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

FIELD SAMPLING PLAN

Remedial Investigation

Eighteenmile Creek Area of Concern

Niagara County, New York

WA No. 051-RICO-1527/Contract No. EP-S5-06-01

November 2009

PREPARED FOR

U.S. Environmental Protection Agency

PREPARED BY

CH2M HILL
Ecology and Environment, Inc.
Environmental Design International, Inc.
Teska Associates, Inc.

Field Sampling Plan for the Eighteenmile Creek Area of Concern Niagara County, New York

Remedial Investigation

WA No. 051-RICO-1527/Contract No. EP-S5-06-01

November 2009

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Great Lakes National Program Office
77 West Jackson Boulevard
Chicago, Illinois 60604

Prepared by:

CH2M HILL, Inc.

and

Ecology and Environment Engineering, P.C.
368 Pleasant View Drive
Lancaster, New York 14086

Table of Contents

List of Tables

List of Figures

List of Acronyms

AOC	-	Area of Concern
AVS/SEM	-	Acid volatile sulfides/simultaneously extracted metals
BGS	-	below ground surface
BUI	-	beneficial use impairment
°C	-	degrees Celsius
CAMP	-	Community Air Monitoring Plan
cfs	-	cubic feet per second
CLP	-	Contract Laboratory (program)
COC	-	chain of custody
DER	-	Division of Environmental Remediation
DOT	-	United States Department of Transportation
EEEPC	-	Ecology and Environment Engineering, P.C.
EPA	-	United States Environmental Protection Agency
FS	-	feasibility study
FSP	-	field sampling plan
GIS	-	Geographic Information System
GLLA	-	Great Lakes Legacy Act
GLNPO	-	Great Lakes National Program Office
GPS	-	Global Positioning System
HASP	-	health and safety plan
IGLD	-	International Great Lakes Datum
IJC	-	International Joint Commission
µg/kg	-	micrograms per kilogram
mg/kg	-	milligrams per kilogram
MS/MSD	-	matrix spike/matrix spike duplicate
NAD	-	North American Datum
NAPL	-	nonaqueous phase liquid
NCSWCD	-	Niagara County Soil and Water Conservation District
NTU	-	nephelometric turbidity unit
NYS	-	New York State
NYSDEC	-	New York State Department of Environmental Conservation
NYSDOH	-	New York State Department of Health
PAH	-	polycyclic aromatic hydrocarbon
PCB	-	polychlorinated biphenyl
PCOC	-	potential contaminants of concern
PCT	-	Project Coordination Team
PPE	-	personal protective equipment
QAPP	-	quality assurance project plan
QC	-	quality control
RAP	-	Remedial Action Plan
RAC	-	Remedial Action Committee

RI	-	remedial investigation
ROD	-	record of decision
SOW	-	Statement of Work
SPDES	-	State Pollutant Discharge Elimination System
SVOC	-	semivolatile organic compound
TAL	-	Target Analyte List
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
UTM	-	Universal Transverse Mercator
VOC	-	volatile organic compound

Distribution List

Party	Affiliation and Title	Revision	Date Sent
Eighteenmile Creek FSP Phase 2 Draft			
Jewelle Keiser	CH2M HILL Site Manager	1	November 2009
Kris Erickson	EEEPC Assistant Site Manager	1	November 2009
Victor DiGiacomo	NCSWCD Project Manager	1	November 2009
Mary Beth Ross	USEPA Work Assignment Manager	1	November 2009
Louis Blume	USEPA QA Officer	1	November 2009
To Be Determined	EEEPC Field Team Leader	1	November 2009

1 Introduction

This Field Sampling Plan (FSP) defines the procedures that will be used to perform the remedial investigation (RI) at the Eighteenmile Creek Area of Concern (AOC). The effort is being conducted in accordance with the Statement of Work (SOW) for Work Assignment No. 051-RICO-1527 issued to CH2M HILL under United States Environmental Protection Agency (USEPA) Remedial Action Contract 2 No. EP-S5-06-01.

Eighteenmile Creek is located in Niagara County in Western New York State. The Eighteenmile Creek AOC addressed under this FSP includes Olcott Harbor and extends upstream through the City of Lockport to the New York State (NYS) Barge Canal (see Figure 2-1 in Appendix A). The Eighteenmile Creek watershed is composed primarily of croplands and orchards, with residential, commercial, and industrial areas located around Lockport, Newfane, and Olcott Harbor. The major sources of sediment contaminants are believed to be the canal, historically industrialized areas of Lockport, and the Lockport wastewater treatment plant. The Burt and Newfane dams may serve as areas where contaminated sediments accumulate in the creek.

The USEPA has tasked CH2M HILL and their team contractor, Ecology and Environment Engineering, P.C. (EEEPC) with finalizing the plans and implementing the nature and extent sampling (see Section 2) to collect the data that will be used in the alternatives-analysis process and the development of the feasibility study (FS). The Eighteenmile Creek Great Lakes Legacy Act (GLLA) Project Coordination Team (PCT) includes the USEPA Great Lakes National Program Office (GLNPO), the Niagara County Soil and Water Conservation District

(NCSWCD), the New York State Department of Environmental Conservation (NYSDEC), the United States Army Corps of Engineers (USACE), and USEPA Region 2.

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 the City of Lockport and the Burt Dam. Although 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.

This investigation is being conducted in two phases. The first phase (Phase 1) has been completed (see the *Phase 1 Reconnaissance Survey, Eighteenmile Creek AOC* [CH2M HILL, Inc. and Ecology and Environment Engineering, P.C. 2009]) and 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 that could be encountered during the second phase (Phase 2) of the field activities. Phase 1 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. Phase 1 field efforts were performed in winter 2008 and spring 2009 in accordance with the approved Quality Assurance Project Plan (QAPP) (CH2M HILL, Inc. and Ecology and Environment Engineering, P.C. 2008a). 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 could affect future Phase 2 RI sediment collection activities. A bathymetric and sediment thickness survey of the Burt Dam impoundment was also conducted by Aqua Survey in June 2008. The findings of Phase 1 were used to develop the strategy and

approach for the sampling and analysis program (Phase 2) for evaluating the nature and extent of contamination in the AOC.

This FSP defines the overall scope of characterizing the nature and extent of potential contaminants of concern (PCOCs), surface water hydrology, and ecological conditions of the Eighteenmile Creek AOC.

This FSP was prepared to provide specific details on the data collection methods and the analytical program to be conducted for the nature and extent investigation. In addition to this FSP, the field investigation will be conducted in accordance with a project-specific QAPP and a site-specific health and safety plan (HASP), which are provided as Appendices A and B, respectively. The QAPP includes a detailed description of the AOC, problem definition, and background.

2 Investigation Approach

2.1 Project Objective and Approach

This section describes the objectives and approach for the second phase of the RI activities that will be implemented to determine the nature and extent of contamination in the creek upstream from Burt Dam to the NYS Barge Canal. The results of the Phase 1 reconnaissance survey were used to develop the sampling and analytical program presented here. A detailed description of the sampling rationale is provided below. Additional detail on the sampling program objectives are provided in Section 1 of the QAPP (Appendix A).

Field Activities

The Phase 2 field effort will be divided into the following activities.

- Mobilization and additional field reconnaissance;
- Field sampling of creek channel and tributaries using hand coring;
- Field sampling of wetlands and historic creek channels; and
- Field sampling in deep water areas behind Burt Dam and Newfane Dam using vibracoring.

Mobilization Activities

The following mobilization and planning activities will be conducted prior to the initiation of the field investigation:

- Completion of reconnaissance survey in areas not visited in Phase 1 (southern part of Reach 6 and northern portion of Reach 7) prior to submittal of this FSP.

- Identifying access locations, potential hazards/obstacles, field support equipment, supplies, and facilities; procurement of required field equipment and supplies.

- Coordination with the local non-federal sponsor (Remedial Action Plan [RAP] Coordinator at the NCSWCD) to coordinate access with property owners, if needed and to notify public of field activities, especially with the onset of the hunting season.

- Coordination with the vessel/sampling subcontractor and mobilization of equipment and supplies to the field site. The box truck with the field supplies and the boat will be staged at NCSWCD Extension offices for the duration of the field work.

- Preparation of detailed geographic information system (GIS) field maps showing the sampling locations and configuration of the handheld global positioning system (GPS) units with field data forms and aerial images.

Field Sampling Activities

During sample collection, the following information will be logged at each location:

- The coordinates of the sample location using a handheld GPS unit. Surface elevation also will be collected at vibracore locations by the vibracoring subcontractor.

- The water depth (in inches) using a yard stick or weighted tape measure, where applicable.

- Sediment depth (in inches) to refusal (bedrock or native material). Geologic log of sediment cores and lithologic description of grab soil or sediment samples.

All information will be recorded using a combination of the GPS unit, field notebooks, and digital photography. The GPS unit will be configured to enter field data such as water depth, sediment depth, and creek width. GPS data and digital photographs will be downloaded at the end of each field day. Field sampling information will be entered into Forms II Lite® at the end of each sampling day.

Analytical Program

Previous investigations have indicated that the PCOCs in Eighteenmile Creek sediment include polychlorinated biphenyls (PCBs), selected metals (chromium, copper, lead, manganese, nickel, zinc, and mercury), dioxins, pesticides, and polycyclic aromatic hydrocarbons (PAHs). Because historical data indicate that PCBs and metals are the primary PCOCs, all the samples will be analyzed, at a minimum, for PCBs as Aroclor mixtures and Target Analyte List (TAL) metals. In addition, all samples will be analyzed for total organic carbon (TOC). The proposed analyses for

hand-core and vibracore samples are summarized in Tables 2-1 and 2-2. Representative portion of samples (40 percent) from each reach will be analyzed for target compound list (TCL) PAHs, pesticides, and grain size. Approximately 40 percent of the surface sediment samples will also be analyzed for PCB congeners to allow correlation between Aroclor and PCB congeners for the determination of total PCBs and for acid volatile sulfides/simultaneously extracted metals (AVS/SEM) to access the bioavailability of the metals. For purposes of this work, the whole core composite samples will be considered equivalent to a surface sediment. Samples collected from the sediments within the tributaries will be analyzed for the full suite of PCOCs because the results of these samples will also serve to define background conditions. Sample selection for full suite analysis is based on proximity to outfalls or drainage areas that could have additional contamination sources or locations where anomalies were observed during site reconnaissance.

Laboratory Analysis

The samples will be analyzed by USEPA contract laboratory program (CLP) laboratories or an independent laboratory procured by CH2M HILL. The specific media, numbers of samples, and the method requirements for the analyses are discussed in the QAPP. For the current phase of the investigation, the USEPA CLP will conduct all of the chemical analysis. TOC and grain size analysis and AVS/SEM will be contracted under the CLP or analyzed by an independent off-site laboratory(ies) contracted by CH2M HILL.

2.2 Investigation Areas and Sampling Approach

Main Creek Reaches

The Eighteenmile Creek AOC was divided into seven smaller investigation areas/reaches based on the physical characteristics of the creek observed during the Phase 1 reconnaissance effort (see Appendix A, Figure 2-1). The proposed investigation to be conducted for each investigation area or reach is described below (downstream to upstream). The sampling locations are depicted on Figures 2-1 through 2-6. These proposed locations may be modified in the field based on field conditions and observations. The reach identifier (R2 through R7) is included at the

Table 2-1 Summary of Sediment Cores by Reach, Eighteenmile Creek, Niagara County, New York

Reach	Length of Reach (Feet)*	Transect Spacing (Feet) **	No. of Transects	No. of Cores Per Transect	Depth of Sediment (feet)	Surface Sediment Samples (0-1', One per Core)	Subsurface Samples per Core (2' Intervals to refusal)	Total Subsurface	Percent Subsurface Samples Analyzed	Total Subsurface for Analysis	Total Samples for Analysis
Reach 2	7815		5	3	13	15	6.0	90	50%	45	60
Reach 3	2188	600	4	3	10	12	5.0	60	50%	30	42
Reach 5	2294	600	4	3	7	12	3.0	36	100%	36	48
Totals						39		186		111	150

* length of reach applies only to areas of Deep Water, Silty Bottom with Thick Sediment for Reaches 3 and 5

** For Reach 2 transects will spaced along entire length of reach and one transect behind Burt Dam

Table 2-2 Summary of Sediment by Reach, Eighteenmile Creek, Niagara County, New York

		Total Length or Area [1]	Core Spacing (Feet)	Depth of Sediment (feet)	Total Number of Samples/ Cores [2,3,5]	PCBs, metals and TOC Only			Full sweep [9]			Total Samples		
						No. of Samples [6]	No. of QC Samples [7]	No. of Lab Samples [8]	No. of Samples [10]	No. of QC Samples [7]	No. of Lab Samples [8]	No. of Samples	No. of QC Samples [7]	No. of Lab Samples [8]
Vibracore Sediments	Reach 2	7,185		13	60	36	6	42	24	4	28	60	10	70
	Reach 3	2,188	600	10	42	26	4	30	16	3	19	42	7	49
	Reach 5	2,194	600	7	48	29	5	34	19	3	22	48	8	56
	Total Creek Samples				150	91	15	106	59	10	69	150	25	175
Hand core Sediments [2]	Reach 4	5,357	~500	1	11	7	2	9	4	1	5	11	3	14
	Reach 6	2,773	~200	1	17	11	2	13	6	1	7	17	3	20
	Reach 7 [4]	4,758	~100	3	39	24	4	28	15	3	18	39	7	46
	Total Creek Samples				67	42	8	50	25	5	30	67	13	80
	Tributaries [5]	7	1 per	-	14				14	3	17	14	3	17
					81									
Surface Soils [3]	Wetlands (12)	12 areas (18 acres total area)	1 per		12	8	2	10	4	1	5	12	3	15
	Historic Creeks (3) /Drainage areas (35)	38	25%		9	6	1	7	3	1	4	9	2	11
Totals Handcore and Surface					102	56	11	67	46	10	56	102	21	123
Total Project Samples					252	147	26	173	105	20	125	252	46	298

[1] For Reach 4 the total length of the reach in feet. For Reach 6 and 7 the total length of depositional area in feet. Other areas are number of features present.

[2] For sediment hand core samples, collect one composite sample per core from entire core.

[3] For surface soil samples, collect a sample from 0 to 6 inches below grade.

[4] Includes one hot spot confirmation sample.

[5] For each tributary (7 total), collect one grab surface sample and a second composite sample underneath.

[6] 60% of the samples will be analyzed only for these parameters.

[7] Assumes 15% QC Samples (5% MS, 5% MSD and 5% field duplicates).

[8] Includes total samples that will be charged.

[9] Includes: PCBs, TAL Metals, Pesticides, TCL PAH, TOC and grain size. PCB Congeners and AVS/SEM will be analyzed on 20% of high concentration samples (50 total).

[10] 40% of the samples will be analyzed only for these parameters.

beginning of every sample identification code. Sample locations within the creek were numbered in an ascending order from downstream to upstream and from left descending bank to right descending bank. These locations are identified by a –C or –V, for hand coring or vibracoring, respectively. A complete list of samples is presented in Table 2-3.

Reach 2

Reach 2 consists of the Burt Dam impoundment. The bathymetric survey conducted during Phase 1 reported shorelines with steep to near vertical slopes and water depths ranging up to about 37 feet. The historic creek channel is still evident throughout most of the survey area. Measurements along transects at the upstream end of the impoundment found sediment thicknesses averaging about 13 feet. Similar to other deep lake environments, the exposure to PCBs in the surficial sediments is the main exposure route, and the concentration levels of PCBs in this biologically active layer are the critical data needed for evaluating potential remedial alternatives. Based on the hydrology of the impoundment, the potential for the subsurface sediments to be exposed by scour or high-flow events in this reach is low. However, there is a potential for Burt Dam to be removed at some point in the future. A few subsurface sediment samples are planned to evaluate the contaminated sediment mass behind the dam. Historical studies indicate that PCBs are present at depth (28 to 56 centimeters [cm], approximately 11 to 22 inches) in the center of the impoundment (New York State Department of Environmental Conservation December 2001). No historical data address the banks of the impoundment.

Planned sediment sampling within the Burt Dam impoundment will be conducted along five cross-sectional transects (i.e., perpendicular to the creek's flow). Sampling locations are shown on Figure 2-1. Aerial photographs, historical dam records, and bathymetric survey data were reviewed to select specific placement of both transects. Sampling will be performed via vibracoring. Each transect will include three coring locations, including the right bank of the historical creek channel, the left bank of the historical creek channel, and the centerpoint of the creek or from the deepest part of the creek as determined by the bathymetric survey. The first transect will be approximately 200 feet upstream of the dam in order to avoid the geotextile that,

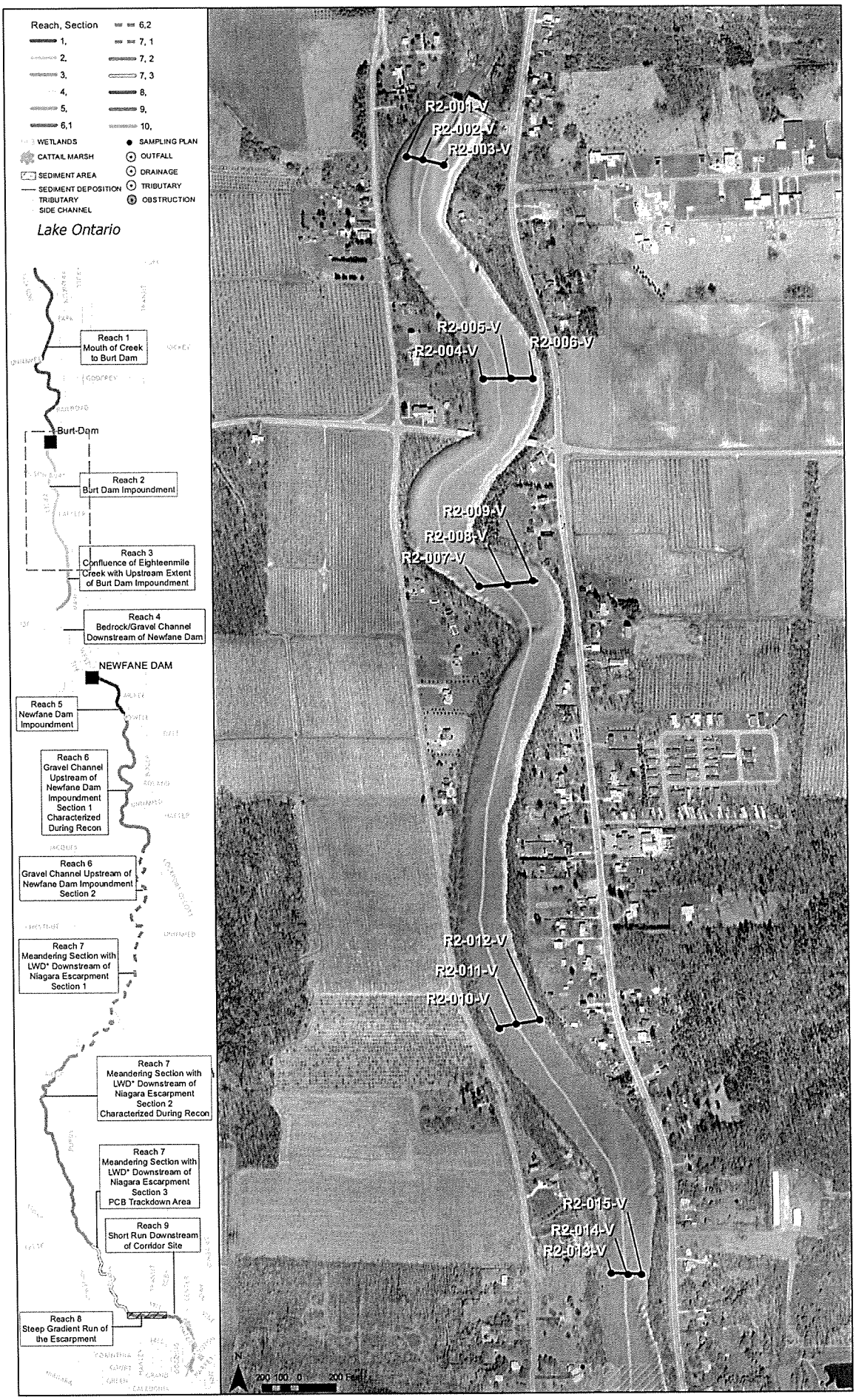

Figure 2-1 Sampling Locations in Reach 2

Table 2-3a Planned Vibracore Sample Locations and Analysis

Reach	Location Number	Bank[1]	Cat[2]	Analysis			Sample ID	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Sediment Depth
				R[3]	FS[4]	A[5]		0.0-1.0	1.0-3.0	3.0-5.0	5.0-7.0	7.0-9.0	9.0-11.0	11.0-13.0	(~ feet)
R2	R2-001	LB	V	2	2	3	R2-001-V	***FS***	R	FS	A	A	A	R	13
R2	R2-002	C	V	2	2	3	R2-002-V	FS	R	A	FS	A	A	R	13
R2	R2-003	RB	V	3	1	3	R2-003-V	FS	R	A	A	R	A	R	13
R2	R2-004	LB	V	3	1	3	R2-004-V	FS	R	A	A	R	A	R	13
R2	R2-005	C	V	2	2	3	R2-005-V	FS	R	A	FS	A	A	R	13
R2	R2-006	RB	V	2	2	3	R2-006-V	***FS***	R	FS	A	A	A	R	13
R2	R2-007	LB	V	3	1	3	R2-007-V	***FS***	R	R	A	A	A	R	13
R2	R2-008	C	V	2	2	3	R2-008-V	FS	R	A	FS	A	A	R	13
R2	R2-009	RB	V	3	1	3	R2-009-V	FS	R	A	A	R	A	R	13
R2	R2-010	LB	V	2	2	3	R2-010-V	FS	R	FS	A	A	A	R	13
R2	R2-011	C	V	2	2	3	R2-011-V	FS	R	A	FS	A	A	R	13
R2	R2-012	RB	V	3	1	3	R2-012-V	***FS***	R	A	A	R	A	R	13
R2	R2-013	LB	V	3	1	3	R2-013-V	***FS***	R	A	A	R	A	R	13
R2	R2-014	C	V	2	2	3	R2-014-V	FS	R	A	FS	A	A	R	13
R2	R2-015	RB	V	2	2	3	R2-015-V	FS	R	FS	A	A	A	R	13
Total for Reach 2			105	36	24	45									
R3	R3-016	LB	V	3	1	2	R3-016-V	***FS***	R	A	R	A	R		10
R3	R3-017	C	V	2	2	2	R3-017-V	FS	R	FS	A	A	R		10
R3	R3-018	RB	V	2	1	3	R3-018-V	FS	R	A	A	A	R		10
R3	R3-019	LB	V	2	1	3	R3-019-V	FS	R	A	A	A	R		10
R3	R3-020	C	V	2	2	2	R3-020-V	FS	R	A	FS	A	R		10
R3	R3-021	RB	V	3	1	2	R3-021-V	***FS***	R	R	A	A	R		10
R3	R3-022	LB	V	2	1	3	R3-022-V	***FS***	R	A	A	A	R		10
R3	R3-023	C	V	2	2	2	R3-023-V	FS	R	A	A	FS	R		10
R3	R3-024	RB	V	2	1	3	R3-024-V	FS	R	A	A	A	R		10
R3	R3-025	LB	V	2	1	3	R3-025-V	FS	R	A	A	A	R		10
R3	R3-026	C	V	2	2	2	R3-026-V	FS	R	FS	A	A	R		10
R3	R3-027	RB	V	2	1	3	R3-027-V	***FS***	R	A	A	A	R		10
Total for Reach 3			72	26	16	30									

Table 2-3a Planned Vibracore Sample Locations and Analysis

Reach	Location Number	Bank[1]	Cat[2]	Analysis			Sample ID	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Sediment Depth (~ feet)
				R[3]	FS[4]	A[5]		0.0-1.0	1.0-3.0	3.0-5.0	5.0-7.0	7.0-9.0	9.0-11.0	11.0-13.0	
R5	R5-039	LB	V	3	1	0	R5-039-V	FS	R	R	R				7
R5	R5-040	C	V	3	1	0	R5-040-V	FS	R	R	R				7
R5	R5-041	RB	V	3	1	0	R5-041-V	***FS***	R	R	R				7
R5	R5-042	LB	V	3	1	0	R5-042-V	***FS***	R	R	R				7
R5	R5-043	C	V	3	1	0	R5-043-V	FS	R	R	R				7
R5	R5-044	RB	V	3	1	0	R5-044-V	FS	R	R	R				7
R5	R5-045	C	V	3	1	0	R5-045-V	FS	R	R	R				7
R5	R5-046	C	V	3	1	0	R5-046-V	FS	R	R	R				7
R5	R5-047	C	V	3	1	0	R5-047-V	***FS***	R	R	R				7
R5	R5-048	C	V	3	1	0	R5-048-V	FS	R	R	R				7
R5	R5-049	C	V	3	1	0	R5-049-V	FS	R	R	R				7
R5	R5-050	C	V	3	1	0	R5-050-V	***FS***	R	R	R				7
Total for Reach 5			48	36	12	0									

[1] LB -Left Bank, C - Center Channel, RB - Right Bank.

[2] Category = V - Vibracore.

EM.

[4] Includes: PCBs, TAL Metals, Pesticides, TCL PAH, TOC and grain size. Samples in bold and italics will be analyzed for AVS/SEM.

[5] Samples will be archived.

Table 2-3b Planned Handcore and Surface Sample Locations and Analysis

Reach	Location Number	Cat[1]	Analysis		Sample ID	Z1	Z2	Z3	Sediment Depth (~ feet)	Report Comments
			R^2	FS[3]		0.0-1.0	1.0-3.0	3.0-5.0		
R4	C	R4-028	0	1	R4-028-C	***FS***			2	Inlet on LDB, adjacent to DRN-054
R4	C	R4-029	1	0	R4-029-C	R			1	
R4	C	R4-030	0	1	R4-030-C	***FS***			1	Downstream of Outfalls
R4	C	R4-031	0	1	R4-031-C	***FS***			0	Near tank
R4	C	R4-032	1	0	R4-032-C	R			0	
R4	C	R4-033	1	0	R4-033-C	R			1	
R4	C	R4-034	0	1	R4-034-C	***FS***			0	Downstream of tributary
R4	C	R4-035	1	0	R4-035-C	R			0	
R4	C	R4-036	1	0	R4-036-C	R			1	
R4	C	R4-037	1	0	R4-037-C	R			1	
R4	C	R4-038	1	0	R4-038-C	R			1	
Total Cores for Reach		11	7	4						
R6	C	R6-051	0	1	R6-051-C	***FS***			2	Downstream of drainage
R6	C	R6-052	0	1	R6-052-C	***FS***			1	Back cut area along RDB, adjacent to wetland/floodplain with drainage (DRN-049), sheen and odor present
R6	C	R6-053	0	1	R6-053-C	***FS***			1	Downstream of two outfalls
R6	C	R6-054	1	0	R6-054-C	R			1	Downstream of black willow
R6	C	R6-055	0	1	R6-055-C	***FS***			1	Downstream of confluence
R6	C	R6-056	1	0	R6-056-C	R			0	
R6	C	R6-057	1	0	R6-057-C	R			1	Along LDB, immediately downstream of fallen trees
R6	C	R6-058	0	1	R6-058-C	***FS***			1	Partially exposed mudflat along LDB, strong odor
R6	C	R6-059	1	0	R6-059-C	R			1	Along LDB
R6	C	R6-060	1	0	R6-060-C	R			2	
R6	C	R6-061	0	1	R6-061-C	***FS***			2	Potential Agricultural Drainage
R6	C	R6-062	1	0	R6-062-C	R			4	
R6	C	R6-063	1	0	R6-063-C	R			2	
R6	C	R6-064	1	0	R6-064-C	R			0	
R6	C	R6-065	1	0	R6-065-C	R			2	
R6	C	R6-066	1	0	R6-066-C	R			5	
R6	C	R6-067	1	0	R6-067-C	R			3	
Total Cores for Reach		17	11	6						

Table 2-3b Planned Handcore and Surface Sample Locations and Analysis

Reach	Location Number	Cat[1]	Analysis		Sample ID	Z1	Z2	Z3	Sediment Depth (~ feet)	Report Comments
			R^2	FS^3		0.0-1.0	1.0-3.0	3.0-5.0		
R7	C	R7-068	0	1	R7-068-C	***FS***			2	Downstream of Outfalls
R7	C	R7-069	1	0	R7-069-C	R			3	
R7	C	R7-070	1	0	R7-070-C	R			2	
R7	C	R7-071	1	0	R7-071-C	R			2	
R7	C	R7-072	1	0	R7-072-C	R			2	
R7	C	R7-073	0	1	R7-073-C	***FS***			3	Downstream of Confluence
R7	C	R7-074	1	0	R7-074-C	R			3	
R7	C	R7-075	0	1	R7-075-C	***FS***			4	Near outfall and drainage area
R7	C	R7-076	1	0	R7-076-C	R			2	
R7	C	R7-077	1	0	R7-077-C	R			3	
R7	C	R7-078	1	0	R7-078-C	R			3	
R7	C	R7-079	1	0	R7-079-C	R			3	
R7	C	R7-080	1	0	R7-080-C	R			3	
R7	C	R7-081	1	0	R7-081-C	R			3	
R7	C	R7-082	1	0	R7-082-C	R			3	
R7	C	R7-083	0	1	R7-083-C	***FS***			3	Along LDB, wetland drainage at end of deposition
R7	C	R7-084	1	0	R7-084-C	R			3	Along RDB, adjacent to wetland/floodplain, soft sediment also near mid-channel
R7	C	R7-085	0	1	R7-085-C	***FS***			3	Organic material present
R7	C	R7-086	1	0	R7-086-C	R			3	Along LDB
R7	C	R7-087	0	1	R7-087-C	***FS***			3	Adjacent to wetland discharge
R7	C	R7-088	1	0	R7-088-C	R			2	Starts along RDB, extends to mid-channel, and across creek, adjacent to wetland drainage (DRN-033)
R7	C	R7-089	0	1	R7-089-C	***FS***			2	Upstream extent along LDB, two wetland drainage inputs
R7	C	R7-090	1	0	R7-090-C	R			4	Adjacent to LDB
R7	C	R7-091	1	0	R7-091-C	R			2	Upstream extent, along RDB, floodplain
R7	C	R7-092	1	0	R7-092-C	R			1	Partially exposed high water depositional area
R7	C	R7-093	0	1	R7-093-C	***FS***			1	Downstream extent, organic material present
R7	C	R7-094	0	1	R7-094-C	***FS***			1	Upstream of old bridge (OBS-029)
R7	C	R7-095	0	1	R7-095-C	***FS***			1	Downstream extent of partially exposed bar on RDB
R7	C	R7-096	1	0	R7-096-C	R			2	Adjacent to RDB

Table 2-3b Planned Handcore and Surface Sample Locations and Analysis

Reach	Location Number	Cat[1]	Analysis		Sample ID	Z1	Z2	Z3	Sediment Depth (~ feet)	Report Comments
			R^2	FS[3]		0.0-1.0	1.0-3.0	3.0-5.0		
R7	C	R7-097	1	0	R7-097-C	R			2	Along trees paralleling channel
R7	C	R7-098	1	0	R7-098-C	R			1	
R7	C	R7-099	0	1	R7-099-C	*FS*			2	Organic material present
R7	C	R7-100	0	1	R7-100-C	*FS*			1	Organic material present
R7	C	R7-101	1	0	R7-101-C	R			3	
R7	C	R7-102	1	0	R7-102-C	R			3	
R7	C	R7-103	1	0	R7-103-C	R			3	
R7	C	R7-104	0	1	R7-104-C	***FS***			3	Near PCB hotspot
R7	C	R7-105	0	1	R7-105-C	***FS***			3	Downstream of Wastewater Treatment Plant
R7	C	R7-106	0	1	R7-106-C	***FS***			3	Near petroleum seepage
Total Cores for Reach		39	24	15						
R4	T	R4-119	0	2	R4-119-T	NA	***FS***	FS	1	
R7	T	R7-120	0	2	R7-120-T	NA	***FS***	FS	1	
R7	T	R7-121	0	2	R7-121-T	NA	FS	FS	2	
R7	T	R7-122	0	2	R7-122-T	NA	FS	FS	1	Upstream extent, sunken bank along LDB
R7	T	R7-123	0	2	R7-123-T	NA	FS	FS	1	
R7	T	R7-124	0	2	R7-124-T	NA	FS	FS	1	
R7	T	R7-125	0	2	R7-125-T	NA	FS	FS	1	
Total Tributary		14	0	14						
R4	H	R4-126	1	0	R4-126-H	R			1	
R5	H	R5-127	0	1	R5-127-H	FS			1	Near Newfane drainage
R6	H	R6-128	0	1	R6-128-H	FS			1	Downstream of outfalls
R6	H	R6-129	1	0	R6-129-H	R			1	
R7	H	R7-105	0	1	R7-105-H	FS			3	Agricultural drainage area
R7	H	R7-130	1	0	R7-130-H	R			1	
R7	H	R7-131	1	0	R7-131-H	R			1	
R7	H	R7-132	1	0	R7-132-H	R			1	
R7	H	R7-133	1	0	R7-133-H	R			1	
Total Historical Creek		9	6	3						

Table 2-3b Planned Handcore and Surface Sample Locations and Analysis

Reach	Location Number	Cat[1]	Analysis		Sample ID	Z1	Z2	Z3	Sediment Depth (~ feet)	Report Comments
			R^2	FS^3		0.0-1.0	1.0-3.0	3.0-5.0		
R3	W	R3-107	0	1	R3-107-W	FS			1	Most downstream wetland area
R3	W	R3-108	1	0	R3-108-W	R			1	
R3	W	R3-109	1	0	R3-109-W	R			1	
R3	W	R3-110	1	0	R3-110-W	R			1	
R4	W	R4-111	1	0	R4-111-W	R			1	
R4	W	R4-112	0	1	R4-112-W	FS			1	Close to Newfane Dam
R5	W	R5-113	1	0	R5-113-W	R			1	
R5	W	R5-114	1	0	R5-114-W	R			1	
R5	W	R5-115	1	0	R5-115-W	R			1	
R5	W	R5-116	0	1	R5-116-W	FS			1	Downstream of outfalls
R6	W	R6-117	1	0	R6-117-W	R			1	
R7	W	R7-118	0	1	R7-118-W	FS			1	Near Wastewater Treatment Plant
Total Wetland		12	8	4						

[1] Category = C - Handcore, T - Tributary, H - Historical Creek Bed, and W -Wetland.

[2] Includes PCB, Metals, and TOC.

[3] Includes: PCBs, Metals, Pesticides, TCL PAH, TOC and grain size. Samples in bold and italics will be analyzed for AVS/SEM.

according to Niagara County, extends 80 feet upstream of the dam. The other four transects will be evenly spaced throughout the impoundment area. Continuous cores will be collected from the top of the sediment to refusal. Samples will be collected from the surface sediments (0 to 1 foot) and in 2-foot intervals thereafter. Only 50 percent of the samples will be submitted for chemical analysis; the remaining samples will be archived and may be analyzed at a later date. The top and bottom interval will be analyzed at locations. Based on the size of vessel that can access the Burt Dam impoundment, the core length may be limited to 12 feet. The sampling program for Reach 2 is summarized in Tables 2-1 to 2-3a.

Reach 3

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. Because surface and subsurface sediments in this reach could be subject to erosion and transport, concentrations of contaminants in the surface and at depth will be investigated. PCB-contaminated sediments may have also been deposited in surrounding marsh and forested wetland areas during historic flooding events. As a result, a representative number of surface soil samples from these features are also planned in this investigation.

The sampling approach for Reach 3 includes cross-sectional transects and coring locations in areas where deep sediments were observed during the reconnaissance survey. Sampling locations are shown on Figure 2-2. Three transects will be installed in the reach more or less perpendicular to the creek's flow at the beginning, middle, and end of the reach. Aerial photographs were reviewed to assist in the selection of the locations for these transects. The proposed transect locations include areas where deep sediments were identified during the reconnaissance survey (farthest downstream transect), the area downstream of the peninsula and marsh, at the island, and at the cross channel (furthest upstream transect). Sediment coring locations generally include the two banks and the creek centerpoint. For the portion of reach with large wetland and cattail islands, cores will be collected from the deepest part of the channel

at the right of the island. Continuous coring from the top of the sediment to refusal will be conducted via vibracore. Samples will be collected at the surface (0 to1 foot) and at 2-foot intervals thereafter. Similar to Reach 2, only 50 percent of the samples will be analyzed initially. The remaining samples will be archived and may be analyzed at a later date. The sampling program for Reach 3 is summarized in Tables 2-1 to 2-3a.

Reach 4

Reach 4 is relatively swift moving and includes a comparatively fewer sediment depositional areas of shallower depths. Limited sediment sampling will be conducted in this reach and will consist of surface grabs. Contaminated sediment may have been deposited in the forested wetland areas and marshes near Ide Road during historic flooding. Eleven samples will be collected. Sample locations include areas where sediment deposition is expected due to obstructions or decrease in flow velocities, near the marshes and old floodplain and near outfalls. Sampling locations are shown on Figure 2-3. These areas will be investigated by collecting sediment samples for analysis using a 3-foot hand core or, if limited sediment is present, surface sediment grabs. The proposed samples to be collected in Reach 4 are summarized in Tables 2-2 and 2-3b.

Reach 5

Reach 5 consists of the impoundment area behind Newfane Dam and includes deep water and thick sediment. The investigation for this impoundment area includes surface and subsurface sediment characterization and is based on the existence of outfalls that may have contributed contaminants in addition to PCBs and the potential for the dam to be removed in the future. The thick sediment layer indicates a higher potential for contamination to be present throughout the sediment profile. In addition, contamination sediments may have been deposited in sediments in a number of relict creek channels, marsh areas, and wetlands during historic flooding from overbank flooding. A representative number of surface sediment/soil samples from these features are also proposed in this investigation.

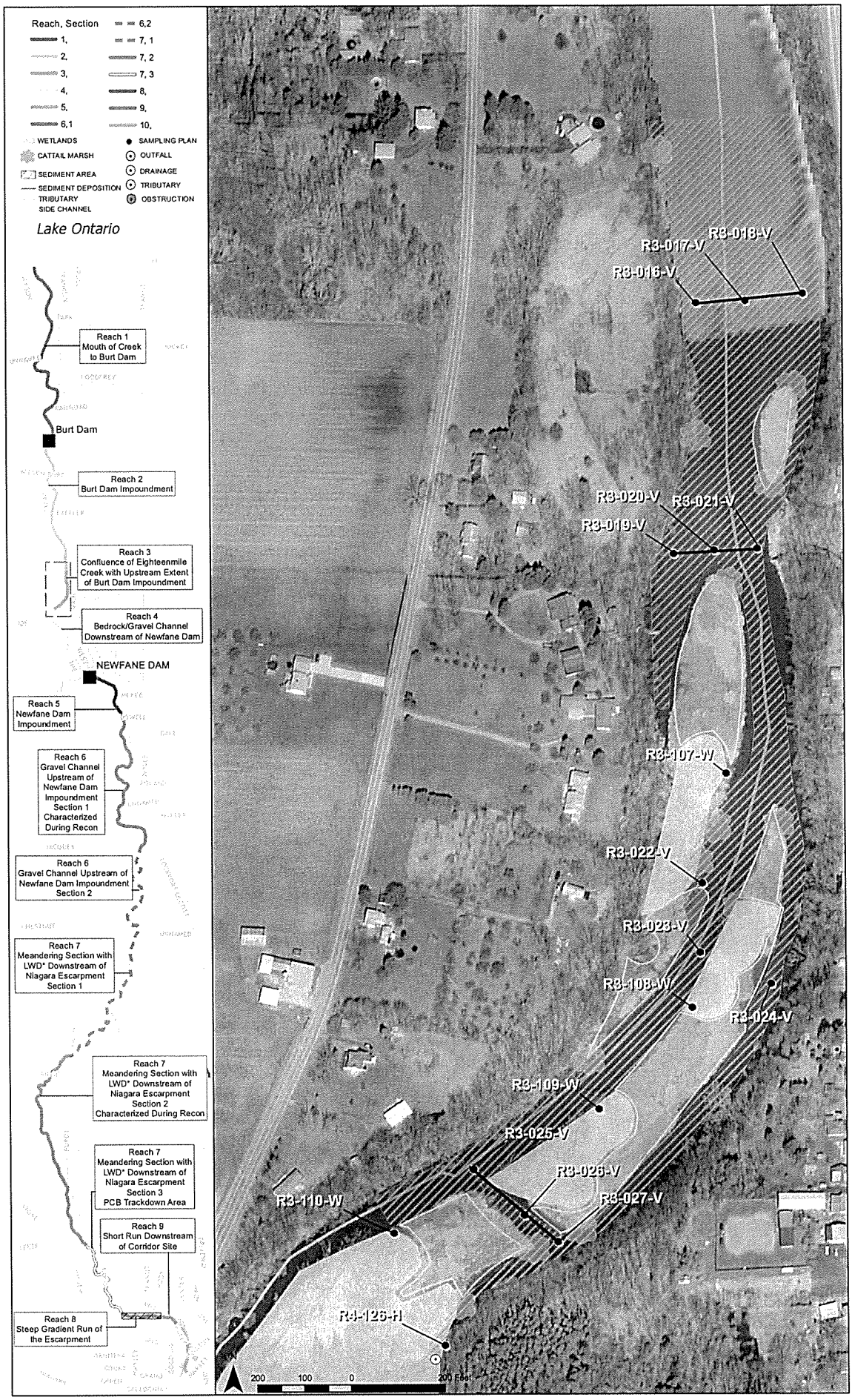

Figure 2-2 Sampling Locations in Reach 3

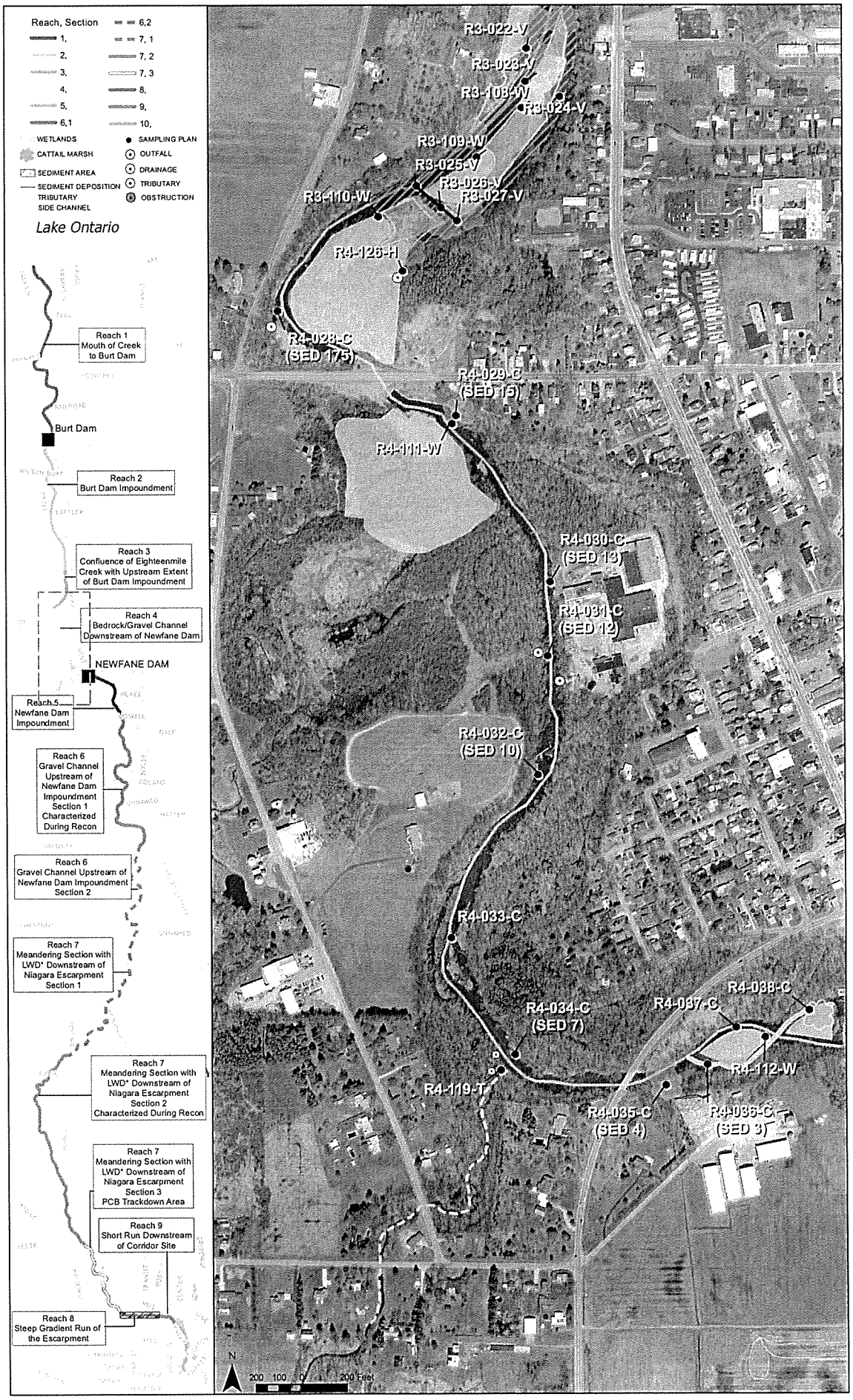

Figure 2-3 Sampling Locations in Reach 4

Sampling in Reach 5 will include cross-sectional transects in the wider portion of the impoundment directly behind the dam and additional locations in the creek channel further upstream. Sediment core sampling will be performed via vibracore. Sampling locations are shown on Figure 2-4. Aerial photographs were reviewed to assist in selecting sampling locations. Two transects will be established, one upstream of the dam and another one 600 feet upstream. Three coring locations will be established along each transect consisting of a left bank, right bank, and in the center. Additional coring locations are planned along the reach at areas where deep sediments were observed during the reconnaissance survey and in the tributary on the east side of the creek. Locations also were chosen near an observed obstruction and outfall. Vibracoring will be continuous from the top sediments to refusal. Samples will be collected at the surface (0 to1 foot) and from each 2-foot interval thereafter until refusal. Due to the lack of historical data, all the samples collected from this area will be submitted for chemical analysis. The sampling program for Reach 5 is summarized in Tables 2-1 to 2-3a.

Reach 6

Reach 6 is characterized by limited access, relatively shallow sediment deposition areas, and higher flow velocities. There are two historic creek channels and one forested wetland where contaminated sediment might have been deposited during historic overbank flooding. Several outfalls from the Newfane area and agricultural drainage areas may have also contributed contaminants other than PCBs to the creek.

Planned sampling locations are shown on Figures 2-5a and 2-5b for each segment of Reach 6. Coring locations were selected in areas where sediment was observed or near obstructions or upstream and downstream of tributaries. At each coring location one composite sample will be collected from the entire sediment column. Coring will be performed from top of sediment to refusal. Samples planned for collected in Reach 6 are summarized in Tables 2-2 and 2-3b.

Reach 7

Reach 7 is characterized by limited access and large stretches of slowly moving water and high sediment deposition. 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 sediment concentrations will be limited to composite samples. A 1-mile stretch of the area sampled during the PCB trackdown study (Ecology and Environment Engineering, P.C. 2007b) will require less sampling than the other areas of the creek, but samples will be collected from floodplains and near drainage areas not previously sampled. A "hot spot" sampled and analyzed during the trackdown study near Plank Road will require additional investigation.

Planned sampling locations are shown on Figures 2-6a to 2-6d for each segment of Reach 7. Samples will be collected on the areas noted above, including areas of deep sediments near obstructions and outfalls. Two samples will be collected near the "hot spot" (one in the area where the hot spot was observed and one in the downstream side of Stone Road). At each coring location one composite sample will be collected from the entire sediment column. Coring will be performed from top of sediment to refusal. Samples planned for collected in Reach 7 are summarized in Table 2-2.

Additional Sampling

Additional sampling will be required to determine if areas adjacent to the creek that were impacted by contaminated sediments due to historic creek flow or flooding. The areas include wetlands, marshes, and historic creek channels. The sampling locations are spread throughout the reaches as depicted on Figures 2-1 through 2-6. These proposed locations may be modified in the field based on field conditions and observations. The reach identifier (R2 through R7) is included at the beginning of every sample identification code. Sample numbering will continue in ascending order. This additional sampling will include the following:

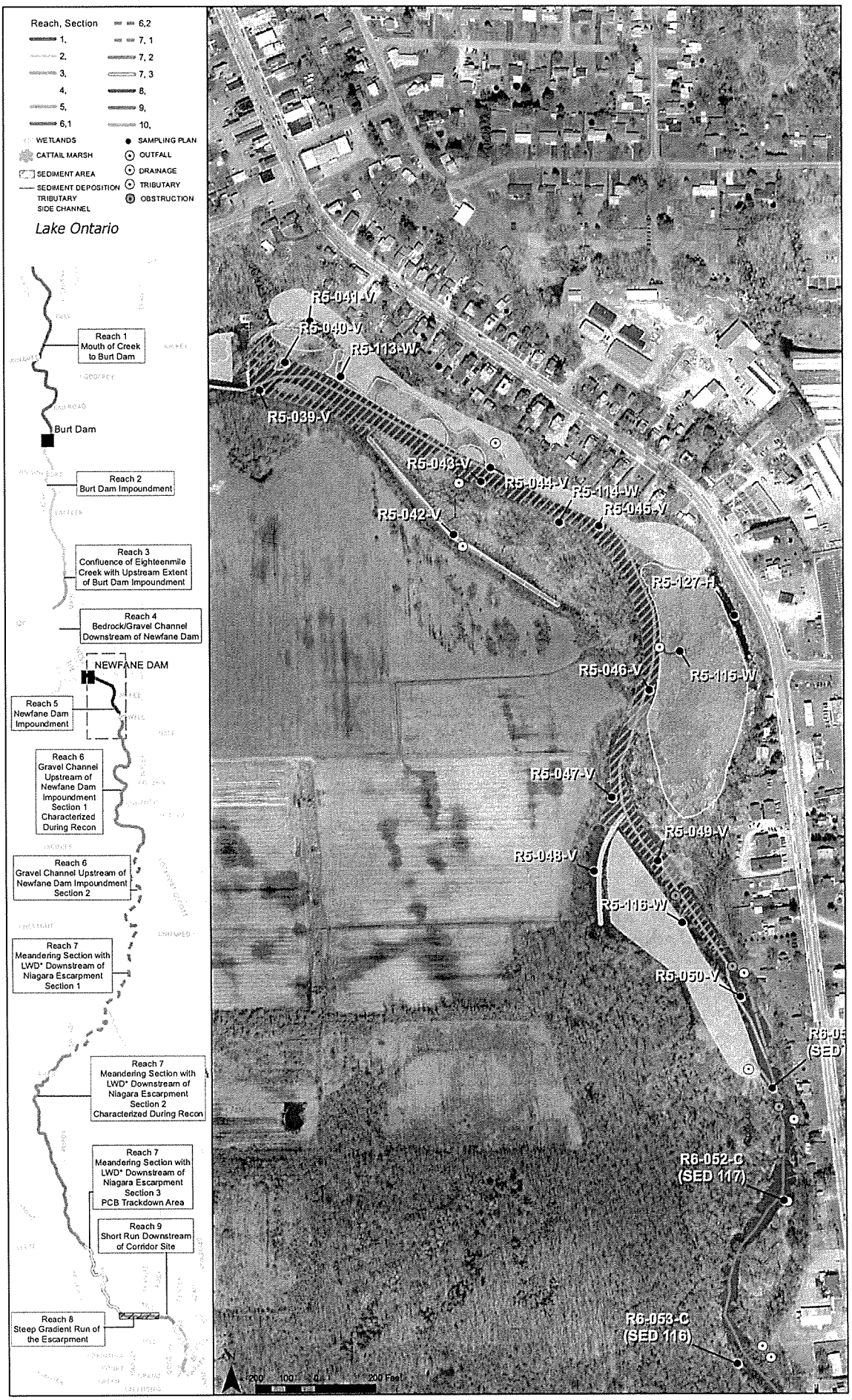

Figure 2-4 Sampling Locations in Reach 5

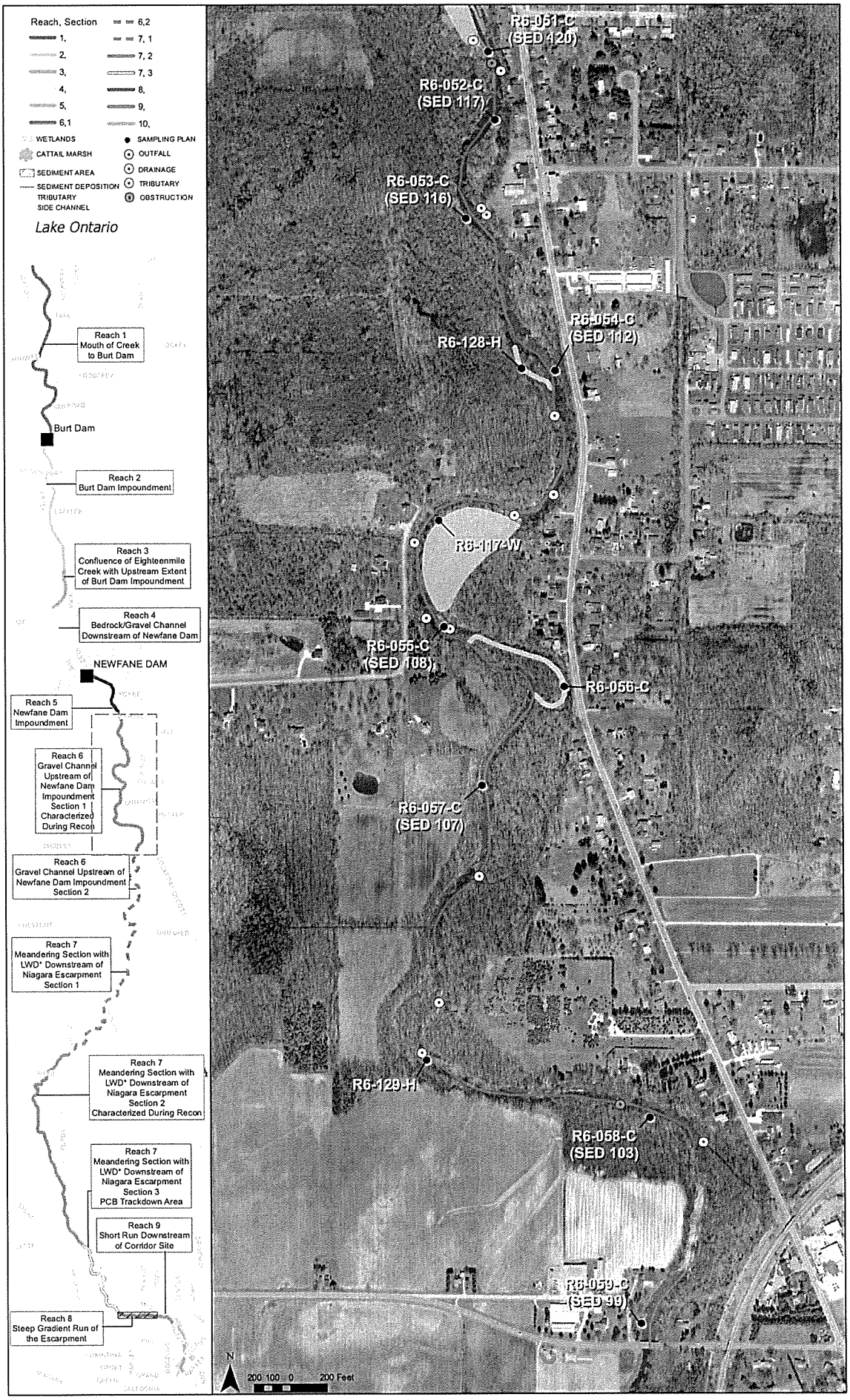

Figure 2-5a Sampling Locations in Reach 6 Section 1

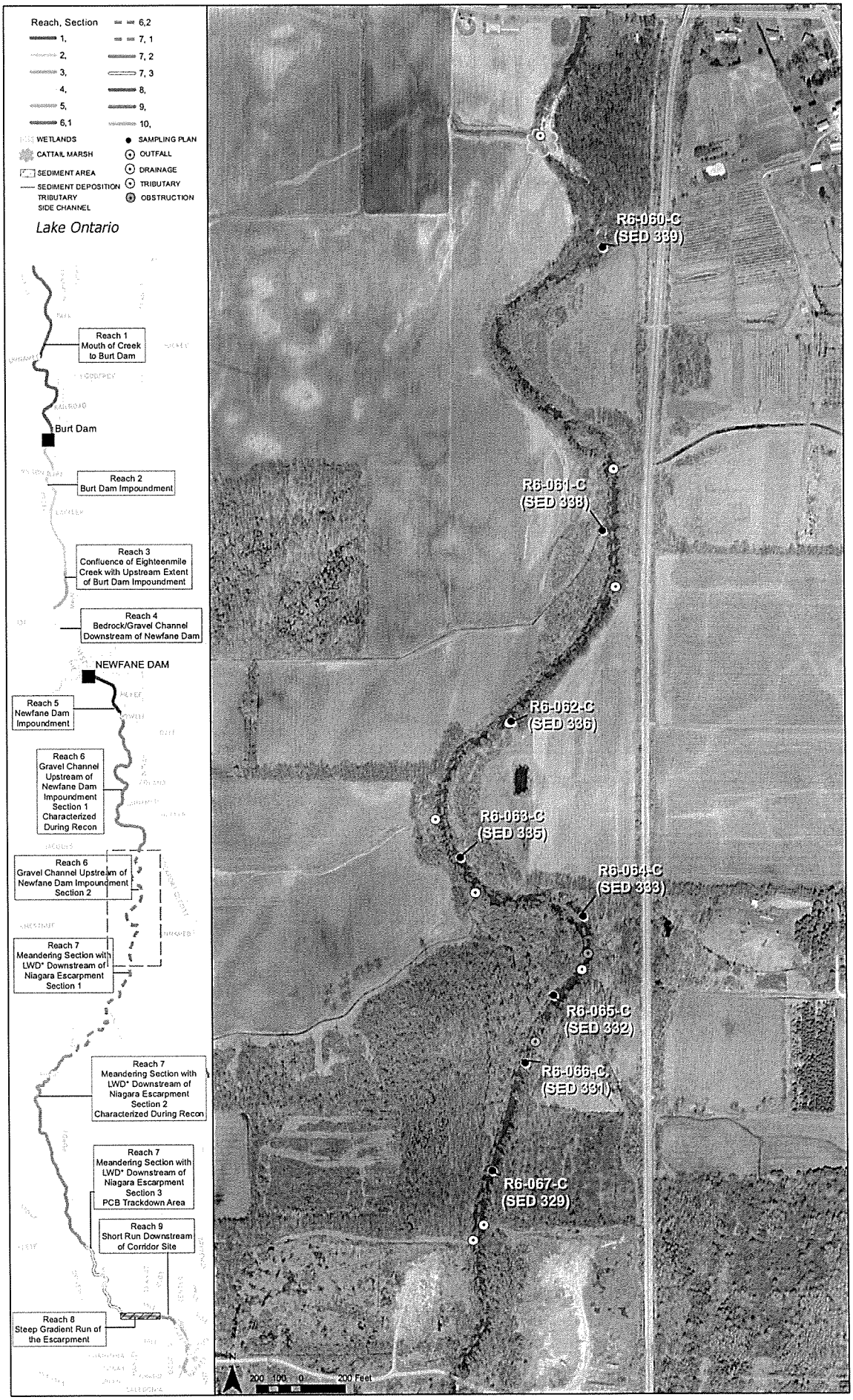

Figure 2-5b Sampling Locations in Reach 6 Section 2

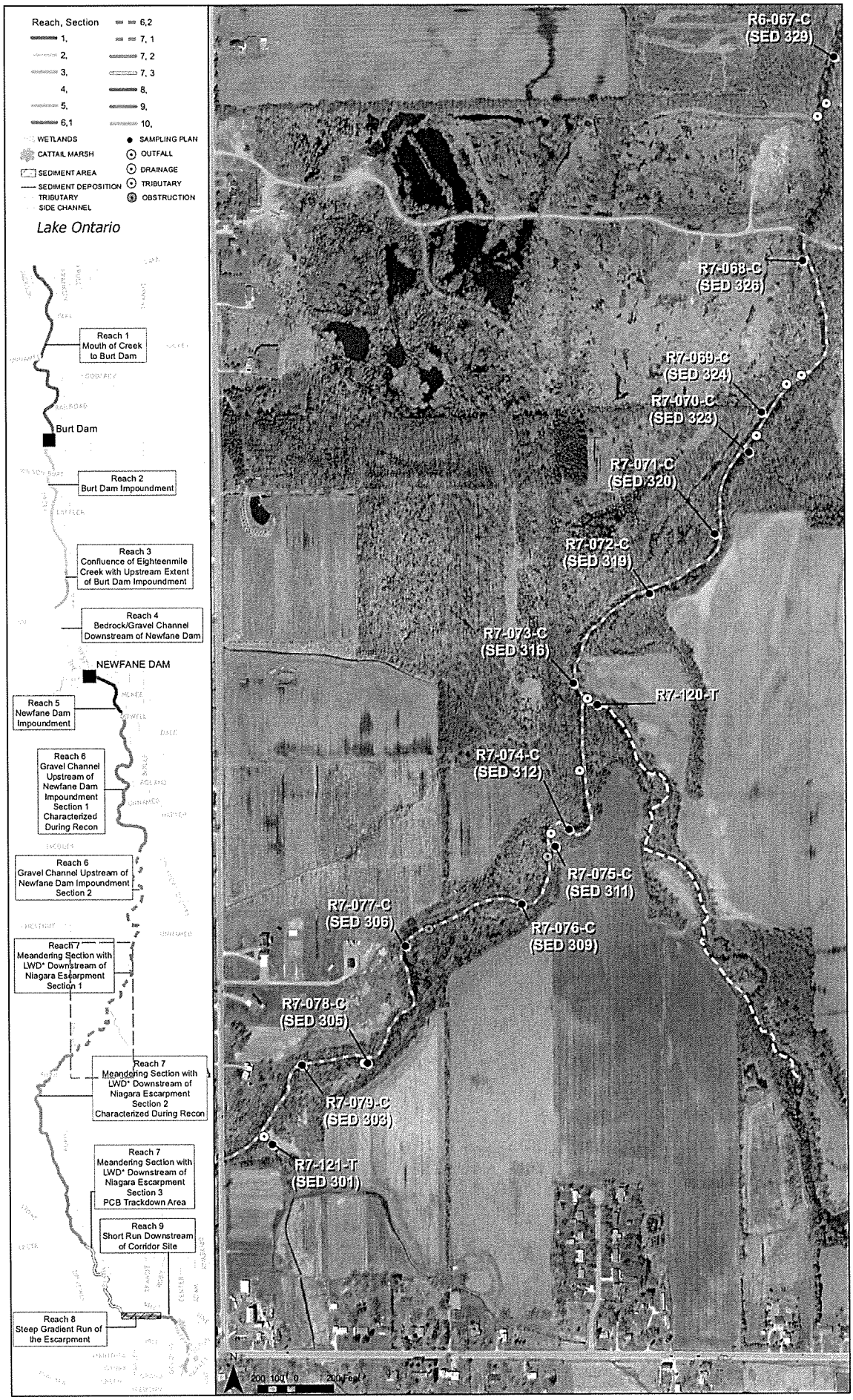

Figure 2-6a Sampling Locations in Reach 7 Section 1

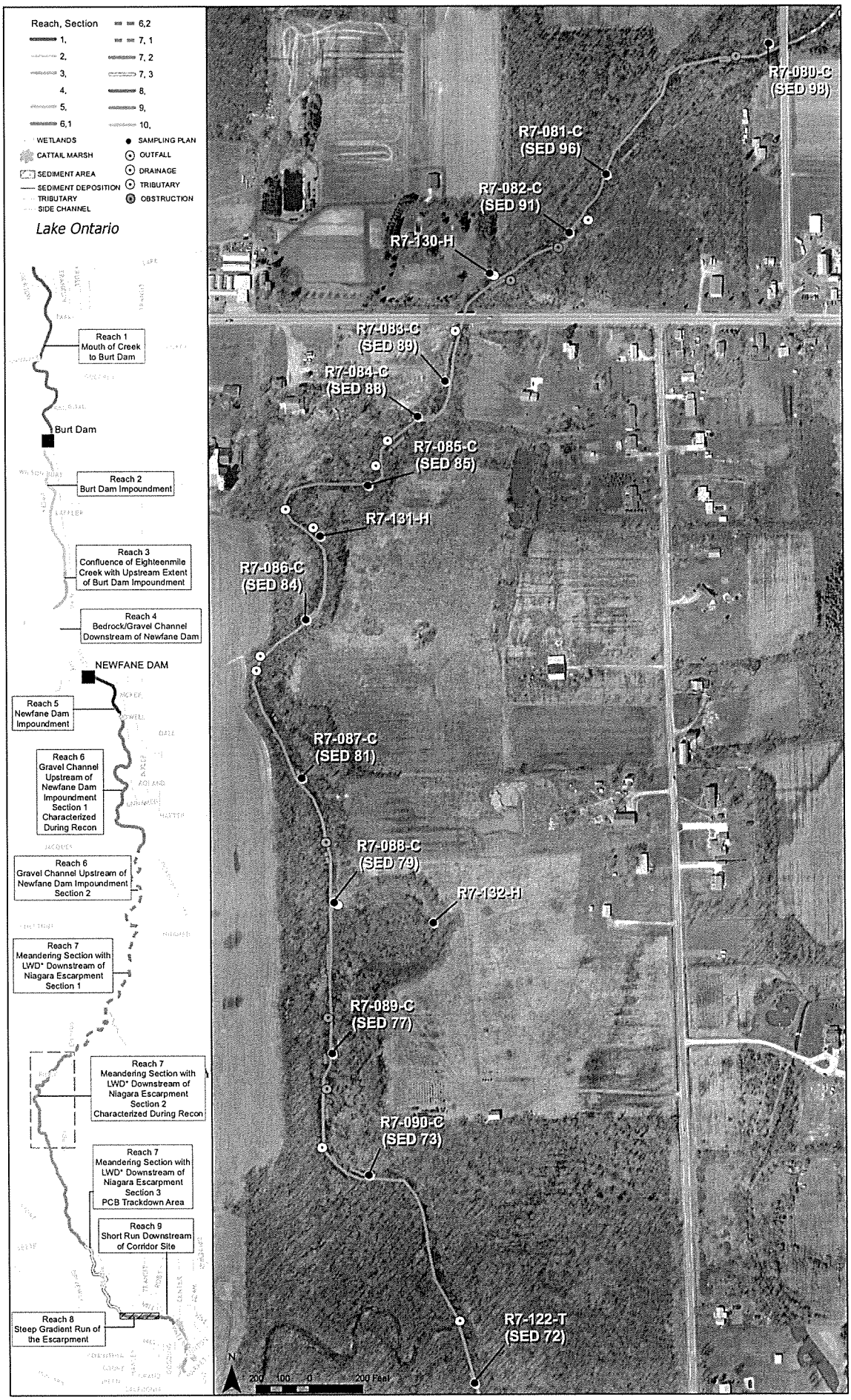

Figure 2-6b Sampling Locations in Reach 7 Section 2 part 1

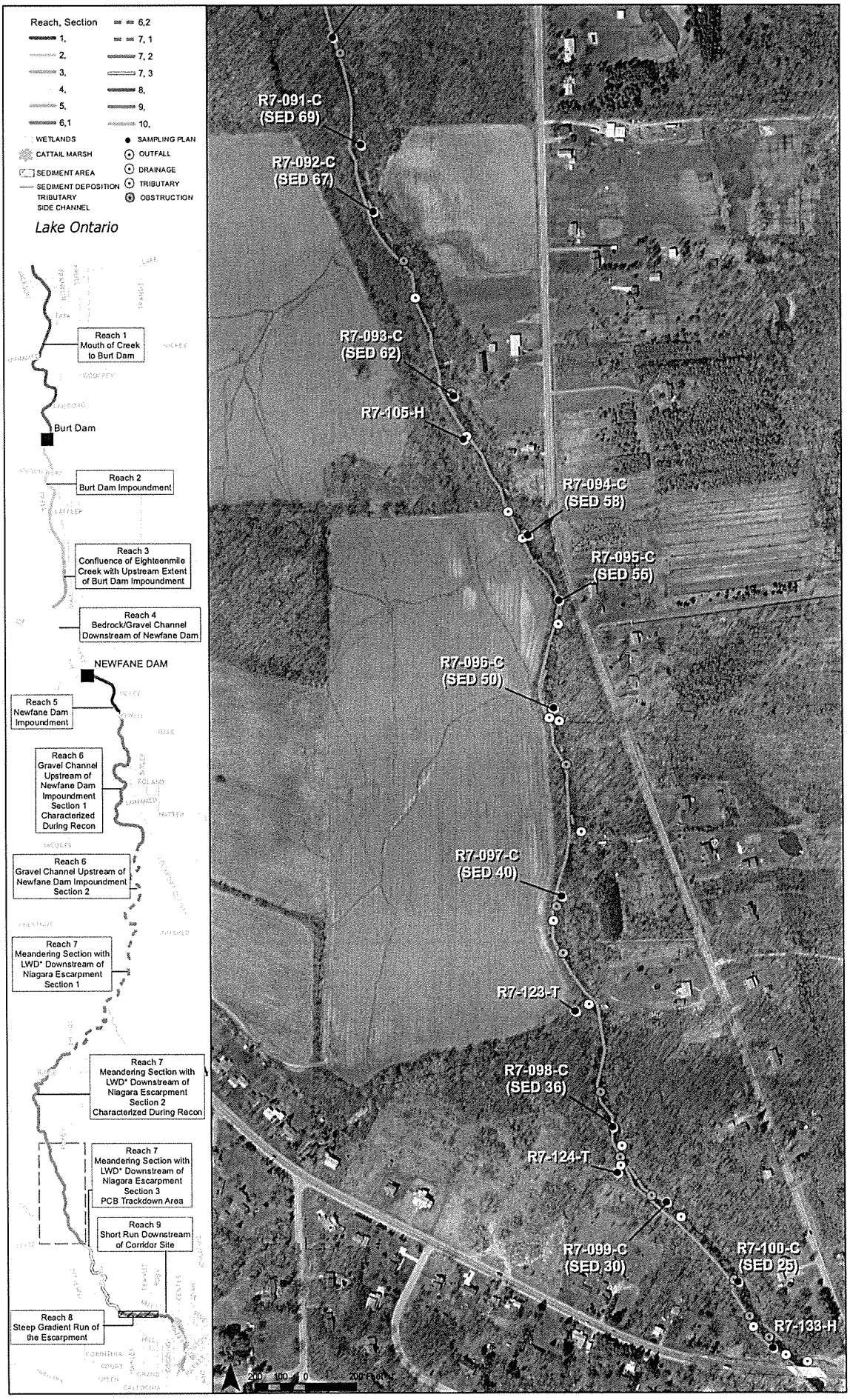

Figure 2-6c Sampling Locations in Reach 7 Section 2 part 2

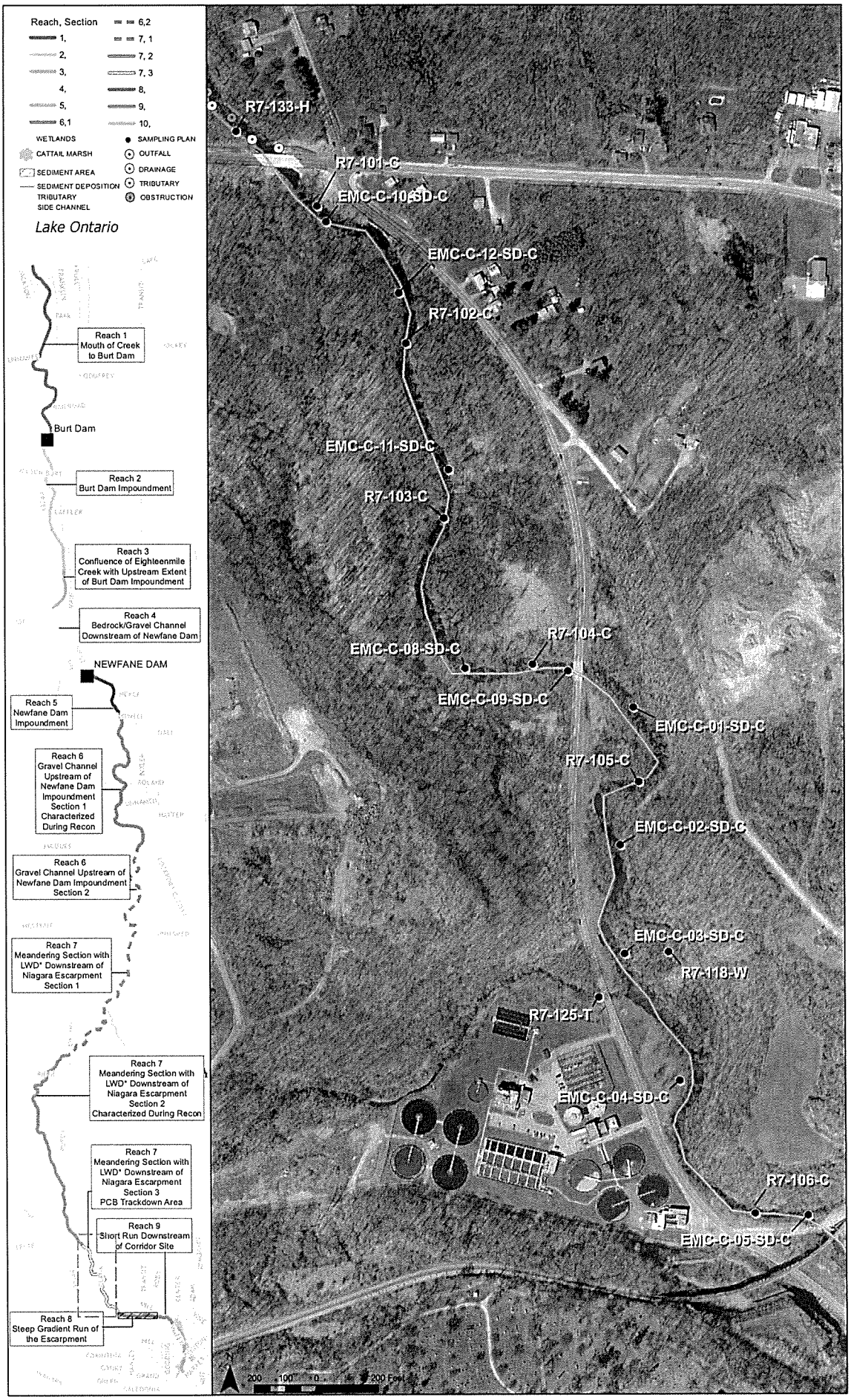

Figure 2-6d Sampling Locations in Reach 7 Section 3

- Samples will be collected from forested wetland areas identified during the Phase 1 reconnaissance as areas that could have been affected during historical flood events. These locations are identified by a "-W". One surface soil sample (0 to 6 inches below ground surface [bgs]) will be collected in each of the areas identified, as summarized in Table 2-2. Sampling locations are focused on areas near the stream bank with obvious flooding influence and were selected based on depositional patterns depicted by historic aerials. It has been estimated that one sample per acre or wetland area will be representative. Samples will be biased locations based on observations of where sediment has accumulated on the surface. If multiple sediment areas are present in a wetland, the sediment will be composited to cover a larger area.

- Historic creek channels and 35 drainage areas also identified during the Phase 1 reconnaissance will be sampled during Phase 2. These locations are identified by a "-H". The historic creek channels represent areas that could have been influenced by historic creek flow. Surface soil samples (0 to 6 inches bgs) will be collected in these areas, as summarized in Table 2-2. Sample locations were selected based on review of historic aerials and drainage locations Samples will be biased locations based on observations of where sediment has accumulated on the surface. If multiple sediment areas are present in a wetland, the sediment will be composited to cover a greater area.

Seven sediment samples will be collected from tributaries identified during the Phase 1 reconnaissance and through the use of aerial photography as indicated in Table 2-2. These locations are identified by a "-T". A sediment core will be collected from sediment deposits located about 50 feet upstream from the confluence of each tributary with Eighteenmile Creek. The selected tributary location will be from an area that is not influenced by the main stem of the creek and represents background conditions. One surface sample (0 to 6 inches below top of sediment) and a composite of the remaining sediment column will be collected.

3 Field Investigation Program

This section describes the procedures for the nature and extent investigation of the Eighteenmile Creek AOC. The field investigation program was developed based on investigation objectives, results of recent investigations conducted by NYSDEC and GLNPO, and knowledge of the potential range of remedial alternatives. The purpose of the nature and extent investigation is to further delineate the concentrations and distributions of PCOCs in the creek sediment. Results from the proposed sediment sampling, combined with results from previous studies, will delineate the chemical concentrations and distributions in the river sediment, both laterally and vertically. This information will be used to identify specific areas with a potential risk of exposure and will allow the selection of an appropriate remedial alternative on an area-specific basis to reduce that risk.

The nature and extent investigation will consist of mobilization, sediment coring (hand and vibracore), surface soil sampling, and analysis, as described below.

3.1 Mobilization

This task includes all other preparation and pre-fieldwork activities as described in Section 2. Currently two mobilization phases are planned. During November 2009, EEEPC will mobilize to the field to conduct hand coring and surface sampling activities. Hand coring will focus on deeper water areas. If these areas cannot be hand cored, the sampling locations will be added to the subcontractor's list for vibracoring. Vibracore sampling and any additional hand core sampling will take place in the spring 2010 as soon as weather permits.

- Underground Utility Notification. EEEPC will contact the Underground Facilities Protection Organization five days in advance of the subsurface field investigation activities to alert them of our subsurface investigation. Once utilities on-site have been marked at the creek banks, the field team will modify the locations of soil coring points, as necessary, such that none are within 25 feet of the identified underground or overhead utility locations.

  The vibracore subcontractor will be responsible for underground utility notification in the impoundment areas.

3.2 Sediment Coring and Sampling

Coring in Reaches 2, 3, and 5 will be conducted via vibracore by a subcontractor overseen by EEEPC. The remaining coring will be performed manually by EEEPC.

Upon arrival at the site each day a safety meeting will be held and the day's objectives will be discussed. Field data will be recorded using the GPS unit, log books, and photographs. Sediment core locations will be determined based on the coordinates associated with the locations shown on Figures 2-1 through 2-6. The field team or subcontracted vessel will navigate to the locations using a GPS. The core will be collected as close as possible to the planned location. If a core cannot be collected from that location because utilities are present or lack of physical access, an alternate location will be selected in the field. The planned locations are summarized on Table 2-3. The GPS unit will be coded to input sample identification, sample depth, water depth, sediment depth, creek width, and field notations. Regardless of the coring method, the following information will be recorded for each core:

- GPS coordinates at coring location (data will be collected in North American Datum [NAD] 83 Universal Transverse Mercator [UTM] Zone 18 North)
- Water depth (in inches)
- Sediment depth (in inches)
- Creek width measured at coring location
- Depth to refusal
- Core recovery

- Continuous lithologic description of the sediment at each location
- Other visual (i.e., presence or absence of sheens) and olfactory observations
- Potential sources of contamination (e.g., nonaqueous phase liquid [NAPL])
- Sample depth interval and time.

Sediment Core Collection via Vibracore

Sediment coring in Reaches 2, 3, and 5 will be performed by a subcontractor using their vessel and according to the methodology presented in Appendix C (standard operating procedures provided at this time, until the vibracore subcontractor has been selected, include those from the USEPA Mudpuppy). In some cases (possibly Reaches 3 and 5), due to a floating platform may be necessary instead of the vessel because of access issues or low water depths. The subcontractor will collect the sediment cores using the Vibracore core sample collection system mounted on the vessel or on the platform. Sediment coring will be conducted at approximately 39 locations within the study area (see Figure 2-1). Sediment core locations will be determined based on the coordinates associated with the locations shown in the Figures 2-3, 2-4, 2-5a, 2-5b, and 2-6a through 2-6d. Navigation to the coring locations will be performed using a differential GPS with an accuracy of less than 1 meter and a visual survey will be conducted to verify there are no utility crossings or obstructions. The GPS sensor will be located on the vibracore frame. The vibracore operator will perform a daily quality control check to verify proper GPS accuracy. The onboard GPS unit will also be used to read the specific latitude and longitudinal coordinates of each core location. The vessel captain will be responsible for collecting this data and transferring it to afield team member.

In general, core collection will begin downstream and advance upstream. All the cores will be advanced from the top of sediment to refusal. The team will use rigid core liners as described in Appendix C. To verify refusal, a minimum of three attempts to collect a core sample will be made at each boring location if refusal is encountered at a depth shallower than that expected for the area. At locations where additional surface sediment volumes are needed, a Ponar dredge

will be used to collect the additional sediment volume. The samples will be labeled as surface samples with an assumed depth of 0 to 0.5 feet. All Ponar samples will be labeled with "P" at the end of the sample name. Appendix C provides a standard operating procedure for the Ponar dredge sampling. Ponars will be attempted at a location at least two times if no recovery is achieved.

Following extraction of each sample core, the vibracore subcontractor will cut the unused portion of the core liner, cap the core, and transfer the core to the EEEPC team, who will follow the procedure described below.

Manual Sediment Core Collection

At Reaches 4, 6, and 7 manual coring will be performed by an EEEPC three-person team using a sediment coring device manually driven into the sediment. A flat-bottomed boat will be used to haul sampling equipment and to navigate those stretches where logjams were separated enough that sampling could be accomplished from the boat. Field crew may use chest waders to walk portions of the reaches where water depths allow it. Additionally, seven sediment samples will be collected from tributaries.

A handheld GPS unit will be used to both navigate to the sampling locations and to survey the specific latitude and longitudinal coordinates of each core location. Two field members will perform the sediment coring. A field geologist will maintain the field logbook and collect and record all visual, olfactory, and lithologic observations, collect the samples, take photographs, and record GPS sampling locations.

The same procedure described in the QAPP for the reconnaissance survey will be followed during the sediment coring activities at the beginning of each day to ensure that the GPS unit functions properly. Additionally, throughout the field collection day, when those conditions are not met, the GPS receiver will provide warnings and sample collection will stop until the receiver can be reset. Data collection will be 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 will be surveyed as a reference location (e.g., bridge, road crossing). Data will be transferred and differentially corrected using the GPS software upon returning to the office and assessed for accuracy. GPS data will undergo GPS correction and quality control by a GIS analyst. Attribute and photo-interpreted data will be checked by both the GIS analyst and a field crew member for accuracy. This data then will be used to revise the sampling location maps (see Figures 2-1 to 2-6).

During the manual coring, the sediment thickness will be determined based on core refusal. Sediment thickness data will be recorded in the field logbook.

The sediment coring device (i.e., macrocore with acetate liners or equivalent) will be driven via slam bar or will be twisted into the sediment. Upon core extraction the general sample processing procedure described below.

3.2.1 Sediment Core Collection Equipment and Procedures

Equipment

- Coring equipment (vibracore or manual coring equipment as described in the following sections)
- Standard or digital camera
- Dedicated stainless-steel spoons
- Dedicated plastic and stainless-steel bowls
- Folding 10-foot measuring rule, graduated in tenths of feet
- GPS unit (handheld or mounted on the vibracore)
- Field logbook

- Probe, graduated steel rod, or rigid carpenter's rule for water level measurements during manual coring (the vibracore vessel may have electronic equipment to collect water depths);
- Appropriate sample containers (see the QAPP [Appendix A])
- Coolers with ice.

Procedures

The team will use the methodology described below to collect the sediment cores and the associated samples that will be submitted to the laboratories for analysis.

- Navigate to sample location. If access is hazardous, or field conditions do not allow sampling, or the depositional characteristics of a location have changed since the reconnaissance survey, a field adjustment of the coring location may be required. In each case, the field crew will look for a depositional area as close to the planned location as possible. If the original coring location was downstream of a drainage area or an outfall, the new location should be downstream of this feature as well. If a field adjustment is made, the reason for the adjustment and the rationale for selecting the new location will be recorded on the logbook and the sample location surveyed.
- Core from top of sediment to refusal. Once each core is collected, pass it to the field geologist to process. The field geologist will then log the sediment core, and document sediment sampling and other data collection activities.
- Sample cores will be considered viable if a minimum of 60 percent recovery is achieved (e.g., an approximately 3-foot recovery from areas where records indicate 5 or more feet of sediment, or an approximately 2-foot recovery from areas where records indicate 3 or more feet of sediment, etc). In shallower areas, acceptable recovery is defined as a minimum of 50 percent of the penetrated sediment thickness. The vibracore system will provide a sediment thickness estimate sufficient to evaluate the percent recovery in cores. The reconnaissance survey data will be used for the manual coring locations.
- Place core sampler on a sheet of plastic or a core cradle lined with sheet plastic and cut open the rigid liner, exposing the soil core.
- Record the lithologic description, depth to refusal, core recovery, water depth, and visual/olfactory observations in the field notebook.
- Photograph the core and/or sampling location if any unusual features are noted. Photographs of representative cores and of the coring operation should be collected throughout the field program. For each photograph, record the time, date, photo compass orientation, and any features or noteworthy items in the core. Record this data in the logbook.

- Identify the appropriate sample interval as follows:

  - For Reaches 2, 3, and 5, at each location collect a surface sediment sample in the 0 to1 foot interval. Samples will be collected every 2 feet after the surface sample. All cores will be sampled to the bottom depth. The bottom depth interval will be collected in all cases; if that interval measures less than 0.5 feet, the material will be combined with previous depth interval volume.

  - For Reaches 4, 6, and 7, at each location collect a composite sample from the entire sediment column. At the tributaries, collect a sample from the first 0.5 feet and composite the remainder of the core. If insufficient material is available in the first part of the core, then collect a surface sediment grab sample.

- All samples will be submitted for PCB, metals, and TOC analyses. At pre-selected locations, as noted in Table 2-3, some samples will be submitted for additional analyses. Identify the appropriate analyses and collect the appropriate sample volume and place directly into a dedicated stainless-steel or plastic bowl. Thoroughly homogenize the sample and remove all stones and debris;

- Some samples will be archived. The sample list table (Table 2-3) indicates the samples to be archived. Archived samples will be submitted to the laboratory using a separate chain of custody on which the archiving requirement is clearly stated.

- Fill appropriate sample container(s) (see the QAPP [Appendix A]).

- Clean samples jars and decant excess,

- Write the sample number on the jar lids as listed on Table 2-3. Record the sample number, depth, and time in the logbook.

- When all samples from the core have been collected, pass the sample information to the Data Manager (for details see Section 3.4). The Data Manager will input the sample numeration data into the Forms II Lite® program.

- Place the sample in a cooler maintained with ice at 4°C.

- Survey coring location and, if possible, each bank using a GPS unit.

- At the end of the field day, the data manager will print the sample jar labels and the chain of custody (COC). Place these labels on the sample jars and check against the COC, also produced by the data manager using the Forms II Lite® program.

- Package samples as described below.
- Decontaminate the down-hole coring equipment according to the procedures described in the "Sampling Equipment Decontamination" section below.
- Continue to the next location.
- Upon return from the field, electronically download and archive GPS data and digital photographs.

3.3 Surface Soil Sampling

Surface soil will be sampled in wetland areas, historic creek channels, and 35 drainage areas. The program will include 49 surface soil locations. At all surface soil sample locations, a grab sample will be collected from the 0- to 6-inch depth interval. All samples will be submitted for PCB, metals, and TOC analyses. At pre-selected locations, as noted in Table 2-3, some samples will be submitted for additional analyses. The 12 samples from forested wetlands are identified by "-W". The 9 samples from the historic creek channel sand drainage areas are identified by the code "-H".

A handheld GPS unit will be used to both navigate to the sampling locations and to survey the specific latitude and longitudinal coordinates of each core location. The same GPS quality control procedures described for the manual coring will be followed during the sediment coring activities at the beginning of each day to ensure that the GPS unit functions properly.

Surface soil sampling will be performed in accordance with the procedures described below.

Equipment

- Handheld GPS unit
- Log book
- Dedicated stainless-steel spoons or trowels
- Dedicated stainless-steel bowls or pans

- Shovel
- Standard or digital camera
- Appropriate sample containers (see the QAPP [Appendix A])
- Coolers with ice.

Procedures

- Walk to sample location using a handheld GPS unit. Survey the area to determine the closest locations with obvious sediment deposition such as low lying areas. If multiple areas are observed in the wetland, then composite up to five locations. Denote each composite location in the logbook and determine a GPS reading for the central location.
- Collect surface soil samples using dedicated, pre-cleaned, stainless-steel spoons or trowels from a depth of 0 to 6 inches bgs. If vegetation is present (grass, weeds, etc.), remove vegetation and sample the top 6 inches of soil immediately under the vegetation.
- Record the lithologic description, depth, and visual/olfactory observations in the field notebook.
- Record the sample location, date, time, and any noteworthy field conditions prevailing at the sample location, such as stressed vegetation, and any prominent waste in the immediate sample area.
- Photograph the sample and/or sampling location if any unusual features are noted. Photographs of representative cores and of the coring operation should be collected throughout the field program. For each photograph, record the time, date, photo compass orientation, and any features or noteworthy items in the core. Record this data in the logbook.
- Identify the appropriate analyses (see Table 2-3) for the location and collect the appropriate sample volume and place directly into a dedicated stainless steel or plastic bowl. Thoroughly homogenize the sample and remove all stones and debris.
- Fill appropriate sample container(s) (see the QAPP [Appendix A]).
- Clean sample jars.
- Write the sample number on the jar lids as listed on Table 2-3. Record the sample number, depth, and time in the logbook.

- Write the sample numbers on a Transfer Log. When all samples from the core have been collected, pass the completed Transfer Log to the Data Manager (for details see "Data Manager" section below). The Data Manager will input the sample numeration data into the Forms II Lite® program.
- Place the sample in a cooler maintained with ice at 4°C.
- Place a wooden stake or pin flag back at the sample location center point and survey sample location.
- At the end of the field day, the data manager will print the sample jar labels and the COC. Place these labels on the sample jars and check against the COC, also produced by the data manager using the Forms II Lite® program.
- Package samples as described below.
- Continue to the next location.
- Upon return from the field, electronically download and archive GPS data and digital photographs.

3.4 Data Management Procedures

Each day, the data manager will be stationed near the reach sampled and will be responsible for maintaining a field log and recording:

- Coring/sampling location number
- Time the field crew arrived at the location
- Any location file adjustments the field sampling/coring crew had to do
- Water depth and the sediment depth at which refusal was encountered during EACH coring attempt
- GPS latitude/longitude location, if available

Upon collection of a successful core/sample, the geologists record the core information and give it to the data manager for recording in Forms II Lite®. The computer record and geological logs will be considered the permanent record.

All sample information related to laboratory analysis will be recorded in the USEPA Forms II Lite® program. The data manager will enter sample number data and print sample jar labels and custody forms.

3.5 Sampling Equipment Decontamination

Personnel wearing proper safety protection shall decontaminate sediment sampling equipment not associated with the coring equipment or drilling using the following procedure:

1. Before entering the potentially contaminated zone, wrap soil contact points in clean plastic.
2. Wash all equipment surfaces that contacted the potentially contaminated soil or water with detergent solution, using a brush as needed to remove particulate matter and surface films.
3. Rinse with potable tap water.
4. Rinse with distilled water and air dry.
5. Wrap equipment with aluminum foil or plastic, if appropriate, to reduce the need for subsequent cleaning if equipment is to be stored or transported.

3.6 Water Elevation Measurement

Water elevations will be collected during the Phase 2 activities. During manual coring, the field crew will collect water depth measurements using a graduated rod/probe or carpenter's rule. During vibracoring, at the beginning of the field activities, water elevations will be measured by the support vessel captain using a water-level logger located on the drilling vessel and will be provided to the field team. The service vessel captain will calibrate the logger to the published International Great Lakes Datum (IGLD) for mean low water. The logger will time-stamp water-level readings, within an accuracy of 0.1 foot, that it records every minute. At the end of each day, or at the end of the sampling project, the water elevation files will be parsed using the specific sediment core collection times.

Water elevation data will be presented with sample collection data in the sampling report.

3.6 Sample Collection

The volumes and containers for soil and water samples as well as sample preservation and holding time requirements are presented in the site-specific QAPP (Appendix A). Pre-washed sample containers will be provided by the analytical laboratory and prepared in accordance with USEPA bottle-washing procedures.

Sediment and surface soil samples will be stored on ice pending delivery to the analytical laboratory.

QA/QC samples, including field duplicates, trip blanks, and additional volume for matrix spike/matrix spike duplicate (MS/MSD) analysis will be collected in accordance with the specifications in the QAPP. A summary of the QA/QC samples to be collected is presented in Table 2-3.

Sample Labeling

All samples will be assigned a unique sample identifier (see Table 2-3). Labels for each sample container will contain the sample identifier, date of sample collection, analytical parameters, and type of preservation used. The sampler will initial any change in the label information prepared prior to sample collection.

Sample labels will be pre-printed with static information, minimizing the amount of data that must be entered in the field. This will aid in sample label legibility as well as completeness.

Sample Packaging and Shipping

Sediment and soil sample containers will be placed inside sealed plastic bags as a precaution against cross-contamination caused by leakage or breakage. They will be placed in coolers in such a manner as to eliminate the chance of breakage during shipment, and ice in plastic bags will be placed in the coolers to keep the samples at 4°C throughout shipment.

Sample shipment will be in strict accordance with all applicable DOT regulations, and project samples will be shipped as environmental samples. The samples will be sent to the subcontracted laboratory by the field team. Arrangements will be made with the CLP laboratory's project manager for samples that are to be received by a laboratory on a weekend day so that holding times are not compromised.

Sample Custody

A sample is considered to be in custody under the following conditions:

- Sample is directly in one's possession.
- Sample is clearly in one's view.
- Sample is placed in a locked location.
- Sample is in a designated secure area.

To demonstrate that the samples and coolers have not been tampered with during shipment, adhesive custody seals will be used. The custody seals will be placed across the cooler lids in such a manner that they will be visibly disturbed upon opening the cooler. The seals will be signed or initialed and dated by field personnel at the time they are affixed to the cooler.

Documentation of the sample's COC is necessary to demonstrate that the integrity of the samples has not been compromised between collection and delivery to the laboratory. A COC record will accompany each sample cooler to document the transfer of custody from the field to the laboratory. All information requested in the COC record will be completed. One copy of the COC form will be retained by the sampler and placed in the project record's file. The remaining pages will be sealed in a plastic bag and placed inside the cooler. Upon receipt at the laboratory, the COC forms will be completed. It is the responsibility of the subcontracted laboratory to document the condition of custody seals and sample integrity upon receipt.

Sample Analysis

All samples will be submitted for PCB and lead analysis in separate jars. Approximately 103 samples will be submitted for additional analysis, including PAHs, PCBs, Target Analyte List (TAL) metals, pesticides, PCB congeners, dioxins, TOCs, and particle size. Tables 2-1 and 2-2 summarize the proposed sampling and analysis. Sample containers, preservatives, and holding times and the complete analyte list are presented in the site-specific QAPP. Analytical data will be presented in a project report to be published following data receipt and QA review.

Samples will be shipped to:

CLP and geotechnical labs (TBD)

3.7 Investigation-Derived Waste Management

The following types of investigation-derived waste are expected to be generated: cuttings from coring; decontamination water from coring equipment; and spent personal protective equipment (PPE). Excess sediment from coring and decontamination water will be discarded back in the creek near the area where it was collected. PPE will be disposed of in the dumpster.

3.8 Field Schedule

Field operations will begin on November 16, 2009 for the first mobilization. Field operations will begin daily at 8 a.m. from:

Niagara County Soil and Water Conservation District
Niagara County Fairgrounds
Lake Street
Lockport, NY 14094

Field sampling will be conducted for 10 hours each day. The EEEPC field team will conduct sample packaging and shipping following completion of the field work.

The second phase of the field efforts will be conducted in the spring 2010 as soon as weather permits.

4 Field Records

4.1 Sediment Core Logs

Sediment cores collected for chemical and grain size analysis sampling will be logged using the log form presented in Appendix D. Sediments will be classified using the United States Geological Survey's Soil Classification System. Depth intervals sampled and other observations will be recorded on these logs. The percent recovery also will be estimated and recorded.

4.2 Daily Reporting

The team will complete a daily report for each field day using the form presented in Appendix D. The completed forms will be e-mailed from the field to the EEEPC project manager, who will then distribute the form to the appropriate recipients.

4.3 In-Field Procedural Adjustment Documentation

Changes to the work plan procedures will be first verbally discussed between EEEPC and the CH2M HILL site manager and the USEPA project manager. Once a verbal agreement has been reached on the proposed change, the change and agreement will be documented in the field logbook and in the daily QC report. The daily QC report will be emailed each day to the PCT for review of any field adjustments.

5 Bibliography

CH2M HILL, Inc. and Ecology and Environment Engineering, P.C. 2008a. *Quality Assurance Project Plan Eighteenmile Creek Area of Concern, Niagara County, New York, for Phase 1 of the Remedial Investigation/Feasibility Study*. Prepared for the United States Environmental Protection Agency.

_____. 2009. *Phase 1 Reconnaissance Survey Eighteenmile Creek Area of Concern, Niagara County, New York, for the Remedial Investigation/Feasibility Study*. Prepared for the United States Environmental Protection Agency.

Ecology and Environment Engineering, P.C. 2007a. *Phase 1 Environmental Site Assessments, Eighteenmile Creek Corridor Sites: Upson Park, United Paperboard Company, and White Transportation*. City of Lockport, New York. Prepared for the New York State Department of Environmental Conservation.

_____. 2007b. *Eighteenmile Creek State of the Basin Report. Niagara County, New York*. Prepared for the United States Army Corps of Engineers, Buffalo District and Niagara County Soil and Water Conservation District.

_____. 2009a. *Eighteenmile Creek Beneficial Use Impairment Assessment. Niagara County, New York*. Prepared for the Niagara County Soil and Water Conservation District.

_____. 2009b. *Final Supplemental Remedial Investigation Report for the Eighteenmile Creek Corridor Site (Site No. 932121), City of Lockport, New York*. Prepared for the New York State Department of Environmental Conservation.

_____. 2009c. *Final Report for Eighteenmile Creek PCB Source Trackdown Project Niagara County, New York*. Prepared for the Niagara County Soil and Water Conservation District.

5. References

Estabrooks, F., S. Litten, and B. Anderson. 1994. *An Investigation of the Dioxin/Furan Concentrations in the Sediments of Eighteenmile Creek and the Erie Canal Near Lockport, New York.* NYSDEC, Division of Water, Bureau of Monitoring and Assessment.

New York State Department of Environmental Conservation. 1988. Determination of Total Organic Sediment. Region II. Edison, N.J.

_____. December 1991. Draft Analytical me6thod for Determination of Acid Volatile Sulfide in Sediment. "Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment."

_____. 1997. *Eighteenmile Creek Remedial Action Plan.* Prepared by NYSDEC, Division of Water, 270 Michigan Avenue, Buffalo, New York.

_____. July 1999. Guidance for the Development of DUSRs.

_____. December 2001. *Final Report: Eighteenmile Creek Sediment Study. Summary of August 17-20 and November 3, 1998 Results.*

_____. 2006a. *Remedial Investigation Report, Eighteenmile Creek Corridor, Lockport, Niagara County, New York, Site Number 932121.* Prepared by NYSDEC, Division of Environmental Remediation, 270 Michigan Avenue, Buffalo, New York.

_____. 2006b. Record of Decision for the Former Flintkote Plant Site.

_____. 2006c. Remedial Program Soil Cleanup Objectives, 6 NYCRR Subpart 375-6.8, December 14, 2006.

_____. March 26, 2009. *Toxic Chemicals in NYS Tributaries to Lake Ontario: A Report on Sampling Undertaken in 2007 and 2009 with Special Emphasis on the Polychlorinated Dibenzodioxins and Furans.*

U.S. Environmental Protection Agency. October 1999. *EPA CLP National Functional Guidelines for Organic Data Review.* EPA 540/R-99-008.

_____. October 2004. *USEPA CLP National Functional Guidelines for Inorganic Data Review.* EPA 540-R-04-004.

_____. May 2006. *USEPA Requirements for Quality Assurance Project Plans.* EPA QA/R-5.

_____. July 2007. *Contract Laboratory Program Guidance for Field Samplers.* EPA 540-R-07-06.

5. References

_____. November 2007. USEPA Geospatial Metadata Technical Specification v. 1.0.

_____. February 2008. *USEPA Interim Guidance for Developing Global Positioning System Data Collection Standard Operating Procedures and Quality Assurance Project Plans, Revision 1.0.*

A Quality Assurance Project Plan

(Bound separately.)

B Site-Specific Health and Safety Plan

(Bound separately.)

C Vibracore Procedures

PROCEDURES IN USING THE VIBRACORING SYSTEM

1.0 Scope and Application

This Standard Operating Procedure describes procedures in using the vibracoring system to obtain sediment cores onboard the *Mudpuppy R/V.*

2.0 Introduction

The vibracoring system consists of the vibrohead, core tube, underwater electrical cable coming from surface support platform to the vibrohead, and control box located between the underwater cable and the power source. The vibrohead has a core tube clamp and an internal vibrator motor. The vibracorer applies thousands of vibrations per minute to help penetrate the sediment. When the core tube is inserted in the core tube clamp, the vibracorer is lowered to one foot above the water body and then turned on. As soon as the core tube touches the sediment, the sediment and water interface to create a slurry due to the vibrations between the core tube and sediment. This eases the entry of the core tube into the sediment. The vibracorer for the *Mudpuppy R/V*, Rossfelder P3C Vibracore (P3C), operates at the following specifications:

Weight of vibrohead: 150 lbs

Power setting: Medium = 5.0 kW, 8.0 amps

Force: centrifugal force at 60 Hz, medium power setting, produces a force of 20 kilonewtons

Vibrations per minute: 3450 vibrations per minute at 60 Hz

Water capability: 500 feet

The P3C handles core tubes from 3 to 5 inches diameter. To date, the Sediment team uses core tubes that have 4 inches in diameter for sediment sampling events.

The P3C is equipped to handle metal and plastic core tubes. To date, the Sediment team uses polycarbonate core tubes for sediment sampling events.

The P3C power settings are low, medium, and maximum operating at 50 Hz or 60Hz current. The power setting used on the *Mudpuppy R/V* is medium at 60 Hz. The medium setting is 5.0 kW (8.0 amps).

The P3C centrifugal force varies depending on current. Please see user manual for more detail. The centrifugal force for the *Mudpuppy R/V* is 20.0 kN (4500 lbs).

The vibrations per minute for the P3C depends on the frequency setting. Since the *Mudpuppy R/V* operates at 60 Hz, the vibrations per minute are 3,450.

The water depth capability for the P3C is 2800 ft. Since the winch cable line for the *Mudpuppy R/V* is 50 ft, the water depth capability is 50 ft.

3.0 Equipment and Supplies

- Rossfelder P3C Vibracore (P3C)
- Polycarbonate core tubes
- Underwater electrical cable
- Control box/power source
- Socket rachet

4.0 Steps in Obtaining Sediment Cores on the *Mudpuppy R/V* Using the Vibracorer

Before coring, the nose cone should be installed in the core tube with four rivets and core tubes should be cut to accommodate sediment depth.

1. Measure and record water depth.
3. Using the winch, vertically lift the vibrohead so that the vibrohead is suspended just off of the bow of the sampling vessel.
4. Insert the core tube into the core tube clamp, making sure that the tube slides into the check valve.
5. Hold core tube in place while tightening the clamp around the core tube using a socket rachet.

NOTE: Per P3C Manual, if any of the nuts and bolts associated with the core tube clamp are loosened during vibration, the following problems may be the cause: "1) The core tube may be damaged and break below the clamp, 2) The amperage draw may raise and exceed the limits of the power source preventing the operation of the vibrohead. Always use a softer steel nut on a stainless steel bolt."

6. With the winch, lower the entire assembly until the core nose is just above the sediment surface. Turn on the power to the vibrohead.
7. Record latitude and longitude. Record time and date.
8. Slowly lower the vibracorer by keeping 6-10 inches slack of cable at a time. The cable is marked in 1 ft increments. Monitor the core tube penetration by feeling for slack in the cable. Keep track of penetration depth by counting the markings on the cable. Counting the markings on the cable prevents the vibrohead from becoming imbedded into the sediment.
10. Once the vibracorer ceases to penetrate the sediment (i.e., the unit stops lowering, cable starts to slack, or when the end of the core tube length is reached), turn off power to the vibrohead.
11. Using the winch, remove the core from the sediment surface.
12. Lift the entire assembly so that the sediment/water interface in the core tube is visible. Rinse off the sediment from the core tube with the hose. Drill holes through the core tube at the sediment/water interface to decant water from the tube.

13. Tie a clove hitch around the core tube.
14. Remove the core tube from the core tube clamp.
15. Lower the vibrohead back into its holding cart using the winch.
16. Use secondary winch to lower core onto deck.
17. Follow sample collection, sample handling and preservation, safety and waste handling per QAPP and site safety plan.

5.0 Quality Control and Quality Assurance

Rinse off sediment from core tube with hose after each core retrieval.

Occasionally rinse off core tube clamp with lake water to ensure that sediment is not there.

6.0 PPE for Operation of Vibrocoring System

At a minimum, a hard hat with face shield, steel-toed boots, safety goggles, thicker rubber gloves or leather gloves, and a life jacket needs to be worn when operating the vibracoring system.

Please refer to the Great Lakes National Program Office's Safety, Health, and Environmental Compliance, Appendix N, for the health and safety requirements as this takes precedence over the SOP requirements.

7.0 Personnel Qualifications

The participant has an opportunity to learn how to use the Rossfelder P3C Vibracore at a sampling event during the sampling season. Training involves shadowing a trained sampler and taking samples under supervision of the trainer.

Please refer to the Great Lakes National Program Office's Safety, Health, and Environmental Compliance, Appendix N, for the health and safety requirements as this takes precedence over the SOP requirements.

8.0 Preventive Maintenance

The vibrator motor has a 1,000-hour operating time before requiring service and lubrication.

The clamp uses a combination of stainless steel bolts and plated steel nuts. Do not use stainless bolt and stainless nuts together since the stainless nut will seize on the stainless bolt.

Make sure that water does not enter the mated connectors of the underwater power connector (UPC). Damage will result causing the replacement of the connector(s).

The connectors and o-rings should be inspected and replaced, if necessary, before each sampling season. Refer to the Rossfelder P3C Vibracore Manual, page 11, for further information.

9.0 References

1. http://www.epa.gov/quality/qs-docs/g6-final.pdf
2. Rossfelder P3C Vibracore Manual, Oct 1999.

PROCEDURES IN USING THE STANDARD PONAR DREDGE

1.0 Scope and Application

This Standard Operating Procedure describes procedures in using the standard ponar dredge to obtain sediment grab samples onboard the *Mudpuppy R/V.*

2.0 Introduction

The ponar dredge consists of a center pivot, tapered scooped edges, heavy-duty hinges, scoop, underlip, stainless steel screen, and a pinch-pin. It has a scoop volume of 8,200 mL and a sampling area of 229 X 229 mm (9 X 9").

Please reference the1725-F10 Standard Ponar Grab for specifications on the unit (Attachment A).

3.0 Equipment and Supplies for Operation of Ponar Dredge

- Winch
- Winch mount
- Stainless steel cable

4.0 Steps in Obtaining Ponars on the *Mudpuppy R/V* Using the Ponar Dredge

1. Measure and record water depth.

2. Securely fasten the cable or rope to the dredge.

3. Insert the pinch-pin (tripping device) into ponar. Pinch-pin has a spring wrapped around bolt. Hold ponar dredge at the upper arm crosses to avoid getting fingers and hands pinched.

4. After inserting the pinch-pin into dredge, lift the dredge with the winch. Lifting the ponar will secure the pinch-pin in place.

5. Winch the dredge into the water body until dredge has reached sediment bottom.

6. Record the latitude and longitude.

7. Trip the dredge shut by allowing slack to the line. The pinch-pin will be released allowing for the jaws clamp shut, grabbing a sediment sample.

8. Winch the dredge to the deck. Decant water from dredge before placing dredge into pan.

9. Empty sediment from dredge. Insert the safety pin into the dredge. Winch the dredge and put the dredge back into its place on the deck.

10. Follow sample collection, sample handling and preservation, safety and waste handling per QAPP and site safety plan.

5.0 Quality Control and Quality Assurance

Rinse the ponar dredge after each use to avoid contamination in samples.

In all cases (vibracorers, all ponars, box corers, etc.), if the first sample attempt does not work out, do not dump the sample overboard at the same location.from where the sample was taken. Dump it away from the area where the sample was taken.

6.0 PPE for operation of ponar dredge

At a minimum, use rubber gloves or leather gloves to operate the standard ponar dredge.

Please refer to the Great Lakes National Proram Office's Safety, Health, and Environmental Compliance, Appendix N, for the health and safety requirements as this takes precedence over the SOP requirements.

7.0 Personnel Qualifications

The participant has an opportunity to learn how to use the standard ponar grab at a sampling event during the sampling season. Training involves shadowing a trained sampler and taking samples under supervision of the trainer.

Please refer to the Great Lakes National Program Office's Safety, Health, and Environmental Compliance, Appendix N, for the health and safety requirements as this takes precedence over the SOP requirements.

8.0 Preventive Maintenance

Please see the section entitled Maintenance in the 1725-F10 Standard Ponar Grab for steps in obtaining ponars aboard the *R/V Mudpuppy* (Attachment A).

9.0 References

1. http://www.wildco.com/vw_prdct_mdl.asp?prdct_mdl_cd=1725

D Field Collection Forms

Sediment Core Log Form

Sediment Core Log
Eighteenmile Creek Area of Concern Remedial Investigation

Core Location Number (Station I.D.): _____

Date: _____

Photo #	Decsription	Direction

Core Location Description:

Coring Method: **Vibracore** ☐
Driller:

Coring Method: **Hand**	Macrocore ☐	Manual Push ☐
Coring Team:		

Geologist: _____

Weather: _____

Water Level Elevation (feet AMSL): _____
Water Depth (feet above from creek bottom): _____
Core Refusal (feet below creek bottom): _____
Core Recovery (feef): _____

Core Depth (ft.)	Sediment Description	USCS Code	Sample Number Suffix	Sample Time	Sample Depth Interval (ft)	PID Readings (ppm)
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Transfer Log Form

Sample Data Transfer Log
Eighteenmile Creek Area of Concern Remedial Investigation

Coring Date: _____ Core Location Number: _____

Sample Interval	Sample Number	Analyses				
		Routine	Full Suite	AVS SEM	Grain Size	PCB Congeners
0 - 0.5'						
0.5' - 1'						
1' - 2'						
2' - 3'						
3' - 4'						
4' - 5'						
5' - 6'						
6' - 7'						
7' - 8'						
8' - 9'						
9' - 10'						
10 - 11'						
11' - 12'						
12' - 13'						

Daily Activity Summary Report

Eighteenmile Creek Area of Concern Remedial Investigation	
Daily Activity Summary Report	
Date:	Report No: EMC-
Weather:	

Personnel	Hrs.	Affiliation

Site Area	Task	Locations Addressed

Field Tests Performed (Field Screening, Chemical Ttesting, etc.)
Work Delays (Due To Weather, Maintenance, Breakdowns, Waiting For Decisions)
Problems Encountered And Deviations From Work Plan
Written And Verbal Instruction By The Client
Safety Issues
Planned Activities For Next Work Day
Remarks (Visitors, Completion of a field task, etc.):

Site Manager Date

E Chain-of-Custody Procedure

FIELD OPERATING PROCEDURE FOP-04

Documentation/Chain-of-Custody Procedure

I. Purpose

The purpose of this FOP is to provide a definition of "custody" and describe protocols for documenting the transfer of custody from one party to the next (e.g., from the site to the laboratory). A documented custody trail is established through the use of sample tags and a USEPA chain-of-custody form which uniquely identifies each sample container, and who has possession of it from the sample's origin to its final destination. The chain-of-custody form also describes the sampling point, date, time, and analysis parameters.

II. Scope

Sample personnel should be aware that a sample is considered to be in a person's custody if the sample meets the following conditions:

- It is in a person's actual possession
- It is in view after being in a person's possession
- It is locked up so that no one can tamper with it after having been in physical custody

When samples leave the custody of the sampler, the cooler must be custody-sealed and possession must be documented.

Data generated from the use of this FOP may be used to support the following activities: site characterization, risk assessment, and evaluation of remedial alternatives.

III. Equipment and Materials

- Computer with Forms II Lite software loaded
- Printer with paper (8.5- × 11-inch) and ink cartridge (black or color)
- USEPA Region 5 Sample Tag
- Forms II Lite generated tag label (encouraged, but not mandatory)
- Indelible black ink pen

IV. Procedures and Guidelines

A. Chain-of-Custody Forms

The chain of custody form must contain the following information:

- CASE NUMBER/CLIENT NUMBER: If a CLP laboratory is used, enter the case number provided by EPA's RSCC. If the CLP is not used, enter the SAS number provided by CH2M HILL's Sample & Analytical Coordinator.
- EPA REGION: Enter Region "5".

- CERCLIS ID: For Waukegan Harbor, use "ILD000802827".
- SPILL ID: For Waukegan Harbor, use "0528".
- SITE NAME/STATE: For Waukegan Harbor, this will be "WAUKEGAN HARBOR", "IL".
- PROJECT LEADER: Enter the CH2M HILL site manager.
- ACTION: For Waukegan Harbor, choose "Remedial Design".
- SAMPLING CO.: "CH2M HILL".
- SAMPLE NO.: This is the unique number that will be used for sample tracking. For CLP, this number is taken from a block of numbers assigned by the EPA RSCC. For non-CLP, the CH2M HILL Sample & Analytical Coordinator will assign this number.
- MATRIX: Describes the sample media (e.g. Sediment etc.).
- SAMPLER NAME: The name of the sampler or sample team leader.
- CONCENTRATION: Low (L), Low/Medium (M) or High (H).
- SAMPLE TYPE: "Grab" or "Composite".
- ANALYSIS: This indicates the analyses required for each sample.
- TAG NO.: This number appears on the bottom of the sample tag and includes a prefix ("5") followed by a series of numbers. The entire number must appear on the chain-of-custody form.
- PRESERVATIVE: Document what preservative has been added to the sample (e.g. "HCl", "Ice Only", "None").
- STATION LOCATION: This is the CH2M HILL Station Location Identifier.
- SAMPLE COLLECT DATE/TIME: Use military time.
- QC TYPE: This is for field QC only, and includes field duplicate, field blanks, equipment blanks, and trip blanks.
- DATE SHIPPED: The date that samples are relinquished to the shipping carrier.
- CARRIER NAME: (e.g., "FedEx").
- AIRBILL: Airbill number used for shipping (if samples are hand delivered to their destination, "Hand delivered" should appear in this field).
- SHIPPED TO: This is the laboratory name and full address, including the laboratory contact. If the contact is not known, use "Sample Custodian".
- CHAIN OF CUSTODY RECORD fields: This sampler's signature must appear in the "Sampler Signature" and the "Relinquished By" fields. The date and time (military time) must also be included. If additional personnel were involved in sampling, their signatures should appear in the "Additional Sampler Signature(s)" field.

Although the samples are "relinquished" to the shipping carrier, the shipping carrier does not have access to the samples as long as the shipping cooler is custody sealed. Consequently, the shipping carrier does not sign the chain-of-custody form.

- SAMPLE(S) TO BE USED FOR LABORATORY QC: This identifies which samples are to be used for matrix spike/matrix spike duplicate analyses.
- Indicate if shipment for case is complete: Use "Y" or "N".
- CHAIN-OF-CUSTODY SEAL NUMBER: Record the custody seal numbers that appear on the Region 5 custody seals that can be found on the shipping container. There is usually a minimum of two per shipping container.

B. Sample Tags

Each sample container will be identified with a uniquely numbered sample tag issued by USEPA Region 5. Each tag will contain the following information:

- Case/SAS number
- The unique sample number for sample tracking
- CH2M HILL station location (i.e., the sample identifier)
- Date of sampling
- Time the sample was collected (in military time)
- All parameters for which the sample will be analyzed
- Preservative used (if any)
- Sample type (grab or composite)
- Sample concentration (low, medium, high)
- Sample matrix (sediment, etc.)
- The signature of sample team leader
- Identification when sample is intended to be used by the lab for matrix spike/spike duplicate

V. Attachments

- Attachment 1: Forms II Lite Quick Reference Guide
- Attachment 2: Example Chain-of-Custody Form, Sample Tag, Custody Seal
- Attachment 3: Capturing Additional Information Required by GLNPO

VI. Key Checks and Items

- All sample containers must be properly tagged.
- Each cooler must have a chain-of-custody form and the samples in the cooler (as identified by the sample tags) must match what is on the chain-of-custody form.
- Each chain-of-custody form must be properly relinquished (signature, date, time).
- The custody seal numbers must be written on each chain-of-custody form.
- The shipping cooler must be custody sealed in at least two places.

FOP-04, Attachment 1
Forms II Lite Quick Reference Guide

Getting Started

(a) Click on the **Start** button on the Windows Desktop and select **Programs**. Select **Forms II Lite** and click on the FORMS II Lite item. The FORMS II Lite application will begin.
(b) Click **File** on the Main Menu bar. Click on the **New Site** item. The first data entry screen will appear.

Step 1 - Enter Site Information

a) Enter all relevant information necessary for Chain-of-Custody paperwork (in accordance with Regional guidance). For CLP Traffic Reports (TRs) this includes:
   - Site Name
   - State
   - EPA Region Number
   - CLP Case Number
   - Lead Sampler
b) Click the **Next** button to proceed to Step 2.

Step 2 - Select Sampling Team

a) Select sampling team members from the **Unassigned Team Members** window by clicking on each name.
b) Click the **>** button. The selected name will move to the **SelectedTeam** window. Repeat until all team members for this sampling event are selected.
c) Click the **Add/Edit Team Members** button to add any remaining sampling team members names that do not appear in the **Unassigned Team Members** window.
d) Enter the first and last name of each sampler. If you would like to add the sampler to the permanent list, click the **Add to Permanent List** box. After you have entered the samplers' names, click the **OK** button. These samplers will appear in the **Selected Team Members** window on the Select Sampling Team screen.
e) Click the **Next** button to proceed to Step 3.

Step 3 - Select Analysis

a) Select an analysis from the **Available Analyses** window by clicking on the analysis.
b) Click the **>** button. The selected analysis will move to the **Selected Analyses** window. Repeat until all analyses to be performed on samples collected for this sampling event are selected.
c) To edit Turnaround Time, click the **Edit Turnaround Days** button. The **Edit Project and Turnaround** screen will appear.
d) Click on the **Turnaround Time** drop down menu to select the number of days or type in a value. Click **Close** to close screen.
e) Click the **Next** button to proceed to Step 4.

Step 4 - Enter Station

a) Enter all relevant information necessary for Chain-of-Custody paperwork (in accordance with Regional guidance). For CLP TRs this includes:
   - Station Name and Location
   - Sample Matrix
   - Sample Date/Time
   - Sample Type
   - Sampler Name

b) The Sample Date/Time field is strictly military time. You may click on the System Date/Time checkbox to populate the current system date/time value into the sample date/time.

c) Click the **Add Station** button to enter the name of a new station and continue with the station locations. To enter a new station location associated with a previously entered station, click on the station name, then click the **Add Location** button, and enter the name of the new station location.

d) Click the **Next** button to proceed to Step 5.

Step 5 - Assign Bottles and Samples

a) Select the Station Location from the **Station/Location** window.

b) Select the analyses associated with the containers from the **Analysis** window. If more than one analysis is associated with a container, select the additional analysis(es) by holding down the control key, and clicking on the additional analysis(es).

c) Enter the number of bottles that will be assigned a specific analysis or set of analyses.

d) Enter the sample tag prefix and starting tag number. Click **Auto Increment Tag Number** if you wish to assign sequential tag numbers for your sampling event. Sample numbers are automatically and sequentially assigned for your sampling event and are unique per Station Location.

e) By default CLP sample numbers are automatically used for CLP analyses. Note that FORMS II Lite generates CLP sample numbers using a BASE 32 system which differs from the CLASS generated CLP sample numbers.

f) Edit the sample number and other pertinent information for these samples in the space provided. After you have confirmed your entries, click the down arrow.

g) Repeat steps 5b through 5f until all desired analyses have been assigned to bottles.

h) Click the Next button to proceed to Step 6.

Generate Labels

a) Click the **Generate Labels** button in Step 5. The application automatically displays samples for the current Station Location. These are the samples for which labels will be generated. Click the appropriate checkbox at the bottom of the screen to select all samples for the station or site. Enter the number of labels to print next to each record if you need more than one.

b) Click the **Generate Labels** button and select the appropriate label template to view, then click **OK.** Edit an existing template by clicking the **Edit Label** button. If you wish to add a new label template, click the **Add New Label** button and follow the wizard to create a

new template. Enter the number of blank labels to control printing on a label other than the first one on the page.

c) View the labels at the end of the edit label or new label process. If labels are not acceptable, close the view and edit the label template. If the labels are acceptable, print the labels.

d) Select **File** and then **Print** from the Main Menu bar. Select the desired number of copies to be printed and click the **OK** button to print the labels. Click **Close** to return to Step 5.

Step 6 - Select Samples and Assign Lab

a) Select a laboratory from the **Lab Code** drop down menu. If the laboratory where samples will be shipped does not appear in the list, click the **Add Lab** button and add the lab information.

b) Select samples from the **Unassigned Samples** window by holding down the [Ctrl] key and clicking on each sample that will be shipped to this laboratory. After you have selected all the samples for the laboratory, click the down arrow.

c) Repeat steps 6a and 6b until all samples have been assigned to laboratories.

d) Click the **Next** button to proceed to Step 7.

Step 7 - Select Labs and Assign Shipping

a) Enter the carrier, date of shipment and airbill number.

b) Select samples from the **Unassigned** window by holding down the [Ctrl] key and clicking on each sample that will be shipped using this airbill. After you have selected the samples to be shipped, click the down arrow.

c) Repeat steps 7a and 7b until all samples have been assigned airbill numbers.

d) Click the **Finish** button for system generated TRs. FORMS II Lite will then display a screen that enables you to view and print TRs for the site.

e) Click **Next** and proceed to Step 8 to customize TRs for specific sets of samples.

Step 8 - Customize Traffic Report

a) Confirm the last four digits of the TR number. (The first two digits represent the Region number, the next nine digits are a random number and the next six digits are the date the TR was created, and the last four digits are automatically incremented by the system but may be edited by the user.)

b) Select a shipment from the **Shipping** window. Select the samples from the **Samples** window that will be assigned to this TR. After you have selected the samples, click the down arrow. (NOTE: samples must be of the same program type and must have the same project code to be assigned to a single TR.)

c) Repeat steps 8a and 8b until all samples have been assigned.

d) Click the **Finish** button. FORMS II Lite will display a screen that will enable you to view, print, archive and export TRs. Follow the directions to print the TRs.

Quick Edit

a) On the **View/Print TR** screen displayed after completion of Step 8, click the **Quick Edit** button.

b) The user may edit most data fields, except those in red, prior to printing a TR. Also able to sort and filter any column and print a report.

Helpful Hints to Use FORMS II Lite 4.0

This Quick Reference Guide is designed to help FORMS II Lite users enter information for their sampling events and generate bottle labels and Chain-of-Custody paperwork. FORMS II Lite provides users the flexibility to enter most of their information ahead of the sampling event.

FORMS II Lite allows users to:

- Add values that are not included in the "list and pick" menus: Select **Admin** from the Main Menu bar, enter the password to log in. **Admin** now shows the user as being **(logged in)**. Select **Reference Tables**, and choose the table that requires editing.
- Customize screens and disable non-key fields: While logged into **Admin** on the Main Menu Bar, select **Custom Features** and click on **Field Names**. Field names and non-key fields can be renamed or hidden on the screen.
- Review the data entered throughout the data entry process by clicking on the **Quick View** button in Steps 4 through 8.
- Select multiple items by highlighting the first item, then hold down the [Ctrl] key and click on the additional items. Or simply click and drag to highlight multiple items.
- Sort data displayed in windows by clicking on the column label. Click on a second column label for a secondary sort.
- Specify more than one sampler's name for samples collected at a
- specific station location. In Step 4, select a sampler's name, then click within the data entry field after the name. Type a comma and type in the second name.
- Export Site information as either a text or (.dbf) file.
- **Note:** FORMS II Lite will not allow information that has been typed over to be saved as a separate file. Once a value in a field has been replaced (edited) with a new value, the original value is lost.

User Preferences

- The following features are maintained in **User Preferences** under **Admin** on the Main Menu bar and can be turned on or off.
- Select **Copy Station** to make the button available in Step 4 to duplicate the current station and its station location information. **Copy Location** duplicates station locations.
- Select the option **Use Default Number of Bottles**, set in the Analysis Reference Tables, to populate the number of containers for each analysis in Step 5.

- Select **Assign All** to make the button available in Step 5 to assign each of the analyses to a separate container. Set the number of containers for each analysis in the bottles field or define through User Preferences.
- Select **One-Step Printing** to make this button available in Step 5 to print labels or tags with a single click. Label template, and number of copies are defined in User Preferences.

FOP-04, Attachment 2
Chain-of-Custody Form, Sample Tag, Custody Seal

EPA USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case: R
Client No: 04CK01

Region:	5	Date Shipped:	08/30/2004	Chain of Custody Record	Sampler Signature: Joe Sampler
Project Code:	TGB 102	Carrier Name:	FedEx	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1234567890	1 Joe Sampler 8/30/04 1845	
CERCLIS ID:	ILD000802827	Shipped to:	Any Lab 1234 West 5th Street Suite 99 Whatever MN 55999 (000) 111-2345	2	
Spill ID:	0528			3	
Site Name/State:	OMC Plant 2/IL			4	
Project Leader:	Jane Sitemanager				
Action:	Remedial Investigation				
Sampling Co:	CH2M HILL				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
04CK01-12	Ground Water/ JOE SAMPLER	L/G	BTEX (21)	512352 (HCL), 512353 (HCL), 512354 (HCL) (3)	OMC-MW01S-01	S: 08/30/2004 13:30	--

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
OFFICIAL SEAL
No 136607

Station Number and Location | Month/Day/Year | Time | DESIGNATE Comp. Grab

Samplers (signatures) Joe Sampler

Tag Number 5- 090996

Remarks:

Sample Number: 04CK01-12
Station Location: OMC-MW01S-01
ANALYSIS: CLP TCL Volatiles
Sample Date/Time: 08/30/2004/ 13:30
Matrix: Ground Water
Preservative: HCL
Sampler(s): JOE SAMPLER Grab
Tag Number: 512345

VOA | PRESERVATIVE: HCL ☐ HNO_3 ☐ NaOH ☐ H_2SO_4 ☐ Other ☐ ICE ☐ | ANALYSES METALS

USE FOR MS/MSD ☐ Lab Sample Number

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = H

BTEX = (Benzene, Toluene, Ethylbenzene, Xylenes)

Number: -0606, 136607

Shipment Iced? _____

TR Number: 5-484657676-051304-0004

PR provides preliminary results. Requests for preliminary results will increase anal

Send Copy to: Sample Management Office, 2000 Edmund Halley Dr., Reston, ... 703/264-9348 Fax 703/264-9222

REGION COPY

F2V31.043 Page 1 of 1

FOP- 4, Attachment 3
Capturing Additional Information Required by GLNPO

GLNPO projects require the capture of additional information into Forms II Lite. The following steps will set up Forms II Lite to receive this information.

Open Forms II Lite

The opening screen will appear. Click the **CANCEL** button.

Click on **CUSTOMIZE** (upper left corner of the screen), then **REFERENCE TABLES**.

Click on the "Field Measurement" tab.

The original Field Measurement field will contain pH, temperature, and turbidity. You can delete these entries using the **DELETE** button or add to them.

Click on the **ADD NEW** button and add the following GLNPO required fields. After each entry, click on the **SAVE** button, followed by **ADD NEW**.

1. Water Depth (units: feet)
2. Sediment Depth (units: feet)
3. Upper Collection Depth (units: feet)
4. Lower Collection Depth (units: feet)
5. Sediment Sample Technique
6. Collected to Refusal?

When done, click on **CLOSE**.

Open Forms II Lite ("File / Open Site" or click on the "folder" icon) and proceed normally.

In "Step 4 - Station Location Information", click on the **ADD/EDIT LOCATION MEASUREMENTS** button to the right of the Station Location field (the icon is a ruler). A window will pop up. Click on the "Field Measurement" tab and fill in the GLNPO required information. X-Y coordinates can also be filled in here. When done, click on **CLOSE**.

To Retrieve the Information

The information that was typed in is stored in the following Access 97 database tables:

- Elevation and X-Y coordinates: tblLocationMeasurement
- All other information: tblLocationFieldMeasurement

If Access97 is not available, the information can be retrieved in Excel:

In Windows Explorer, locate the database in C:\Program Files\FORMS2Lite51. The database is named: F2L51_db.mdb

- Right click on F2L51_db.mdb
- Open with > Microsoft Office Excel
- Open
- Okay
- Okay

Locate "tblLocationMeasurement" or "tblLocationFieldMeasurement" and click **OKAY**

Save the Excel table.