
ALTERNATIVE CAPITAL COSTS								
Institutional Controls								
33022037	Overnight Delivery, 8 oz Letter	4	EA	$ 14.43	$ -	$ -	$ 57.72	RSMeans 2004 ECHOS
33220102	Project Manager	16	HR	$ -	$ 51.77	$ -	$ 828.32	RACER 2007
33220105	Project Engineer	20	HR	$ -	$ 50.20	$ -	$ 1,004.00	RACER 2007
33220106	Staff Engineer	40	HR	$ -	$ 43.93	$ -	$ 1,757.20	RACER 2007
33220110	QA/QC Officer	16	HR	$ -	$ 42.34	$ -	$ 677.44	RACER 2007
33220114	Word Processing/Clerical	40	HR	$ -	$ 22.35	$ -	$ 894.00	RACER 2007
33220115	Draftsman/CADD	40	HR	$ -	$ 29.22	$ -	$ 1,168.80	RACER 2007
33220120	Computer Data Entry	40	HR	$ -	$ 20.08	$ -	$ 803.20	RACER 2007
33220505	Attorney, Senior Associate, Real Estate	4	HR	$ -	$ 175.00	$ -	$ 700.00	RACER 2007
33220509	Paralegal, Real Estate	4	HR	$ -	$ 100.00	$ -	$ 400.00	RACER 2007
33240101	Other Direct Costs	1	LS	$ 751.16	$ -	$ -	$ 751.16	RACER 2007
99041205	Portable GPS Set with Mapping, 5 cm Accuracy	1	MO	$ 689.22	$ -	$ -	$ 689.22	RACER 2007
							$ -	RACER 2007
99130602	Local Fees	1	LS	$ 200.00	$ -	$ -	$ 200.00	RACER 2007
	Task Subtotal						$ 9,931.06	
ALTERNATIVE ANNUAL AND PERIODIC COSTS								
Annual Institutional Control and Cover Inspections and Reporting								
MACTEC	Inspection	4	HR		$ 90.00	$ 25.00	$ 460.00	RACER 2006
MACTEC	Report	1	LS	$ -	$ 2,500.00	$ -	$ 2,500.00	RACER 2006
	Task Subtotal						$ 2,960.00	
Long-Term Monitoring (Years 1 through 5)								
MACTEC	Stream Restoration Inspection	0	DAY	$ -	$ 1,000.00	$ 25.00	$ -	
MACTEC	Environmental Sampling	0	DAY	$ -	$ 1,000.00	$ 500.00	$ -	
MACTEC	Sediment Sampling, PCBs	0	EA	$ 80.00	$ -	$ -	$ -	
MACTEC	Surface Water Sampling, PCBs	0	EA	$ 80.00	$ -	$ -	$ -	
MACTEC	Report	0	LS		$ 20,000.00		$ -	
	Task Subtotal						$ -	

PRESENT VALUE OF ANNUAL AND PERIODIC COSTS FOR ALTERNATIVE 1

Year	Cost*	Number of Annual Periods	Annual Discount Rate	Number of 5-Year Periods	5-Year Discount Rate	Number of 10-Year Periods	10-Year Discount Rate	Total Non-Discounted Cost	Present Value Cost
Capital (Year 0)	$16,000	1	0	NA	NA	NA	NA	$ 16,000.00	$ 16,000.00
Annual OM&M (Years 1-5)	$ 4,000	5	0.031	NA	NA	NA	NA	$ 20,000.00	$ 18,266.64
Annual OM&M (Years 6-30)	$ 4,000	25	0.031	NA	NA	NA	NA	$ 100,000.00	$ 68,882.81
Long Term Monitoring (Years 1-5)	$ -	5	0.031	NA	NA	NA	NA	$ -	$ -
Totals								**$ 136,000.00**	**$ 103,149.45**

*Annual and periodic costs include 10% for technical support and 25% contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.
Capital costs include 25% contingency, as well as and project management, remedial design, and construction management costs per DER-10 guidance.

Discount rate of 3.1 Percent based on OMB Circular No. A-94 App. C (Revised Jan. 2008)

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Alternative 2
Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Task	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Comments/ Assumptions
Subtask								
Assembly (1)								
ALTERNATIVE CAPITAL COSTS								
Pre-Design Investigations								
Survey								
99241201	Surveying - 2-man Crew	2	DAY	$ -	$ 617.50	$ 204.77	$ 1,644.54	RSMeans 2004 ECHOS
MACTEC	Bathymetry Survey	2	DAY		$ 2,000.00		$ 4,000.00	
MACTEC	Sediment Survey/Geoprobe	3	DAY		$ 2,000.00	$ 7,500.00	$ 28,500.00	
MACTEC	Pre-design Report	1	LS	$ -	$ 20,000.00	$ -	$ 20,000.00	
	Task Subtotal						$ 54,144.54	
Mobilization and Temporary Facilities and Controls								
Temporary Utilities								
99040101	Temporary Office 20' x 8'	4.00	MO	$ 206.42	$ -	$ -	$ 825.68	RSMeans 2004 ECHOS
99140201	Temporary Storage Trailer 16' x 8'	4.00	MO	$ 80.72	$ -	$ -	$ 322.88	RSMeans 2004 ECHOS
99040501	Portable Toilets	4.00	MO	$ 82.65	$ -	$ -	$ 330.60	RSMeans 2004 ECHOS
01510.050.0040	Temporary Power Service, overhead feed, 3 use, 200 amp	1.00	EA	$ 745.00	$ 335.00	$ -	$ 1,080.00	RSMeans Site Work & Landscape Cost Data 2006
01520.550.0140	Telephone utility fee	4.00	MO	$ 210.00	$ -	$ -	$ 840.00	RSMeans Site Work & Landscape Cost Data 2006
MACTEC	Electrical utility fee	4.00	MO	$ 200.00	$ -	$ -	$ 800.00	
01520.550.0100	Field office expenses, office equipment rental, average	4.00	MO	$ 145.00	$ -	$ -	$ 580.00	RSMeans Site Work & Landscape Cost Data 2006
01560.250.0200	Rented chain link, 6' high, to 1,000'	1000	LF	$ 3.03	$ 1.10	$ -	$ 4,130.00	RSMeans Site Work & Landscape Cost Data 2006
02220.350.0725	Dumpster, weekly rental, 1 dump/week , 20 cy capacity (8 tons)	16	WK	$ 420.00	$ -	$ -	$ 6,720.00	RSMeans Site Work & Landscape Cost Data 2006
Stabilized Construction Access								
Temporary Access Road from Turner Street								
01550.700.0100	Temporary roads, gravel fill, no surfacing, 8" gravel depth	1300	SY	$ 6.60	$ 2.27	$ 0.37	$ 12,012.00	Assume1200' long x 10' wide access road
33080534	16 oz/sy nonwoven geotextile	1300	SY	$ 2.39	$ -		$ 3,107.00	RSMeans 2004 ECHOS
Access Pads								
02060.150.0100	Borrow, spread with 200HP dozer, no compaction, 2 mile round trip haul, bank run gravel	100	CY	$ 18.15	$ 1.43	$ 3.12	$ 2,270.00	Assume 12' wide access pads. Material to be reused as needed
33080534	16 oz/sy nonwoven geotextile	260	SY	$ 2.39	$ -		$ 621.40	RSMeans 2004 ECHOS
Wastewater Handling								
19040406	21,000 Gallon Steel Wastewater Holding Tank, Rental	4	MO	$ 1,200.00	$ -	$ -	$ 4,800.00	RSMeans 2004 ECHOS, for decontamination water containment
Water Diversion System								
Inflatable Dams								
Vendor Quote	AquaDam, 10ft H x 22ft W (2 dams)	200	LF	$ 250.00	$ 1.43	$ 3.12	$ 50,910.00	Standard AquaDam Price Guide for Jan. 2008.
Water Diversion Operation								
02240.500.1000	Pumping 8 hr., attended 2 hrs. per day, including 20 LF of suction hose and 100 LF of discharge hose, w/ 4"	120	DAY	$ -	$ 405.00	$ 83.00	$ 58,560.00	RSMeans Site Work & Landscape Cost Data 2006, duration of source removal, sediment excavation, and trib restoration

	diaphragm pumped used 8 hrs.							
Culvert Piping								
10", 20 ft lengths, Tubing Corrugated and snap-on ABS fittings.	Polyethylene Flexible Drainage drainage tubing, plain or perforated fittings. Installed in an open trench.	4400	LF	$ 6.37	$ 0.78	$ -	$ 31,460.00	http://www.get-a-quote.net
MACTEC	sand bag cover anchor/ballast system	6	EA	$ 2,000.00	$ -	$ -	$ 12,000.00	
Lagoon Containment Areas (2)								
Earthen Berms								
02060.150.0100	Borrow, spread with 200HP dozer, no compaction, 2 mile round trip haul, bank run gravel	2934	CY	$ 18.15	$ 1.43	$ 3.12	$ 66,601.80	Cross-secion of berms, A=30sf or 10sy, Linear feet of berm, L=1200ft; V=(30sfx1200ft) = 36000cf or 1333bcy. Assume 10% swell, 1333bcy x 1.10 = 1467cy Berm heigh is 4 ft.
02315.310.7000	Compaction, walk behind, vibrating plate 18" wide, 6"lifts, 2 passes	2640.6	ECY		$ 1.10	$ 0.13	$ 3,247.94	Assume 10% shrink
33080534	16 oz/sy nonwoven geotextile	1067	SY	$ 0.44	$ -		$ 469.33	RSMeans 2004 ECHOS
MACTEC	60-mil LLDPE geobmembrane	9600	SF	$ 0.67	$ -		$ 6,432.00	RSMeans 2004 ECHOS
MACTEC	Sand bag cover anchor/ballast system	6	EA		$ 2,000.00	$ -	$ 12,000.00	
Lagoon area								
02060.150.0100	Borrow, spread with 200HP dozer, no compaction, 2 mile round trip haul, bank run gravel	5000	CY	$ 18.15	$ 1.43	$ 3.12	$ 113,500.00	Assume 15000cy holding area; A=300ftx300ft = 90000sf; V = 90000cf or 3333 bcy + 50% for slope = 5000 bcy
02060.150.0100	Borrow, spread with 200HP dozer, no compaction, 2 mile round trip haul, bank run gravel	3833	CY	$ 18.15	$ 1.43	$ 3.12	$ 87,009.10	Assume 15000cy holding area; A=300ftx300ft = 90000sf; V = 90000cf or 3333 bcy + 15% for collection sump area = 3833 bcy
02315.310.7000	Compaction, walk behind, vibrating plate 18" wide, 6"lifts, 2 passes	7949.7	ECY		$ 1.10	$ 0.13	$ 9,778.13	Assume 10% shrink
33080534	16 oz/sy nonwoven geotextile	33000	SY	$ 0.44	$ -		$ 14,520.00	RSMeans 2004 ECHOS
MACTEC	60-mil LLDPE geobmembrane	297000	SF	$ 0.67	$ -		$ 198,990.00	RSMeans 2004 ECHOS
02240.500.0600	Pumping 8 hr., attended 2 hrs. per day, including 20 LF of suction hose and 100 LF of discharge hose, w/ 4" diaphragm pumped used 8 hrs.	240	DAY	$ -	$ 101.00	$ 14.50	$ 27,720.00	RSMeans Site Work & Landscape Cost Data 2006, duration of source removal, sediment excavation, and canal restoration 2 pumps at 4 months = 240 days
Sediment Dewatering Management								
02315.120.3220	Backfill, Structural, dozer or FE Loader, from existing stockpile, no compaction, 105 HP, 150' haul, common earth	18036	CY	$ -	$ 0.66	$ 0.76	$ 25,611.12	
Loading/Off-Loading Ramp								
02060.150.0100	Borrow, spread with 200HP dozer, no compaction, 2 mile round trip haul, bank run gravel	187	CY	$ 18.15	$ 1.43	$ 3.12	$ 4,244.90	Assume 2 ramps each lagoon area at berm height of 4ft at 8% slope Assume 10% swell, 170bcy x 1.10 = 187cy
02315.310.7000	Compaction, walk behind, vibrating plate 18" wide, 6"lifts, 2 passes	168.3	ECY		$ 1.10	$ 0.13	$ 207.01	Assume 10% shrink
33080534	16 oz/sy nonwoven geotextile	512	SY	$ 0.44	$ -		$ 225.28	RSMeans 2004 ECHOS
Decontamination Facility								
33290401	25 gpm, 1-1/2" discharge, cast iron sump pump	1	EA	$ -	$ -	$ 2,317.00	$ 2,317.00	RSMeans 2004 ECHOS
33290704	50' Flexible, Product Discharge Hose	1	EA	$ -	$ -	$ 175.00	$ 175.00	RSMeans 2004 ECHOS
02060.150.0300	3/4" crushed stone borrow, spread w/ 200 HP dozer, no compaction, 2 mi rt haul	56	CY	$ 27.50	$ 1.43	$ 3.12	$ 1,780.56	RSMeans Site Work & Landscape Cost Data 2006, assume 30 ft by 50 ft by one foot thick
02315.310.5100	Compaction, General, riding vibrating roller, 12" lifts, 4 passes	56	ECY	$ -	$ 0.16	$ 0.16	$ 17.78	RSMeans Site Work & Landscape Cost Data 2006
33080544	60-mil Polymeric Liner, Very Low Density Polyethylene	1500	SF	$ 1.97	$ -		$ 2,955.00	RSMeans 2004 ECHOS, assume 30 ft by 50 ft
33080534	16 oz/sy nonwoven geotextile	167	SY	$ 2.39	$ -		$ 398.33	RSMeans 2004 ECHOS
33170814	1,800 psi pressure washer, 6HP, 4.8 gpm	1	EA	$ -	$ -	$ 1,635.00	$ 1,635.00	RSMeans 2004 ECHOS
19040605	2,000 gal steel sump, aboveground w/	1	EA	$ 2,233.00	$ 853.69	$ 123.26	$ 3,209.95	RSMeans 2004 ECHOS

	supports and fittings								
33170823	Operation of pressure washer, including water, soap, electricity, and labor	960	HR	$ -	$ -	$ 41.69	$ 40,022.40	RSMeans 2004 ECHOS, Assume 6 min (0.10 hrs) /truck, assume 120 days/8 hrs/day
33410101	Pump and motor maintenance/repair	1	EA	$ -	$ -	$ 431.15	$ 431.15	RSMeans 2004 ECHOS
Erosion and Sediment Control Measures								
18050206	Filter Barrier, Silt Fences, Vinyl, 3' High with 7.5' Posts	8240	LF	$ 0.70	$ 1.41	$ -	$ 17,386.40	RSMeans 2004 ECHOS, top of bank along Erie Canal, both sides
02370 700 1350	Haybales, staked	100	LF	$ 2.25	$ 0.26	$ 0.05	$ 256.00	RSMeans Site Work & Landscape Cost Data 2006
	Air/Dust Monitoring							
MACTEC	Siltation Curtains	300	SF	$ 4.42	$ -	$ -	$ 1,326.00	
Wastewater Treatment System								
Vendor	100 gpm Dewatering Treatment Facility	2	LS	$ -	$ -	$ 125,000.00	$ 250,000.00	Contractor Bid to MACTEC 2008, includes 20,000 gal FRAC EQ Tank, OWS, bag filter, GAC filters
02240.500.1000	Pumping 8 hr., attended 2 hrs. per day, including 20 LF of suction hose and 100 LF of discharge hose, w/ 4" diaphragm pumped used 8 hrs.	120	DAY	$ -	$ 405.00	$ 83.00	$ 58,560.00	RSMeans Site Work & Landscape Cost Data 2006, assume two weeks
Sludge Handling and Disposal								Assumes 200 gpm, 120 days, 50% solids influent
MACTEC	Materials	92	Drums	$ 45.00	$ -	$ -	$ 4,140.00	Based upon drummed sludge disposal costs for Buffalo NY to Illinois 2008
	Transportation	92	Drums	$ 50.00	$ -	$ -	$ 4,600.00	Based upon drummed sludge disposal costs for Buffalo NY to Illinois 2008
	Disposal	92	Drums	$ 325.00	$ -	$ -	$ 29,900.00	Based upon drummed sludge disposal costs for Buffalo NY to Illinois 2008
	Fees and Charges	25	%				$ 9,660.00	Estimated
Temporary Discharge Monitoring								
MACTEC	Aqueous Sampling, PCBs	120	EA	$ 140.00			$ 16,800.00	24-hr turn around expedited at additional 100% of cost
	Aqueous Sampling, Metals	120	EA	$ 130.00			$ 15,600.00	24-hr turn around expedited at additional 100% of cost
	Aqueous Sampling, VOCs	120	EA	$ 140.00			$ 16,800.00	24-hr turn around expedited at additional 100% of cost
	Aqueous Sampling, SVOCs	120	EA	$ 360.00			$ 43,200.00	24-hr turn around expedited at additional 100% of cost
Clearing and Grubbing								
17010107	Medium Brush, Medium Trees, Clear, Grub, Haul	10	ACRE	$ -	$ 3,327.00	$ 2,852.00	$ 61,790.00	RSMeans 2004 ECHOS. Includes lagoon areas, 2000 feet to the north and ~3000' along the south of the canal and access road
17010107	Medium Brush, Medium Trees, Clear, Grub, Haul	0.5	ACRE	$ -	$ 3,327.00	$ 2,852.00	$ 3,089.50	RSMeans 2004 ECHOS.
MACTEC	Bulk Disposal of Contaminated Debris	2379	TON	$ 141.54	$ -	$ -	$ 336,733.35	Direct Landfill - Model City - Quote December 2008 - PCBs >50 ppm, includes fees, taxes, and surcharges
Survey								
99241201	Surveying - 2-man Crew	2	DAY	$ -	$ 617.50	$ 204.77	$ 1,644.54	RSMeans 2004 ECHOS
		Task Subtotal					$ 1,686,354.13	
Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 50 mg/kg								
Source Sed Excavation								
MACTEC	Excavation, sed, loading for stockpile	2523	BCY	$ 9.80	$ -	$ -	$ 24,726.89	See Excavation Rates, Sed All
02315.490.0310	Hauling, excavated material, 12 CY dump truck, 1/4 mile RT	2775	LCY		$ 0.79	$ 1.66	$ 6,799.49	RSMeans Site Work & Landscape Cost Data 2006, assume 10% swell
MACTEC	Excavation, sed, loading from stockpile	2523	BCY	$ 1.13	$ -	$ -	$ 2,846.26	See Excavation Rates, From Stockpile
Transportation and Disposal								
Vendor	Transportation and Disposal, hazardous soils and sediment	4037	TON	$ 141.54	$ -	$ -	$ 571,361.10	Direct Landfill - Model City - Quote December 2008 - PCBs >50 ppm, includes fees, taxes, and surcharges
		Task Subtotal					$ 605,733.74	
Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Greater than the Sediment Screening Criteria of 0.35 mg/kg								
MACTEC	Excavation, sed, loading for stockpile	15,513	BCY	$ 10.27	$ -	$ -	$ 159,374.53	See Excavation Rates, Sed > 0.35 (0-3)

02315.490.0310	Hauling, excavated material, 12 CY dump truck, 1/4 mile RT	17064.3	LCY		$ 0.79	$ 1.66	$ 41,807.54	RSMeans Site Work & Landscape Cost Data 2006, assume 10% swell
MACTEC	Excavation, sed, loading from stockpile	15513	BCY	$ 1.13	$ -	$ -	$ 17,500.61	See Excavation Rates, From Stockpile
Confirmation Samples								
MACTEC	Confirmation Sampling, PCBs	562	EA	$ 80.00	$ -	$ -	$ 44,960.00	MACTEC standby quote, qty consistent with NYSDEC DER-10
Transportation and Disposal								
Vendor	Transportation and Disposal, non-hazardous soils and sediment	24820.8	TON	$ 125.44	$ -	$ -	$ 3,113,598.72	Direct Landfill - Model City - Quote December 2008 - PCBs <50 ppm, includes fees, taxes, and surcharges
		Task Subtotal					$ 3,377,241.40	
Restoration of Old Erie Canal								
Backfill excavation								
02315.210.4060	Borrow, Loading, commmon earth, 1-1/2 CY bucket	15,361	BCY	$ 8.25	$ 0.42	$ 0.25	$ 137,019.13	RSMeans Site Work & Landscape Cost Data 2006, average 2 feet deep @ 207372 SF
02315.490.0560	Hauling, excavated or borrow, loose CY, 12 CY dump truck, 20 mile round trip, 0.4 loads per hour	16896.98	LCY	$ -	$ 5.80	$ 12.20	$ 304,145.60	RSMeans Site Work & Landscape Cost Data 2006, assume 10% fluff
02315.120.3220	Backfill, Structural, dozer or FE Loader, from existing stockpile, no compaction, 105 HP, 150' haul, common earth	16896.98	LCY	$ -	$ 0.66	$ 0.76	$ 23,993.71	RSMeans Site Work & Landscape Cost Data 2006
02315.310.7000	Compaction, Walk behind, vibrating plate 18" wide, 6" lifts, 2 passes	15360.89	ECY	$ -	$ 1.10	$ 0.13	$ 18,893.89	RSMeans Site Work & Landscape Cost Data 2006, assume 10% consolidation
Canal Restoration								
Bank Run Cobbles								
02370.450.0100	Riprap and Rock Lining, broken stone, machine placed for slope protection	12,288	TON	$ 51.00	$ 8.45	$ 9.15	$ 842,956.80	RSMeans Site Work & Landscape Cost Data 2006 - assumes to average 1 ft, 1.6 tons/cy
Plantings								
Vendor Quote	Live Staking	200	EA	$ 5.00	$ -	$ -	$ 1,000.00	Certified Erosion Control of New Hampshire
02910.710.0300	Lawn bed preparation, screened loam, york rake and finish, ideal conditions	82.4	MSF	$ -	$ 30.00	$ 6.40	$ 2,999.36	RSMeans Site Work & Landscape Cost Data 2006, 4120 ft, 10 ft wide, both sides
02920.320.0200	Seeding, hydro w/ mulch and fertilizer	82.4	MSF	$ 24.50	$ 9.25	$ 5.05	$ 3,197.12	RSMeans Site Work & Landscape Cost Data 2006
Vendor Quote	Compost Blanket	82400	SF	$ 0.50	$ -	$ -	$ 41,200.00	Certified Erosion Control of New Hampshire
		Task Subtotal					$ 1,375,405.61	
Site Restoration								
02315.120.3220	Backfill, Structural, dozer or FE Loader, from existing stockpile, no compaction, 105 HP, 150' haul, common earth	3121	LCY	$ -	$ 0.66	$ 0.76	$ 4,431.82	RSMeans Site Work & Landscape Cost Data 2006. Assume demo and leave onsite berms and associated ramps
Vendor Quote	Compost Blanket	180000	SF	$ 0.50	$ -	$ -	$ 90,000.00	Certified Erosion Control of New Hampshire
		Task Subtotal					$ 94,431.82	
Institutional Controls								
33022037	Overnight Delivery, 8 oz Letter	4	EA	$ 14.43	$ -	$ -	$ 57.72	RSMeans 2004 ECHOS
33220102	Project Manager	16	HR	$ -	$ 51.77	$ -	$ 828.32	RACER 2007
33220105	Project Engineer	20	HR	$ -	$ 50.20	$ -	$ 1,004.00	RACER 2007
33220106	Staff Engineer	40	HR	$ -	$ 43.93	$ -	$ 1,757.20	RACER 2007
33220110	QA/QC Officer	16	HR	$ -	$ 42.34	$ -	$ 677.44	RACER 2007
33220114	Word Processing/Clerical	40	HR	$ -	$ 22.35	$ -	$ 894.00	RACER 2007
33220115	Draftsman/CADD	40	HR	$ -	$ 29.22	$ -	$ 1,168.80	RACER 2007
33220120	Computer Data Entry	40	HR	$ -	$ 20.08	$ -	$ 803.20	RACER 2007
33220505	Attorney, Senior Associate, Real Estate	4	HR	$ -	$ 175.00	$ -	$ 700.00	RACER 2007

33220509	Paralegal, Real Estate	4	HR	$ -	$ 100.00	$ -	$ 400.00	RACER 2007
33240101	Other Direct Costs	1	LS	$ 751.16	$ -	$ -	$ 751.16	RACER 2007
99041205	Portable GPS Set with Mapping,	1	MO	$ 689.22	$ -	$ -	$ 689.22	RACER 2007
	5 cm Accuracy						$ -	RACER 2007
99130602	Local Fees	1	LS	$ 200.00	$ -	$ -	$ 200.00	RACER 2007
	Task Subtotal						$ 9,931.06	

ALTERNATIVE ANNUAL AND PERIODIC COSTS

Annual Institutional Control and Cover Inspections and Reporting

MACTEC	Inspection	4	HR		$ 90.00	$ 25.00	$ 460.00	RACER 2006
MACTEC	Report	1	LS	$ -	$ 2,500.00	$ -	$ 2,500.00	RACER 2006
	Task Subtotal						$ 2,960.00	

Long-Term Monitoring (Years 1 through 5)

MACTEC	Stream Restoration Inspection	1	DAY	$ -	$ 1,000.00	$ 25.00	$ 1,025.00	
MACTEC	Environmental Sampling	5	DAY	$ -	$ 1,000.00	$ 500.00	$ 7,500.00	
MACTEC	Sediment Sampling, PCBs	12	EA	$ 80.00	$ -	$ -	$ 960.00	
MACTEC	Surface Water Sampling, PCBs	12	EA	$ 80.00	$ -	$ -	$ 960.00	
MACTEC	Report	1	LS		$ 20,000.00		$ 20,000.00	
	Task Subtotal						$ 30,445.00	

PRESENT VALUE OF ANNUAL AND PERIODIC COSTS FOR ALTERNATIVE 2

Year	Cost*	Number of Annual Periods	Annual Discount Rate	Number of 5-Year Periods	5-Year Discount Rate	Number of 10-Year Periods	10-Year Discount Rate	Total Non-Discounted Cost	Present Value Cost
Capital (Year 0)	$ 10,371,000	1	0	NA	NA	NA	NA	$ 10,371,000.00	$ 10,371,000.00
Annual OM&M (Years 1-5)	$ 4,000	5	0.031	NA	NA	NA	NA	$ 20,000.00	$ 18,266.64
Annual OM&M (Years 6-30)	$ 4,000	25	0.031	NA	NA	NA	NA	$ 100,000.00	$ 68,882.81
Long Term Monitoring (Years 1-5)	$ 41,000	5	0.031	NA	NA	NA	NA	$ 205,000.00	$ 187,233.07
Totals								**$ 10,696,000.00**	**$ 10,645,382.52**

*Annual and periodic costs include 10% for technical support and 25% contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.
Capital costs include 25% contingency, as well as and project management, remedial design, and construction management costs per DER-10 guidance.

Discount rate of 3.1 Percent based on OMB Circular No. A-94 App. C (Revised Jan. 2008)

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Alternative 3
Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Task / Subtask / Assembly (1)	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Comments/ Assumptions
ALTERNATIVE CAPITAL COSTS								
Pre-Design Investigations								
	From Alternative 2							
		Task Subtotal					$ 54,144.54	
Mobilization and Temporary Facilities and Controls								
	From Alternative 2							
		Task Subtotal					$ 1,686,354.13	
Excavation and Off-site Disposal of PCB Contaminated Sediments Greater than or Equal to 10 mg/kg								
	Source Sed Excavation							
MACTEC	Excavation, sed, loading for stockpile	14011	BCY	$ 9.80	$ -	$ -	$ 137,316.09	See Excavation Rates, Sed All
02315.490.0310	Hauling, excavated material, 12 CY dump truck, 1/4 mile RT	15412	LCY		$ 0.79	$ 1.66	$ 37,759.65	RSMeans Site Work & Landscape Cost Data 2006, assume 10% swell
MACTEC	Excavation, sed, loading from stockpile	14011	BCY	$ 1.13	$ -	$ -	$ 15,806.17	See Excavation Rates, From Stockpile
	Transportation and Disposal							
Vendor	Transportation and Disposal, hazardous soils and sediment	22418	TON	$ 141.54	$ -	$ -	$ 3,172,945.07	Direct Landfill - Model City - Quote December 2008 - PCBs >50 ppm, includes fees, taxes, and surcharges
		Task Subtotal					$ 3,363,826.98	
Excavation and Off-site Disposal within 0-3 feet of Remaining PCB Contaminated Sediments that are Less than 10 mg/kg but Greater than the Sediment Screening Criteria of 0.35 mg/kg								
MACTEC	Excavation, sed, loading for stockpile	5,177	BCY	$ 10.27	$ -	$ -	$ 53,186.49	See Excavation Rates, Sed <10 (0-3)
02315.490.0310	Hauling, excavated material, 12 CY dump truck, 1/4 mile RT	5694.7	LCY		$ 0.79	$ 1.66	$ 13,952.02	RSMeans Site Work & Landscape Cost Data 2006, assume 10% swell
MACTEC	Excavation, sed, loading from stockpile	5177	BCY	$ 1.13	$ -	$ -	$ 5,840.31	See Excavation Rates, From Stockpile
	Confirmation Samples							
MACTEC	Confirmation Sampling, PCBs	562	EA	$ 80.00	$ -	$ -	$ 44,960.00	MACTEC standby quote, qty consistent with NYSDEC DER-10
	Transportation and Disposal							
Vendor	Transportation and Disposal, non-hazardous soils and sediment	8283.2	TON	$ 125.44	$ -	$ -	$ 1,039,070.49	Direct Landfill - Model City - Quote December 2008 - PCBs <50 ppm, includes fees, taxes, and surcharges
		Task Subtotal					$ 1,157,009.30	
Restoration of Old Erie Canal								
	From Alternative 2							
		Task Subtotal					$ 1,375,405.61	
Site Restoration								
	From Alternative 2							
		Task Subtotal					$ 94,431.82	
Institutional Controls								

From Alternative 2

Task Subtotal	$	9,931.06

ALTERNATIVE ANNUAL AND PERIODIC COSTS

Annual Institutional Control and Cover Inspections and Reporting
From Alternative 2

Task Subtotal	$	2,960.00

Long-Term Monitoring (Years 1 through 5)
From Alternative 2

Task Subtotal	$	30,445.00

PRESENT VALUE OF ANNUAL AND PERIODIC COSTS FOR ALTERNATIVE 3

Year	Cost*	Number of Annual Periods	Annual Discount Rate	Number of 5-Year Periods	5-Year Discount Rate	Number of 10-Year Periods	10-Year Discount Rate	Total Non-Discounted Cost	Present Value Cost
Capital (Year 0)	$ 11,145,000	1	0	NA	NA	NA	NA	$ 11,145,000.00	$ 11,145,000.00
Annual OM&M (Years 1-5)	$ 4,000	5	0.031	NA	NA	NA	NA	$ 20,000.00	$ 18,266.64
Annual OM&M (Years 6-30)	$ 4,000	25	0.031	NA	NA	NA	NA	$ 100,000.00	$ 68,882.81
Long Term Monitoring (Years 1-5)	$ 41,000	5	0.031	NA	NA			$ 205,000.00	$ 187,233.07
Totals								**$ 11,470,000.00**	**$ 11,419,382.52**

*Annual and periodic costs include 10% for technical support and 25% contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.
Capital costs include 25% contingency, as well as and project management, remedial design, and construction management costs per DER-10 guidance.

Discount rate of 3.1 Percent based on OMB Circular No. A-94 App. C (Revised Jan. 2008)

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Alternative 4
Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

Task / Subtask / Assembly (1)	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Comments/ Assumptions
ALTERNATIVE CAPITAL COSTS								
Pre-Design Investigations								
	From Alternative 2							
		Task Subtotal					$ 54,144.54	
Mobilization and Temporary Facilities and Controls								
	From Alternative 2							
		Task Subtotal					$ 1,686,354.13	
Excavation and Off-site Disposal of PCB and Metals Contaminated Sediments								
	Excavation and Disposal of Contaminated Sediment							
MACTEC	Excavation, sed, loading for stockpile	23791	BCY	$ 9.80	$ -	$ -	$ 233,165.88	See Excavation Rates, Sed All
02315.490.0310	Hauling, excavated material, 12 CY dump truck, 1/4 mile RT	26170	LCY		$ 0.79	$ 1.66	$ 64,116.75	RSMeans Site Work & Landscape Cost Data 2006, assume 10% swell
MACTEC	Excavation, sed, loading from stockpile	23791	BCY	$ 1.13	$ -	$ -	$ 26,839.24	See Excavation Rates, From Stockpile
MACTEC	Confirmation Sampling, PCBs	562	EA	$ 80.00	$ -	$ -	$ 44,960.00	MACTEC standby quote, qty consistent with NYSDEC DER-10
	Transportation and Disposal							
Vendor	Transportation and Disposal, hazardous soils and sediment	38066	TON	$ 141.54	$ -	$ -	$ 5,387,733.65	Direct Landfill - Model City - Quote December 2008 - PCBs >50 ppm, includes fees, taxes, and surcharges
		Task Subtotal					$ 5,756,815.52	
Restoration of Old Erie Canal								
	Backfill excavation							
02315.210.4060	Borrow, Loading, commmon earth, 1-1/2 CY bucket	7,680	BCY	$ 8.25	$ 0.42	$ 0.25	$ 68,509.89	RSMeans Site Work & Landscape Cost Data 2006, average 1 foot deep
02315.490.0560	Hauling, excavated or borrow, loose CY, 12 CY dump truck, 20 mile round trip, 0.4 loads per hour	8448.53	LCY	$ -	$ 5.80	$ 12.20	$ 152,073.53	RSMeans Site Work & Landscape Cost Data 2006, assume 10% fluff
02315.120.3220	Backfill, Structural, dozer or FE Loader, from existing stockpile, no compaction, 105 HP, 150' haul, common earth	8448.53	LCY	$ -	$ 0.66	$ 0.76	$ 11,996.91	RSMeans Site Work & Landscape Cost Data 2006
02315.310.7000	Compaction, Walk behind, vibrating plate 18" wide, 6" lifts, 2 passes	7680.481	ECY	$ -	$ 1.10	$ 0.13	$ 9,446.99	RSMeans Site Work & Landscape Cost Data 2006, assume 10% consolidation
	Canal Restoration							
	Bank Run Cobbles							
02370.450.0100	Riprap and Rock Lining, broken stone, machine placed for slope protection	12,288	TON	$ 51.00	$ 8.45	$ 9.15	$ 842,956.80	RSMeans Site Work & Landscape Cost Data 2006 - assumes to average 1 ft, 1.6 tons/cy
	Plantings							
Vendor Quote	Live Staking	200	EA	$ 5.00	$ -	$ -	$ 1,000.00	Certified Erosion Control of New Hampshire
02910.710.0300	Lawn bed preparation, screened loam, york rake and finish, ideal conditions	82.4	MSF	$ -	$ 30.00	$ 6.40	$ 2,999.36	RSMeans Site Work & Landscape Cost Data 2006, 4120 ft, 10 ft wide, both sides
02920.320.0200	Seeding, hydro w/ mulch and fertilizer	82.4	MSF	$ 24.50	$ 9.25	$ 5.05	$ 3,197.12	RSMeans Site Work & Landscape Cost Data 2006
Vendor Quote	Compost Blanket	82400	SF	$ 0.50	$ -	$ -	$ 41,200.00	Certified Erosion Control of New Hampshire

	Task Subtotal	$ 1,133,380.61

Site Restoration

From Alternative 2

	Task Subtotal	$ 94,431.82

ALTERNATIVE ANNUAL AND PERIODIC COSTS

Long-Term Monitoring (Years 1 through 5)

From Alternative 2

	Task Subtotal	$ 30,445.00

#

PRESENT VALUE OF ANNUAL AND PERIODIC COSTS FOR ALTERNATIVE 4

Year	Cost*	Number of Annual Periods	Annual Discount Rate	Number of 5-Year Periods	5-Year Discount Rate	Number of 10-Year Periods	10-Year Discount Rate	Total Non-Discounted Cost	Present Value Cost
Capital (Year 0)	$ 12,562,000	1	0	NA	NA	NA	NA	$ 12,562,000.00	$ 12,562,000.00
Long-Term Monitoring (Years 1 through 5)	$ 41,000	5	0.031	NA	NA			$ 205,000.00	$ 187,233.07
Totals								**$ 12,767,000.00**	**$ 12,749,233.07**

*Annual and periodic costs include 10% for technical support and 25% contingency for unforeseen project complexities, including insurance, taxes, and licensing costs.
Capital costs include 25% contingency, as well as and project management, remedial design, and construction management costs per DER-10 guidance.

Discount rate of 3.1 Percent based on OMB Circular No. A-94 App. C (Revised Jan. 2008)

Prepared By: SEW
Date: 01/07/2009
Checked By: RTB
Date: 01/19/2009

MACTEC

Project:	**Old Erie Canal**
Job No:	3650070085
Created by:	S. Wright
Date:	1/7/2008
Checked by:	R. Belcher
Date:	1/19/2009

Table C.1: Excavation Unit Cost Calculation Based on Crew and Equipment Production Rates, Sediment

Production			
1. Excavated volume of sed	**23,791**	bcy	
2. Excavator	CAT 330		
3. Bucket Size	**2**	cy	
4. Bucket Fill Factor	**70%**		Note 1
5. CY/bucket	1.4	cy	
6. Operator/Site Efficiency	**10%**		Note 2
7. Cycles/minute	3.5		Note 3
8. Actual cycles/minute	0.35	cycles/min	
9. LCY/minute	0.5	lcy/min	
10. Productive minutes/hour	**49**	min/hr	Note 4
11. LCY/hour	24.0		
12. Hours/day	8	hrs/day	
13. LCY/day	192.08	lcy/day	
14. BCY/day	173	bcy/day	Note 5
15. Days to complete	138.6		Note 6
16. Crew Hours	1112.0		Note 7

Bucket Fill Factors	
Moist Loam Sandy Soil	100-110%
Sand & Gravel	95-110%
Hard Tough Clay	80-90%
Rock - Well Blasted	60-75%
Rock - Poorly Blasted	40-50%

Labor and Equipment Costs

Unit	Quantity	Rate	Hours	Cost
1. Laborer	1	$20.00	1112.0	$22,240.00
2. Operator	1	$25.00	1112.0	$27,800.00
3. Excavator	1	$130.00	1112.0	$144,560.00

Diesel (Note 8)

Machine	HP	$/gallon	Gallons/hr	Cost
CAT 330	222	$2.74	12.68	$38,565.88

Total Excavation Costs (Note 9)	
Lump Sum	$233,165.88
Cost/BCY	$9.80

Notes:

1. See "Bucket Fill Factors Table". Material is classified generally as fine silty submerged sediments, some debris, therefore 70% was se
2. All inefficiencies are carried in the "Operator/Site Efficiency" line item.
3. "Cycles/minute" line item assumes 100% efficiency.
4. "Productive minutes/hour" accounts for time lost to:safety talk, nonproductive time before/after breaks, early breakdown.

calculation:		
	8	hr work day
	15	minute safety talk
	15	minutes post talk prior to productive work
	10	minutes nonproductive time before and after coffee break (20 min total)
	10	minutes nonproductive time before and after lunch break (20 min total)
	15	minutes nonproductive time at end of day
	85	nonproductive minutes/day
	11	nonproductive minutes/hour
	49	productive minutes/hour

5. Assume 10% shrink/swell conversion between bank cubic yards (bcy) and loose cubic yards (lcy).
6. Assumes 1 day of lost work due to inclement weather
7. Assume hours are rounded up to the nearest whole day.
8. Diesel unit price based on data reported by Energy Information Administration (EIA), Official Energy Statistics of the U.S. government, reported for 12/01/08, <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>
9. Total excavation cost estimate does not include mobilization/demobilization or transportation.

MACTEC

Project:	**Old Erie Canal**
Job No:	3650070085
Created by:	S. Wright
Date:	1/7/2008
Checked by:	R. Belcher
Date:	1/19/2009

Table C.2: Excavation Unit Cost Calculation Based on Crew and Equipment Production Rates, Sediment

Production			
1. Excavated volume of sed	**5,878**	bcy	
2. Excavator	CAT 330		
3. Bucket Size	**2**	cy	
4. Bucket Fill Factor	**70%**		Note 1
5. CY/bucket	1.4	cy	
6. Operator/Site Efficiency	**10%**		Note 2
7. Cycles/minute	3.5		Note 3
8. Actual cycles/minute	0.35	cycles/min	
9. LCY/minute	0.5	lcy/min	
10. Productive minutes/hour	**49**	min/hr	Note 4
11. LCY/hour	24.0		
12. Hours/day	8	hrs/day	
13. LCY/day	192.08	lcy/day	
14. BCY/day	173	bcy/day	Note 5
15. Days to complete	35.0		Note 6
16. Crew Hours	288.0		Note 7

Bucket Fill Factors	
Moist Loam Sandy Soil	100-110%
Sand & Gravel	95-110%
Hard Tough Clay	80-90%
Rock - Well Blasted	60-75%
Rock - Poorly Blasted	40-50%

Labor and Equipment Costs

Unit	Quantity	Rate	Hours	Cost
1. Laborer	1	$20.00	288.0	$5,760.00
2. Operator	1	$25.00	288.0	$7,200.00
3. Excavator	1	$130.00	288.0	$37,440.00

Diesel (Note 8)

Machine	HP	$/gallon	Gallons/hr	Cost
CAT 330	222	$2.74	12.68	$9,988.29

Total Excavation Costs (Note 9)	
Lump Sum	$60,388.29
Cost/BCY	$10.27

Notes:

1. See "Bucket Fill Factors Table". Material is classified generally as fine silty submerged sediments, some debris, therefore 70% was s
2. All inefficiencies are carried in the "Operator/Site Efficiency" line item.
3. "Cycles/minute" line item assumes 100% efficiency.
4. "Productive minutes/hour" accounts for time lost to:safety talk, nonproductive time before/after breaks, early breakdown.

calculation:		
	8	hr work day
	15	minute safety talk
	15	minutes post talk prior to productive work
	10	minutes nonproductive time before and after coffee break (20 min total)
	10	minutes nonproductive time before and after lunch break (20 min total)
	15	minutes nonproductive time at end of day
	85	nonproductive minutes/day
	11	nonproductive minutes/hour
	49	productive minutes/hour

5. Assume 10% shrink/swell conversion between bank cubic yards (bcy) and loose cubic yards (lcy).
6. Assumes 1 day of lost work due to inclement weather
7. Assume hours are rounded up to the nearest whole day.
8. Diesel unit price based on data reported by Energy Information Administration (EIA), Official Energy Statistics of the U.S. government, reported for 12/01/08, <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>
9. Total excavation cost estimate does not include mobilization/demobilization or transportation.

MACTEC

Project:	**Old Erie Canal**
Job No:	3650070085
Created by:	S. Wright
Date:	1/7/2008
Checked by:	R. Belcher
Date:	1/19/2009

Table C.3: Excavation Unit Cost Calculation Based on Crew and Equipment Production Rates, Sediment

Production			
1. Excavated volume of sed	**23,791**	bcy	
2. Excavator	CAT 330		
3. Bucket Size	**2**	cy	
4. Bucket Fill Factor	**90%**		Note 1
5. CY/bucket	1.8	cy	
6. Operator/Site Efficiency	**75%**		Note 2
7. Cycles/minute	3.5		Note 3
8. Actual cycles/minute	2.625	cycles/min	
9. LCY/minute	4.7	lcy/min	
10. Productive minutes/hour	**49**	min/hr	Note 4
11. LCY/hour	231.5		
12. Hours/day	8	hrs/day	
13. LCY/day	1852.2	lcy/day	
14. BCY/day	1667	bcy/day	Note 5
15. Days to complete	15.3		Note 6
16. Crew Hours	128.0		Note 7

Bucket Fill Factors	
Moist Loam Sandy Soil	100-110%
Sand & Gravel	95-110%
Hard Tough Clay	80-90%
Rock - Well Blasted	60-75%
Rock - Poorly Blasted	40-50%

Labor and Equipment Costs

Unit	Quantity	Rate	Hours	Cost
1. Laborer	1	$20.00	128.0	$2,560.00
2. Operator	1	$25.00	128.0	$3,200.00
3. Excavator	1	$130.00	128.0	$16,640.00

Diesel (Note 8)

Machine	HP	$/gallon	Gallons/hr	Cost
CAT 330	222	$2.74	12.68	$4,439.24

Total Excavation Costs (Note 9)	
Lump Sum	$26,839.24
Cost/BCY	$1.13

Notes:

1. See "Bucket Fill Factors Table". Material is classified generally as fine silty dry sediments, some debris, therefore 90% was selected.
2. All inefficiencies are carried in the "Operator/Site Efficiency" line item.
3. "Cycles/minute" line item assumes 100% efficiency.
4. "Productive minutes/hour" accounts for time lost to:safety talk, nonproductive time before/after breaks, early breakdown.

calculation:		
	8	hr work day
	15	minute safety talk
	15	minutes post talk prior to productive work
	10	minutes nonproductive time before and after coffee break (20 min total)
	10	minutes nonproductive time before and after lunch break (20 min total)
	15	minutes nonproductive time at end of day
	85	nonproductive minutes/day
	11	nonproductive minutes/hour
	49	productive minutes/hour

5. Assume 10% shrink/swell conversion between bank cubic yards (bcy) and loose cubic yards (lcy).
6. Assumes 1 day of lost work due to inclement weather
7. Assume hours are rounded up to the nearest whole day.
8. Diesel unit price based on data reported by Energy Information Administration (EIA), Official Energy Statistics of the U.S. government, reported for 12/01/08, <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>
9. Total excavation cost estimate does not include mobilization/demobilization or transportation.

Project:	**Old Erie Canal**
Job No:	3650070085
Created by:	S. Wright
Date:	1/7/2008
Checked by:	R. Belcher
Date:	1/19/2009

Table C.4: Wastewater Treatment Sludge Calculations

Assume:	50	percent solids
	200	gallons per minute
	120	days operation
	2	tons per cubic yard

Calculate number of drums of sludge

5045.2	gallons
91.7	55-gal drums

Dredging

Assume:	50	percent solids
	200	gallons per minute
	90	days operation
	2	tons per cubic yard

Calculate number of drums of sludge

3783.9	gallons
68.8	55-gal drums

MACTEC

Project:	**3456 Oneida Street**
Job No:	3650070089.00
Created by:	R. Belcher
Date:	12/15/2008
Checked by:	S.Wright
Date:	1/7/2008

Table C.5: Transporation and Disposal Unit Rates Backup Calculations

Waste type/description	**Haz Soils/Sed**	**Non-Haz Soil/Sed**	**Notes**
Disposal Facility Location	Model City, NY	Model City, NY	
Transportation ($/ton)	$ 40.00	$ 40.00	
Disposal ($/ton)	$ 75.00	$ 65.00	
State Tax ($/ton)	$ -	$ -	applies to total
State Tax (%)	8.75%	8.75%	applies to total
Local Tax (%)	6.00%	0.00%	applies to disposal
Transportation Fuel Surcharge (%)	21%	21%	applies to transportation
Disposal Fuel Surcharge (%)	0%	0%	applies to disposal
Environmental Fees (%)	3%	3%	applies to disposal

Total	$ 141.54	$ 125.44