REGION 5 RAC2

REMEDIAL ACTION CONTRACT FOR

Remedial, Enforcement Oversight, and
Non-Time Critical Removal Activities at Sites of Release
or Threatened Release of Hazardous Substances in Region 5

PHASE 1 RECONNAISSANCE SURVEY

Eighteenmile Creek Area of Concern
Niagara County, New York
Remedial Investigation/Feasibility Study
WA No. 051-RICO-1527/Contract No. EP-S5-06-01

July 2009

PREPARED FOR

U.S. Environmental Protection Agency

PREPARED BY

CH2M HILL
Ecology and Environment, Inc.

Phase I Reconnaissance Survey
Eighteenmile Creek Area of Concern
Niagara County, New York

Remedial Investigation/Feasibility Study

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Revision 1

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List of Acronyms

ASM	Assistant site manager
AVS	Acid volatile sulfides
AOC	Area of Concern
BUI	Beneficial use impairment
COC	Contaminants of concern
EEEPC	Ecology and Environment -Engineering, P.C.
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
FS	feasibility study
GIS	Geographic Information System
GLLA	Great Lakes Legacy Act
GLNPO	Great Lakes National Program Office
GPS	Geographic Positioning System
IJC	International Joint Commission
LDB	Left descending bank
LWD	Large woody debris
µg/kg	Micrograms per kilogram
mg/kg	milligrams per kilogram
NCSWCD	Niagara County Soil and Water Conservation District
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCBs	Polychlorinated Biphenyls
PAH	Polycyclic aromatic hydrocarbons
PCDD/F	Polychlorinated dibenzodioxins and furans
PCT	Project Coordination Team
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RAC	Remedial Action Committee

List of Abbreviations and Acronyms (cont.)

RAP	Remedial Action Plan
RDB	Right descending bank
RI	Remedial investigation
RI/FS	Remedial investigation/feasibility study
SEM	simultaneously extracted metals
SM	Site manager
SPDES	State Pollutant Discharge Elimination System
TAGM	Technical and Administrative Guidance Memorandum
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCL	Target compound list
TEQ	Toxic equivalent
TOC	Total organic carbon
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WA	Work Assignment
WAM	Work Assignment Manager

Distribution List

Party	Affiliation and Title	Revision	Date Sent
Eighteenmile Creek Phase 1 Survey Report - Draft			
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1 Introduction

This site reconnaissance report has been prepared pursuant to Work Assignment (WA) No. 051-RICO-1527 issued to CH2M HILL under United States Environmental Protection Agency (USEPA) Remedial Action Contract 2 No. EP-S5-06-01. This report summarizes the results of the Phase1 site reconnaissance survey performed by CH2M HILL's team subcontractor, Ecology and Environment Engineering, P.C. (EEEPC), as part of the remedial investigation/feasibility study (RI/FS) at the Eighteenmile Creek Area of Concern (AOC), in Niagara County, New York.

The purpose of the remedial investigation (RI) is to evaluate the nature and extent of contamination in the sediments throughout the AOC, with the primary focus on the unevaluated area between Lockport and the Burt Dam. The investigation is currently planned to be conducted in two phases. The first phase consists of a reconnaissance survey to identify the physical characteristics of the creek and potential sediment depositional areas. The first phase activities were performed in accordance with the approved Quality Assurance Project Plan (QAPP; CH2M/EEEPC, December 2008). The Phase 1 field activities and modifications from the planned implementation are described in Section 2 of the report. The observations and results of the Phase 1 investigation are presented in Section 3 of the report. The findings will be used to develop the objectives and approach for sediment sampling and the analytical program to be implemented during the second phase of the investigation. Recommendations for future sampling are included in Section 4 of the report.

The Eighteenmile Creek Great Lakes Legacy Act (GLLA) Project Coordination Team (PCT) includes the USEPA Great Lakes National Program Office (GLNPO), Niagara County Soil and Water Conservation District (NCSWCD), the New York State Department of Environmental Conservation (NYSDEC), United States Army Corps of Engineers (USACE), and USEPA

Region 2. The PCT will use the site reconnaissance survey data to review and approve the sampling and analytical program for the next investigation phase.

1.1 Background

The Eighteenmile Creek Remedial Action Plan (RAP) was prepared by NYSDEC and the Eighteenmile Creek Remedial Action Committee (RAC) in 1997. The RAP was prepared in response to a recommendation by the Water Quality Board of the International Joint Commission (IJC) that RAPs be prepared for the 43 AOCs identified within the Great Lakes basin, including the Eighteenmile Creek AOC. The NCSWCD is the Eighteenmile Creek RAP Coordinator, having assumed management of the RAP in 2005 with funding support from the USEPA's GLNPO. The NCSWCD has been involved in investigative and remedial activities and public education/outreach activities within communities affected by the Eighteenmile Creek AOC.

Eighteenmile Creek, located in the heart of Niagara County, is surrounded by six residential townships. Many citizens own creek-front property from its headwaters in the town of Lockport to its discharge to Lake Ontario in Olcott, New York. The creek within the AOC is used extensively for fishing, boating, and recreation. The investigation area is primarily in a rural/residential area. Sediment contamination in the area upstream of the AOC (in the Lockport area) has impacted residential properties adjacent to the creek.

Investigations completed in the 1980s and 1990s indicated that the sediments of Eighteenmile Creek within the AOC and in the Lockport area are contaminated with polychlorinated biphenyls (PCBs). PCBs are factors in restrictions on fish and wildlife consumption, bird and animal deformities, or reproductive problems and degradation of benthos. A surface sediment sample collected in 1994 from Olcott Harbor contained PCBs at a concentration greater than the NYSDEC guidance for screening of contaminated sediments. Ten of 15 fish flesh samples from the creek contained PCBs at levels above the U.S. Food and Drug Administration action level of 2.0 milligrams per kilogram (mg/kg). Sediment samples collected during NYSDEC investigations in the upstream portion of the creek (Flintkote Site) contained PCBs at 49 mg/kg (NYSDEC 1997).

Beneficial use impairment (BUI) investigation was conducted in 2007 to determine whether Eighteenmile Creek is impaired in regard to existence of fish tumors and other deformities; status of fish and wildlife populations; and status of bird or mammal deformities or reproductive impairment. A wide range of data was collected from Eighteenmile Creek and a similar background stream, Oak Orchard Creek, and the data from the two creeks were compared. The data collected for this investigation suggest that bird and amphibian populations at Eighteenmile Creek are not impaired, but that fish and mammal populations likely are. The possible impairment of fish and mammal populations results from high levels of PCBs in fish. Whole-body concentrations of Aroclors 1248, 1254, and 1260 and total PCBs were an order of magnitude greater in brown bullheads from Eighteenmile Creek compared with the levels in brown bullheads from Oak Orchard Creek (EEEPC 2009). Whole-body concentrations of dioxins/furans (expressed as the 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD] toxic equivalent [TEQ]) in bullheads from Eighteenmile Creek were approximately five times greater than in bullheads from Oak Orchard Creek. .

Sources and potential sources of PCBs to Eighteenmile Creek have been identified as industrial and municipal wastewater discharges, combined sewer overflows, inactive hazardous waste sites, the New York Barge Canal discharge, contaminated sediments already present in the creek, and an unknown source between Olcott Street and North Transit Road. Extensive progress has been made by monitoring discharges and updating State Pollutant Discharge Elimination System (SPDES) permits for industrial and municipal wastewater dischargers and de-listing inactive hazardous waste sites. NYSDEC conducted a sediment study in the area of the unknown source of PCBs located between Olcott Street and North Transit Road in August of 2005 and performed follow-up investigations in 2007 and 2008 (NYSDEC 2006 and EEEPC 2007b and 2008). NYSDEC has divided the site into the Flintkote Site and the Eighteenmile Creek Corridor site. NYSDEC has completed a remedial record of decision (ROD) for the Flintkote site (NYSDEC 2006a) and anticipates a ROD to be issued for the corridor site in 2009.

1. Introduction

Under contract to NCSWD, EEEPC performed a PCB trackdown study (EEEPC 2007). Samples were collected for PCB screening using grab samples at 80 locations from Harwood Street to Stone Road (8,000 feet), including east of the confluence between Gulf Creek and Eighteenmile Creek and an unmapped drainage on the west side of Eighteenmile Creek. Approximately 2,000 feet of creek within this area was not investigated because the gradient of the creek cascading down the Niagara Escarpment is too steep to ensure the safety of the field sampling crews. In addition, the amount of sediment in this area available for sampling is minimal due to high flow velocities and steep gradient. A total of 80 samples and three duplicates were collected and analyzed for PCBs using a screening method. Total PCB concentrations ranged from 59 micrograms per kilogram (µg/kg) to 4,300 µg/kg and 29 samples did not contain detectable levels of PCBs. A total of 12 cores were collected in areas to confirm PCB screening levels. Three samples were collected at various depths. The concentrations in the core samples confirmed the screening results and ranged from 12 µg/kg to 69,000 µg/kg and only 6 samples were non-detect. A comparison of PCB screening results to PCB confirmation samples indicates the screening results need to be increased by 40% to be comparable to the confirmation results.

The results indicate that PCBs are present in areas of Eighteenmile Creek outside of the AOC and downstream of the potential source area near Lockport. The core sample results show a general decrease in concentration with depth. The results indicate that the entire sediment column is impacted with PCBs and only the native material in the creek bed is free of PCB contamination. Most of the positive PCB results exceeded PCB screening criteria. The results show a relatively uniform concentration of PCBs except at areas close to the Flintkote property and in the area near the intersection of Old Niagara and Plank Road. The results indicate the potential for an additional source of PCBs in an area north of Gulf Creek but before Plank Road.

The surface samples from all 12 cores were also analyzed for select list of metals. The metals results were compared to NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 standards. All metal concentrations were near or exceeded TAGM criteria. The metals concentrations in the sediment cores were relatively uniform throughout the PCB trackdown study area.

The overall objective of the RI activities is to determine the nature and extent of contamination throughout the Eighteenmile Creek area. Numerous sediment investigations have been conducted in the vicinity of the canal, throughout Lockport, and downstream of Burt Dam, additional data are needed to develop a conceptual model of the existing physical and chemical conditions in Eighteenmile Creek between Burt Dam and Lockport. The Phase 1 of this investigation was designed to collect data on the physical conditions of the creek upstream from Burt Dam to Lockport. The results of the Phase 1 activities will be used to develop a strategy to implement a sampling and analytical program (Phase 2) for evaluating the nature and extent of contamination in the AOC.

1.2 Project Description

CH2M HILL and EEEPC implemented the Phase 1 activities for Eighteenmile Creek in a manner consistent with NYSDEC and USEPA requirements, protocols, and guidance. This portion of the project focused on the area from Burt Dam south to Lockport, an area for which there is little historical data regarding sediment characteristics and quality, and depositional areas. The Phase 1 reconnaissance activities included using a small boat to survey Eighteenmile Creek focusing on the approximate 9.4-mile segment between Stone Road and the area just north of Ide Road. The survey identified and mapped areas of sediment deposition, point discharges, ecologically significant areas (e.g., wetlands, floodplains, cattail marshes), and other features that may affect future Phase 2 RI sediment collection activities. Data collected included during Phase 1 field activities included the following:

- Global Positioning System (GPS) coordinates of the location and extent of depositional areas and ecologically significant habitats;
- Water depth, sediment thickness, and width of the creek at selected locations; and
- Locations of point discharges, utility crossings, bridges, logjams, and other features that may affect future actions.

Details of the field methodology are provided in Section 2 and the results of the survey are provided in Section 3. A bathymetric and sediment thickness survey of the Burt Dam

impoundment was also conducted and the results will be submitted in a separate report.

Section 4 of this report provides preliminary recommendations for Phase 2 investigations.

2 Methodologies

Section 2 provides a brief overview of the investigation areas and field methods used for the Phase 1 reconnaissance survey. The details of the areas and methods are provided in the QAPP (CH2M/EEEPC, December 2008). Adjustments to the planned field activities and the rationale for the modifications are described below.

2.1 Investigation Areas

Digital information from the 2005 aerial image of the creek and historic sampling areas were loaded into the Geographic Information System (GIS) to divide Eighteenmile Creek into smaller investigation areas based on the geography of the creek and the existing data. As noted in the QAPP, the creek was divided into five segments that require different levels of investigation (CH2M/EEEPC, December 2008 Figure 2-1). The Phase 1 reconnaissance survey was conducted in a 9.4-mile stretch of the creek just north of Ide Road upstream to Stone Road (see Segment 3 as noted in the QAPP). This stretch of the creek is relatively isolated and little information has been developed on habitats, stream channel conditions, or sediment characteristics. A bathymetric survey will be performed over the 1.5 miles of the impoundment area from behind Burt Dam upstream to the area just north of Ide Road (see Segment 2 as defined in the QAPP). This portion of the creek is relatively wide and deep and there was little information on water depth and sediment thickness.

The results of the Phase 1 survey were used to define reaches of the creek based on the overall physical and channel substrate characteristics. These reaches are shown in Figure 2-1 and summarized on Table 2-1.

Table 2-1 Summary of Reaches, Eighteenmile Creek, Niagara County, New York

Reach	Reach Description	Section	Section Description	Starting Mile Marker	Ending Mile Marker	Total Length (miles)
Reach 1	Mouth of Creek to Burt Dam	NA		13.0	15.2	2.2
Reach 2	Burt Dam Impoundment	NA		11.5	13.0	1.5
Reach 3	Reach 3 – Confluence of Eighteenmile Creek with Upstream Extent of Burt Dam Impoundment	NA		11.0	11.5	0.5
Reach 4	Bedrock/Gravel Channel Downstream of Newfane Dam	NA		10.0	11.0	1.0
Reach 5	Newfane Dam Impoundment	NA		9.2	10.0	0.8
Reach 6	Gravel Channel Upstream of Newfane Dam Impoundment	1	Characterized During Recon	7.3	9.2	1.9
		2	Observations from December 2008; not Fully Characterized	5.9	7.3	1.4
					Total Reach Length	**3.3**
Reach 7	Meandering Section with Large Woody Debris (LWD) Downstream of Niagara Escarpment	1	Observations from December 2008; not Fully Characterized	4.6	5.9	1.3
		2	Characterized During Recon	2.2	4.6	2.4
		3	PCB Trackdown Area*	1.2	2.2	1.0
					Total Reach Length	**4.7**
Reach 8	Steep Gradient Run of the Escarpment	NA		0.8	1.2	0.4
Reach 9	Short Run Downstream of Corridor Site	NA		0.6	0.8	0.2
Reach 10	Eighteenmile Creek Corridor Site	NA		0.0	0.6	0.6

* Eighteenmile Creek RAP and EEEPC conducted sediment sampling in 2006 for the purposes of PCB source trackdown.

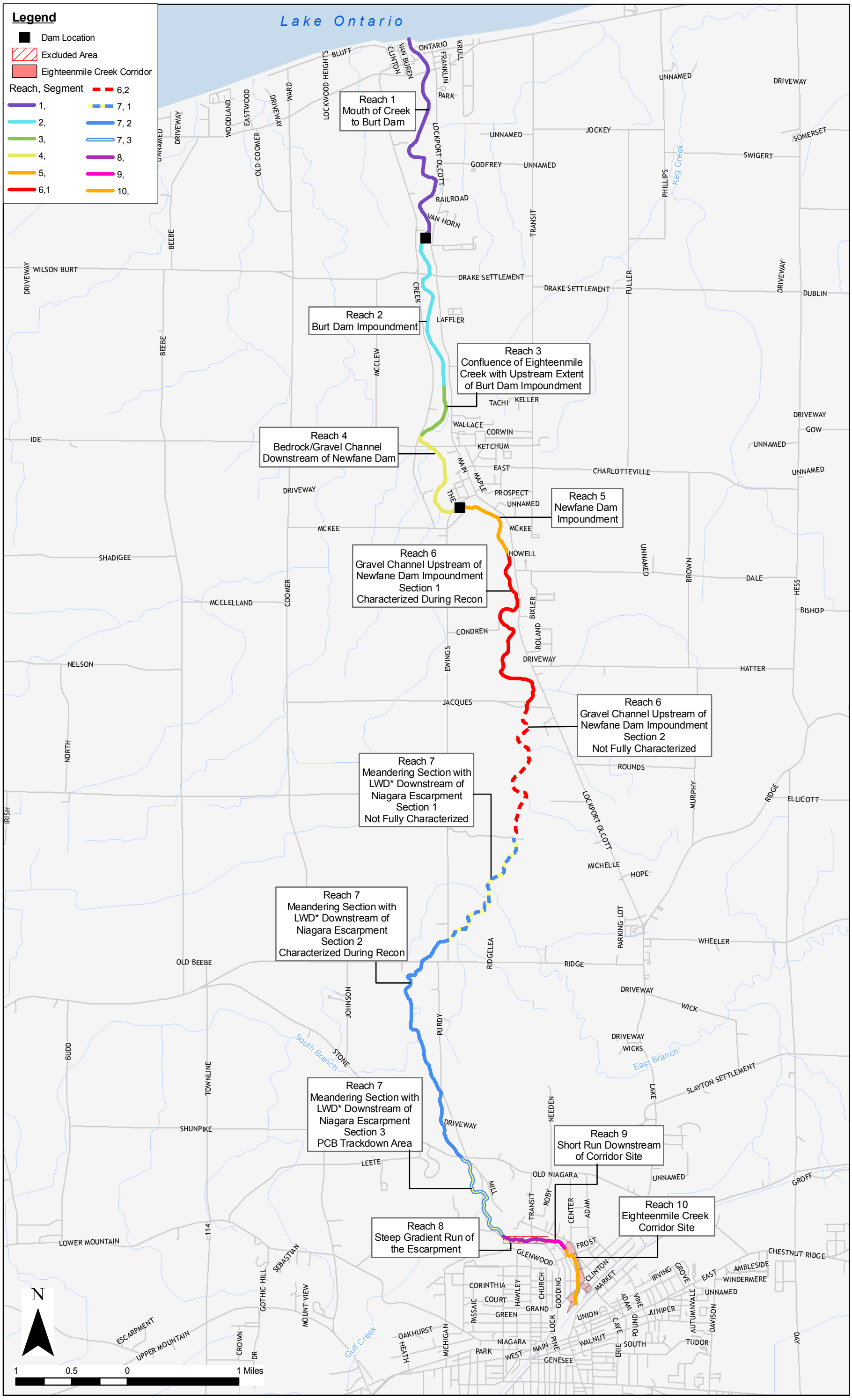

Figure 2-1 Eighteenmile Creek AOC and Investigation Areas

*Large Woody Debris (LWD)

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The detailed findings from for each of the different sections of the creek are presented in Section 3 of this report. Appendix A includes detailed figures of the reconnaissance survey area presenting: (1) data collection points recorded during the survey (Figure A-1-1 to 16); (2) locations where photos were taken (Figure A-2-1 to 16); and (3) sediment deposition areas and thicknesses (Figure A-3-1 to 16).

2.2 Field Activities

The Phase 1 investigation consisted of a detailed reconnaissance survey to investigate site access, identify areas of sediment deposition and measure sediment thickness, and map sensitive habitats and other areas of potential ecological concern encountered during the field activities. Phase 1 field efforts were initiated in winter of 2008 and later completed during the spring of 2009. The Phase 1 investigation was initiated with two days of field work in December 2008, but the extreme cold weather, snow, and ice prevented further activities. The remaining field work was conducted re-activated and completed in April and May 2009.

In December, the creek between Ewings Rd and Jacques Rd was initially surveyed to assess obstacles and site conditions, but limited field observation points were collected. This portion of the stream was characterized by numerous tree falls that limited the ability to navigate the creek. Given that other reaches of the creek had similar physical conditions there was no additional field data collection on along this stretch (Reach 7, Section 1 and Reach 6, Section 2) of the creek in the spring. All other areas of the creek were investigated as planned.

Site reconnaissance field teams consisted of two to three members from EEEPC. Upon arrival at the site each day a safety meeting was held along with a discussion of the day's objectives. The field team entered the creek at the various access points (See Figure A-1-1, -4, -7, -8, -10, -12, -13, -15, and -16). A canoe was used for hauling sampling equipment and was also utilized in those stretches where logjams were separated enough that sampling could be accomplished from the boat. Field crew members used chest waders and walked long portions of the reaches where water depths allowed. In most areas two members of the sampling team waded along the left and right descending banks of the creek channel probing for sediment deposition areas and becoming

familiar with the various sediment types and transitions (e.g., rock-cobble-boulder, hard pan clay, thin sediments with silts and organics, deeper sediments with silts, detrital matter and organics). The third sampling team member maintained the field logbook, took photographs, and GPS points. At each point of interest, the following information was collected:

- GPS coordinates at data collection points;
- Water depth (in inches) using an adjustable length, graduated pole, yard stick or similar device;
- Sediment depth (in inches);
- Creek widths were measured when changes in channel widths occurred or in the absence of changes at undirected intervals; GPS coordinates were collected on opposite banks (toe of slope), with mid-channel information collected for all channel cross-sections; and
- GPS coordinates for wetlands, cattail marshes, areas of surface discharges to the creek, and utility crossings.

A combination of tools was utilized to record field data including the GPS unit, log books, and photographs. The GPS was coded to input water depth, sediment depth, creek width, and field notations. GPS data and digital photographs were electronically copied and archived. Field personnel ensured that the GPS was functioning properly before collecting data, including meeting the following requirements:

1. A minimum of four satellites are available
2. Position Dilution of Precision <= 6
3. Satellite elevation >= 15° above the horizon
4. Acceptable Signal-to-Noise Ratio Mask

Field personnel checked that the GPS was functioning properly before collecting data at the beginning of each field collection day. The receiver would also provide warnings if the above conditions were not being met throughout the field collection day. When this happened, data collection stopped until the receiver could be reset. Data collection was on horizontal

coordinates only, with attributes documented in the field through a customized script developed specifically for this project. At the beginning and end of each day, the nearest known, fixed structure was surveyed as a reference location (e.g., bridge, road crossing). Data were collected in NAD 83 UTM Zone 18 North (units are meters). Data were transferred and differentially corrected using the GPS software upon returning to the office and assessed for accuracy.

Point data collected included X- and Y- coordinates of sediment probes, outfalls, tributaries, water depths, drainage points, and obstructions. A database was constructed for containing the information associated with each location/point including type of point, soil depth, water depth, and the time/date collected. Other physical conditions are summarized in database based on photo interpretation and field reconnaissance, including: cattail marsh, wetlands, bank widths, and the creek centerline (interpreted from aerial photography).

Data collected using GPS underwent GPS correction and quality control by the GIS analyst. Attribute and photo-interpreted data were checked by both the GIS analyst and a field crew member for accuracy. These data were then mapped over the 2008 aerial photography. The final GIS database includes a data dictionary (i.e., a list of all GIS layers and their sources and metadata prepared using the USEPA, Geospatial Metadata Technical Specification v. 1.0, November 2007).

3 Results

Section 3 presents the results of the Phase 1 reconnaissance survey for each of the reaches listed on Table 2-1 for which field work was implemented. All of the results are incorporated into a GIS database for use in Phase 2. The details of the results are presented on figures, tables, and photo logs in appendices to this report. The actual GIS shape files are not included.

3.1 Field Reconnaissance Survey Results

Field survey results are provided on detailed figures in Appendix A. The figures start at the beginning of the reconnaissance survey area near the upstream extent of the Burt Dam impoundment and proceed upstream to Stone Road. Figures A-1-1 through A-1-16 provide locations of bank points, sediment probes, tributaries, water depth points, drainage points, obstructions, outfall, and other notable locations including access points. Details on the findings for each of these locations are provided in the tables in Appendix B. Figures A-1-1 through A-1-16 also identify habitats such as forested wetlands and cattail marshes. The center line of the creek is color coded to represent the predominant creek channel substrate encountered during the survey including bedrock channel with organic sediment deposits, clay bottom, deep water, silty bottom with thick sediment, and gravelly bottom.

Photographs were collected throughout the field reconnaissance process; photo logs are provided in Appendix C and Figures A-2-1 through A-2-16 in Appendix A-2 show the locations of the photo points. Sediment thickness and water depths were collected at a total of 218 locations. The measurements are provided on Figures A-3-1 through A-3-16 in Appendix A-3 for the entire survey area. The figures in Appendix A-3 also show areas of sediment deposition. The linear feet of sediment deposition along or near creek banks were measured with the GPS if the length was greater than 10 feet, obtaining an upstream and downstream point for the extent of the

depositional area. Otherwise the sediment locations were treated as separate points. The summary of these measurements are show on Table 3-2.

As provided earlier, the study area was divided into reaches, largely depending on substrate characteristics. The reaches are shown on Figure 2-1 and summarized in Table 2-1. Reach 1 extends from the mouth of the creek to Burt Dam. While Reach 1 is part of the AOC, it is not part of the study area for this RI/FS. Reach 2 is the Burt Dam impoundment and is part of the study area but the results of the bathymetric survey and sediment thickness mapping will be provided as a separate report. Reaches 8, 9 and 10 extend from the escarpment to the New York State Barge Canal. Reaches 8, 9, and 10 were not included in the reconnaissance survey because the areas were previously investigated as part of the investigations conducted by the NYSDEC. In summary the Phase 1 field activities concentrated on collecting information from Reaches 3, 4, 5, 6, and 7 (see Figure 2-1). The results for these reaches are discussed below. The sediment and water depths for these reaches are summarized on Table 3-1. The sediment depositional areas for these reaches are summarized on Table 3-2.

3.1.1 Reach 3 – Confluence of Eighteenmile Creek with Upstream Extent of Burt Dam Impoundment

Figure 3-1 and a portion of Figure 3-2 summarize the reconnaissance survey results for Reach 3. This reach is representative of a flooded stream bed with the meander of the original stream bed channel evident among islands of forested wetland and cattail marsh. The stretch is approximately 0.5 miles upstream of the deeper water of the Burt Dam impoundment (see Reach 2 on Figure 2-1). The sediment reconnaissance survey was completed on May 2, 2009. Two sediment thickness points also were probed in areas that fall within Reach 2 as shown on Table 3-1. The sediment probes indicate the deeper water in this reach is characterized by average sediment thickness of about 9 feet and relatively shallow water (less than 2 feet). Reach 2 area will also be characterized as part of the bathymetric survey.

Table 3-1 Summary of Sediment Thickness and Water Depth Points, Eighteenmile Creek, Niagara County, New York

Reach	Section	Number of Sediment Sampling Points	Number of Points with Sediment Deposition	Average Depth (feet)[1]	Min. Sediment Depth (feet)	Max. Sediment Depth (feet)	Number of Water Points	Average Depth (feet)	Min. Water Depth (feet)	Max. Water Depth (feet)
Reach 2	NA	2	2	9.2	8.9	9.5	2	1.5	1.1	2.0
Reach 3	NA	31	30	4.6	0.1	9.8	31	2.1	0.4	7.5
Reach 4	NA	22	13	0.5	0.2	1.8	32	1.0	0.2	3.5
Reach 5	NA	52	42	3.0	0.1	7.2	52	3.7	0.3	10.4
Reach 6	1	30	23	0.9	0.2	2.0	30	0.9	0.0	2.8
Reach 6	2[2]	0					2	2.5	1.5	3.5
Reach 7	1[2]	1					3	2.5	1.5	4.0
Reach 7	2	81	80	1.4	0.2	4.3	81	1.1	0.0	3.0

[1] Averaging includes only those locations where sediment was present.
[2] Segment was not fully characterized during Phase 1 activities.

Table 3-2 Sediment Depositional Areas, Eighteenmile Creek, Niagara County, New York

Reach	Section	Length (miles)	Number of Points with Sediment Deposition	Number of Areas Containing Sediment Areas of Lengths Greater than 10 Feet	Total Linear Feet of Depositional (feet)	Total Depositional Area (acres)
Reach 2	NA	1.48	2			1.3
Reach 3	NA	0.55	30			9.8
Reach 4	NA	1.01	13			
Reach 5	NA	0.76	42	1	244	5.4
Reach 6	1	1.89	23	17	1567	
Reach 6	2[(1)]	1.46			*1207*[(1)]	
Reach 7	1[(1)]	1.32			*1333*[(1)]	
Reach 7	2	2.40	80	47	2428	
Reach 7	3[(1)]	0.99			*997*[(1)]	
Totals			190	65	*6778*[(1)]	16.5

[(1)] Linear feet of deposition was estimated based on sections that were fully characterized during the survey.

The upstream portion of Reach 3 is characterized by a gravel bottom with swift flow and few sediment deposition areas. From SED 181 (Figure A-3-2) to the ending point of the reconnaissance survey at a point just south of the Burt Impoundment, the creek is characterized by large, deep sediment deposits due to the entrance of slack water. This lower portion has forested wetlands and cattail marsh along both banks with a mix of steep sloped sides and low floodplains. Sediment is primarily comprised of silt with fine sand, and some clay, with sediment depths generally greater than 3 feet and water depths less than 3 feet. A total of 31 sediment thickness and water depth points were collected in this area (see Table 3-1). Table 3-2 shows that total sediment depositional area was estimated at 9.75 acres with an additional 1.3 acres identified in what is Reach 2. There are several areas which are notable within this section of the creek:

- Two drainage locations were identified on either side of the creek near Ide Road.
- An inlet with some flow into the creek near SED 176 and SED 177 has sediment deposition with depths up to almost 2 feet (Figure A-3-2).
- From SED 181 to the survey end, sediment is deep throughout the entire creek. Sediment depths range from 1 foot to up to 10 feet. Additional deposition occurs along the entire length of the cattail marshes (Figures A-3-1, -2).
- A secondary (slough-like) channel along the east side of the creek valley is connected to the main stem of the creek by a small channel that runs between cattail marsh and wetland areas. This secondary channel also contains sediment, with depths from above 3 feet to almost 5 feet. Sediment depths within the connection channel range from just above 2 feet to over 5 feet (Figure A-3-2).

3.1.2 Reach 4 – Bedrock/Gravel Channel Downstream of Newfane Dam

Figure 3-2 summarizes the Reach 4 reconnaissance survey results for the portion of stream downstream of Newfane Dam to Ide Road. This reach is about 1 mile long and is influenced by the flow from Newfane Dam. It appears there are at least two locations along this stretch that had historic water withdrawal structures that influenced the channel and left obstructions in the creek. The survey reconnaissance effort was completed between the point immediately downstream of Newfane Dam to Ide Road on December 4 (see Figures A-1-2 to -4 and A-3-2 to -4). EEEPC encountered David Eaton, who owns the property next to Newfane Dam. He was

unaware of the field activities, but did not have any issue with EEEPC's presence in the area. Mr. Eaton gave the name of another land owner, Eugene Collins, whose property along Ewings Road in the Town of Newfane has a small lot for parking. Permission was granted from the landowners to NCSWCD for use both of these areas for access. These access points are shown on Figure A-1-4.

Reach 4 is characterized by relatively swift stream flows and fewer, shallower sediment depositional areas. Of the 22 sediment measurement points recorded, 13 exhibited sediment accumulations with an average sediment depth of 0.5 feet. The water was shallow with a depth of (generally less than 3.5 feet at all locations) with an average depth of 1 foot. Two channels depart from the dam (Photos P30 to P32); outflow from an old pump house structure along right side (Photo P56), and spillway overflow from left side. These conditions created an island over time of approximately 600 feet in length with a small, high water overflow channel reconnecting the two channels. Stream banks are 1 to 4 feet high with slopes of varying steepness that rise onto a floodplain bench. Stormwater enters the creek at the bridge at Ewings Road which contains roadside drainage pipes, and from non-point run-off along rip rapped stream banks.

Between Ewings Road North and Ide Road, areas of sediment deposits were shallow. This portion of the creek contains bedrock substrate within the main channel and was stripped of any sediment with the exception of the immediate vicinity of the banks. In these locations, less than 0.5 feet of sand, gravel, and organic material had accumulated, but it is likely that this material would be prone to washing out during higher flow events. Water depth between Ewings Road North and Ide Road (Figures A-3-2 and 3-3) was variable (0.25 feet to greater than 3.5 feet) and the flow was swift. Two small island features with right and left channels can be found along this stretch, the first is located approximately 600 feet downstream from the Ewings Road bridge. This island creates a small rapid adjacent to it that is choked with fallen trees and branches and not navigable by canoe (see P65A). Giant Hogweed was observed on this island. The second island is located 300 feet upstream from the Ide Road bridge and is defined by a giant willow that is split which has created a pond area that flushes during high water flow. A concrete structure along the west bank is situated upstream from the only tributary observed entering the

creek in this section (Photo P43A). The structure is approximately 20 feet by 10 feet size with no apparent connections and extends approximately 5 feet into the stream. Stream banks are 1- to 4-foot slopes of varying steepness that rise onto a flood plain bench. In some locations the embankment ascends 20 feet to 50 feet above departing from the streambed.

Approximately halfway through this section an impoundment/weir/water-intake culvert bisects the stream (Photos P50A to P55A as noted on Figure A-2-2). This is a safety hazard at all water levels. The structure is at a 45 degree angle departing the left descending bank (LDB) which forces water to flow behind the water-intake structure upstream approximately 30 feet away. The upstream intake leads to the right descending bank (RDB) via a culvert and creates a spillway along the RDB. There are trees and debris piled up at the intake structure at river center, creating further hazards (Figure A-1-3).

Other features observed along this section include a 1000-gallon tank rusted out along the LDB (Photo P62A), an irrigation system (disconnected) leading into agriculture fields along the LDB (Photo P61A), a concrete retaining wall along the RDB near creek side industry (Photo P63), and several broken concrete culverts that have been washed downstream. A large wetland complex is located south and west of Ide Road (Photo P68).

3.1.3 Reach 5 – Newfane Dam Impoundment

Figure 3-3 summarizes the Reach 5 reconnaissance survey results for the area immediately upstream of Newfane Dam. The dam creates an impoundment/slack water section that extends approximately 4000 feet upstream (see Table 2-1). Reach 5 is characterized by deeper water and large sediment deposition areas. A total of 52 locations were probed in this reach of which 42 locations contained had sediment deposits averaging 3 feet. The water depths in this reach were on average greater than 3 feet and up to 10 feet deep in areas immediately behind the dam. The area shows the presence of wetlands, cattail marshes, and increased sediment deposition along creek banks and bottom. The use of a canoe was necessary in this portion of the creek as the water depth is greater than five feet. Sediments in this stretch are primarily comprised of silt with some fine sands and some clay, with a gravelly mid-channel between SED 133 to SED 152

(Figures A-3-4, -5). The relatively long stretch of creek (approximately 244 linear feet) is influenced by the presence of the dam and almost entirely depositional, and was estimated to be 5.4 acres (see Table 3-2).

Data points were collected on April 27 and 30, 2009. There are several areas which are notable within this section of the creek:

- Two outfalls on the east side appear to drain residential areas from Newfane and three drainage locations on the west side of the creek (see Figure A-1-5 and 6).
- At SED 113 there is a mid-channel island (Photo P70) with sediment deposition at the downstream end. Sediment depth are less 0.5 feet. At the end of the depositional area the sediment become much coarser.
- Downstream of SED 127 there is a large woody debris complex (start point: OBS-042, end point: OBS-043) (see Photo P77), that has influenced depositional characteristics along both banks; sediment depths range from 1.5 feet to greater than 4 feet.
- Cattail marshes begin just downstream of OBS-043 (Figure A-1-5) and continue to Newfane Dam. Sediment deposition occurs along the entire length of the cattail marsh edges (Photo P129).
- In the area just upstream and in front of the Newfane Dam, thick sediment covers the entire creek channel (Figure 4-4).
- A tributary along the west side of the creek contains large sediment deposits ranging from about 1.5 feet to 4 feet thick (SED 154 to SED 157) (see Photo P78). The area appears to drain land that is primarily agricultural.
- A tributary along the east side of the creek near the dam (Photos P82, P85), parallel to Route 78, had sediment depths greater than 4 feet thick (SED 170 to SED 172) (Figure A-3-4). Sediment composition in this tributary was silt and cattail marshes are located along both banks.

3.1.4 Reach 6 – Gravel Channel Upstream of Newfane Dam Impoundment

Reach 6 is upstream of the Newfane Dam impoundment and is characterized by a gravel channel with scattered and shallow sediment deposition. The reach was divided into two sections based on the survey efforts. Section 1 was fully characterized during the Phase 1 survey and the results are summarized on Figure 3-4. Section 2 was part of the area from Ewings Road South to

Jacques Road that was not fully characterized due to limited access and the large number of log jams and woody debris across the creek.

Reconnaissance efforts were performed between Jacques Road and Condren Road on April 25 and between Condren Road and Newfane Dam impoundment on April 27. The area south of Jacques was surveyed on December 1, 2008, but characterization efforts were limited. Figures A-1-6 to A-1-10 present the entire reach area in detail. The entire reach length is estimated to be 3.3 miles of which a little over half was fully characterized. Of the 30 locations probed, only 23 locations had sediment present. The average sediment and water depths were about 0.9 feet (see Table 3-1). A total of 17 areas of sediment deposition greater than 10 feet were identified (see Figures A-3-6 to -8) for an estimated total of 1,567 linear feet of deposition. If this estimate was expanded to the entire reach, approximately 2,800 linear feet of sediment deposition can be assumed (see Table 3-2).

During reconnaissance efforts, the field crew spoke with Darcy O'Brien at Zehr Farms along Jacques Road in regards to creek access. She mentioned that many people enter the creek from the access road that runs parallel with the creek on the east side of the farm. This segment of the creek is characterized by a wide, shallow channel, with a hard substrate, primarily gravel and cobble. It appears that there are few locations that accumulate sediments. Riffles were noted where the water depths are too shallow for canoe passage and there are larger stones and faster stream flow velocities. Throughout this section of creek the LDB and RDB varied in height and slope. Often those areas consisting of high banks (greater than 20 feet) characterized by much bank erosion, unstable stream banks, and fallen trees. Typically, the area adjacent to the stream bank opposite the high bank contained floodplain. Deposition within this stretch of creek was primarily gravel bars, but where sediment deposition occurred, depths ranged from 0.8 to1.3 feet. The notable findings within this reach of the creek are as follows:

- There are several outfalls and drainage on the creek where it runs parallel and close to Condren Road on the west and Lockport-Olcott Road on the east (see Figure A-1-6).

- As the ending point at Condren Road is approached, the creek splits, creating a secondary channel adjacent to Route 78 (Photo P66 on Figure A-2-7). This secondary channel has flowing water and a extensive piles of large woody debris. Two roadside drainage areas exist for Route 78 along here. Sediment depths within this channel range from less than 0.5 feet to greater than 3 feet. Sediment is generally fine sand, silt, and some clay which is consistent with other deposition areas within this segment of creek.

- Where the creek rejoins itself downstream there is a small in-channel island with deposition on the downstream end (Photo P120 on Figure A-2-7).

- The remaining area of the reach is characterized by obstructions and overland drainage areas.

- An additional access area was identified on an unnamed road at Malley Topsoil (see Figure A-1-10).

3.1.5 Reach 7 – Meandering Section with Large Woody Debris Downstream of Niagara Escarpment

Reach 7 begins at the bottom of the Niagara escarpment and continues upstream for almost 5 miles. The reach was divided into three sections based on the survey efforts. Section 1 (1.3 miles) was part of the area from Ewings Road South to Jacques Road that was not fully characterized due to limited access and a large number of log jams and woody debris. Section 2 (2.4 miles) was fully characterized during the Phase 1 survey and the results are summarized on Figure 3-5. Section 3 (1 mile) was characterized during the PCB trackdown study performed by EEEPC under contract to NCSWD (EEEPC 2007).

A reconnaissance effort was performed between Stone and Ridge Roads on April 23 and 24, 2009 (Figures A-1-13 to -16, A-3-13 to -16). This portion of the creek is characterized by a narrow channel compared to stretches located further downstream, with water depths ranging from 0 to 3 feet. The creek substrate contains hard clay overlain by primarily coarse sand with some pockets of silt and clay due to large amounts of fallen trees along the bottom of the creek which function as sediment "cribs." Over time the trunks and numerous branches of these fallen trees have trapped sediment creating depositional areas and sediment "bars," sometimes extending into the middle of the channel. The sediment is generally dark grey to dark brown in color, with little-to-no gravel, a substantial component containing detrital and organic material, and often has a relatively strong odor of decomposing organic material. As the creek approaches

Ridge Road, sediment becomes more of sandy silt with increased clay content within sediment pockets. Additionally, an increased frequency of cobble and some boulder were observed. In the lower portions of this sampling reach a number of forested wetlands were observed within floodplain. Visual observation indicates that overbank flooding occurs in many of these areas. It is also likely that drainage from agricultural fields beyond the riparian corridor also flows into the floodplains and wetlands. Points of discharge where overland drainages meet the creek were noted and mapped.

A reconnaissance effort was performed between Ridge Road and Ewings Road South on April 24 and 25, 2009 (Figures A-1-12 and -13 and A-3-12 and -13). This stretch of the creek is very similar in substrate and bank characteristics as the stretch between Stone Road and Ridge Road. However, this portion of the creek has soft sediment deposition on top of hard clay creek bottom less 0.5 feet in depth. Sediment is primarily composed of silt with fine sand and some clay content and is highly organic; ranging in depth from 0.5 feet to over 4 feet. Abundant areas of large woody debris are present and many sections of the LDB are sloughing into the creek.

The area north of Ewings Road South to Jacques was surveyed on December 1, 2008, but characterization efforts were limited. Figures A-1-10 to A-1-12 show this entire reach area in detail. One large gooseneck in the creek (Photos P03, P04) had a large amount of downed trees. This area is indicated on Figure A-1-11 and denoted with the text “sediment deposition area.” The field crew portaged in this area and sank approximately 1 to 1.5 feet into saturated organic sediment. A few drainages entered the east side of the creek, some were substantial in size and are denoted as tributaries, others were small drainages from agricultural fields.

This reach of the creek is difficult to maneuver due to fallen trees within the creek (Photo P08). Most of the tree falls are significant in size, ranging from approximately 0.5 feet up to 3.5 feet or more in diameter and are submerged or over-hang the entire creek width. A chainsaw will be needed to effectively navigate the creek in the future. Seasonal and storm-event related changes in water levels will likely cover some obstacles but will also expose new ones. Three old farm bridges (Figure A-1-11), were located in this section of the creek (Photos P06, P21 to P27).

The average sediment depth in Reach 7 segment 2 was 1.4 feet. The water depth was less than 3 feet and averaged just over 1 foot (see Table 3-1). A total of 47 areas of sediment deposition greater than 10 feet were identified (see Figures A-3-12 to -16) for a total linear feet of deposition estimated at 2,428 feet. If this estimate was expanded to the entire reach, approximately 4,800 linear feet of sediment deposition can be assumed (see Table 3-2). There also were several areas that are notable within this section of the creek as follows:

- At SED 24 along the LDB a sheen was noticed on the sediment (see Figure A-2-16, Photo P29, P30); the origin of the sheen was not determined.
- At SED 34 there is an area of thick mud. It is composed of grey silty sand, with a minor component of clay. It is approximately three feet thick near the bank and becomes more of a silt bar as it angles toward the center of the creek channel. Sediment depths on the silt bar range from about 1.25 to 2.5 feet (Figure A-3-16).
- Downstream of SED 46 and nearby large woody debris is a mid-channel silt bar. Sediment depths range from 0.75 to 2 feet (Figure A-3-16).
- SED 77 along the LDB has two inputs form a wetland (see Photo P65). Sediment depths are up to 1.6 feet. Deposition at this point extends over 100 feet downstream and has varying widths, often reaching mid-channel (Figure A-3-14).
- SED 89 along the LDB is the last sediment point taken before Ridge Road. At this point deposition extends over 125 feet in length with sediment depths up to 3 feet. There is drainage from a wetland (see Photo P109) and potential for roadside drainage to be directed to this area (Figure A-3-13).
- Immediately downstream of Ridge Road there are two sections of large woody debris (Photo P110); sloughing banks combined with the large woody debris is causing a buildup of soft sediment along the RDB. Sediment depth ranges from 0.5 to 1.6 feet and deposition is 65 feet in length (SED 90, SED 91) (Figure A-3-13).
- At SED 93 there is an exposed bar along the RDB that is due to high water events or a sunken bank. Deposition is 40 feet long with depths ranging from 1.25 to 2.3 feet (Figure A-3-12).
- SED 97 along the LDB is directly downstream from an open pasture area that has had the creek bank stabilized by the use of a large log and rocks (see Photo P113). This has caused that section of bank to erode and deposition to occur downstream. Sediment depths are up to 2.6 feet and deposition extends 50 feet downstream (Figure A-3-12).

- The stretch between SED 97 and SED 98 has little deposition. At SED 98, just upstream of Ewings Road South along the LDB, sediment depths are approximately 1 foot. Deposition extends 30 feet upstream from Ewings Road South (Figure A-3-12)

3.2 Summary

The Phase 1 RI activities conducted along Eighteenmile Creek involved the planning, mobilization, and reconnaissance survey to characterize the physical conditions of the creek channel. The investigation began in December 2008 and was completed in April/May 2008 on the 9.4-mile segment between Stone Road and just south of Burt Impoundment. This investigation phase focused on collecting data describing sediment deposition areas within the channel, identifying the locations of wetlands, floodplains, cattail marshes, point discharges, and other features that could affect future sediment sampling in the next investigation phase. In summary the following data points were collected (Figures A-1-1 to -16):

- 201 sediment depth points,
- 88 bank points
- 19 cattail marsh points,
- 36 drainage points,
- 24 obstruction points,
- 8 outfall points,
- 7 tributary points,
- 25 water depth points,
- 7 wetland points, and
- 7 other points (bridges, etc.).

The data presented here will be used to develop a sampling and analytical plan (Phase 2) within Eighteenmile Creek from Burt Dam to Lockport to characterize the nature and extent of contamination outside the AOC. General recommendations for future sampling are presented in Section 4.

RECON END POINT

WEST CREEK RD

DRIVEWAY

FORESTED WETLAND

N

0 400 Feet

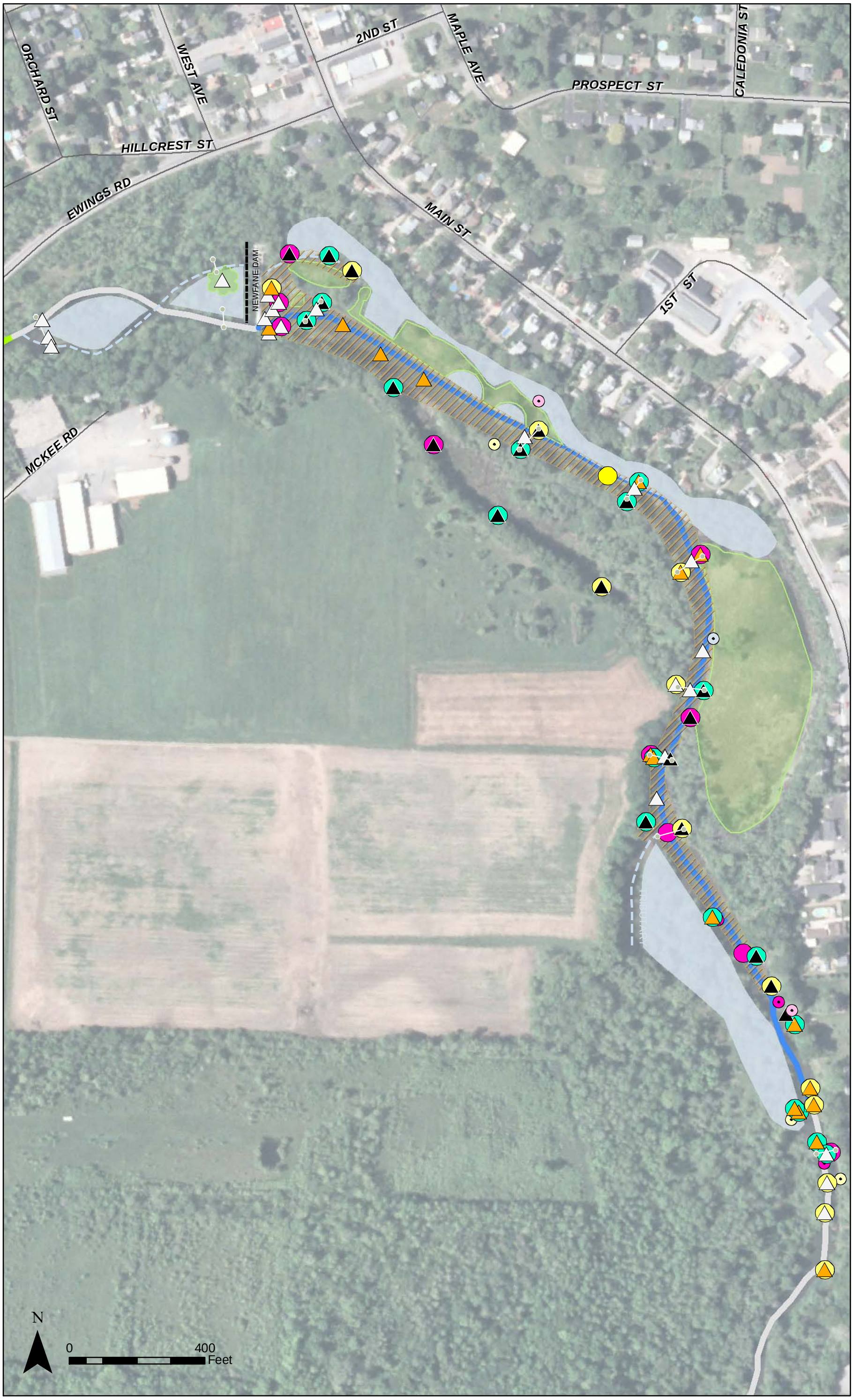
Sediment Thickness
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

Water Depth
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

- Tributary
- Drainage
- Obstruction
- Outfall
- Other
- Bank Point
- Cattail
- Sediment Deposition Area
- Forested Wetland
- Cattail Marsh
- Tributary
- Bedrock Channel with Organic Sediment Deposits
- Clay Bottom
- Deep Water, Silty Bottom with Thick Sediment
- Gravelly Bottom

Figure 3-1 Reach 3
Eighteenmile Creek Field Reconnaissance,
Fall 2008 and Spring 2009, Niagara County, New York

Figure 3-2 Reach 4
Eighteenmile Creek Field Reconnaissance,
Fall 2008 and Spring 2009, Niagara County, New York

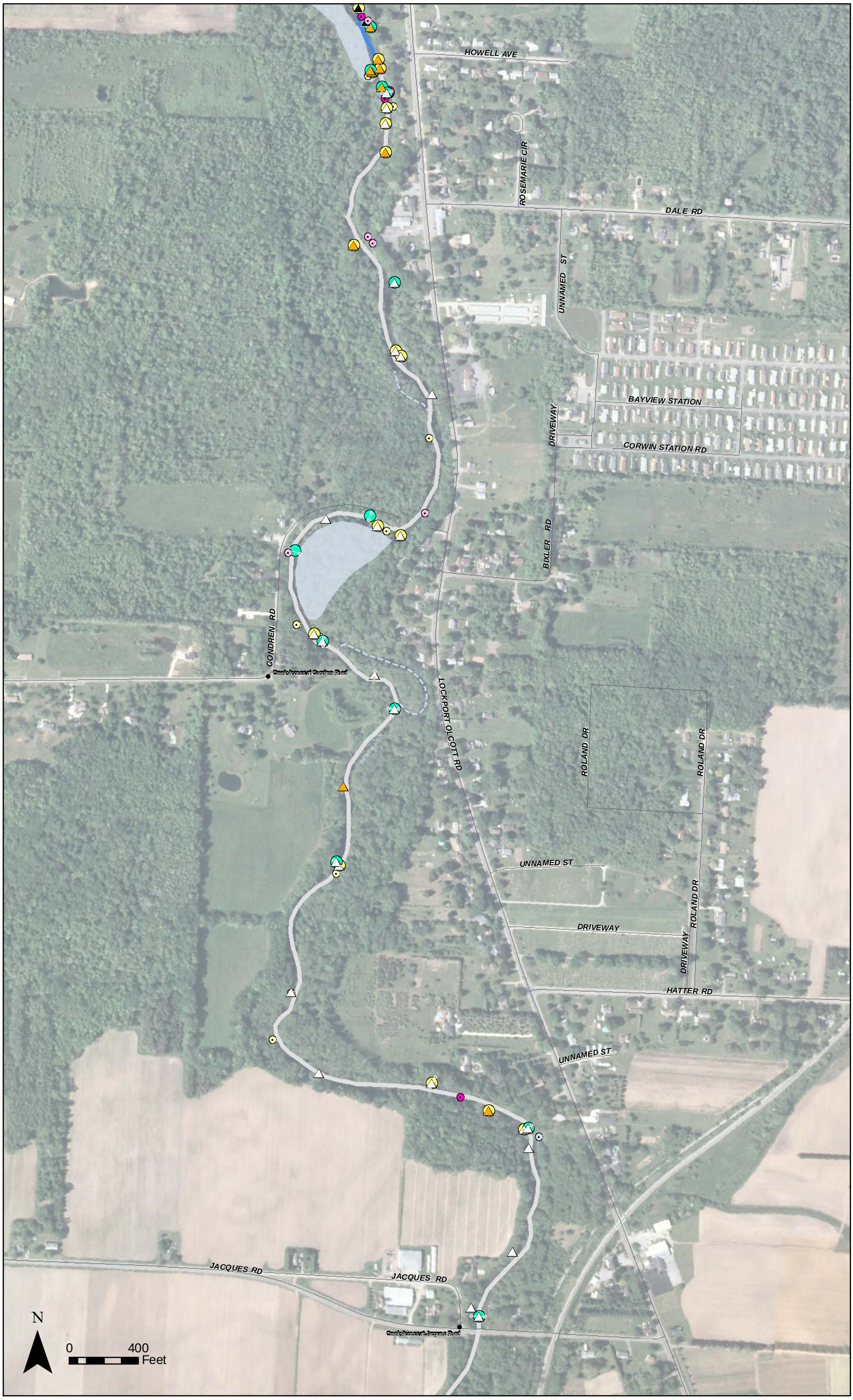


Sediment Thickness
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

Water Depth
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

- Tributary
- Drainage
- Obstruction
- Outfall
- Other
- Bank Point
- Cattail
- Sediment Deposition Area
- Forested Wetland
- Cattail Marsh
- Tributary
- Bedrock Channel with Organic Sediment Deposits
- Clay Bottom
- Deep Water, Silty Bottom with Thick Sediment
- Gravelly Bottom

Figure 3-3 Reach 5
Eighteenmile Creek Field Reconnaissance,
Fall 2008 and Spring 2009, Niagara County, New York



Sediment Thickness
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

Water Depth
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

- Tributary
- Drainage
- Obstruction
- Outfall
- Other
- Bank Point
- Cattail
- Sediment Deposition Area
- Forested Wetland
- Cattail Marsh
- Tributary
- Bedrock Channel with Organic Sediment Deposits
- Clay Bottom
- Deep Water, Silty Bottom with Thick Sediment
- Gravelly Bottom

Figure 3-4 Reach 6, Segment 1
Eighteenmile Creek Field Reconnaissance,
Fall 2008 and Spring 2009, Niagara County, New York

RIDGE RD
UNNAMED ST
EWINGS RD
RIDGELEA DR
DRIVEWAY
DRIVEWAY
PURDY RD
DRIVEWAY
STONE RD
LEETE RD
SHARON DR
SHARON DR
OLD NIAGARA RD
PLANK RD
UNNAMED ST
CANDLEWOOD DR
UNNAMED ST
N
0
2,000
Feet

Sediment Thickness
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

Water Depth
- < 1 ft
- 1 ft - 3 ft
- > 3 ft

- Tributary
- Drainage
- Obstruction
- Outfall
- Other
- Bank Point
- Cattail
- Sediment Deposition Area
- Forested Wetland
- Cattail Marsh
- Tributary
- Bedrock Channel with Organic Sediment Deposits
- Clay Bottom
- Deep Water, Silty Bottom with Thick Sediment
- Gravelly Bottom

Figure 3-5 Reach 7, Segment 2
Eighteenmile Creek Field Reconnaissance,
Fall 2008 and Spring 2009, Niagara County, New York

4 Recommendations

Section 4 summarizes implications of the Phase 1 reconnaissance survey results for Phase 2 sampling and analysis activities. To support the planning process, a preliminary conceptual site model is presented for each reach of the creek. Section 4 lists considerations for the planning sampling and analysis activities. Some of these considerations were discussed in the PCT team planning meeting held on May 21, 2009.

4.1 Conceptual Site Model

The reconnaissance survey results were used to divide Eighteenmile Creek into a series of reaches representing Eighteenmile Creek which are based upon the groupings of areas characterized by similar physical (e.g., substrate) conditions (see Figure 2-1 and Table 2-1). A number of considerations and recommendations are provided for each reach. These vary from reach to reach based upon reach characteristics such as number of depositional areas identified, sediment depths, access, water depths, etc. A brief description of these considerations for each reach is provided below:

- **Reach 1** is downstream of Burt Dam and is not considered in this RI/FS. Remedial actions upstream of the dam will act to reduce the PCB load to this area.

- **Reach 2** is the Burt Dam impoundment. This area was not included in this field reconnaissance effort but the bathymetric survey was completed in early June by Aqua Survey. The results of that activity will be provided in a separate report. This area will be treated similar to a lake. The surficial sediment concentrations will likely be the most critical data points. The basic assumption is that high concentrations of PCBs in the surface sediments are biologically available and will be critical to future remedial efforts. It also is assumed that subsurface sediments in the deeper water would not be exposed during scour or other normal water flow events in this reach. The data needs for an evaluation of the concentrations in subsurface sediments will be discussed after the results of the bathymetric survey are reviewed.

- **Reach 3** is characterized by the historic stream channel that was flooded after the installation of the dam. Large sediment deposition areas have formed where the swift moving upstream creek flows into the impoundment area and the flow velocities drop quickly. Both surface and subsurface sediments could be subject to movement and therefore concentrations of contaminants need to be investigated at all depths. Marsh and forested wetland features may have been exposed to PCB contaminated sediments in the creek during historic flooding events. As a result, surface sediment concentrations in these areas may need to be considered. Access for sediment sampling may be difficult due to shallow water.

- **Reach 4** is relatively swift moving with minimal sediment depositional areas. Limited sampling in this area is expected and will likely be focused on surface grabs. Forested wetland areas and marshes near Ide Road could have been exposed to historic flooding and surface sediment concentrations in these areas may need to be considered. One tributary and one relict stream channel near Newfane Dam should also be investigated due to the potential of past and current sediment deposition from high flow events. Obstructions to creek flow and a steel tank may have contributed to accumulation sediment behind the structures that should be sampled. These obstructions need to be considered for safety concerns.

- **Reach 5** is the impoundment area behind Newfane Dam with deep sediment and water. Surface and subsurface sediment characterization will be relevant in this portion of the creek because of the sediment depths discovered and therefore the probability of the area containing legacy constituents somewhere in the sediment profile. There is also the potential consideration of the future removal of the dam and the need for characterization of the material behind the dam prior to its dismantling. Several outfalls from the Newfane area may contribute contaminants to the creek other than PCBs and locations downstream from these features should be sampled. Sampling with more than a hand coring device will likely be required to characterize the sediment at depth. Access to this location with proper equipment may be problematic. A number of relict creek channels, marsh areas, and wetlands are likely to have been exposed to historic flooding from overbank flooding. Surface sediments will need to be considered in these areas.

- **Reach 6** is characterized by limited access, relatively shallow sediment deposition areas, and higher water velocities. There are two historic creek channels and one forested wetland that could have been exposed to historic overbank flooding and consequently surface sediment concentrations in these areas need to be considered. Several outfalls from the Newfane area and agricultural drainage areas may contribute contaminants to the creek other than PCBs. A 1.5-mile stretch was not fully characterized and has access issues due to large woody debris. Additional field observations are required during sampling activities. Clearing of the area may be required.

- **Reach 7** is characterized by limited access and large stretches of slow moving water and high sediment deposition. Surface sediment concentrations should be considered, but the depth of the sediment in the depositional areas and potential scour suggest that remedial options might target removal of sediment to native material. Characterization of subsurface sediment concentrations would be limited to composite samples. Several agricultural drainage areas

may need to be sampled for potential pesticide contamination. A 1.3-mile stretch was not fully characterized and has access issues due to large woody debris. Additional field observations are required during sampling activities. Clearing of the area may be required. A 1-mile stretch of the area sampled during the PCB trackdown study (EEEPC 2007) may require less sampling than the other areas of the creek. A "hot spot" sampled and analyzed during the trackdown study near Plank Road will require additional investigation.

- **Reach 8** is characterized by swift moving water, steep channel slope (as the creek descends the escarpment) and bolder-cobble-gravel substrates with little-to-no opportunities for sediment deposition. No sediment is expected in this area and sampling or remedial actions are considered unlikely.

- **Reach 9** is outside the Eighteenmile Creek Corridor site but was characterized by NYSDEC during the PCB trackdown investigations. No additional sampling is anticipated as part of the RI.

- **Reach 10** is the Eighteenmile Creek Corridor site that was characterized during NYSDEC investigations. No additional sampling is anticipated as part of this RI.

Contaminants of Concern

A list of contaminants of concern (COCs) is provided in the USACE Sampling Plan included in the Eighteenmile Creek State of the Basin report (EEEPC 2007a) as follows:

- **PCBs** – primary COC due to high levels of bioaccumulation in downstream areas of the creek.

- **Metals** – including chromium, copper, lead, mercury, nickel and zinc, manganese and cyanide were listed as potential sources unknown.

- **Chlorinated Pesticides** – assume pesticides are likely inputs from agricultural sources.

- **Polychlorinated dibenzodioxins and furans (PCDD/F)** from New York State Barge Canals and possibly Flintkote site.

The NYSDEC record of decision for the Flintkote site also listed PCBs and metals as COCs for sediment and water quality, but added the following COCs.

- **Polycyclic aromatic hydrocarbons (PAHs)** - potential coal tar source or urban runoff.

- Metals listed above and also antimony, arsenic, barium and silver.

Previous studies by NYSDEC and NCSWCD targeted PCBs, lead and other select metals (i.e., arsenic, copper, chromium, zinc, and mercury) as key indicator compounds for contamination in the Eighteenmile Creek sediments.

Surface sediment samples from the historical investigations show relatively uniform PCB concentrations except for hotspot just downstream of Plank Road. The hot spot requires further investigation and may be due to a culvert that was built with PCB oil-coated fill or NYSEG substation in the vicinity. The high slit sediments mean higher deposition, less transport out of this area and these sediments require more sampling for PCBs. These sediments were identified in Reaches 4, 5 and 7. Metals concentrations are historically found in all samples at consistent levels and samples will collected at a representative portion for these contaminants. PAHs appear to be related to normal urban runoff except for a potential coal tar seeping to creek near the Van DeMark site that is under investigation.

Stakeholders

An estimated 15 stream owners may be potentially be impacted by cleanup efforts. The Town of Newfane is a primary stakeholder and public meetings are anticipated at key decision points to keep the stakeholder informed of the project status and potential remedies.

4.2 Sampling and Analysis Recommendations

The recommendations are based on findings from the Phase 1 survey and discussions held during the PCT team planning meeting on May 21, 2009.

Analysis

PCBs are the primary COC. Analysis of PCBs as Aroclors is necessary to be consistent with historical data. However, PCB congener data are needed for toxicology data assessments and a statistical significant set of samples will need to be analyzed for congeners to provide a potential correlation to the Aroclor data. Total organic carbon (TOC) data are needed for PAH equilibrium partitioning model and to determine if PCBs are bioavailable in the sediment. TOC corrected concentrations are important for determination of clean-up levels. The collection of

acid volatile sulfides/simultaneously extracted metals (AVS/SEM) data should also be considered as measure of bioavailability of the metals. Concentrations of PCBs are not considered to be high enough for hazardous material shipping. Metals previous used as indicator COCs should be considered for future analysis. For PAHs, PCT indicates all 16 target compound list (TCL) PAHs should be used for analysis.

Sampling Issues

Sampling Locations, Depths, and Numbers.

- Wetlands/historic creek channels and forested wetlands
  - Low relative cost so representative samples should be collected
  - Use historical photos to identify areas that may have been impacted since introduction of PCBs
  - Sample and analyze top 0.5 feet of core, then composite the remaining core to get an average concentration of the subsurface materials
  - A few representative areas - at least three areas.

- Tributaries
  - 50 feet up the tributary
  - full suite of pesticides
  - confirm not sources of other contaminants
  - serve as a background

- Flood plain model may be used to determine statistical representative number of samples in these areas.

- Sediment deposition areas assume about 10 samples per acre.

- Sediment deposition lines assume about 1 core every 50 linear feet.

- Impoundments Areas
  - Do full scan on cores behind dams
  - Sample intervals: 0 to 6 inches and 6 to 12 inches and every 2 feet below.

Sampling Logistics

- **Debris and Obstructions** – There are large amounts of woody debris, strainers, etc. that cover parts or all the way across the creek. Removal of the debris will allow easier movement on the creek, but may result in loss of trapped sediment. It is anticipated that removal of the obstructions would be conducted downstream to upstream so they can be floated downstream, unless debris was hauled away.

- **Water and sediment depths** – There are areas where the water is above chest wader height and/or sediment is many feet thick. A work platform will be needed in these areas because the sampling will require the operator(s) to stand over the sample point (for safety reasons work cannot be performed over the side of a boat). The platform will need to be of sufficient size to accommodate equipment, opening of the cores, and decontamination of equipment.

- **Sampling teams** – Because of the obstacles and the transport of the equipment to the sampling locations, this will be a physically demanding effort. The number of teams, number of samples, sampling equipment and the affects of weather (e.g., heat exhaustion) will need to be factored into the sampling approach. Each sample team would require at least three personnel: two on water and one on bank. In addition, an extra person may be required for sample processing, packing and management.

- **Safety considerations** – Sampling within the Newfane impoundment will pose safety issues that may require a subcontractor to provide a sampling platform. Additionally there are some areas of outtakes, pump houses, which present additional safety concerns.

- **Time considerations** – The field survey indicated the length of the field day relative to distance to access points will need to be considered when developing the sampling approach. In addition, recovery of sediment core at some locations may be a challenge so composites are recommended. Depending on volume required for analyses per sample, it is likely that each sample will require advancing the sampler at least 2 times or more for QA samples.

- **Creek access** – Potential access locations were identified during the survey, but additional access points may be necessary to reduce the distance that sampling equipment will need to be transported to the creek and to provide access for support vehicles.

5 References

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