U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 2 RAC2 PROGRAM

CONTRACT NUMBER EP-W-10-007
WORK ASSIGNMENT NUMBER 010-RICO-0269

LOS ALAMOS TECHNICAL ASSOCIATES

REVISED WORK PLAN
Revision 01

02 July 2014

EIGHTEEN MILE CREEK SITE – OU2
Remedial Investigation/Feasibility Study

Los Alamos Technical Associates, Inc.

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02 July 2014

Ms. Peggy DeLuca, Contracting Officer
U.S. Environmental Protection Agency
290 Broadway, 27th Floor
New York, New York 10007-1866

SUBJECT: USEPA RAC2 CONTRACT NUMBER EP-W-10-007
USEPA WORK ASSIGNMENT NUMBER 010-RICO-0269
EIGHTEEN MILE CREEK SITE – OU2 RI/FS
REVISED WORK PLAN, REVISION 01

Dear Ms. DeLuca:

Los Alamos Technical Associates, Inc. (LATA) is pleased to submit the enclosed plan for the subject Work Assignment.

The Revised Budget Estimate (Revision 01) has been submitted under separate cover. If you have any questions, please call me at (732) 947-3277 or email me at wcolvin@lata.com.

Sincerely,

William R Colvin

William R. Colvin, PMP, CHMM, PG
LATA RAC2 Program Manager

CF: K. Moncino, Project Officer
T. Taccone, Work Assignment Manager

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Eighteen Mile Creek Site – OU2
Remedial Investigation/Feasibility Study

Prepared by: Marcia M. Galloway	**Signature:** Marcia M. Galloway	**Title:** E & E Project Manager	**Date:** 02 July 2014
Reviewed by: Gene Florentino	**Signature:** Gene Florentino	**Title:** E & E Program Manager	**Date:** 02 July 2014
Approved by: William R. Colvin	**Signature:** William R Colvin	**Title:** LATA RAC2 Program Manager	**Date:** 02 July 2014

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1.0 INTRODUCTION

This work is being performed under U.S. Environmental Protection Agency (EPA) Remedial Action Contract 2 (RAC2) Contract Number EP-W-10-007. The Original Work Assignment Form (WAF) for the Remedial Investigation/Feasibility Study (RI/FS) to be performed by Los Alamos Technical Associates (LATA) for the Eighteen Mile Creek Site – Operable Unit 2 (OU2) (Site) was issued on 23 September 2013. This Work Plan was developed based on the Statement of Work (SOW) in the Original WAF.

The Draft Work Plan and Budget Estimate were submitted on 14 February 2014. The continued performance of Task 01 activities (Project Planning and Support) was authorized via WAF Amendments 002 and 003 issued on 30 April 2014 and 10 June 2014, respectively.

On 09 April 2014 the LATA Team received comments on the Draft Work Plan and held a conference call with the WA Manager (WAM) on 23 April 2014 to discuss the comments. During that call, it was decided that EPA and LATA Team risk assessors should discuss the comments; that conference call was held on 05 May 2014. Following the call, the LATA Team assessed the technical activities needed to be performed to address EPA's comments. On 14 May 2014, LATA sent the WAM descriptions of the technical activities planned to be performed to revise the Draft Work Plan; the WAM concurred with the technical activities the next day. On 04 June 2014, the LATA Team Project Manager met with the WAM to review the details of the sampling program that would be included in this Revised Work Plan (Revision 01).

Ecology and Environment, Inc. (E & E) is a Team Subcontractor to LATA on this contract and has a key role in this project. All communications between EPA and E & E that might potentially affect cost, level of effort (LOE) hours, scope, and/or schedule will be directed through the LATA Point of Contact (POC).

1.1 PURPOSE AND SCOPE

The purpose of this WA is to plan and implement a RI/FS for OU2 of the Eighteen Mile Creek Site (the Creek Corridor). The scope includes activities to determine the extent of contamination, perform human health and ecological risk assessments, delineate the extent of wetlands along the Creek Corridor, conduct Stage 1A cultural resource evaluations of effected properties in the Creek Corridor, provide continued community relations support, and assist with the development and issuance of a proposed plan and record of decision (ROD) in accordance with the National Contingency Plan (NCP) and all applicable EPA RI/FS guidance. The work performed under this WA will supplement the RI/FS completed by New York State Department of Environmental Conservation (NYSDEC) for the Creek Corridor (NYSDEC 2006a; EEEPC 2009a, b, c) and the separate RI/FS completed by NYSDEC and Niagara County the Flintkote property (TVGA 2005a, b). OU2 will include the portion of OU1 that is along the Creek Channel banks.

OU1 will address contaminated soil at the Residential Properties on Water Street in Lockport, New York, as well as the conditions of a building located on the former Flintkote Plant property (former Flintkote Building). EPA completed a ROD for the preferred alternative for OU1 (issued on 30 September 2013) and most of the OU1 activities have been completed. OU3 will focus on Eighteenmile Creek north of the Creek Corridor.

1.2 BACKGROUND

The LATA Team completed a review of existing data and prepared a memorandum entitled *Evaluation of Existing Data for the Eighteenmile Creek Superfund Site OU2* (LATA and E & E 2014). The memorandum was submitted on 27 January 2014 and was provided as Appendix A of the Draft Work Plan submitted on 14 February. Comments on the memorandum were provided in conjunction with the comments on the Draft Work Plan. The memorandum was updated to address EPA's comments and is included in this Revised Work Plan (Revision 01) as Appendix A.

The memorandum in Appendix A provides background information for OU2 including a description and history of the site. The memorandum also includes figures and tables summarizing the sampling program that will be undertaken for the OU2 field investigation.

2.0 SUMMARY OF SITE CONDITIONS

The memorandum provided in Appendix A includes a summary of site conditions at OU2.

3.0 TASK PLAN FOR THE EIGHTEEN MILE CREEK RI/FS

The EPA Region 2 Superfund Program supports the adoption of green site assessments and remediation, which is defined in the SOW for this WA as the practice of considering all environmental impacts of remedy studies, selection and implementation, and incorporating strategies to maximize the net environmental benefit of cleanup actions. The LATA Team has explored green strategies to reduce energy use, promote material reuse and recycling, and plans to implement the following approaches to reduce negative impacts on the environment during the period of performance (POP) of this WA:

Office and Community Relations Activities

- Use the smallest on-road rental vehicles (hybrid if possible) practical for travel.
- Recycle office wastes through segregation, collection, storage, and removal of paper, liquid containers, ink cartridges, batteries, and other items.
- Submit documents in digital rather than hardcopy format to save paper, unless otherwise directed by EPA.
- Ensure the heating and cooling systems in LATA Team offices are maintained by the building management companies.
- Use “Energy Star” appliances, compact fluorescent lights, and recycled products in LATA Team offices to the greatest extent possible.
- Minimize travel and use public transportation for travel to meetings with EPA in New York City.

Field Activities

- Use the smallest on-road rental vehicles (hybrid if possible) practical for travel/fieldwork.
- Recycle non-contaminated wastes through segregation, collection, storage, and removal of paper, liquid containers, batteries, and other items.
- Recycle drums used for storage of investigation-derived waste (IDW).
- Prepare and submit daily activity summary reports to the Project Manager and EPA representative in digital rather than hardcopy format to save paper.

Additionally, in accordance with the requirements of the SOW for this WA, the LATA Team will consider the efficient use of natural resources and energy and the reduction of waste to the maximum extent possible in the conduct of the FS phase of the project. The objective will be to incorporate approaches and strategies to maximize the net environmental benefit of the cleanup action(s) considered for implementation. Therefore, for Tasks 10, 11, and 12, the LATA Team will:

- Incorporate green remediation best practices for each remedy as part of the cost evaluation;
- Analyze the feasibility of alternate energy sources for remedial alternatives;
- Evaluate low-energy remedial alternatives;
- Assess the cost of the energy required for alternatives projected out 30 years;

- Consider future use of the site in determining the short and long-term effectiveness of the remedy;
- Consider using local vendors to the greatest extent possible to lower the environmental footprint through reduced transportation;
- Focus on minimizing high quality fresh water use;
- Assess the use of reclaimed water where applicable;
- Evaluate the amount of soil necessary to be displaced/disturbed to remove one pound of contaminant; and
- Evaluate the amount of raw materials extracted, processed, or disposed for each pound of contaminant treated.

The following sections describe the work to be performed to meet the objectives of this WA.

3.1 TASK 1: PROJECT PLANNING AND SUPPORT

3.1.1 Project Administration (Subtask 1.01)

This subtask contains two main components: setting up the project in the LATA and E & E financial systems, conducting monthly administration tasks, and coordinating between LATA and E & E. These components are summarized below.

Project Setup

Activities include: entering project charge numbers in accordance with the WA work breakdown structure (WBS); entering budgets for the various tasks and subtasks; and entering the charge categories for the tasks and subtasks (labor, other direct costs, travel, team subcontractors, and subpool). Setup includes the effort to open charge numbers as the project proceeds.

Monthly Administration

Activities include: tracking expenditures and the project schedule by task and subtask on a weekly basis; generating and reviewing WA-specific RAC2 Reports; preparing and reviewing the progress report for the WA; monthly invoicing to LATA; and conducting overall management of the execution of the WA. This subtask also includes the preparation, issuance, and acceptance of purchase orders between LATA and E & E needed for each change in WA Expenditure Limits resulting in the updating of the LATA and E & E financial systems.

3.1.2 Scoping Meeting (Subtask 1.02)

The Project Manager contacted the EPA WAM on 26 September 2013 to schedule the Scoping Meeting, which was held on 18 December 2013 at EPA's New York City office. Meeting minutes were submitted on 19 December 2013.

3.1.3 Site Visit (Subtask 1.03) – Optional

If directed by EPA, the LATA Team will attend a two-day site visit. Two members of the LATA Team will attend the site visit. The site visit may be held in conjunction with OU3 planning. The specific locations will be determined as outlined in Section 3.3.5.

3.1.4 Draft Work Plan and Budget Estimate (Subtask 1.04)

The LATA Team prepared the Draft Work Plan based on the SOW in the Original WAF. The Draft Work Plan was submitted on 14 February 2014 and described the project tasks planned to be performed and the procedures that would be employed to meet the objectives of this WA. The Draft Budget Estimate, submitted on 14 February 2014 was prepared based on the task descriptions in the Draft Work Plan.

3.1.5 Negotiate and Revise Draft Work Plan and Budget Estimate (Subtask 1.05)

To prepare this Revised Work Plan (Revision 01) and Revised Budget Estimate (Revision 01), the LATA Team: reviewed and addressed EPA's 09 April 2014 comments on the Draft Work Plan; held a conference call with the WAM on 23 April 2014 to discuss EPA's comments; participated in the 05 May 2014 conference call with the WAM and EPA risk assessors to discuss the comments; on 15 May 2014, discussed with the WAM the technical activities needed to be performed to address EPA's comments; submitted to the WAM, Project Officer (PO), and Contract Officer (CO) (on 20 May 2014) a description of the activities planned to be performed to revise the Draft Work Plan and Draft Budget Estimate; and had a follow-up meeting with the WAM on 04 June 2014 to review the details of the sampling program that would be included in this Revised Work Plan (Revision 01).

The LATA Team will participate in a teleconference with EPA to negotiate the Revised Budget Estimate (Revision 01). A memorandum documenting the agreements reached during the negotiation will be submitted for EPA's review. Revisions to the Revised Work Plan (Revision 01) following the negotiation will not be necessary because the revisions were based on the agreements reached in the technical discussions held in May and June 2014 mentioned in the preceding paragraph. Revisions to the Revised Budget Estimate (Revision 01) will be necessary to incorporate the agreements reached in the negotiation which will result in the preparation and submission of the Revised Budget Estimate (Revision 02). The Revised Work Plan (Revision 01) and Revised Budget Estimates (Revisions 01 and 02) will be submitted in both hard copy and electronic formats.

3.1.6 Evaluate Existing Data and Documents (Subtask 1.06)

The LATA Team prepared a review memorandum that: 1) addressed whether additional data are needed to develop a complete Conceptual Model of the Site and whether other modeling is necessary to determine the fate and transport of sediment in the Creek and assess adverse risk to humans and ecological receptors; 2) included a qualitative Sediment Erosion and Deposition Analysis (SEDA); and 3) identified data gaps to be addressed through implementation of quality assurance and field sampling plans. The Data Evaluation Memorandum was submitted on 27 January 2014 and was incorporated into the 14 February 2014 Draft Work Plan as Appendix A. Based on EPA's 09 April 2014 comments and technical discussions described in Subtask 1.05 above, Appendix A was revised and included in this Revised Work Plan (Revision 01).

An inventory of technical documents reviewed by the LATA Team is provided in Table A-1 of the memorandum provided in Appendix A.

3.1.7 Quality Assurance Project Plan (Subtask 1.07)

The LATA Team will prepare a Draft and Revised Quality Assurance Project Plan (QAPP) to support Task 3, if performed. The QAPP will be prepared in accordance with the Uniform

Federal Policy for QAPP (UFP-QAPP) guidance and procedures. The existing QAPPs for the project are not formatted in accordance with UFP-QAPP guidance and, therefore, a new UFP-QAPP will be developed. The figures and tables in Appendix A of this Revised Work Plan (Revision 01) will be used and updated, if necessary, for the UFP-QAPP.

3.1.8 Health and Safety Plan (Subtask 1.08)

The LATA Team will prepare site-specific Health and Safety Plan (HASP) to support Task 3, if performed. The site-specific HASP will specify employee training, protective equipment, medical surveillance requirements, standard operating procedures, and a contingency plan in accordance with 29 Code of Federal Regulations (CFR) 1910.120 (l)(1) and (l)(2). The HASP will be consistent with the previous E & E HASP prepared for field activities at the site.

3.1.9 Non-Routine Analytical Services Analyses (Subtask 1.09)

With the exception of toxicity testing, hexavalent chromium, acid-volatile sulfide/simultaneously extracted metals (AVS/SEM), and passive sampler analyses, all sample analyses are planned to be performed by the EPA Region 2 Division of Environmental Science and Assessment (DESA) laboratory or in the EPA Contract Laboratory Program (CLP) or by the EPA-Environmental Response Team (ERT). The LATA Team will prepare Laboratory Services Requests for all non-Routine Analytical Services (RAS) analysis not performed by ERT, DESA, or CLP. QC criteria developed for each parameter in the UFP-QAPP prepared under Subtask 1.07 will be incorporated in the Laboratory Service Request.

Samples also will be analyzed for non-RAS under the CLP program including Multi-Media, Multi-Concentration Dioxins and Furans Analysis (DLM02.2) and Multi-Media, Multi-Concentration Chlorinated Biphenyl (CB) Congeners (CBC01.2). A portion of all samples (i.e., 10%) should be analyzed for dioxin/furan, hexavalent chromium, and polychlorinated biphenyls (PCBs) congeners in order to have a few representative samples with a Target Compound list/Target Analytical List (TCL/TAL) analyses to support the human health risk assessment. For analysis of PCBs in surface water, the samples should be analyzed with low-level PCB congener analysis to maintain consistency with historical data and achieve lower detection limits. Table 15 in Appendix A provides a summary of samples by media that will be analyzed for non-RAS.

In regard to certification requirements, the toxicity testing laboratories do not typically maintain certifications the same as environmental laboratories. If certification programs are not available, the LATA Team will review the laboratories' qualifications, laboratory QAPP, procedures, and any relevant performance evaluation samples results.

All analytical services will be reported in Analytical Services Tracking System (ANSETS) in accordance with EPA Region 2 requirements.

3.1.10 Meetings/Weekly Conference Calls (Subtask 1.10)

The LATA Team will participate in six progress meetings during the course of this WA. Four meetings will be held via teleconference, one meeting will be held at EPA's New York City office, and one meeting will be held at the Site. Minutes of these meetings will be prepared and submitted via email within five calendar days following each meeting.

3.1.11 Subcontract Procurement (Subtask 1.11)

The LATA Team will identify, solicit, and award seven subcontracts for the following services: Court Reporting (Subtask 2.03); Cultural Resources Survey (Subtask 3.01.02); Driller and Surveyor (Subtask 3.03); Investigation Derived Waste Characterization and Disposal (Subtask 3.08); and two laboratory services (one for toxicity testing and one for passive sampler analysis), hexavalent chromium, and AVS/SEM analyses (Subtask 4.03).

3.1.12 Subcontract Management (Subtask 1.12)

The LATA Team will manage and oversee the seven subcontracts awarded for this WA. Progress will be monitored and systems and records will be maintained to ensure that the work proceeds in accordance with the requirements of the respective subcontracts. The LATA Team will review and approve subcontractors' invoices and issue any necessary subcontract modifications.

3.1.13 Pathway Analysis Report (Subtask 1.13)

A Pathway Analysis Report (PAR) will be prepared in accordance with the "Risk Assessment Guidance (RAGs) for Superfund: Part D," dated December 2001. The PAR will be completed based on existing data and will include RAGs, Part D Tables 1 through 6; Exhibit 3-3 Data Usability Worksheet; and a technical memorandum with the necessary explanatory text. Because the PAR includes RAGs, Part D Tables 1 through 6 and the Data Usability Worksheet, the PAR will be completed after all historical data are tabulated as part of Subtask 6.02. The PAR will focus on how the risk assessment will be prepared for OU2 considering the receptors and exposure pathways outlined in Appendix A Table 7 for OU2. As discussed in Appendix A Section 3.2, it is anticipated that the stream channel will be divided into six reasonably homogeneous exposure areas (EA) for Human Health Risk Assessment (HHRA) purposes:

1. The Creek bed and Creek banks will be evaluated for sediment only, the creek bank soils will be assessed with each property; however, the Creek bank samples can be evaluated as a group for some parameters because the exposure areas are similar for all properties;
2. Flintkote – a 6-acre former industrial facility. The Creek bank soils immediate downstream of Flintkote will be considered part of the exposure area for this site. The Creek bank soils include samples on the opposite side that are part of the Water Street properties;
3. United Paperboard – an active 4.8-acre industrial facility. The Creek bank soils include samples on the opposite side that are part of the Water Street properties;
4. Upson Park – a 5.9-acre public park at the south end of the corridor that is mostly wooded with walking paths and a few picnic tables; and
5. White Transportation Property – an inactive 2.6-acre former commercial/industrial facility.
6. Groundwater will be assessed on an OU-wide basis based on the historical plume identified on the south side of the Creek in Upson Park and opposite United Paperboard.

For the ecological risk assessment, a technical memorandum that includes information similar to that presented in the PAR will be provided, and is discussed in Section 3.7.2.

3.2 TASK 2: COMMUNITY RELATIONS

3.2.1 Community Interviews (Subtask 2.01)

Community interviews were conducted for OU1. The LATA Team will provide support to EPA to identify new stakeholders, such as appropriate governmental officials, environmental groups, local broadcast and print media, and any other relevant stakeholders who may be interested in or concerned with the Site. These stakeholders may also include public meeting attendees who express interest in being interviewed for the updated Community Relations Plan (CRP). Draft interview questions will be prepared for review by the EPA WAM and finalized upon receipt of comments from EPA. The LATA Team will draft and finalize an invitation letter; and coordinate invitation mailings to potential interviewees. Responses from the interviews will be incorporated into the deliverable for Subtask 2.02, CRP.

3.2.2 Community Relations Plan (Subtask 2.02)

The LATA Team will prepare two updates of the November 2013 CRP prepared under the OU1 SOW. These updates will reflect additional community concerns and planned activities pertaining to OU2. Updates may also include revisions to the site background; community overview; and planned activities. The plan will also include updated figures, an updated mailing list of contacts and interested parties and residences that may be subject to fishing advisories (mailings will be done by EPA), and any new meeting venue information. The LATA Team will electronically submit the updated draft CRP to EPA for review and comment and will incorporate comments into a final updated CRP. One electronic copy and 15 hard copies of the updated CRP will be provided.

3.2.3 Public Meeting Support (Subtask 2.03)

The LATA Team will perform the following activities in support of the Public Meeting and Availability Session that will be held on the same day:

- Arrange for one Public Meeting and one Availability Session to be held on two different days. The meeting places will be determined by EPA.
- Prepare the text and graphics for three two-page handouts.
- Prepare one posterboard display and slides for a PowerPoint presentation for the Public Meeting.
- Attend the Public Meeting and Availability Sessions and provide sign-in sheets.
- Prepare draft and final presentation materials/visual aids (e.g., slides, handouts, and large format maps of the site) incorporating EPA review comments.
- Provide a court reporter for the Public Meeting. A full-page original and a “four on one” page copy, along with an electronic copy of the transcripts will be provided to EPA after the meeting. Three hard copies will be placed in the information repositories, as required.

For the site tour, the LATA Team will perform the following activities:

- Attend the site tour and provide sign-in sheets.
- Provide technical personnel to describe site activities and a community relations specialist to document public questions and concerns.
- Provide copies of handouts and technical materials prepared under Subtask 2.04 and 6.02.

3.2.4 Fact Sheet Preparation (Subtask 2.04)

The EPA WAM will prepare draft fact sheets and community updates. The LATA Team will review, edit and lay out the two fact sheets and community updates for EPA to finalize. The fact sheets will be two to four pages in length. After EPA finalizes the fact sheets, the LATA Team will photocopy the final fact sheets in black and white and attach mailing labels before delivering them to EPA from where they will be mailed.

3.2.5 Proposed Plan Support (Subtask 2.05)

EPA will prepare the Proposed Plan. The LATA Team will provide administrative and technical support for the preparation of the Draft and Final Proposed Plan that will describe the preferred alternative and other alternatives evaluated in the FS.

3.2.6 Public Notices (Subtask 2.06) – Not Applicable

3.2.7 Information Repositories (Subtask 2.07)

The LATA Team will maintain and update site-specific Administrative Records located in the Lockport Public Library, 23 East Avenue, Lockport, New York. The team will assure that all information received from EPA is documented and filed in the appropriate electronic files, and will maintain a list of available documents by subject area. Community involvement plans, meeting logs, and mailing lists will be maintained in addition to technical reports directed to be included by EPA. Two repository updates will be performed in association with OU2 activities.

3.2.8 Site Mailing List (Subtask 2.08)

The LATA Team will update the mailing list for the entire Eighteen Mile Creek Site as necessary. The LATA Team will provide mailing labels to EPA upon request. Information will be mailed to the community by EPA. Two mailing list updates will be performed under the OU2 WA.

3.2.9 Responsiveness Summary Support (Subtask 2.09)

The LATA Team will provide administrative and technical support for a Responsiveness Summary as directed by the EPA WAM. The LATA Team will provide assistance in compiling and summarizing comments received during the public comment period on the Proposed Plan and Feasibility Study. The LATA Team will support the preparation of one responsiveness summary by assisting in addressing approximately 100 separate comments (including duplicates). This support may include: researching official transcripts to ascertain information about community concerns and questions; incorporating written comments and questions into the summary; categorizing and organizing comments; and preparing technical responses.

3.3 TASK 3: FIELD INVESTIGATION

The memorandum provided in Appendix A includes recommendations for sample collection activities to address data gaps in outlined in Section 5 (Data Gaps and Recommendations). These recommendations were the basis for the field investigation task.

3.3.1 Site Reconnaissance and Cultural Resource Assessment (Subtask 3.01)

3.3.1.1 Site Reconnaissance (Subtask 3.01.01)

The existing locations and the updated floodplain will be reviewed to develop a base map for the Creek Corridor. The base map will consider Creek bank-full delineation completed during the NYSDEC Supplement Remedial Investigation (SRI) (EEEPC 2009a) to clearly establish the property boundaries on the Creek side and the 2010 Federal Emergency Management Agency floodplains. There will be no additional floodplain delineation. A well inventory or wetland delineation will be included in the base map based on existing data. The site geologist will identify specific sample locations and access points for the soil and groundwater investigation and perform photo documentation during the site visit under Subtask 1.03. The site geologist also will determine the condition of existing wells to be sampled under Subtask 3.05.

The reference and background areas to be sampled for risk assessment purposes need to be evaluated for suitability by a biologist or ecologist. Access to the reference or background areas also will be needed for the site reconnaissance. Specific locations for collection of reference or background samples have not been determined. Possible reference locations include: (1) Oak Orchard Creek, a nearby tributary to Lake Ontario; (2) the East Branch of Eighteen Mile Creek; and (3) the headwaters of Eighteen Mile Creek upstream from the New York State Barge Canal. The specific locations will be determined as outlined in Section 3.3.5.

3.3.1.2 Cultural Resource Assessment (Subtask 3.01.02)

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), a Stage 1A Cultural Resource Investigation will be performed to evaluate the existence of cultural and archaeological resources adjacent to the Creek that could be impacted by implementation of the proposed residential soil remedy for OU1 residential properties and the remaining Creek Corridor (OU2). The assessment of OU1 residential properties will be performed first and separate Phase 1A Cultural Resource Assessment Report will be prepared. Although the former Flintkote Plant building demolition is included in OU1, an evaluation conducted by NYSDEC for the former Flintkote Plant on Mill Street indicates that the remaining structure is not of historical significance, therefore, it will not be included in the cultural resource assessment.

The following is a general schedule of the cultural resource assessment process. After each step in the process, the Phase 1A report will be submitted to the EPA WAM for review and potential coordination with the New York State Historic Preservation Office (NYSHPO).

SUBMITTAL	PHASE	SCHEDULE
Cultural Resource Assessment Report	1A	90 days after Work Plan approval
NYSHPO Consultation	1A	30 days after EPA Approval
Cultural Resource Assessment Field Survey (only if cultural sensitive resources found)	1B	60 days after NYSHPO Review
Cultural Resource Assessment Survey Report	1B	60 days after field work
NYSHPO Consultation	1B	30 days after EPA Approval
Determination of eligibility of for National Registry (only if cultural resources are discovered as potentially eligible resources)	2	90 days after NYSHPO Review
NYSHPO Consultation	2	30 days after EPA Approval
Mitigation Plan	3	Occur as part of Remedial Design Phase

Cultural Resource Assessment Reports will comply with the *State Historic Preservation Office Phase I Archaeological Report Format Requirements* (NYSHPO, May 30, 2005).

The Phase 1A report will be prepared by a qualified cultural resources specialty firm that specializes in New York State requirements. A cultural resource investigation is a complicated professional activity that requires the exercise of careful, subjective judgments related to evaluation of the significance of a resource. Specialty firms have the specific expertise, data bases, resources, and access to New York State cultural resource databases. Specialty firms are able to produce the reports more cost effectively than general environmental and engineering firms. In addition, using a firm that has experience with New York requirements facilitates a faster review of the deliverables prepared for this subtask. The LATA Team will provide a Department of Interior, 36 CFR 61 qualified Principal Investigator to oversee the subcontract and coordinate with EPA and NYSHPO.

3.3.2 Mobilization and Demobilization (Subtask 3.02)

Mobilization and demobilization will be performed for one field investigation event. Mobilization will include coordination with the EPA WAM to obtain access to properties where sampling will be performed. The LATA Team will provide a list of owners to EPA to obtain access to the sampling locations. A global positioning system (GPS) will be rented, loaded with sample locations from the QAPP, and used to obtain sample coordinates. The GPS locations will be downloaded and checked. The field team will coordinate with the subcontract driller to establish staging area and decontamination pad and obtain necessary field supplies. The field team will operate from the E & E offices in Lancaster, New York, and travel to the OU2 site in Lockport, New York, on a daily basis. Mobilization will not be required for the second round of groundwater sampling.

3.3.3 Sediment and Soil Boring, Drilling, and Testing (Subtask 3.03) - Optional

At the Flintkote Property, 10 borings will be drilled to a depth of 10 feet and three samples will be collected from each boring using conventional hollow stem auger drilling. Samples will be collected at three depths. A surface sample at 0 to 6 inches below ground surface (bgs) and near surface sample at 1 to 2 feet bgs will be collected to assess presence of PCB

contamination and provide data for risk assessment. Additional sample depths will be determined based on visual observation of fill material or staining. If no fill or staining is present, one subsurface sample will be collected in native soil above bedrock. Borings will be placed below and around the Flintkote building after building demolition. Figure 10 of Appendix A shows the existing and planned sample locations at the Former Flintkote Plant Site.

Although there is a potential of encountering soils with high concentrations of PCBs, direct-push sampling, which minimizes soil waste, is not recommended due to potential early refusal from the construction and demolition backfill material expected to be present at the site. The LATA Team will subcontract this activity to a drilling company.

3.3.4 Hydrological Assessment (Subtask 3.04) – Optional

Due to the uncertain nature of the source of the elevated levels of chlorinated volatiles in MW05 (Former United Paperboard south of the Creek) and in MW14 (Upson Park), new monitoring wells need to be installed to address data gaps described in Section 5.1.1 of Appendix A. Two new monitoring wells will be installed at locations that are upgradient of MW-5 and MW-14 (see Figures 5 and 6 Appendix A). In addition, MW09 will be re-drilled if determined to be dry or not capable of producing a sufficient amount of water. Monitoring wells will be drilled to a depth of 25 feet with a 10-foot screen and constructed of 2-inch polyvinyl chloride (PVC). The three new monitoring wells with be developed 48 hours after completion.

3.3.5 Environmental Sampling (Subtask 3.05)

Environmental sampling will be performed to address data gaps described the Section 5 of Appendix A. Sample data gaps are summarized in Appendix A on Tables 10 through 14 for the Creek channel and each property within OU2. Specific sampling and analysis recommendations for all properties are summarized on Table 15 of Appendix A and in the table below. The locations of existing and planned sample locations are included on Figures 6 and 9 to 13 in Appendix A. General sampling requirements are as follows:

- Soil samples will be collected with the 10 borings installed at the former Flintkote Plant site under Subtask 3.03. Planned sample locations are shown on Figure 10 of Appendix A. Samples will be collected at an estimated three depths as described in in Section 3.3.3. Samples will be analyzed for the all TCL/TAL parameters so the samples can supplement the data for HHRA.
- Sampling of the eight monitoring wells (two new wells, one replacement well and five existing wells) will completed using low-flow techniques. A total of eight water samples will be collected with the addition of two QA/QC samples for a total of 10 samples. Samples will be analyzed for volatile organic compounds (VOCs) to evaluate upgradient sources. In addition, the groundwater samples will be analyzed for the all TCL/TAL parameters to provide data to support HHRA (see Appendix A, Section 5.3). Two rounds of groundwater monitoring will be completed to support the HHRA requirements. The monitoring wells that will be sampled on shown on Figure 6 of Appendix A. The monitoring wells are located in what was identified as potential plume from sources unrelated and upgradient from the site.
- Surface sediment (0 to 6 inches beneath the sediment water interface) and surface water samples will be collected in the Creek channel at three sample locations and one reference area location for both chemical parameters and toxicity testing. Sediment samples will be collected in shallow water using a hand-held Ponar

sampler (multiple grabs for significant volume) and surface water will be collected using bottle direct-fill methods. Chemistry and toxicity samples will be collocated. Surface water parameters (pH, temperature, and specific conductivity) will also be monitored at each location with a Horiba U-22 multi-parameter probe. Approximate sample locations are included on Figure 9 of Appendix A. The reference location will be selected during site reconnaissance as described in Section 3.3.1.1. The actual sample locations will be chosen to represent a concentration gradient as described in Appendix A. The specific locations will be chosen after completion of the Screening Level Ecological Risk Assessment (SLERA) as described in Section 3.7.2. All chemical and toxicity samples will be co-located. The surface water and sediment chemistry will be analyzed for TCL/TAL parameters to provide additional data for human health and ecological risk assessment as well as assess toxicity.

- Sediment samples for chemical analysis will also be collected from background locations for statistical comparison to existing sediment data in the Creek Channel. Background locations will be selected to be upstream of any site-related contamination as described in Appendix A in Sections 3.2.4 and 3.3.3. Background samples will be analyzed for inorganic compounds to assess statistical comparison to inorganic concentrations at the site for risk assessment. Samples will be also be analyzed for PCBs and other organics to compare concentrations for evaluating on-site versus off-site sources.
- Passive samplers will be installed at 15 locations in the Creek Channel near the former Flintkote Site Plant to identify areas where PCBs may enter the Creek channel via upwelling of porewater/groundwater. Methods will follow Ghosh et al. (2014) and other paper in the recent series of technical papers in *Integrated Environmental Assessment and Management* regarding the use of passive samplers in contaminated site investigations.
- To support the Baseline Ecological Risk Assessment (BERA), vegetation, earthworms, and small mammals will be collected at three locations per property plus three locations at a suitable reference area for a total of 15 locations. Surface soil (0 to 0.5 feet bgs) and near surface soil (0.5 to 2 feet bgs) will be collected at same locations. Samples will be analyzed for a full suite of parameters to support both human health and ecological risk assessment. The approximate sample locations are shown on Figures 10 to 13 in Appendix A. Although samples will be collected on each property, the available habitat along the Creekside is very similar and the samples can be assessed as a group as representative of the entire OU2 for evaluation of general environmental contaminants, such as pesticides and other organics.
- Fish (forage and edible) will be collected in the Creek corridor using electroshocking and netting techniques. Fish will be categorized, weighed, and measured. The target fish species are expected to be juvenile sunfish (*Lepomis* spp.) and adult largemouth bass (*Micropterus salmoides*). Both species are expected to be plentiful in the OU2 based on historical sampling in other areas of the Creek. For largemouth bass, skin-on fillet samples will be collected following NYSDEC protocols for use in the human health risk assessment. Whole-body composite samples of juvenile sunfish will be collected for use in the ecological risk assessment. Approximate sample locations are shown on Figure 9 of Appendix A. The reference location will be selected during site reconnaissance as described in Section 3.3.1.1

- In addition to the surface soil samples collected for ecological receptors, 10 additional surface soils and near surface soils will be collected at Upson Park in the picnic area as described in Appendix A, Section 5.2.1; and shown on Appendix A, Figure 12. Although the area is not expected to be contaminated based on limited historical data, the picnic area is considered a separate EA than the Creek Channel and banks and there is insufficient data to complete the HHRA.
- Soil samples for chemical analysis will also be collected from background locations for statistical comparison to existing soil data in OU2. Background locations will be selected as described in Appendix A, Sections 3.2.4 and 3.3.3. Background samples will be analyzed for inorganic compounds to assess statistical comparison to inorganic concentrations at the site for risk assessment. Samples will be also be analyzed for PCBs and other organics to compare concentrations for evaluating on-site versus off-site sources. The soil samples collected as reference for the vegetation, earthworms, and small mammals sample also can be used as background. Therefore, only seven locations needed to provide a set of 10 samples for statistically evaluation.

The following are summary tables of samples to be collected for shipment to EPA laboratories and subcontract laboratories. The specific analytical parameters are listed on Table 15 in Appendix A.

Summary of Samples to Be Collected

		Number of Samples					Number of Samples per Laboratory				
Sample Media	**Notes**	**Number of Locations**	**Number of Reference Locations**	**No. of Samples**	**No. of QA/QC Samples**	**Total**	**CLP Analysis Routine - Organic SOM01.2**	**CLP Analysis Routine - Inorganic ISM01.3**	**CLP Analysis Non-Routine**	**Hexavalent Chromium**	**Other**
Subsurface soil	Ten borings after the Flintkote building is removed. Depths: 0 to 6 inches, 1 to 2 feet, and selected in the field based on staining. Samples for both characterization of PCB contamination and risk assessment purposes.	10		30	6	36	36	36	4	4	
Ground water	Three new and five existing wells in and upgradient of VOCs detected south of the Creek. Data to characterize up-gradient VOC sources and provide data for HHRA. Round One	8		8	2	10	10	10	0	1	
	Three new and five existing wells. A second round of sampling is recommended for HHRA.	8		8	2	10	10	10	0	1	
Sediment	Sediment samples for chemical analysis associated co-located with toxicity samples from three locations in Creek and one reference location.	3	1	4	1	5	5	5	1	1	
	Sediment sample for chemical analysis from an additional nine background location for statistical comparison to existing sediment data.		9	9	2	11	11	11	2		
Sediment Toxicity	EPA 100.4 - *Hyalella azteca* (amphipod), 42-day test. Three site samples and one reference area sample.	3	1	4	1	5					5
	EPA 100.4 - *Chironomus dilutus* (midge), life-cycle test. Three site samples and one reference area sample.	3	1	4	1	5					5

Summary of Samples to Be Collected

		Number of Samples					Number of Samples per Laboratory				
Sample Media	**Notes**	**Number of Locations**	**Number of Reference Locations**	**No. of Samples**	**No. of QA/QC Samples**	**Total**	**CLP Analysis Routine - Organic SOM01.2**	**CLP Analysis Routine - Inorganic ISM01.3**	**CLP Analysis Non-Routine**	**Hexavalent Chromium**	**Other**
Surface Water	Surface water samples chemical analysis associated co-located with toxicity samples from three locations in the Creek and one reference location.	3	1	4	1	5	5	5	1	1	
Surface Water Toxicity	EPA 1000.0 - Fathead Minnow Larval Survival and Growth Test. Three site samples and one reference area sample.	3	1	4	1	5					5
	EPA 1000.2 - *Ceriodaphnia dubia* Survival and Reproduction Test. Three site samples and one reference area sample.	3	1	4	1	5					5
Biological Tissue	Vegetation from three locations on each property and three background locations.	12	3	15	2	17	17	17	2		
	Earthworms from three locations on each property and three background locations.	12	3	15	2	17	17	17	2		
	Tissues collected from small mammals from three locations on each property and three background locations.	12	3	15	2	17	17	17	2		
Fish	Forage Fish - Ten site samples and 10 reference area samples.	1	1	20	2	22	22	22	3	3	22
	Sport Fish Fillets. Ten site samples and 10 reference area samples.	1	1	20	2	22	22	22	3	3	22
Surface Soil	Soils collected at the same location as the biological tissue samples.	12	3	30	2	32	32	32	16	4	0
	Additional surface soil collected Upson Park Picnic Area. Surface soil (0 to 0.5 feet) and near surface soil (0.5 to 2 feet).	10		20	2	22	22	22	3	3	

Summary of Samples to Be Collected

		Number of Samples					Number of Samples per Laboratory				
Sample Media	**Notes**	**Number of Locations**	**Number of Reference Locations**	**No. of Samples**	**No. of QA/QC Samples**	**Total**	**CLP Analysis Routine - Organic SOM01.2**	**CLP Analysis Routine - Inorganic ISM01.3**	**CLP Analysis Non-Routine**	**Hexavalent Chromium**	**Other**
	Additional surface soil collected from background location for statistical evaluation. Surface soil (0 to 0.5 feet) and near surface soil (0.5 to 2 feet).		7	14	4	18	18	18	9	2	
Passive Samplers	Passive Samplers to Access PCBs in PoreWater	15		15	4	19					19
IDW	Toxicity characteristic leaching procedure (TCLP) parameters except herbicides, PCBs, corrosivity, and ignitibility	10		10	0	10					10
	Totals	**119**	**36**	**243**	**40**	**283**	**244**	**244**	**48**	**23**	**83**

Summary of Samples Collected for Subcontract Analysis

Parameter	Method	No. of Samples	Remarks
Passive Samplers	Ghosh et al. (2014)	15	In Creek channel near former Flintkote Plant
Sediment Toxicity	EPA 100.4 – *Hyalella azteca* (amphipod), 42-day test	4	Three site samples and one reference area sample
	EPA 100.4 – *Chironomus dilutus* (midge), life-cycle test	4	Three site samples and one reference area sample
Surface Water Toxicity	EPA 1000.0 – Fathead Minnow Larval Survival and Growth Test	4	Three site samples and one reference area sample
	EPA 1000.2 – *Ceriodaphnia dubia* Survival and Reproduction Test	4	Three site samples and one reference area sample
Hexavalent Chromium	Sediments and soils	16	10% of samples plus two QC samples
	Ground and Surface waters	3	10% of samples
	Fish Tissue	6	10% of samples
AVS/SEM	Sediments	4	Three site samples and one reference area sample

3.3.6 Ecological Characterization (Subtask 3.06)

Aquatic habitats, wetlands, fish, wildlife, threatened and endangered (T&E) species, and other ecological resources in OU2 will be described based on existing site reports and data, including NYSDEC SRI (EEEPC 2009a), National Wetland Inventory (NWI) maps, New York State designated wetland maps, aerial and ground-level photographs, and T&E species information from the United States Fish and Wildlife Service and New York State Natural Heritage Program. No field activities are planned to further characterize the site ecology given the abundance of existing information.

3.3.7 Geotechnical/Geophysical Survey (Subtask 3.07) – Not Applicable

3.3.8 Investigation Derived Waste (IDW) Characterization and Disposal (Subtask 3.08)

IDW will be generated as part of the field investigation and drilling activities. Disposable sampling equipment and PPE will be decontaminated in the field, double-bagged, and placed in a commercial dumpster located at E & E's Lancaster, New York, office. Any removed soil that is not included as a sample will be used to backfill the respective boreholes and the borehole will be filled with bentonite chips. If soil associated with the sampling cannot be returned to the borehole, it will be drummed.

The IDW drums containing decontamination water and purging and potentially soil from the subsurface investigation will be moved each day to a secure area inside the fence at the Flintkote property. The IDW samples will be analyzed prior to disposal (analyzed for TCLP

parameters excluding herbicides, PCBs, corrosivity, and ignitibility) by the EPA Region 2 DESA laboratory under Task 3.4. Analytical results will be provided to the waste hauler and the drums will be disposed of as non-hazardous waste by the waste hauler. The LATA Team will explore lower cost options for disposal of water in the sanitary sewer with the City of Lockport Wastewater Treatment Plant during planning for the field sampling program.

3.4 TASK 4: SAMPLE ANALYSIS

3.4.1 Innovative Methods/Field Screening Sample Analyses (Subtask 4.01) – Not Applicable

3.4.2 Analytical Services Provided by CLP or DESA or EPA-ERT (Subtask 4.02)

The majority of the sample analyses will be performed by the EPA Region 2 DESA laboratory or the EPA Contract Laboratory Program as RAS or by EPA-ERT. Non-RAS analyses PCB congeners and dioxin/furan and all biological and fish tissue will be processed and analyzed by the EPA laboratories as discussed at the 18 December 2013 scoping meeting.

3.4.3 Non-Routine (Subcontracted) Analytical Services (Subtask 4.03) - Optional

Sediment toxicity, surface water toxicity, passive sampler analysis, hexavalent chromium, and AVS/SEM analyses will be performed by non-RAS laboratories that will be subcontracted by LATA.

3.5 TASK 5: ANALYTICAL SUPPORT AND DATA VALIDATION

3.5.1 Collect, Prepare, and Ship Samples (Subtask 5.01)

This activity includes collecting, preparing, and shipping the soil, tissue and water samples collected from the Creek Corridor and from the IDW drums in accordance with the QAPP. Sample shipments will be made each day after sample collection during the seven-day field program. One shipment of IDW samples will be sent at the end of the field program.

3.5.2 Sample Management (Subtask 5.02)

The Project Chemist will establish sample information in Scribe and print labels for the field team during site mobilization. The Project Chemist will coordinate with the field samplers to ensure that field data are collected in accordance with Scribe requirements. After sample collection, the Project Chemist will prepare Chain of Custody forms, shipping documents, and trip reports for all samples that will be analyzed by the EPA DESA, CLP and/or EPA-ERT or subcontract laboratories for toxicity testing and hexavalent chromium. The Project Chemist will ensure consistency between multiple laboratories and that all required parameters in the appropriate format so there are no difficulties preparing and uploading the electronic data delivery (EDD) submittals. The LATA Team will ensure accurate chain-of-custody procedures for sample tracking, protective sample packing techniques, and proper sample-preservation techniques are implemented. The Project Chemist will also coordinate with the Regional Sample Control Coordinator (RSCC) and/or DESA laboratory regarding sample scheduling and sample shipment arrival. The Project Chemist will respond to questions from the RSCC over a six-week period (the time estimated for the all laboratories to complete and report all samples results.

3.5.3 Data Validation (Subtask 5.03) - Optional

All sample analyses performed by the EPA Region 2 DESA laboratory, EPA CLP, and/or EPA-ERT will be validated by EPA. No data validation work will be performed by the LATA Team except for Non-RAS analyses (e.g., sediment toxicity, surface water toxicity, passive sampler analysis, hexavalent chromium, and AVS/SEM analyses). There are no formal validation procedures for these non-standard tests. Data validation will involve review of the laboratory report against the QAPP requirements and evaluation of quality control data.

3.6 TASK 6: DATA EVALUATION

All existing data and data collected during the previous tasks will be organized and evaluated as described below.

3.6.1 Data Usability Evaluation (Subtask 6.01)

Evaluation of the usability of existing data will be performed for the existing data outlined on Table 1 of Appendix A. Usability evaluations of the data generated in Task 3 will be performed in accordance with the approved QAPP. As the first step in the data evaluation process, the data will be examined to determine the usability of the electronic and hardcopy results. Specifically, the review will include the format of the hardcopy and electronic deliverables, the completeness of the data package, and the comments of the data validator. Data that was not formally validated will be validated and qualifiers determined and a data validation memorandum will be prepared. If a data package is determined to be unusable, the evaluator will immediately notify the RSCC who will then inform the analytical laboratory. The geologic and other field data will also be reviewed for completeness and usability.

Data usability for risk assessment purposes will be evaluated by completing RAGS Part D Exhibit 3-3, the Data Usability Worksheet.

3.6.2 Document Reduction, Tabulation, and Evaluation (Subtask 6.02)

3.6.2.1 Database Development (Subtask 6.02.01)

A database of existing data as outlined on Table 1 of Appendix A will be developed. The sample data comprising the database, if available, will include:

- Location data;
- Collection date and time;
- Field sampling information (e.g., screening data and soil descriptions);
- Analytical results and qualifiers; and
- Quality assurance (QA)/quality control (QC) results.

This subtask also includes formatting the existing data in accordance with EPA Region 2's electronic data deliverable (EDD) requirements. The historical data from 2002 and 2005 will require additional data entry from analytical packages and field notes to complete all the required fields. Geographic information system (GIS) locations of the NYSDEC data points will be checked against the field notes and existing reports and geo-referenced in the GIS

database. The database will include a clear indication of the samples associated will each individual property based on reconciled locations and field notes.

This subtask also includes electronically formatting the historical data and data generated in this WA in accordance with Region 2's EDD requirements. The data will be transmitted to EPA electronically. The following is an estimate of the number of datasets and data packages to be processed.

- Historical data packages (estimated 20 data packages) from sediment and soils samples collected as part of the NYSDEC Site Characterization of Flintkote (TVGA 2005a) and NYSDEC RI of the Eighteen Mile Creek Corridor (NYSDEC 2006a) will require some hand entry to be formatted in accordance with EPA Region 2 EDD requirements.
- Existing data from five reports listed in Table 1 of Appendix A are available electronically and will be with processed to a format consistent with EPA Region 2 EDD requirements. Table 1 summarizes the number of samples are included each report and what are the appropriate uses.

3.6.2.2 Data Reduction, Tabulation, and Evaluation (Subtask 6.02.02)

- Historical data and data generated in this WA will be evaluated, interpreted, and tabulated in an appropriate presentation format for final data tables using the following general guidelines: tables of analytical results for each matrix will be organized by property for each individual parcel; and table organization will be coordinated with the EPA WAM.
- Analytical results will not be organized by laboratory identification numbers. The sample location number will always be used as the primary reference for the analytical results, if available for the existing data.
- Analytical tables will indicate the sample collection dates, detection limits, and data qualifiers.
- Analytical results in the text, tables, and figures will be reported using a consistent convention of mg/kg for soil analyses.
- Field blank and field duplicate results will be evaluated and results eliminated based on field blanks will be consistent with EPA Region 2 data validation standard operating procedures and clearly explained.
- Discussion of approved sampling results will not be qualified by suggesting that a particular chemical is a common lab contaminant or was detected in the lab blank. If the reported result has passed QA/QC it will be considered valid. In cases where the chemical in question was known to have been used and/or disposed of on site, positively identified at high levels in other environmental media, and passes QA/QC protocols, the sampling results will not be questioned as being due to laboratory contaminants.
- Compile data will be presented in GIS format using the base map developed under Subtask 3.01.01.

3.6.3 Modeling (Subtask 6.03)

Modeling may be needed to complete an accurate characterization of the nature, extent, distribution, and movement of site contamination and to help identify additional potential source areas. The historical data and data collected in Task 3 of this WA will be evaluated to make an assessment of and recommendation for the need for modeling. As part of this evaluation and assessment, a work plan will be prepared to describe the scope and technical approach for performance of a modeling effort. A budget for the modeling effort will also be prepared. Work will not proceed with the modeling effort until formally directed to do so by the EPA.

3.6.4 Technical Memorandum (Data Evaluation Report) (Subtask 6.04)

The results of the data evaluation effort will be presented in a Data Evaluation Report (DER) that will be submitted for EPA's review and approval. The report will include:

- An evaluation of the historical data;
- A summary of the data generated in the optional field investigation and identify data gaps for future investigations; and
- A completed RAGS Part D Exhibit 3-3 Data Usability Worksheet.

Figures, maps, and tables produced under Subtask 6.02 will be evaluated and discussion of nature and extent of contamination and contaminant fate and transport will be added to the DER. A revised DER will not be prepared; however, responses to EPA's comments will be prepared and submitted. Any changes to the information presented in the DER will be incorporated into the Draft Supplemental I report.

3.7 TASK 7: ASSESSMENT OF RISK

After approval of the PAR prepared under Subtask 1.13, a HHRA will be prepared for the Creek Corridor. A BER) will also be performed after completion of SLERA. The risk assessments will determine whether site contaminants pose a current or potential risk to human health or the environment in the absence of any remedial action. The risk assessment will address contaminant identification, exposure assessment, toxicity assessment, and risk characterization. The risk assessments will be used to determine whether remediation is necessary at OU2, provide justification for performing remedial actions, and determine what exposure pathways need to be remediated. An evaluation of existing data for use in the risk assessments is provided in Sections 3.2 and 3.3 of Appendix A. Data gaps and recommendations for collection of additional data are provided in Sections 5.2 and 5.3 of Appendix A. These discussions serve as the basis for the following work plan tasks.

3.7.1 Baseline Human Health Risk Assessment (Subtask 7.01)

A Baseline HHRA will be performed in accordance with the approach and parameters described in the approved PAR. The PAR must be reviewed and approved by EPA prior to the submission of the Draft HHRA Report. Comments on the PAR will be incorporated into the draft HHRA.

Section 3.2 of the memorandum provided in Appendix A provides an evaluation of the site for HHRA.

Draft Baseline Human Health Risk Assessment (Subtask 7.01.01)

The HHRA will be performed in accordance with EPA risk assessment guidance (EPA 2007). All applicable parts of EPA's RAGS, Human Health Evaluation Manual, Parts A, B, D, E and F, and associated and supplemental guidance documents will be considered. The most current EPA RAGS guidance can be accessed on EPA's internet site:

http://epa.gov/oswer/riskassessment/ragse/index.htm

Risk assessment guidance continues to evolve and the latest and most appropriate guidance needs to be evaluated and approved immediately prior to the beginning the HHRA.

The Draft HHRA will include the following:

- Characterization of Site: The physical characteristics of the site, its history, the site setting, nearby populations, including potentially sensitive subpopulations, and the nature and extent of contamination will be described.
- Data Usability Assessment: The adequacy and usability of the available data for risk assessment purposes will be evaluated by completing the RAGS Part D Exhibit 3-3 Data Usability Worksheet.
- Hazard Identification: The contaminants of potential concern (COPCs) will be identified and described based on their intrinsic toxicological properties.
- Site Conceptual Model: The CSM will be updated as needed considering the COPCs identified and determine how the various exposure pathways and receptors will be evaluated (quantitatively or qualitatively).
- Exposure Point Concentrations: Exposure point concentrations (EPCs) will be calculated for the EAs and environmental exposure media identified for quantitative assessment in the CSM using the latest version of EPA's ProUCL statistical software package.
- Exposure Assessment: The exposure assessment will identify the magnitude of actual or potential human exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. In preparing the exposure assessment, reasonable maximum and central tendency (when appropriate) estimates of exposure for both current and potential land use conditions at the OU2 will be developed. The rationale for use of site-specific over default exposure factors will be clearly explained and justified.
- Toxicity Assessment: The toxicity values (e.g., slope factors and reference doses) for the COPCs and the sources of the toxicity values will be listed according to EPA's current tiered approach (OSWER Directive 9285.7-53). If a toxicity value is not available from one of the preferred sources identified in OSWER Directive 9285.7-53, EPA's Regional Screening Levels (RSLs) table will be consulted. Any chemicals that are based on a Provisional Peer Reviewed Toxicity Value Appendix Value (PPRTVs) will be discussed in the risk characterization based on the considerable uncertainty associated with their derivation. Any toxicity values will be submitted to EPA for approval before use in the assessment.
- Risk Characterization: In the risk characterization, chemical-specific toxicity information will be combined with quantitative and qualitative information from the exposure assessment and measured contaminant levels to determine whether

concentrations of contaminants at or near the site affect or could potentially affect human health. Estimated excess lifetime cancer risks will be compared to the range of risks generally considered acceptable by the EPA – 10^{-6} to 10^{-4}. Hazard indices will be compared to a hazard index of 1, the highest value generally considered protective of human populations including sensitive subgroups while allowing an adequate margin of safety.

- Identification of Limitations/Uncertainties: Critical assumptions and uncertainties will be identified in the report.

E & E Final Baseline Human Health Risk Assessment (Subtask 7.01.02)

EPA's comments on the Draft HHRA Report will be incorporated and submitted with the Final HHRA Report, including RAGS Part D Tables.

3.7.2 Baseline Ecological Risk Assessment (Subtask 7.02)

Four deliverables were identified under Task 7.2 in the Statement of Work for OU2 (dated September 2013): (1) Technical Memorandum; (2) SLERA; (3) BERA; and (4) final BERA. The content of these deliverables is described below.

Screening Level Ecological Risk Analysis (Subtask 7.02.01)

Before preparing and submitting the SLERA, a technical memorandum that identifies proposed screening values for all media (including critical body residues for tissue data screening), assessment and measurement endpoints, representative receptors, and toxicity reference values (TRVs) will be prepared. EPA will review and approve the memorandum. If necessary, revisions to the technical memorandum will be made to produce a final, approvable version for the public record. The information provided in the technical memorandum will be used in the SLERA and ERA, although it is possible that the information may need to be revised or augmented based on the SLERA results.

A SLERA will be prepared in accordance with current Superfund ecological risk assessment guidance (*Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments [ERAGS],* EPA, 1997 [EPA/540-R-97-006]). The SLERA (ERAGS Steps 1 and 2) will compare maximum contaminant concentration in each medium with conservative eco-toxicity screening values, and use conservative exposure estimates when assessing wildlife risks. The SLERA report will include screening tables for each medium of concern, a description of site habitats, measurement and assessment endpoints, TRVs, food-chain modeling inputs, and bioaccumulation factors (water-to-organism, soil-to organism, and sediment-to-organism). EPA will review and approve the SLERA and determine whether a BERA is appropriate for the site. If necessary, revisions to the SLERA will be made to produce a final, approvable version for the public record. The primary purpose of the SLERA is to identify COPCs for further evaluation in a BERA.

Draft Baseline Ecological Risk Assessment Report (Subtask 7.02.02)

If EPA determines that a BERA for OU2 is required, a draft BERA will be prepared that includes the following:

- BERA problem formulation (ERAGS Step 3) that refines the preliminary COPC list from the SLERA, refines the ecological conceptual site model, selects final

assessment and measurement endpoints for the BERA, and otherwise satisfies ERAGs Step 3 guidance.

- Characterization of Site and Potential Exposure Pathways: The BERA report will describe the ecological resources at the site, including aquatic habitats, wetlands, and threatened and endangered species, and identify potential ecological receptors and exposure pathways.
- ERAGs Steps 4 and 5: During the conduct of the BERA, the ecological risk assessor will provide input to the project team regarding the type and design of field and laboratory studies needed to address the ecological data gaps that were identified for OU2 (see Section 3.3.5 for summary of studies to support the OU2 BERA). Study design, data quality objectives, sampling plans, and data analysis plans will be developed by the ecological risk assessor to address the data gaps and describe the use of the data in the BERA.
- Exposure Assessment (ERAGs Step 6a): The exposure assessment will identify the magnitude of actual or potential ecological exposures, frequency and duration of the exposures, and routes by which receptors are exposed. The exposure assessment will provide a basis for developing acceptable exposure levels to site related contaminants. ProUCL version 5.0 will be used to develop exposure point concentrations for surface water, sediment, and other media.
- Toxicity Assessment/Ecological Effects Assessment (ERAGs Step 6b): The toxicity and ecological effects assessment will address the types if adverse environmental effects associated with chemical exposures, relationships between magnitude of exposure and adverse effects, and related uncertainties for contaminant toxicity (e.g., bioavailability and chemical form).
- Risk Characterization (ERAGs Step 7a): During risk characterization, chemical-specific toxicity information will be combined with quantitative and qualitative information from the exposure assessment and measured contaminant levels to determine whether concentrations of contaminants at or near the site affect or could potentially affect ecological receptors at the site.
- Identification of Limitations/Uncertainties (ERAGs Step 7b): The BERA will describe critical assumptions and uncertainties in the report.

Final Baseline Ecological Risk Assessment Report (Subtask 7.02.03)

EPA comments on the Draft BERA Report will be incorporated and submitted with a Final BERA Report. Prior to finalization of the BERA, responses to comments on the draft BERA will be approved by EPA.

3.8 TASK 8: TREATABILITY STUDY AND PILOT TESTING – NOT APPLICABLE

3.9 TASK 9: SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT – OPTIONAL

A Supplemental RI Report will be prepared to incorporate any new data collected under Task 3 and any existing data added under Subtask 6.01 to provide an overall assessment of the extent of contamination at the Creek Corridor (OU2). The key contaminants will be selected based on persistence and mobility in the environment and the degree of hazard as outlined in the baseline HHRA and ERA. The key contaminants identified in the RI will be evaluated for receptor exposure and an estimate of the key contaminants level reaching human or

environmental receptors must be made. LATA will use existing standards and guidelines, such as drinking-water standards, water-quality criteria, and other criteria accepted by the EPA, as appropriate, to determine nature and extent. The Baseline HHRA and ERA will be an integral part and consistent with the Supplemental RI Report.

3.9.1 Draft Supplemental RI Report (Subtask 9.01) – Optional

A Draft Supplemental RI Report will be prepared that will include the following sections as detailed in the SOW:

- Executive Summary
- Introduction
- Study Area Investigation
- Physical Characteristics of the Study Area
- Nature and Extent of Contamination
- Contaminant Fate and Transport
- Baseline Risk Assessment
- Summary and Conclusions
- Conclusions
- References
- Tables and Figures
- Appendices

The sections will include any new or changed conditions from the existing NYSDEC SRI and RI reports and will be as brief as possible (EEEPC 2009a; NYSDEC 2006a). The Baseline HHRA and ERA sections of the RI report will include the findings and conclusions of the risk assessments prepared by the LATA Team under Task 7. The supplemental RI report appendices will include the HHRA, ERA, data analysis, log books, soil boring logs, analytical data, QA/QC evaluation results, and other information relevant to the Supplemental RI.

3.9.2 Final Supplemental RI Report (Subtask 9.02) – Optional

EPA comments on the Draft Supplemental RI Report will be incorporated and submitted with a Final Supplemental RI Report.

3.10 TASK 10: REMEDIAL ALTERNATIVES SCREENING - Optional

This task will be performed to develop remedial alternatives that will undergo a comprehensive evaluation. Evaluation of remedial alternatives and a final Remedial Alternatives Report (RAR) was completed for the Former Flintkote Plant site for the Niagara County Department of Planning, Development and Tourism in cooperation with NYSDEC in 2005 (TVGA 2005b). Evaluation of remedial alternatives and a FS was also completed for the remaining properties, namely Upson Park, White Transportation, Former United Paperboard Company Property, and the Creek Channel for NYSDEC in 2009 (E & E 2009b). The information from the existing RAR (TVGA 2005b) and the existing FS (E & E 2009b)

will be adjusted as needed to focus only on the former Flintkote Plant Site (without the building demolition and asbestos abatement), Upson Park, former United Paperboard Company property, White Transportation, and the Creek Channel. Based on the results of the additional investigation activities and the HHRA and BERA risk assessments, the existing hazardous waste management alternatives will be evaluated to determine if the measures selected to remediate or control contaminated soil and sediments remaining at the site will provide adequate protection of human health and the environment.

3.10.1 Draft Technical Screening Memorandum (Subtask 10.01)

A Draft Technical Screening Memorandum presenting the existing and potential alternatives will be prepared if directly by EPA. The Draft Technical Screening Memorandum will include the following information:

- **Update Remedial Action Objectives.** Based on existing information and the completed HHRA and BERA, the existing site-specific remedial action objectives will be reviewed and updated as necessary. The objectives will specify the contaminant(s) and media of concern, the exposure route(s) and receptor(s), and an acceptable contaminant level or range of levels for each exposure route (i.e., preliminary remediation goals).
- **Update General Response Actions.** The general response actions for each medium of interest will be reviewed and updated if necessary by defining contaminant, treatment, excavation, or other actions, singly or in combination to satisfy remedial action objectives. The general response actions include: no action; institutional controls (ICs); monitored natural recovery (MNR); in situ capping; in situ treatment; and removal technology. The response actions will take into account requirements for protectiveness as identified in the remedial action objectives as well as the chemical and physical characteristics of the site.
- **Identify and Screen Potential Remedial Technologies.** If the supplemental RI reports a change in nature and extent of contamination or site conditions, then hazardous waste treatment technologies will be identified and screened based on existing alternatives to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other site characteristics will be considered. This screening will be based primarily on a technology's ability to effectively address the contaminants at the site, but will also take into account a technology's implementability and cost to select options, as appropriate, to carry forward into alternative development.
- **Develop Additional Remedial Alternatives in Accordance with National Contingency Plan.** In addition to the existing alternatives for the former Flintkote Plant site from the existing RAR, additional alternatives may need to be developed to address changes in nature and extent of contamination or site conditions resulting from the building demolition completed as part of OU1 and subsurface investigation completed in Subtask 3.03 to address data gaps. The alternatives will be developed in accordance with the NCP and other guidance outlined in the SOW.
- **Screen Remedial Alternatives for Effectiveness, Implementability, and Cost.** Any new or modified alternatives will be screened to identify the potential technologies or process options that will be combined into media-specific or site-

wide alternatives. The developed alternatives will be defined with respect to size and configuration of the representative process options; time for remediation; rates of flow or treatment; spatial requirements; distances for disposal; and required permits, imposed limitations, and other factors necessary to evaluate the alternatives. If any new viable options are available and developed, the alternatives will be screened on a general basis with respect to their effectiveness, implementability, and cost.

3.10.2 Final Technical Screening Memorandum (Subtask 10.02) – Not Applicable

3.11 TASK 11: REMEDIAL ALTERNATIVES EVALUATION – Optional

This task includes efforts associated with the assessment of individual alternatives against each of the nine evaluation criteria and a comparative analysis of all options against the criteria. The analysis will be consistent with the NCP and will consider the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA and other pertinent OSWER guidance. EPA will make the determination regarding the final selection of remedial alternatives.

The existing RAR prepared for Niagara County Department of Planning, Development and Tourism (NCDP) (TVGA 2005b) provides a detailed evaluation of alternatives for the entire former Flintkote Plant site. These alternatives will be updated to remove the activities associated with building demolition and asbestos abatement as they have been addressed as part of OU1. The existing alternatives for the former Flintkote Plant site include:

- Alternative 1 – No Action
- Alternative 2 – Exposure Pathway Removal
- Alternative 3 – Containment/Limited Removal
- Alternative 4 – Excavation and Containment
- Alternative 5 – Complete Excavation

The existing FS prepared for NYSDEC provides a detailed evaluation of alternatives for the Creek Channel, Upson Park, former United Paperboard Company property, White Transportation Property and the Creek Channel (EEEPC 2009c). For the Creek Channel, the FS evaluated sediments within the channel. For Upson Park, former United Paperboard Company property, and White Transportation Property the FS evaluated the surface and subsurface soils. Various alternatives in the FS are summarized below.

The alternatives for the Creek channel include:

- Alternative 1 – No Action
- Alternative 2 – Contaminated Sediment Excavation to Pre-Disposal conditions, Off-site disposal, Bank stabilization and continued monitoring.

The alternatives for the Upson Park, former United Paperboard Company property and the White Transportation Property include:

- Alternative 1 – No Action
- Alternative 2 – Institutional Controls, Bank Stabilization, and Long-term monitoring

- Alternative 3 – Limited Excavation and Off-site Disposal, Containment in Areas Where COCs exceed Commercial Use soil clean-up objectives (SCO)s, Bank Stabilization, Institutional Controls and Long-term Monitoring Properties
- Alternative 4 – Complete Excavation and Off-site Disposal, Bank Stabilization and Long-term Monitoring
- Alternative 5 – Limited Excavation and Off-site Disposal, Complete Containment, Bank Stabilization, and Long-term Monitoring
- Alternative 6 – Complete Excavation and Off-site Disposal of Material where COPCs Exceed Unrestricted Use SCOs and Bank Stabilization.

These alternative evaluations will be included in the Draft Technical Evaluation Memorandum prepared for this subtask along with additional remedial alternatives identified under Subtask 10.1. The evaluation of alternatives for the former Flintkote property will be updated to be uniform with the analysis of potential alternatives for the other properties in the Corridor. Each property will be evaluated as a source area.

The cost evaluation for each of the existing alternatives for all properties will be updated to 2014 costs. In addition, for the former Flintkote property, the cost evaluation will be updated based on any revised volumes and the costing tables normalized to be consistent with the costing tables developed for the other properties.

All remedial alternatives will be evaluated against the nine evaluation criteria listed below:

- Overall protection of human health and the environment;
- Compliance with the Applicable or Relevant and Appropriate Requirements (ARAR);
- Long-term effectiveness and permanence;
- Reduction in toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability – technical and administrative;
- Cost;
- State acceptance; and
- Community acceptance.

As necessary, the existing ARARs for the alternatives evaluation will be reviewed and updated and a comparative analysis of the new alternatives against the evaluation criteria listed above will be performed.

3.11.1 Draft Technical Evaluation Memorandum (Subtask 11.01)

A Draft Technical Evaluation Memorandum will be prepared that includes the following:

- A technical description of each alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative.

- A discussion that describes the performance of each alternative with respect to each of the evaluation criteria and a table summarizing the results of this analysis. Once the individual analysis is complete, the alternatives will be compared and contrasted to one another with respect to each of the evaluation criteria.

3.11.2 Final Technical Evaluation Memorandum (Subtask 11.02) – Not Applicable

3.12 TASK 12: SUPPLEMENTAL FS REPORT – Optional

A supplemental FS Report consisting of a detailed analysis of any new or changed alternatives will be developed if directly by EPA. The supplemental FS report will include a cost-effectiveness analysis completed in accordance with the NCP and current EPA Feasibility Study Guidance. Three bound copies and an electronic copy of the Draft and Final Supplemental FS reports will be submitted to EPA.

3.12.1 Draft Supplemental FS Report - Optional (Subtask 12.01)

A Draft Supplemental FS Report will be prepared for the former Flintkote property Site, Upson Park, White Transportation, former United Paperboard Company Property, and the Creek Channel. To expedite the development of this report, close contact will be maintained with the EPA WAM throughout the execution of this subtask. Drafts of the chapters will be submitted to the WAM for review as they are developed. The supplemental FS will be a stand-alone document, incorporating (e.g., text, figures, and tables) pertinent information from the existing RAR prepared by NCDP and the existing FS and ROD prepared by NYSDEC for the entire Corridor site. The Draft Supplemental FS Report will contain the following:

- Feasibility Study Objectives;
- Remedial Objectives;
- General Response Actions;
- Identification and Screening of Remedial Technologies;
- Remedial Alternatives Description;
- Detailed Analysis of Remedial Alternatives; and
- Summary and Conclusions.

3.12.2 Final Supplemental FS Report (Subtask 12.02)

After EPA's review, EPA comments on the Draft Supplemental FS Report will be incorporated into the Final Supplemental FS Report.

3.13 TASK 13: POST RI/FS SUPPORT

The LATA Team will provide technical support for EPA's preparation of the ROD excluding those activities addressed under Task 2.

3.14 TASK 14: NEGOTIATION SUPPORT – NOT APPLICABLE

3.15 TASK 15: ADMINISTRATIVE RECORD – NOT APPLICABLE

3.16 TASK 16: WORK ASSIGNMENT CLOSEOUT

Upon direction from EPA, the LATA Team will perform the necessary activities to close out this WA in accordance with contract requirements. After WA closeout activities have been completed, the LATA Team will retain the WA files in accordance with Clause H.34, "Retention and Availability of Contractor Files."

3.16.1 Revised Work Plan Budget (Subtask 16.01)

A revised work plan budget will be prepared with the actual costs incurred and the estimate to complete the closeout activities.

3.16.2 Document Indexing (Subtask 16.02)

At the conclusion of this WA, the LATA Team will organize the WA files and provide the index to the Project Officer. At a minimum, the index will contain the following information:

- Project Name and WA Number (in a heading on top of the list); and
- Document date (the documents will be sorted chronologically by date, beginning to end), description/subject of document, who sent the document, and who received the document.

The documents to be indexed will include all final deliverables, WA amendments, and working files that may need to be accessed to provide information on why certain technical decisions were made.

3.16.3 Document Retention/Conversion (Subtask 16.03)

The LATA Team will convert all indexed documents into PDF and prepare compact disks (CDs) containing the indexed documents. The CDs will be delivered to the Project Officer within 45 days of approval of the revised work plan budget.

The boxes of files indexed in Subtask 16.02 will be retained by LATA in accordance with Clause H.34, "Retention and Availability of Contractor Files."

4.0 PROJECT MANAGEMENT APPROACH

4.1 PROJECT ORGANIZATION

Mr. Colvin, the LATA RAC2 Program Manager, is the primary POC with EPA on the RAC2 contract and this WA. He has overall responsibility for the successful execution of this project, including communicating any project issues that may affect the cost, LOE hours, scope, or schedule to the EPA WAM.

The Project Manager (PM) is Ms. Marcia Galloway of E & E. As the PM, Ms. Galloway will ensure that the day-to-day communications will not result in action taken by E & E personnel that will impact WA cost, LOE hours, scope, and/or schedule. She has the primary responsibility for: development of the Work Plan, Work Plan Budget, and other associated plans; acquisition of specialized technical support including graphic illustrators, editors, community involvement, and engineering and science staff required for WA delivery; and all aspects of the day-to-day activities associated with the project. Ms. Galloway will identify staff requirements, direct and monitor progress, and ensure implementation of quality procedures and adherence to applicable codes and regulations. She will also be responsible for project performance within the established budget and schedule and will oversee the daily activities of E & E personnel. Ms. Galloway is also the Remedial Investigation Lead for this project.

Assisting Ms. Galloway will be two key project personnel: Preetam R. Kuchikulla P.E. (Feasibility Study Lead); and Deepali McCloe (Community Relations Lead). Technical support personnel will include engineers, scientists, and specialists for the execution of task activities including project planning and management, data management, and document preparation and review.

4.2 PROJECT SCHEDULE

The following is the anticipated order in which the subtasks will be performed:

TASK/SUBTASK	DESCRIPTION
3.01	Cultural Resource Assessment
6.01.01	Validation of Existing Data
6.02.01	Database Development for Historical Data
6.02.02	Data Evaluation Tables of Historical Data
7.02.01	Technical Memorandum
7.02.01	SLERA
	Assess Additional Data Needs
1.07	QAPP
1.08	HASP
3.0	Field Investigation
5.03	Data Validation Reports
6.01.01	Validation of New Data
6.02.01	Database Development for New Data
6.02.02	Data Evaluation Tables of New Data
6.04	Data Evaluation Report
1.13	Pathways Analysis Report
7.01.01	Draft Baseline Human Health Risk Assessment Report
7.02.02	Draft Ecological Risk Assessment Report
7.01.02	Final Baseline Human Health Risk Assessment Report
7.02.03	Final Ecological Risk Assessment Report
9.01	Draft Supplemental RI Report
9.02	Final Supplemental RI Report
10.01	Draft Technical Screening Memorandum
11.01	Draft Technical Evaluation Memorandum
12.01	Draft Supplemental Feasibility Study Report
12.02	Final Supplemental Feasibility Study Report
16.01	Revised Work Plan Budget
16.02	WA File Index
16.03	CDs of Indexed Documents

4.3 PROJECT DELIVERABLES

Exhibit 4-1 summarizes the project deliverables.

4.4 BUDGET ESTIMATE

The budget estimate for completing the activities described in this work plan has been provided under separate cover.

Exhibit 4-1

Eighteen Mile Creek Superfund Site RI/FS OU2
Summary of Major Submittals

SUB TASK	SUBMITTAL	DUE DATE
1.04	Draft RI/FS Work Plan and Budget	16 February 2014
1.05	Revised RI/FS Work Plan and Budget	15 days after negotiation
1.06	Evaluation of Existing Data Memorandum	17 January 2014
1.07	QAPP	21 days after Work Plan approval
1.08	HASP	21 days after Work Plan approval
1.10	Meeting Minutes	5 days after meeting
1.13	Pathways Analysis Report	21 days after submission of Data Evaluation Report, under Subtask 6.04
2.02	Community Relations Plan Update	14 days after last interview
3.01	Cultural Resource Assessment Deliverables	90 days after Work Plan approval
503	Data Validation Reports	30 days after receipt of all analytical results from laboratory
6.03	Assessment of Modeling Needs	15 days of EPA's direction of modeling needs
6.04	Data Evaluation Report	30 days after completion of Subtask 6.02
7.01.01	Draft Baseline Human Health Risk Assessment Report (Human Health)	45 days after approval of Pathways Analysis Report, submitted under Subtask 1.13
7.01.02	Final Baseline Human Health Risk Assessment Report (Human Health)	14 days after receipt of EPA final comments
7.02.01	Technical Memorandum	The Technical Memorandum will be submitted 21 days after submission of the Data Evaluation Report, submitted under Subtask 6.04.
7.02.02	Screening Level Ecological Risk Assessment (SLERA)	The SLERA will be submitted within 45 days after submission of the DER under Subtask 6.04.
7.02.03	Draft Baseline Ecological Risk Assessment Report (BERA)	The Draft BERA Report will be prepared upon receipt of EPA's direction.
7.02.03	Final BERA	14 days after receipt of EPA final comments on the Draft BERA Report
9.01	Draft Supplemental RI (SRI) Report	90 days after approval of DER submitted under Subtask 6.04.
9.02	Final Supplemental RI Report	30 days after receipt of EPA comments on the Draft SRI Report submitted under Subtask 9.01.
10.01	Draft Technical Screening Memorandum	60 days after submission of the Final RI Report
10.02	Final Technical Screening Memorandum	Not Applicable. EPA comments will be addressed under Subtask 11.01.

SUB TASK	SUBMITTAL	DUE DATE
11.01	Draft Technical Evaluation Memorandum	30 days after receipt of EPA comments on the Draft Technical Screening Memorandum submitted under Subtask 10.01.
11.02	Final Technical Evaluation Memorandum	Not Applicable. EPA comments on Draft Technical Evaluation Memorandum (Subtask 11.01) will be addressed in the Draft Supplemental FS Report under Subtask 12.01.
12.01	Draft Supplemental Feasibility Study Report	45 days after receipt of EPA comments on the Draft Technical Evaluation Memorandum submitted under Subtask 11.01.
12.02	Final Supplemental Feasibility Study Report	30 days after receipt of EPA final comments on Draft Supplement FS Report submitted under Subtask 12.01.
16.01	Revised Work Plan Budget	Within 30 days of EPA's direction for closeout
16.02	WA File Index	Within 45 days of EPA's direction for closeout
16.03	CDs of Indexed Documents	45 days after approval of 16.01 deliverable

5.0 REFERENCES

An inventory of the technical documents reviewed is provided in Table A-1 of Appendix A. The following is a list of specific references highlighted in the Draft Work Plan.

Ecology and Environment Engineering, P.C. (EEEPC). 2009a. *Additional Investigation Report, Addendum to the 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 by EEEPC, Lancaster, New York.

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

_____. 2009c. *Final Feasibility Study Report for the Eighteenmile Creek Corridor Site (Site No. 932121) and Adjacent Upland Properties, City of Lockport, New York.* Prepared for the New York State Department of Environmental Conservation by EEEPC, Lancaster, New York.

Ghosh, U., S.K. Driscoll, R.M. Burgess, M.T.O. Jonker, D. Reible, F. Gobas, Y. Choi, S.E. Apitz, K.A. Maruya, W.R Gala, M. Mortimer, and C. Beegan. 2014. Passive Sampling Methods for Contaminated Sediments: Practical Guidance for Selection, Calibration, and Implementation. *Integrated Environmental Assessment and Management* 10: 210–223.

Golder Associates, Inc. (Golder). 2008. Design Report, Erie Canal Flight of Five Locks Rehabilitation Project, Appendix I – Hazardous Materials Assessment Report. Submitted by: Golder Associates Inc., 2221 Niagara Falls Boulevard, Suite 9; Niagara Falls, New York.

Los Alamos Technical Associates, Inc. (LATA) and E & E. 2014 *Evaluation of Existing Data for the Eighteenmile Creek Superfund Site OU2*. Prepared for the USEPA Region 2 RAC2 by LATA and E & E, WA, 010-RICO-0269/Contract Number EP-W-10-007.

New York State Department of Environmental Conservation (NYSDEC). 1994. *An Investigation of the Dioxin and Furan Concentrations in the Sediments of the Eighteenmile Creek at the Erie Canal near Lockport, New York*. June 1994.

_____. 2006a. *Remedial Investigation Report, Eighteenmile Creek Corridor Site, 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.*

TVGA Consultants (TVGA). 2005a. *Site Investigation Report, Site Investigation/Remedial Alternatives Report (SI/RAR), Former Flintkote Site, 198 and 300 Mill Street, City of Lockport, Niagara county, New York.* Niagara County Department of Planning and Tourism, Sanborn, New York.

_____. 2005b. *Final Remedial Alternatives Report, Former Flintkote Site, Site Investigation/Remedial Alternatives Report (SI/RAR), Former Flintkote Site, 198 and 300 Mill Street, City of Lockport, Niagara county, New York.* Niagara County Department of Planning and Tourism, Sanborn, New York.

United States Environmental Protection Agency (EPA). 1994. Engineering Forum Issue Paper "Determination of Background Levels of Inorganics in Soils and Sediments at Hazardous Waste Sites", Breckenridge, R.P and Crocket, A.P., Review Draft, Version 9, November 28, 1994.

_____. 2001, Guidance for Characterizing Background Chemicals In Soil at Superfund Sites, External Review Draft, Office of Emergency and Remedial Response, EPA 540-R-01-003, OSWER 9285.7-41, June 2001.

_____. 2002a, Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, Office of Emergency and Remedial Response, EPA 540-R-01-003, OSWER 9285.7-41, September 2002.

_____. 2002b, Role of Background in the CERCLA Cleanup Program, Office of Solid Waste and Emergency Response and Office of Emergency and Remedial Response, OSWER 9285.6-07P, April 26, 2002.

_____. 2007. *Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments [ERAGs],* EPA/540-R-97-006

_____. 2014. "Waste and Cleanup Risk Assessment, Human Health: Exposure Assessment." Available online at: http://epa.gov/oswer/riskassessment/human_health_exposure.htm. Last updated December 24, 2012.

APPENDIX A
EVALUATION OF EXISTING DATA, EIGHTEEN MILE CREEK SUPERFUND SITE, OPERABLE UNIT 2

Evaluation of Existing Data
Eighteen Mile Creek Superfund Site
Operable Unit 2
City of Lockport, Niagara County
New York

July 2014
Revision 01

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 2
290 Broadway
New York, New York 10007-1866

Prepared by:

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Los Alamos Technical Associates, Inc.

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1 Overview

1.1 Introduction

This work is being performed under U.S. Environmental Protection Agency (EPA) RAC2 Contract Number EP-W-10-007. The Original Work Assignment Form (WAF) for the Remedial Investigation/Feasibility Study (RI/FS) to be performed by Los Alamos Technical Associates (LATA) for the Eighteen Mile Creek Site – Operable Unit 2 (OU2) (Site) was issued on September 23, 2013. Ecology and Environment, Inc. (E & E) is a Team Subcontractor to LATA on this contract and has the lead technical role in this project. WAF Amendment 001 was issued on December 27, 2013, to revise the project schedule based on the results of the December 18, 2013, Scoping Meeting. The information in this memorandum is included in the Revised Work Plan (Revision 01) for this Work Assignment.

1.2 Site Overview

Eighteen Mile Creek Superfund Site is a National Priorities List (NPL) hazardous waste site under investigation pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund.

Eighteen Mile Creek Superfund Site (Site) is located in Niagara County, New York, on the south side of Lake Ontario (see Figure 1). The main branch of Eighteen Mile Creek (the Creek) flows north for approximately 15 miles and discharges into Lake Ontario in Olcott, New York. Much of the flow in the main branch of Eighteen Mile Creek comes from water diverted from the New York State Barge Canal (Canal). Eighteen Mile Creek watershed also includes the two main tributaries, the east branch and the Gulf Creek, and minor tributaries. The Site consists of contaminated sediments, soil, and groundwater in and around the Creek.

To address the cleanup of this Site, EPA has divided the Site into three separate operable units (OUs) as shown in Figure 2. OU1 will address contaminated soil at the Residential Properties on Water Street in Lockport, New York and also will address conditions of a building located on the former Flintkote Plant property (former Flintkote Building). EPA completed a Record of Decision (ROD) for OU1 on September 30, 2013. OU2 is part of Eighteen Mile Creek Corridor (the Creek Corridor), which extends from the Creek's headwaters at the Canal to Harwood Street in Lockport (see Figure 2 insert and Figure 3). OU2 will address

contaminated sediments and soil in other areas of the Creek Corridor including the banks of the Residential Properties of OU1. OU3 will address contaminated sediment in the Creek from the north end of the Creek Corridor in Lockport to the mouth of the Creek in Olcott, New York, where the Creek discharges into Lake Ontario (see Figure 2).

For OU1 and OU2 as defined by EPA, the New York State Department of Environmental Conservation (NYSDEC) completed a RI/FS and ROD for the Flintkote property and separate RI/FS and ROD for the remainder of the Creek Corridor. NYSDEC separated the site based on property boundaries. For OU3, EPA completed a RI under the Great Lakes Legacy Act (GLLA) program for the contaminated sediment in the Creek channel from Creek Corridor (OU2) to Burt Dam (CH2MHill and EEEPC 2012). The EPA GLLA RI for contaminated sediment also compiled and evaluated historical sediment data, which included the NYSDEC sediment data from OU2. Past studies, site information, and existing analytical data from these studies and others were evaluated to determine whether additional data are needed to develop a complete conceptual model of OU2, understand the fate and transport of sediment in the Creek, and assess risk to humans and ecological receptors at the contaminated properties in the Creek Corridor. The results of the evaluation are presented in this technical memorandum.

2 OU2 Background

This section includes a description of OU2 and summary of existing conditions and previous investigations. All of the reports reviewed for this technical memorandum are listed in Appendix A. A description of the data available from each report is presented in Table 1.

2.1 Site OU2 Description

The Creek Corridor is defined as the Creek channel from the New York State Canal to the Harwood Street and the adjacent properties (see Figure 3). OU2 encompasses the entire Creek Corridor except for the residential properties on Water Street and the former Flintkote building that are part of OU1. The adjacent properties are divided based on site ownership and are described below.

2.1.1 Creek Channel

The Creek channel consists of the Creek, contaminated sediments in the Creek, and Creek banks. To delineate boundaries between the sediment OU2 and the upland soil OUs, the bankfull width of the Creek was field delineated by NYSDEC in 2008. The bankfull width is commonly known as the width at which water begins to leave the channel and discharge to the floodplain. The Creek channel outlined in blue on Figure 3 represents the bankfull width. The headwaters of the Creek consist of an east and west branch, which begin immediately north of the Canal. Water from the Creek's east branch originates at the spillway on the south side of the Canal, where it is directed northward underneath the Canal and the Mill Street Bridge through a culvert. Water from the west branch originates from the dry dock on the north side of the Canal and then flows northward. The east branch and west branch converge just south of Clinton Street in Lockport.

According to the National Wetlands Inventory (NWI), two reaches of Eighteen Mile Creek within the Creek channel are considered palustrine, permanently flooded, diked/impounded wetlands (for more information, see EEEPC 2009a).

The Creek Corridor is bordered by several properties that are part of OU2. The Creek channel is included in the real property parcels of the individual properties as listed below. Descriptions of the Creek channel within the properties are included with each parcel.

The City of Lockport Comprehensive Plan (Nutter Assoc. 1998) shows future use of the Creek channel as park land and as a recreation opportunity area including a proposed nature trail. The Comprehensive plan proposes extension of the Canalway Trail west from locks and improved fishing access. Therefore, future use scenarios need to consider the potential for increased visitors and recreational users.

2.1.2 The Former Flintkote Plant Site

The Former Flintkote Plant Site (198, 225, and 300 Mill Street) in the city of Lockport, Niagara County, New York, is bounded by Eighteen Mile Creek to the west, Mill Street to the east, a commercial property to the north, and vacant land of the Former United Paperboard Company to the south (see Figure 3). A small portion of the site, however, is located along the western bank of Eighteen Mile Creek, and is bounded to the south by residential properties along Water Street. This portion of the site is referred to as the Water Street Section (WSS). William Street, which is no longer open to vehicular traffic, bisects the site. A dam approximately 10 feet high diverts the Creek westward for approximately 300 feet along William Street (located on top of the dam). The Creek continues northward and returns to its original natural channel farther downstream. The two sluice gates located at the east end of the dam have been closed for at least 30 years. A millrace containing a sluggish stream approximately 6 inches to 1 foot deep runs along the west side of the buildings at 300 Mill Street and empties into Eighteen Mile Creek (see Figure 3). The section of 300 Mill Street between Eighteen Mile Creek and the millrace is referred to as the island.

The Flintkote property was purchased from the Beckman Dawson Roofing Company in 1928 and was operated as a manufacturer of felt and felt products. Production of sound-deadening and tufting felt for use in automobiles began at Flintkote in 1935 and continued until operations ceased and the plant closed in December 1971. It is suspected that composite laminates observed at the southernmost demolished building on the 198 Mill Street Property may have also been manufactured at Flintkote. A portion of the Flintkote property at 300 Mill Street near William Street was formerly listed as Site No. 932072 in the Registry of Inactive Hazardous Waste Disposal Sites in New York State (NYS) because of seven drums containing sweepings, solid materials and polychlorinated biphenyl (PCB) transformer oil that were stored in the basement of an on-site building. In January 1984, these drums were removed from the site by a waste oil processor and the site was removed from the Registry in 1985. In 1989, a number of drums containing chemicals were found in various locations throughout the buildings at 300 Mill Street with 28 of these drums containing hazardous wastes. These drums were disposed of off-site in May 1991 during a NYSDEC drum removal action. Additional detail concerning the history of this property can be found in the ROD prepared by NYSDEC in March 2006 (NYSDEC 2006b).

The City of Lockport currently zones this parcel as heavy industrial (i.e., District I-3). The City of Lockport Comprehensive Plan (Nutter Assoc. 1998) shows future use of the Flintkote properties as industrial. Under the industrial zoning re-

quirements uses incompatible with industry are not to be permitted. The uses would include residential properties or day care centers. The City of Lockport has no future plans to change this use and designation of these areas.

2.1.3 The Former United Paperboard Company Property

The Former United Paperboard Company property is located at 62 and 70 Mill Street (see Figure 3). Sixty-two Mill Street is the larger of the two parcels and is bordered by Olcott Street to the north, Mill Street to the east, Clinton Street to the south, and Water Street to the west. The property is currently occupied by Duraline Abrasives, Inc., and contains one warehouse building. Seventy Mill Street is a vacant lot with fill material and building ruins and is bordered by the Flintkote site to the north, Mill Street to the east, Olcott Street to the south, and Eighteen Mile Creek to the west. An abandoned transformer pad and poles are present on the west bank of the Creek, immediately downstream of the dam located in the Creek behind the building on 62 Mill Street. The ponded water behind the dam is referred to as the Mill Pond. A storm sewer line also crosses the Creek approximately 25 to 50 feet downstream of the dam, and several sewer manholes were observed on both banks (east and west) of the Creek. Water in the pond was high (close to the top of the dam), and flow beneath the dam was swift. Water from the pond leaks around the west side of the dam and flows adjacent to or over the top (during high flow conditions) of the abandoned transformer pad. The City of Lockport Assessor's Office lists the parcel (Parcel ID 109.10-1-57) as consisting of 3.7 acres and Parcel 109.06-3-11 as consisting of 1.2 acres of land owned by Tri-Side LLC.

In late 1880s and early 1890s, the 62 Mill Street United Paperboard property was owned and operated by the Jackson Lumber Company with the building designated as the Saw Mill and Sash & Blind Manufacturing. In 1892, Sash & Blind added a pulp mill and box facility to its operations. By 1898 the lumber company had shut down their operations and the area previously occupied by Sash & Blind became the Traders' Paper Company paper mill, which became United Box Board and Paper Company (Mutual Risk) in 1903. The 70 Mill Street United Paperboard property was owned by United Box Board Company in 1909. United Box Board Company became United Paper Board Company in 1914, which changed its name to United Paperboard Company in 1928, which then became United Board's Carton Corporation in 1948 and Beaverboard Company, Inc., in 1969. By 1969 the buildings had been vacated and dismantled.

The City of Lockport currently zones this parcel as heavy industrial (i.e., District I-3). The City of Lockport Comprehensive Plan (Nutter Assoc. 1998) shows future use of United Paper Board as industrial. Under the industrial zoning requirements uses incompatible with industry are not to be permitted. The uses would include residential properties or day care centers. The City of Lockport has no future plans to change this use and designation of these areas.

The area is also deemed to have "Archeological Sensitivity" by the New York State Historic Preservation Office (SHPO) (accessed at http://pwa.parks.ny.gov/nr/).

2.1.4 Upson Park

Upson Park is located at 100 Clinton Street in the city of Lockport, Niagara County, New York (see Figure 3). Upson Park is bordered by Clinton Street and a residential area to the north, the West Branch of Eighteen Mile Creek and the Canal Authority to the east, the Canal to the south, and a wooded area to the west. The land is currently a town park and contains picnic areas and a walking trail along the canal. There is a parking area on the Site, but no standing buildings. The City of Lockport Assessor's Office lists the parcel (Parcel ID 109.10-1-76) as consisting of 5.9 acres of land owned by the City of Lockport.

In the mid 1880s, this property contained a canal boat building company that was no longer in operation by 1892. A pulp mill operated at the Upson Park property between 1919 and 1928 and the pulp company operated until at least 1928. In 1914, the mill company name changed to the United Paper Board Company. By 1948, operations at the mill had been shut down and the buildings on the property were vacant. By 1969, the buildings on the property had been demolished.

The City of Lockport currently zones this parcel as reserved area (RA). The purpose of the RA District is to delineate those areas where substantial development of the land in the form of buildings or structures is prohibited due to various conditions listed in the zoning regulations. Therefore, development of future structures is not anticipated for Upson Park. The City of Lockport Comprehensive Plan (Nutter Assoc. 1998) shows future use of Upson Park as park land and the area as designated as part of the Erie Canal Tourism Area. The park is also listed on the State and National Registers of Historic Places as the Lockport Industrial District (#90NR01975) (see Figure 4) and the area is also deemed to have "Archeological Sensitivity" by SHPO (accessed at http://pwa.parks.ny.gov/nr/).

2.1.5 White Transportation

The White Transportation property is located at 30-40 Mill Street in the city of Lockport, Niagara County, New York (see Figure 3). The property is bordered by the Canal to the south, Mill Street to the east, Clinton Street to the north, and the East Branch of Eighteen Mile Creek to the west. All parcels associated with White Transportation (parcels 109.10-1-60, 109.10-1-61, 109.10-1-58, and 109.10-1-59) is owned by Gertrude W. White (estate attorney is Mr. Ben May). During the Supplemental Remedial Investigation (SRI), there were only three trailers on Site: one locked trailer located near the front of the Site building facing Mill Street and two trailers near the bank of the East Branch of Eighteen Mile Creek. One of the trailers along the bank contained 55-gallon drums, two of which were lying on the ground behind the trailer. One of the drums on the ground had an open bung and contained an oily liquid. The NYSDEC Spills Department was notified on the day of the inspection (October 25, 2006) by NYSDEC personnel present during the Site visit. The trailers and drums were

later removed from the property under the supervision of NYSDEC. The spill was closed by NYSDEC on January 30, 2008.

The northern portion of the White Transportation property operated as the New York Cotton Batting Company from at least 1909 until at least 1920, as the James O-Ring Company during the early 1940s, and White Transportation from 1948 until the late 1990s when operations ceased. Use of the northern portion of the White Transportation property during the 1920s and 1930s is unknown. The southern portion of the subject property operated as the Niagara Paper Mill from at least 1875 until approximately 1898, as a box factory by D.C. Graham in at least 1903, as a cold storage facility by L. Huston from at least 1903 until at least 1937, as the Lockport Leather Board Company from at least 1909 until sometime in 1914, as the Simon William Brewery from at least 1940 to 1952; and White Transportation from 1952 until the late 1990s, when operations ceased.

The City of Lockport currently zones this parcel as light industrial (i.e., District I-2). Under the industrial zoning requirements uses incompatible with industry are not to be permitted. The uses would include residential properties or day care centers. The City of Lockport Comprehensive Plan (Nutter Assoc. 1998) shows future use of White Transportation as commercial although there are no specific projects designated for this area in the plan. The City of Lockport current zoning requirements does not included zoning for commercial areas. According to the City of Lockport Building Inspection Department there are no future plans to change this use and designation of this area (Galloway 2014).

The area is also deemed to have "Archeological Sensitivity" by SHPO (accessed at http://pwa.parks.ny.gov/nr/).

2.2 OU2 Summary of Existing Site Conditions

Detailed descriptions of the existing site conditions are provided in previous study reports as listed in Table 1. A summary of key points is provided below.

- The most prominent topographic feature in Eighteen Mile Creek watershed is the Niagara Escarpment. The watershed is located within both the Ontario and Huron plains, two relatively flat plains that are separated by the escarpment, which runs generally east-west along the northern portion of the city of Lockport. OU2 lies at the top of escarpment where the elevation is highest at the Canal and drops 65 feet to just before the escarpment.
- The Canal is located at the most upstream portion of the Creek Corridor Site. Most of the water in the western portion of the Canal comes from the Lake Erie via the Niagara River and Tonawanda Creek via the Lockport locks. During the navigational season, water flows through the canal from the Niagara River to Lockport in a northeasterly direction. In the winter, a guard gate in Pendleton, New York, is lowered and the Canal is drawn down (NYS Canal Corp. 2000). During normal operating and drawdown

periods, water is discharged from the canal into Eighteen Mile Creek, resulting in an increase in flow volumes and potential hydrological link to Lake Erie. Drawdown primarily occurs in November after the canal is closed for the winter and the canal is drained into the Creek. During dry periods, the canal contributes the majority of the flow for the portion of Eighteen Mile Creek in the city of Lockport (NYSDEC 1997). Under terms of an agreement with the Federal Energy Regulatory Commission (FERC) for Burt Dam in Olcott New York, the New York State Department of Transportation (NYSDOT) issued a permit in which they agreed to provide a diversion of excess water from the Erie Canal to augment the natural flow of Eighteen Mile Creek to maintain a flow of 400 cubic feet per second (cfs) at the dam.

- The increased flow to Eighteen Mile Creek contributed by the early Erie Canal led to the construction of mills and dams on the Creek. The significance of the Erie Canal and the historic features along Creek will need to be addressed as cultural resources during the development of future remedial alternatives.
- Sediment contaminated with PCBs and metals has been identified along the entire 15-mile length of the main branch of Eighteen Mile Creek. The Creek Corridor Site (OU2) has been identified as source area. The source of the metals contamination appears to be the historic fill that is present throughout OU2. The extent of the fill is fairly well documented and it appears most of the channel banks are fill. The thickness of fill was difficult to determine as it was found mixed at different proportions with other overburden material, but it generally ranged from less than 1 foot to more than 10 feet thick.
- The primary PCB source is unknown but suspected to be historical operations from the Flintkote plant. Evidence indicates that PCB contamination may be present beneath the Flintkote building and this area may be the source of ongoing contamination.
- Most of the banks of the Creek channel are forested and steeply sloped, making access to the Creek channel difficult in most places. Almost all of the Flintkote property is overgrown with vegetation and fenced. Of the properties, approximately 75% of the surface area at OU2 is covered by grass/vegetation and some areas of exposed soils and fill, with the other 25% of the surface area covered by buildings and asphalt/stone.

2.3 OU2 Summary of Existing Data

The usability of data for evaluating fate and transport and assessing risk is summarized in Table 1 and discussed in Section 3. Table 1 also summarizes the sediment data that was included in the NYSDEC SRI. A general summary of the existing studies is presented below:

- Many of the early investigations in the 1990s focused on the evaluation of sediment and water quality to address impacts to the Creek below Burt

Dam within Eighteen Mile Creek Area of Concern. A limited number of older studies were conducted between Burt Dam and Lockport, New York. These investigations were completed under standard, state-wide monitoring protocols implemented by the New York State Department of Health (NYSDOH). The data are useful for understanding the fate and transport of contaminants of concern through the watershed. The earlier studies demonstrated the link between the Canal and a broad list of contaminants transported in water that could originated as far away Lake Erie and the Niagara River, and migrated to Eighteen Mile Creek via the Canal. The contaminants include specific PCBs, metals, pesticides, polychlorinated dibenzodioxins and dibenzofurans (dioxin/furan), and polynuclear aromatic hydrocarbons (PAHs).

- The early studies also identified potential sources of specific contamination for PCBs and metals in the Creek Corridor. The subsequent studies completed in the Creek Corridor focused on the nature and extent of these specific contaminants. Other contaminants, such as volatile organic compounds (VOCs), pesticides, and dioxin/furan, were not found at levels determined to be significant by NYSDEC in the Creek Corridor site investigations and, therefore, were not considered contaminants of concern for the Creek Corridor and thus were not analyzed in many samples. The concentrations were screened against the current NYSDEC guidance values at the time of the study including Technical Guidance for Screening Contaminated Sediments and NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) No. 4046 surface soil cleanup objectives. Sediment screening values for organics are based on site-specific equilibrium partitioning and criteria were calculated as site specific based on the amount of organic carbon. Under this guidance the risk-based screening levels are calculated for: human health bioaccumulation, wildlife bioaccumulation, and benthic aquatic life acute and chronic toxicity.
- Previous investigations have focused on PCBs and select metals as the primary site related contaminants. More limited data are available for semivolatile organic compounds (SVOCs), other metals, and pesticides. Very limited data are available for dioxins/furans and VOCs. SVOC analyses were often limited to a list of 16 PAH.
- Evaluation of remedial alternatives and FS were completed for Flintkote for the Niagara County Department of Planning, Development and Tourism in cooperation with NYSDEC in 2005 (TVGA 2005b). Evaluation of remedial alternatives and FS were completed for NYSDEC for the rest Creek Corridor in 2009 (E & E 2009b). The extent of contamination and the extent of fill and excavation volumes were determined based on all the available historical data. These existing volume estimates are considered usable for the purpose of the FS. Volume estimates for Flintkote may be updated after the building has been removed. NYSDEC recommends that the extent of fill be confirmed with additional sampling as part of the predesign investigation.

3 Data Evaluation

The usability of data for evaluating fate and transport and assessing risk is summarized on Table 1. Data generated within the last 10 years are considered potentially usable and representative of current site conditions. Data are considered usable if the results were generated under acceptable quality practices and methods. Not all of the data has been formally validated, but if supporting analytical reports are available to perform validation, it is expected that the data would be found to be usable for risk assessment purposes. Table 1 indicates the studies that contain data that can be imported into a database for the current RI. Table 1 also indicates the reports that have data that will require validation prior to using the data for the current RI. Table 1 also summarizes the number of samples included in the NYSDEC Supplemental RI database. In addition, as part of the EPA GLLA RI all existing sediment data collected prior to 2012, including sediment data in OU2, were evaluated for usability and compiled into a sediment database. Table 2 summaries the number of sediment samples already compiled for PCBs and other contaminants. An estimate number of sample results available for specific data uses also are summarized in Table 1. However, additional evaluation for each contaminant and media is required.

The total number of samples from existing reports for the other properties is summarized in Tables 3 to 6. The sufficiency of the data for evaluating fate and transport of contaminants and assessing risk is described below. Data gaps identified as part of the data evaluation process are summarized in Section 5.

3.1 Fate and Transport of Contaminants

3.1.1 Groundwater

Fifteen groundwater monitoring wells were installed at Eighteen Mile Creek Corridor site in 2007 and 2009 as part of the Supplemental RI conducted for the NYSDEC (see Figure 5). All nine wells on the east side of the Creek and two on the west side of the Creek were installed as overburden wells, and the remaining four on the west side of the Creek were installed as bedrock wells. Bedrock was encountered at depths ranging from 9 feet below ground surface (BGS) to 26 feet BGS, and in some cases, bedrock was not encountered to depths of 26 feet BGS on the north side of the New York State Canal Upson Park and 30 feet BGS on the east side of the Creek in the northern parcel of the United Paperboard Company property.

Groundwater was investigated as part of the Flintkote Site Investigation Report for the Niagara County Department of Planning, Development and Tourism (see Figure 5), but was not investigated during the NYSDEC Supplemental RI of Eighteen Mile Creek Corridor site. Six of the Flintkote wells are overburden wells and seven are bedrock wells (see Figure 5). The depth to bedrock varies across the property, with the shallowest occurrences along Mill Street, Eighteen Mile Creek and the northern portion of the Island, which generally correspond to areas with limited fill materials. Fill materials vary in thickness from less than one foot thick to 24.9 feet thick. The fill materials were generally encountered directly at the ground surface or just below the thin topsoil layer. The thickness of the native soils, when encountered, ranged from 0.1 feet to 9.8 feet.

Geology

The overburden consists of glacial tills and lacustrine silts and clays with localized areas of fill material. Native materials consisted of brown silt to silty clay, and dark gray silty clay. Fill materials consist of ash (reddish-brown, black, white, and red); reworked cohesive soils (reddish-brown silts and clays); and reworked granular soils (silts with sand, gravel, coal, and slag).

Bedrock beneath the Flintkote site is red and white sandstone (Grimsby Formation), and bedrock beneath the Upson Park, United Paperboard, and Whiting sites consisted of light to dark gray dolostone with interbedded gray clay.

Hydrology

The groundwater hydrogeology is largely influenced by topography and the underlying geology (soils/bedrock). Groundwater occurs primarily in the fractured bedrock, but also occurs in the overburden in some areas, especially where bedrock was deeper. The depth to Groundwater also varied significantly with topography (approximately 5 to 18 feet BGS). Groundwater was encountered in the overburden in most of the wells, except MW09, MW15, and MW16 located on the west side of the Creek where bedrock was shallower (between 9 and 17 feet). Groundwater flow on both the east and west and west sides of the Creek is toward the Creek, and groundwater flow in the vicinity of the north side of the Canal near the White Transportation property is toward the Canal (see Figure 5).

Sample Analysis and Results

Flintkote groundwater samples were collected in October 2003 from 13 groundwater monitoring wells associated with the Flintkote site. The samples were tested for VOCs, SVOCs, PCBs, pesticides, and metals (both total and dissolved).

The impacts to groundwater appear to be limited to the PCBs detected in 198-F and pentachlorophenol detected in up-gradient monitoring well MW-1 RK above groundwater standards (see Figure 5). In general, the geochemistry of the overburden and bedrock groundwater is similar and no site-derived metals impacts to groundwater have been identified. The PCB detection is likely the result of leaching from the PCB impacted surface and subsurface fill materials identified on the 198 Parcel or from historical poor housekeeping practices resulting in past releas-

es. Pentachlorophenol was historically used as a pesticide and wood preservative. The presence of pentachlorophenol in the groundwater may be related to treated timbers typically used to construct railroads and railroad sidings, which were once located in the general area of MW-1 RK. The pentachlorophenol could also be the result of contaminant migration from an up-gradient, off-site source.

For the Supplemental RI, groundwater samples were collected in July 2007 from 14 of the 15 groundwater monitoring wells installed at the Corridor site located in OU-2. MW09 was not sampled because it had less than a foot of water and was purged dry. The samples were tested for VOCs, SVOCs, PCBs, pesticides, and metals (both total and dissolved). In February 2009, four wells (MW05, MW14, MW15, and MW16) were re-sampled to confirm the 2007 VOC sample results, thus these samples were only tested for VOCs.

The impacts to groundwater appear to be limited to cis-1,2-dichloroethene (cis-1,2-DCE) and trichloroethene (TCE) detected in MW-14 in Upson Park on the west side of the Creek, and cis-1,2-DCE in MW05 in United Paperboard also on the west side of the Creek (see Figure 5). Phenol was also detected above standards in one well (MW08) on the United Paperboard property. In general, the geochemistry of the overburden and bedrock groundwater was also found to be similar and no site-derived metals impacts to groundwater have been identified.

Data Gap Analysis for Groundwater

Due to the urban setting of the site, the presence of fill materials, and the former industrial activities conducted at the properties in the Corridor site, the presence of organic and inorganic compounds in soils and groundwater is not uncommon. However**,** although the fill materials could be the source of VOCs, the source or sources of the VOCs is considered unknown for the following reasons:

- The elevated levels of cis-1,2 DCE and TCE were detected in wells along the western side of the Creek, furthest from industrial activities;
- Soils collected as part of the Supplemental RI in the vicinity of these wells were not tested for VOCs, therefore, there it is difficult to determine whether or not the VOCs are present and thus leaching into the groundwater beneath the site; and
- The direction of groundwater flow in the vicinity of the VOC contaminated wells is from west to east toward the Creek. There are no up gradient wells to determine the quality of groundwater entering the site.

In addition, the elevated PCBs in 198-F is likely due to on-site sources; however, the source(s) of the elevated phenol on United Paperboard property and pentachlorophenol on the Flintkote property is also unknown.

3.1.2 Surface Water

Surface water has not been extensively sampled as part of previous investigations because of the high flow rates in the Creek and lack of standing water. Studies of

dissolved PCBs in water indicate that there is a source of PCBs to the surface water within OU2 (NYSDEC 2010c). It is expected that the source is beneath the Flintkote building.

3.1.3 Sediment

Sediment has been extensively sampled as part of previous investigations and is discussed further as part of the human health and ecological risk evaluation. Sediment transport and erosion are presented in Section 4.

3.1.4 Soils

Subsurface soils have been extensively sampled as part of previous investigations except for soils near and beneath the Flintkote buildings. Existing soil data were used to assess nature and extent and establish cleanup areas and volumes. The estimated volume is considered usable for the FS.

3.1.5 Additional Analytical Parameters

Tables 2 to 6 summarize the type of analytical data available for samples in various media by each property. Most all samples were analyzed for PCB and metals, primarily lead. PCBs were analyzed as PCB Aroclors and PCB congeners for some of the sediment samples. PCB Aroclor data were historically used for evaluating the nature and extent of contamination, because the majority of the existing samples were analyzed for Aroclors. PCB Aroclor data will be used for future evaluation of nature and extent of contamination. PCB congener data were used for some of the NYSDEC Lake Ontario and tributary monitoring studies. In general these data are not considered usable for the purposes of the RI. PCB congeners were analyzed in place of PCB Aroclors in situations where the Aroclor patterns are expected to be weathered (e.g., in low-level water analysis).

Most samples were analyzed for lead or select metals, including mercury, arsenic, chromium, copper, lead, and zinc. For the NYSDEC Supplemental RI all samples were analyzed for both Target Analyte List (TAL) metals for the bank cores and select metals (i.e., arsenic, chromium, copper, lead, and zinc) for samples tracing nature and extent of know contamination. The data set for complete metals may be limited and all planned sampling should be completed for TAL metals to provide additional data for risk assessment purposes. No samples in OU2 were analyzed for acid volatile sulfides/simultaneously extracted metals (AVS/SEM) and TOC to assess the bioavailability of divalent metals including cadmium, copper, lead, nickel, and zinc and monovalent silver.

Select samples were analyzed for lead by Toxicity Characteristic Leaching Procedures (TCLP) and the results were compared to hazardous waste levels (6 New York Codes, Rules and Regulations [NYCRR] 371). Several sample with high lead concentrations exceeded hazardous waste criteria. TCLP data compared to the total lead concentrations showed inconsistent correlation, suggesting that the leachability of the lead varies with the type of source material.

Dioxin/furans were chemicals of potential concern (COPCs) in historical studies because these contaminants are identified as critical in the lake-wide management plan for Lake Ontario. Dioxin and furans were included in the Eighteen Mile Creek AOC Remedial Action Plan, and select sediment samples from several early NYSDEC investigations were analyzed for dioxin and furans or 2,3,7,8-TCDD only. Dioxin/furans were detected in the sediment samples in the early studies at concentrations that exceed site-specific Technical Guidance for Screening Contaminated Sediments. NYSDEC performed a specific investigation in 1994 to identified dioxin/furan in the sediments of Eighteen Mile Creek. No specific sources of dioxin and furans in the Eighteen Mile Creek were identified, but the levels in the sediments were considered potential significant. The Flintkote property and Erie Canal were identified as potential sources. Eight ash samples collected during the NYSDEC Site Investigation of the Flintkote sited were also analyzed for dioxins and furans as these contaminants were detected in the two ash samples 1994 study. The total 2,3,7,8-TCDD toxic equivalent concentrations of the 1994 samples were 51.81 parts per trillion (ppt) and 871.50 ppt, respectively. Neither dioxins nor furans were detected in any of the ash samples collected during the Site Investigation (NYSDEC 2000). However, all samples (except one) that were submitted for dioxin/furan analysis were collected from depths ranging from 4 to 24 feet.

Dioxin/furans were not analyzed as part of the NYSDEC RI for the OU2 Corridor Site because dioxin and furans were not detected in the ash waste samples collected during the Site Investigation at the former Flintkote Plant site (NYSDEC 2000). The former Flintkote Plant site was then eliminated as potential source of dioxin/furan.

As part of 1997 -1998 NYS Canal Corp investigation of sediment quality in the Erie Canal (Canal Corp 1999), elevated levels of dioxin/furan contamination were encountered within the sediments under the Prospect Street Bridge in Lockport and are detectable in the sediments all the way to the Genesee River in Rochester. In some locations the 2,3,7,8 substituted TEQ levels exceed the NYSDEC Class C Sediment criteria of 50 ppt. In no case does the level of 2,3,7,8-TCDD TEQ found in the sediment exceed the EPA residential soil action limit at the time of 1 ppb or the NYSDEC Technical and Administrative Guidance Memorandum allowable soil concentration of 6 ppb. The study concluded that historical upstream sources need Tonawanda could potentially be contributing dioxin and furan to canal sediment. A recent study of sediment in the Erie Canal historical locks was completed to access the sediment for removal and disposal (Golder 2008). The sediment inside the locks would be representative of historical upstream sediment coming from above the locks. Dioxin and furans were detected in all the samples collected. Compared to the NYSDEC TOGS 5.1.9 Class A Sediment Quality Threshold Values for Dredging, Riparian, or in-water Placement threshold value calculated as toxic equivalent (TEQ) of 4.5 ppt), all samples except on exceeded this value. There are no studies to indicate current concentrations of dioxin and furan in sediment below the locks and in the OU2 Creek Corridor.

3.2 Human Health Risk Assessment

Eighteen Mile Creek Corridor area originally included residential properties on the west side of the Creek along Water Street, but these parcels were assessed separately as OU1. A Human Health Risk Assessment (HHRA) was completed for OU1 Water Street residences by EPA in July 2013. The remaining potential human exposure areas within OU2 include the following areas:

1. The Creek bed and Creek banks will be evaluated for sediment only, the creek bank soils will be assessed with each property. However, the Creek bank samples can be evaluated as a group for some parameters because the exposure areas are similar for all properties.
2. Flintkote – a 6-acre former industrial facility. The Creek bank soils immediate downstream of Flintkote will be considered part of the exposure area for this site. The Creek bank soils include samples on the opposite side that are part of the Water Street properties;
3. United Paperboard – an active 4.8-acre industrial facility. The Creek bank soils include samples on the opposite side that are part of the Water Street properties;
4. Upson Park – a 5.9-acre public park at the south end of the corridor that is mostly wooded with walking paths and a few picnic tables; and
5. White Transportation Property – an inactive 2.6-acre former commercial/industrial facility.
6. Groundwater will be assessed on an OU-wide basis based on the historical plume identified on the south side of the Creek in Upson Park and opposite United Paperboard.

Numerous studies have been conducted of the soil and sediment in the corridor area as listed in Table 1. In general terms, the contaminants that have been found in the area that might pose health risks to humans contacting soil and/or sediment include PCBs, metals, PAHs, and pesticides.

Potential exposure pathways and receptors are summarized in Figure 7, the conceptual site model (CSM) from the NYSDEC Supplemental RI Report and in Table 7 presented herein. Potential receptors include:

- Recreational users and groundkeepers/maintenance workers of Upson Park and the Downstream area;
- Workers, site visitors/trespassers and utility workers of the White Transportation, United Paperboard, and Flintkote parcels; and
- Anglers and other recreational users of the stream bed and banks.

Recreational users, visitors, workers and possible future residents might be exposed to site contaminants in soil and sediment via direct contact with these envi-

ronmental media, including incidental ingestion via hand-to-mouth contact, dermal contact, and inhalation of particles and/or vapors emanating from these media as a result of volatilization and wind erosion. In addition to these pathways, anglers and their families who might consume fish or crayfish caught from the stream might be exposed to contaminants absorbed by these organisms from Creek water and sediment. Groundwater is not currently used as a source of potable water in the OU2 area but it is classified GA by NYSDEC indicating that its best potential use is as a source of drinking water so hypothetical future use of groundwater in OU2 as potable water will be assessed.

Assessing potential exposures to site contaminants requires that sufficient data be available to make reliable estimates of contaminant concentrations in the various potential exposure areas. EPA estimates potential exposures based on a conservative estimate, typically the 95% upper confidence limit (95% UCL) on the average contaminant concentrations within an exposure area. EPA has developed the ProUCL statistical software package to evaluate the analytical data and perform the appropriate statistical calculations. The ProUCL Technical Guidance document recommends that at least eight to 10 detected values be available in order to calculate reliable estimates of the 95% UCL values. The 95% UCL or the maximum detected value in a dataset, whichever is lower, will be used as the exposure point concentration.

For technical reasons, lead is assessed differently from other contaminants. EPA's Superfund Lead Contaminated Residential Sites Handbook recommends that for parcels larger than 1 acre, one five-point composite sample be collected for each ¼ acre. The upland parcels in OU2 range from about 2.6 to 6 acres in size. The lead sampling guidance is not relevant to the upland parcels in OU2 for the Flintkote Plant Site, United Paperboard and White Transportation because the properties are presently designated for commercial/industrial use and there are no plans in the Lockport Comprehensive Plan to change that designation. The upland parcel in Upson Park is designated as a park and will continue for recreational use.

Future use plans for the Creek Channel indicate potential expansion as a trail and fishing location. The Creek Channel and the Creek banks are associated with individual properties but from an exposure standpoint the area is all similar. Therefore, samples collected in Creek banks and sediments can be considered as group for evaluating this exposure pathway for future recreational users.

3.2.1 Available Data for the Human Health Risk Assessment

The historical analytical data for soil samples in OU2 have been reviewed to determine whether data of sufficient quality and quantity is available to support the HHRA. The soil sample totals by depth are summarized on Table 8 because exposure assessments are based on sample depth. The properties with sample sets less than 10 samples per exposure area are highlighted on the table indicating a potential data gap. The number of soil samples available for the various upland areas appears to be fewer than those recommended by the guidance document cit-

ed previously. This is especially true for PAHs and pesticides. For example, most of the samples in Upson Park are located along the Creek banks and there are limited sample locations in the picnic area (see Figure 12). The upland samples for former United Paper Board and White Transportation are also limited, but most of these are paved or have buildings located on them.

Sediment data are summarized on Table 2 but the samples are not evaluated based on depth because all the samples are generally shallow. The data available for soil and sediment in the stream bed and banks in the Creek channel generally appears to be sufficient for most COPCs. Groundwater data for OU2 was collected prior to 2009 and is not acceptable for risk assessment. Groundwater monitoring in the designated plume area needs to be completed within one year and have a recommended two rounds of data.

3.2.2 Additional Analytical Parameters

In order to comply with EPA risk assessment guidance, the full Target Compound list/Target Analytical List (TCL/TAL) analyses are needed for at least some fraction of the samples to provide assurance that no significant COPCs are missed in the RI and risk assessment process. Some analytical parameters have limited data as described below.

Dioxins and furans have been detected in fish collected near the northern end of the Creek at concentrations higher than fish collected from Oak Orchard Creek, a reference creek to the east. Environmental media in the Creek Corridor have generally not been analyzed for dioxins and furans as part of the NYSDEC RIs, but earlier NYSDEC studies of the Canal and Creek channel suggest dioxin/furan is present in the sediments and therefore could contribute to the total risks.

Total chromium concentrations appear to be elevated in environmental media in Eighteen Mile Creek. Chromium can exist in two valence states, Cr(III), and Cr(VI). The Cr(VI) is generally much less common in environmental media, but it is much more toxic than Cr(III), therefore, it is important to know the chemical form of the chromium present. Historical evaluation of the industry in OU2 did not indicate any potential sources of Cr(VI) to the sediment and surface water and therefore Cr(VI) is not expected to be present in the sediments and surface water of OU3. Samples collected by EPA's Removal Program in the soils at the Water Street residential yards did not find Cr(VI). Therefore, further analyses for Cr(VI) for all samples are not recommended. However, about 10% of all samples also will be analyzed for Cr(VI) to confirm there are no other potential sources of Cr(VI) in OU2.

3.2.3 Additional Environmental Media

Some of the potential exposure scenarios that may occur in OU2 involve contact with surface water – swimming, wading and fishing, and consumption of fish and/or crayfish caught from the Creek. Data available for the Creek channel are summarized on Table 2. There is no analytical data available for fish or crayfish tissue from OU2. Fishing in OU2 has been reported by local residents and im-

proved fishing access is a potential future use. The Great Lakes Biomonitoring Project is currently under way by NYSDOH, which focuses on the Burmese in Buffalo and licensed anglers in Erie, Niagara, and Monroe counties. NYSDOH collected fish consumption data and blood and urine samples from approximately 200 Burmese participants. The data they collected did include general eating patterns of fish, including shellfish (e.g., mussels) and small mammals in this group (from all sources including the Great Lakes). Data are still under elevation but should be available in estimate exposure rates. There is little analytical data available for surface water from OU2. Swimming and wading have not reported by local residents and exposure to contaminated surface water is not expected to be a significant exposure pathway. Because most of the water in the Creek comes from the Canal, water quality from the Canal could be used to estimate surface water exposure. If the NYSDOH Great Lakes Biomonitoring Project data is available at the time the risk assessment is being prepared information from that study will be used to help in selecting exposure factor values. Further, if the Burmese (Hmong) population proves to be a sensitive or subsistence subpopulation, separate exposure and risk estimates will be prepared for that group.

3.2.4 Background and Reference Areas

A number of contaminants found in OU2 are naturally occurring (e.g., most metals such as iron, lead, copper, zinc, and aluminum), or are ubiquitous in environmental media (PAHs and dioxin/furan) as a result of natural processes like combustion or other regional or global human activities. Consequently it is important to collect analytical data for environmental media in nearby reference or background areas in order to distinguish site-specific concentrations, exposures and risks from those found in the general western New York environment. For the NYSDEC site investigations, contaminant concentrations were compared with state screening standards so no background or reference data were collected for OU2. There are limited samples collected upstream of the Canal that may be considered background for sediment. The number of samples is not sufficient to establish statistical significance.

Consequently it is important to collect analytical data for environmental media in nearby reference or background areas in order to distinguish site-specific concentrations, exposures, and risks from those found in the other Lake Ontario watersheds. Some tissue samples were collected from Oak Orchard Creek in 2007 (E & E 2009). Basin-wide monitoring programs also can be used as references for surface water and historical sediment data. EPA has developed several guidance documents describing:

- How background locations should be identified;
- How background concentrations should be determined (statistical procedures);
- How contaminant concentrations in site soil should be compared with background concentrations; and

- How background concentrations should be taken into consideration in CERCLA remedy selection decisions.

Specific guidance documents include *Determination of Background Levels of Inorganics in Soils and Sediments at Hazardous Waste Sites* (EPA 1994); *Guidance for Characterizing Background Chemicals In Soil at Superfund Sites* (EPA 2001); *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (EPA 2002a) and *Role of Background in the CERCLA Cleanup Program* (EPA 2002a) All of this guidance will be taken into consideration in developing and using background concentrations. Background concentrations will only be taken into consideration for inorganic chemicals for refining risk calculations.

3.3 Ecological Risk Assessment

Data available to support the Baseline Ecological Risk Assessment (BERA) for OU2 are presented in this section. A Screening Level Ecological Risk Assessment (SLERA) has not yet been conducted for OU2; however, it seems likely that an unacceptable screening level risk will be identified in OU2 when a SLERA is conducted, for at least two reasons:

1. Elevated levels of PCBs, copper, lead, zinc, and other contaminants in sediment and soil have been reported in OU2 in several recent investigations (e.g., CH2MHill and EEEPC 2012; EEEPC 2009a; NYSDEC 2006); and
2. Fish, wildlife, and other ecological receptors are abundant in and along the Creek in OU2 (EEEPC 2009a).

The information presented in this memorandum is intended to assist EPA with understanding the potential data needs to conduct a BERA for OU2, should EPA decide to do so.

Data evaluation for OU2 was designed to determine whether or not there are sufficient data to support a BERA for OU2, and was based on the following:

1. The preliminary ecological CSM for OU2 (see Figure 8);
2. The preliminary list of assessment endpoints, risk questions, and measures (see Table 9); and
3. A review of the available data for OU2 as presented in recent site investigation reports, including the Great Lakes National Program Office (GLNPO) Remedial Investigation Report (CH2MHill and EEEPC 2012), Final Supplemental Remedial Investigation Report for Eighteen Mile Creek Corridor Site (EEEPC 2009a), and other recent site reports.

As the risk assessment process for OU2 advances, it is expected that refinements will be made to the CSM and assessment and measurement endpoints. The following section summarizes available data for the Creek channel and each property in OU2. Recommendations to fill identified data gaps are presented in Section 5.

3.3.1 Available Data for Ecological Risk Assessment

Creek Channel

Table 2 provides a summary of existing data. The following points are noteworthy regarding the sufficiency of the available data to support a BERA for the Creek channel:

- Existing sediment chemistry data appear to be adequate for determining the extent of contamination.
- There are no data available to evaluate sediment toxicity and bioaccumulation or develop biota-sediment bioaccumulation factors.
- A surface water evaluation of dissolved PCBs was completed, but no other contaminants were analyzed for, and no studies of general water quality were done.
- No fish tissue data or benthic macroinvertebrate data have been collected within the Corridor site.

For the Creek sediment in OU3, there is much larger data set addressing toxicity and bioaccumulation factors. The OU3 may be useful addressing data gaps in the OU2 risk assessment sediment concentrations and areas are comparable. For example, *Lumbriculus* bioaccumulation tests were completed for OU3 in 2012 for PCBs. The data may be applied to determining bioaccumulation factors for OU2.

Flintkote Property

Table 3 provides a summary of existing data and the following points are noteworthy for evaluation of data for BERA. Figure 10 shows the locations of all the existing soil locations that are considered potentially usable.

- Sufficient data are available for surface soil/fill for some parameters (PCBs, metals, mercury, SVOCs), but not others (pesticides, dioxins/furans, and VOCs).
- No biological tissue data have been collected from the Flintkote Property.

United Paper Property

Table 4 provides a summary of existing data. The following points are noteworthy regarding the sufficiency of the available data to support a BERA for this property. Figure 11 shows the locations of all the existing soil locations that are considered potentially usable.

- Sufficient recent data are available for surface soil/fill for some parameters (PCBs, metals, mercury, SVOCs), but not others (SVOCs, pesticides, dioxins/furans, and VOCs).

- No biological tissue data have been collected from the United Paper Property.

Upson Park

Table 5 provides a summary of existing data. The following points are noteworthy regarding the sufficiency of the available data to support a BERA for this property. Figure 12 shows the locations of all the existing soil locations that are considered potentially usable.

- Insufficient surface soil data are available for the Upson Park property in the area above the Creek banks including the picnic area.
- Sufficient recent data are available for bank surface soil for some parameters (PCB Aroclors, metals, mercury, and SVOCs,), but not others (, pesticides, dioxins/furans, and VOCs).
- No biological tissue data have been collected from the Upson Park Property.

White Transportation

Table 6 provides a summary of existing data. The following points are noteworthy regarding the sufficiency of the available data to support a BERA for this property. Figure 13 shows the locations of all the existing soil locations that are considered potentially usable.

- Sufficient recent data are available for surface soil (property and bank combined) for some parameters (PCB Aroclors, metals, mercury, and SVOCs), but not others (SVOCs, pesticides, dioxins/furans, and VOCs).
- No biological tissue data have been collected from the White Transportation Property.

3.3.2 Additional Analytical Parameters

PCB congener data have been collected for Eighteen Mile Creek system in several investigations. Recently, all 209 PCB congeners were measured in fish and sediment samples collected to support a Trophic-Trace model for Eighteen Mile Creek in OU3 (E. Risk Sciences 2012). PCB congener data are useful for assessing exposure instances when PCB patterns from Aroclors are weathered or degraded and comparing to available historical tissue data from OU3.

Select samples from the escarpment to Burt Dam have been analyzed for AVS/SEM to evaluate the bioavailability of metals as part of the OU3 projects. The results indicate that the metals in Eighteen Mile Creek sediments are unlikely to be bioavailable or toxic. Actual toxicity studies are needed to confirm these results. There is no AVS/SEM or toxicity data available for OU2.

3.3.3 Background and Reference Areas

As described for the HHRA, a number of the contaminants found in OU2 are naturally occurring (metals), or are ubiquitous in environmental media (PAHs and dioxin/furan) as a result of natural processes like combustion or other regional or global human activities. Consequently, it is important to collect analytical data for environmental media in nearby reference or background areas in order to distinguish site-specific concentrations, exposures and risks from those found in the general Western New York environment.

For the NYSDEC site investigations, contaminant concentrations were compared with state screening standards so no background or reference data were collected for OU2.

For the BERA, exposure and risk at the site should be compared with exposure and risk at a reference area. For OU2, a suitable reference area for the terrestrial and aquatic portions of the site has not yet been identified. One possible reference area for OU2 is Oak Orchard Creek, which was used as a reference area for the Eighteen Mile Creek AOC Beneficial Use Impairment Investigation conducted in 2007 (E & E 2009). Oak Orchard Creek has many similarities with Eighteen Mile Creek. Both creeks are tributaries of Lake Ontario, are of similar size and surrounding geography, and are subject to water level fluctuations due to changes in lake water levels. In addition, each creek has a hydro-electric dam located some distance from their confluences with the lake. Oak Orchard Creek is not a Great Lakes AOC and was recommended as a suitable reference location by NYSDEC. Finally, the BUI investigation demonstrated that PCBs and dioxin/furans in brown bullheads (whole-body samples) collected from Eighteen Mile Creek were an order of magnitude greater than in brown bullheads collected from Oak Orchard Creek.

Other potential reference areas are the East Branch of Eighteen Mile Creek or upstream areas of Oak Orchard Creek closer to the Erie Canal. Aquatic and terrestrial habitats within these potential reference area or areas may be more comparable to the OU2 section of Eighteen Mile Creek.

4 Sediment Erosion and Deposition Analysis

Sediment erosion is of primary concern in OU2. The NYSDEC RI and SRI found concentrations of PCBs and metals in sediment exceeding screening criteria in the Creek and Flintkote millrace and in the soils on the properties located adjacent to the Creek. The SRI concluded that erosion of contaminated fill material from adjacent properties and runoff appears to be the primary mechanism for transport of PCBs and lead to the Creek.

The SRI indicated that the Canal is potentially a chronic source of PCB contamination to the Creek. PCB contaminated sediment in the Canal immediately upstream (to the west) of Eighteen Mile Creek was identified by an investigation performed by URS Corporation in 2006, the RI, and to a lesser ex-tent, during the SRI. The Additional Investigation (EEEPC 2009a) was conducted to determine whether the Canal is a significant source of contamination to Creek sediments. This investigation concluded that the Canal is not a significant contributor of PCBs and metals to Eighteen Mile Creek sediments at the Corridor. Therefore, the likelihood of re-contamination from the Canal after Creek sediments have been remediated is small. However, the investigation also concludes that one-time events, such as pulling the canal plug (allows water to drain from the Canal to the Creek) and significant discharges from combined sewer overflow (CSO) outfalls were not evaluated in the investigation. Such events could cause a slug of potentially contaminated sediments to enter the Creek. The NYSDEC FS assumed that a sediment re-lease from pulling the canal plug could be avoided through operational changes (i.e., use of pumps) to prevent such a potential slug release to the Creek. CSOs are being monitored under NYSDEC Division of Water, and it is therefore assumed that the sediment levels in the sewer system are being monitored for COCs for Eighteen Mile Creek. The latest CSO monitoring data from city of Lockport was collected in 2011 from two locations in OU2 (City of Lockport 2011). The samples were analyzed for fecal coliform and metals only.

In terms of deposition, the Creek has a relatively high velocity and constant flow which is at a maximum annually when the Canal is drained and during flood events. Sediment thickness was evaluated as part of the NYSDEC FS based on depth to refusal or bedrock of the sampling on transects for purposes of calculating volumes. In many areas, the Creek bed along the center of the channel is

comprised mostly of coarse sand and various sizes of gravel, stone, and rubble. A larger proportion of silt was observed along the Creek bottom in the West Branch of the Creek, as well as between Clinton Street and the Clinton Street Dam. However, sediment thickness is expected to change over time due to high flow rates and scour. High concentrations of PCBs and lead were found in the millrace adjacent to the Former Flintkote Plant Site. Based on Site hydrology, this area is clearly a depositional area with intermittent flow. Sediment deposition also is expected to occur behind the Clinton Street dam. However, the concentrations of PCBs and metals were higher below the dam than above the dam indicating that the sediment behind the dam may not be retained over time.

Deposition of sediments on floodplains during high water events was clearly demonstrated for the Residential Properties of OU1. The deposition of sediments on surrounding properties needs to be addressed as part of the overall remedy selection.

The following summarizes the Sediment Erosion and Deposition Analysis (SEDA) concerns:

- Sediment transport has not been modeled at the site but a general CSM of sediment movement is generally understood based on previous investigations.
- Sediment input is primarily from annual draining of Canal and erosion of banks. Sufficient data are available to understand the contribution of contamination from these sources. NYSDEC concluded that the erosion pathway from the banks must be eliminated as part of the remedy and that contributions from other sources can be controlled.
- Sediment bedload was evaluated in 2009 by NYSDEC. Sediment resuspension due to scour and settling is suspected to occur based on observations and chemical analysis but the extent is unknown.
- Sediment deposition was only clearly identified in one location in the Creek Corridor at the Flintkote millrace.
- Sediment transport off bank due to flooding and sediment transport downstream are well documented based on the measured extent of contamination.

The existing NYSDEC FS and ROD only evaluated two remedial alternatives for the Creek: No Action and Complete Removal and Bank Stabilization. Therefore, modeling of sediment transport is not required for this alternative. Other remedial alternatives such as in-situ capping, monitored natural recovery and in-site treatment were determined to not be effective for the Creek channel.

5 Data Gaps and Recommendations

The following data gaps and recommendations are based on the data evaluation presented in Section 3. The data gaps and sampling recommendations to address them are summarized below and on Tables 10 through 14 for the Creek channel and each of the properties within OU2. Figures 6 to 13 present the location of existing samples that are considered usable and proposed new sample locations. Table 15 provides a summary of all recommended samples and analytical parameters.

5.1 Fate and Transport

Several contaminants were detected at the Corridor sites in the various media sampled. The following are recommendations to fill data gaps by media:

5.1.1 Groundwater

Elevated metals detected in monitoring wells form all the sites is representative of ambient conditions in the area and no site-specific sources. However, there were some VOCs, SVOCs, and PCBs detected in some wells that are likely the result of on-site or off-site contaminant sources. For human health risk assessment, current groundwater results analyzed for all TCL/TAL is required in the area of the identified plume.

The Former Flintkote Plant Site

The presence of elevated level of pentachlorophenol in MW-1RK (see Figure 5) appears to be an isolated occurrence either from an onsite source or former railroad ties, thus no additional investigations are recommended at this time. However, the detection of PCBs in 198-F clearly indicates that PCBs from the Flintkote site are impacting groundwater. The screened interval in this well is close to the same elevation as the Creek, thus it is highly likely that PCB-contaminated groundwater is discharging to the Creek (coinciding with elevated PCBs in the Creek water downgradient of the Flintkote site). However, because there are plans to remediate the Flintkote site (i.e., building and soil removal in the area of 198-F, no additional groundwater investigations are warranted at this time. The groundwater contamination at the Flintkote site will be revisited once the building is demolished and additional soil data are collected. Passive sampling in the Creek Channel is recommended to assess the impacts of groundwater to the sediment (see Section 5.1.3).

Former United Paperboard

The presence of the elevated level of phenol in MW8 (see Figure 5) appears to be an isolated occurrence and likely from an onsite source, thus no additional investigations are recommended at this time. However, due to the uncertain nature of the source of the elevated levels of cis-1,2 DCE in MW05, one upgradient/offsite monitoring well (on Jackson Street north of Monroe Street) is recommended to be installed and sampled for VOCs to determine whether or not the contamination in MW14 is originating on- or off-site (see Figure 6). In addition, the two existing wells (i.e., MW05 and MW09) should also be sampled for VOCs. However MW-9 has been dry in past sampling events and therefore, if MW-09 cannot produce a sufficient amount of groundwater it will be replaced and sampled.

Upson Park

Due to the uncertain nature of the source of the elevated levels of cis-1,2 DCE and TCE in MW14 (Upson Park) (see Figure 5), one upgradient/off-site monitoring well (on Jackson Street approximately halfway between Clinton Street and Monroe Street) is recommended to be installed and sampled for VOCs to determine whether or not the contamination in MW14 is originating on- or off-site (see Figure 6). In addition, the four existing wells (MW14, MW15, MW16, and MW17) should also be sampled for VOCs.

White Transportation

Other than elevated metals which appear to be representative of ambient condition in the area, no other elevated contaminants were detected, therefore, no additional groundwater investigations are proposed at this time.

5.1.2 Surface Water

As stated above, studies of dissolved PCBs in water indicate that there is a source of PCBs to the surface water within OU2. It is expected that the source is beneath the Flintkote building. While no additional sampling is needed to evaluate fate and transport, some additional sampling is recommended as part of the human health and ecological risk evaluation.

5.1.3 Sediment

Sediment has been extensively sampled as part of previous investigations as shown on Figure 10 and summarized on Table 2. No additional sampling is needed to evaluate fate and transport; however, some additional sampling is recommended as part of the human health and ecological risk evaluation.

5.1.4 Soils

Subsurface soils have been extensively sampled as part of previous investigations except for soils near and beneath the Flintkote buildings. Additional sampling is needed to evaluate nature and extent of contamination once the building is demolished. Estimated number of samples is provided on Table 15. Proposed sample locations are shown on Figure 12. Samples will be collected at depth to characterize potential sources of PCBs. In addition, some additional surface soil sampling is recommended as part of the human health and ecological risk evaluation

to address requirements for the full list TCL/TAL parameters. A surface sample will be collected from the borings to support risk assessment.

5.2 Human Health Risk Assessment

As stated in Section 3, the data available for soil and sediment in the stream bed and banks generally appears to be sufficient for most COPCs. However the following additional sample parameters, sample locations, and environmental media are recommended:

5.2.1 Additional Samples

As noted on Table 8, several most of the properties have sufficient samples to meet HHRA guidelines for the majority of analytical parameters. In Upson Park, there are limited samples in the park area and additional sampling is recommended as noted on Table 13. Many of the areas have limited data for select parameters including pesticides, SVOCs, dioxin/furan and pesticides. Additional surface sampling is recommended to provide full TCL/TAL parameters. Surface water, sediment and soil samples will be collocated with samples for sediment and surface water toxicity and tissue sampling on the various properties as shown on Figures 9 to 13. These samples are also usable for risk assessment and should provide all the required data for non-site related contaminants.

5.2.2 Additional Environmental Media

Additional samples to assess exposure pathways from fish consumption are recommended as noted on Table 10.

5.2.3 Additional Sampling Locations

Suitable comparison or background areas need to be identified, sampled and analyzed to establish general area concentrations of chemicals that might be site-related COPCs. The background samples are summarized on Table 15.

5.3 Ecological Risk Assessment

Recommendations for further sampling are presented for the Creek channel and each individual property within the Creek Corridor.

5.3.1 Additional Samples

As discussed in Section 3, several the Creek channel and most properties in OU2 have sufficient sample data to assess contaminant exposure for the majority of analytical parameters, but there is not sufficient data for all parameters for all media. For example, previous investigations have not assessed biological uptake or toxicity of contaminated media to wildlife or other ecological receptors. Additional sampling is recommended as summarized below and noted on Tables 10 through 14. The locations of recommend samples are shown on Figures 9 to 13.

Creek Channel

Table 10 provides a summary of data gaps and recommended additional sampling to fill the data gaps. The recommendations are summarized below.

- Additional sampling is recommended to evaluate sediment toxicity and bioaccumulation for the BERA. Data collected for OU3 will be used to develop biota-sediment bioaccumulation factors until changing concentrations warranted OU2 specific factors.
- A surface water evaluation of dissolved PCBs was completed, but no other contaminants were analyzed for, and no studies of general water quality were done. Additional surface water sampling is recommended to evaluate surface water chemistry and toxicity for the BERA.
- Collection of fish-forage composite samples for analysis of site-related contaminants is recommended for the BERA.

Approximate locations for the sediment and surface water toxicity samples are shown on Figure 9. The specific locations will be chosen based on more detailed review of existing data. The samples collection should cover a range of contaminant concentrations (low, medium, high) so that both toxic and non-toxic samples are collected. Because contaminant concentrations in sediment vary with grain size, a range of sediment textures (sand, silt, etc.) should be sampled.

Flintkote Property

Table 11 provides a summary of data gaps and recommended additional sampling to fill the data gaps. The recommendations are summarized below.

- New soil data for select parameters is recommended; and
- Collection of vegetation, earthworm, and small mammal data are recommended for the BERA. Biota samples should be collocated with new soil samples so that site-specific biota soil accumulation factors can be developed for the site.

United Paper Property

Table 12 provides a summary of data gaps and recommended additional sampling to fill the data gaps. The recommendations are summarized below.

- New soil data for select parameters is recommended; and
- Collection of vegetation, earthworm, and small mammal data are recommended for the BERA. Biota samples should be collocated with new soil samples so that site-specific biota soil accumulation factors can be developed for the site.

Upson Park

Table 13 provides a summary of data gaps and recommended additional sampling to fill the data gaps. The recommendations are summarized below.

- Insufficient surface soil data are available for the Upson Park Property. Additional sampling is recommended to define the nature and extent of contamination and for risk assessment purposes; and
- Collection of vegetation, earthworm, and small mammal data are recommended for the BERA. Biota samples should be collocated with new soil samples so that site-specific biota soil accumulation factors can be developed for the site.

White Transportation

Table 14 provides a summary of data gaps and recommended additional sampling to fill the data gaps. The recommendations are summarized below.

- New soil data for select parameters is recommended; and
- Collection of vegetation, earthworm, and small mammal data are recommended for the BERA. Biota samples should be collocated with new soil samples so that site-specific biota soil accumulation factors can be developed for the site.

5.3.2 Additional Environmental Media

As noted above, for each property within OU2 collection of vegetation, earthworm, and small mammal data are recommended for the BERA. The number of samples and locations noted on the tables may be reduced based on the results of the SLERA that will be conducted for each property. For example, if no risks to herbivorous wildlife are found in the SLERA, then collection of plant tissues for chemical analysis will be necessary.

5.3.3 Additional Sampling Locations

Suitable comparison or background areas need to be identified and sampled to establish background concentrations of chemicals that might be site-related. One possible reference area is the East Branch of Eighteen Mile Creek, but additional field reconnaissance and data review is required to determine if suitable aquatic and terrestrial habitats exist therein.

5.4 Sediment Erosion and Deposition Analysis

The existing NYSDEC ROD recommended complete sediment excavation of Creek channel and therefore further modeling of existing conditions is not recommended. Modeling of sediment transport may be required to support further evaluation of alternatives other than complete removal alternative selected by NYSDEC.

However as part of future Remedial Design, hydraulic and hydrologic models need to be created for the Creek. The models are expected to be used for evaluating the impacts of the proposed design (including sediment excavation and dam removal). The models will need to address inputs from CSOs and runoff.

Tables

Table 1

Summary and Evaluation of Historical Data

Eighteen Mile Creek Superfund Site - Operable Unit 2

Investigations	Study Key	Area	Data Summary	Data Evaluation	Data Availability and Status	Data Use	Import Data for RI	Validate Data for RI	*Samples in Supplemental RI Database*			*Summary of Samples by Data Use*		
									Properties	PCBs	Other Tests	Risk	Nature and Extent	Fate and Transport
NYSDEC 1998. Eighteenmile Creek and Olcott Harbor Sediment Study.	NYSDEC 1998	OU 2 and 3	Sediment sampling at 8 sites on Eighteenmile Creek, tributaries, and Barge Canal. Sampling was completed in 1994.	The report provides detailed description of data collection and data validation procedures. Laboratory results are attached in the appendix. The data is only source of dioxin data for the sediment and therefore can be used for screening purposes. Surface contamination and toxicity results are greater than 10 years old and not representative of current conditions.	A partial data set is available electronically for PCBs, Dioxin and Furan and PCB Congener data from Trophic Trace Model. The available sediment data were imported into GLNPO RI database. Additional data was entered from the original report for missing COPCs. Only total concentrations were entered for PCBs, PAHs, and DDT metabolites. Additional data entry is needed for other parameters and individual compounds.	Dioxin data will be used for risk assessment. Subsurface sediment will be used for nature and extent.			Creek	2	2	2	2	2
NYSDEC. 2000. Site Investigation Report. Former Flintkote Site 198 and 300 Mill Street.	NYSDEC 2000	OU 2 Flintkote and Creek Channel	Sediment, soil, waste, and surface water samples from NYSDEC sampling event in 1999. Report includes a summary of historical sediment data. The report reports only the positive detections and no data packages are provided. Report is the only evidence of dioxin analysis of waste samples in which dioxin was only detected in a few samples.	The report provides detailed description of data collection, but only reports positive hits for analytical data. Analytical data reports are not available. The data is only source of dioxin data for for soils and therefore will be used for screening purposes.	None of the data are available electronically. Sediments were handled under NYSDEC 2004 report. Results will need to entered from the summary tables and validation memos. NYSDEC should have coordinates from CAD drawings.	Data are not usable for risk assessment.			Flintkote and Creek Channel					
NYSDEC. 2004. Site Investigation Scope of Work. Eighteenmile Creek Corridor: New York State Barge Canal to North Transit Road.	NYSDEC 2004	OU1 and 2	The scope of work summarizes initial data collection for Eighteenmile Creek Corridor site and Water Street residential sampling including sediments from Flintkote SI (NYSDEC 2000). Data from historical investigations are compiled for PCBs and lead from select samples from NYSDEC 1998, 1999 and NYSDEC 2001.	Results are summarized from the previous DEC investigations include the 1998 and 2001 creek reports that are evaluated separately. Samples collected in 1996 and 1999 are presented by no data packages or details are available. Data are usable for risk assessment.	A partial data set is available electronically for PCBs and metals for 1996 and 1999 samples. The available sediment data were imported into GLNPO RI database. Additional data was entered from the original report for missing COPCs. Only total concentrations were entered for PCBs, PAHs, and DDT metabolites.	Data are not usable for risk assessment.			Flintkote and Creek Channel		10			10
TVGA. 2005. Site Investigation Report. Former Flintkote Site 198 and 300 Mill Street.	NCDP 2005	OU2	Work was conducted to support the evaluation of alternatives for Flintkote by a TVGA under contract to Niagara Count Department of Planning. Samples include building, groundwater, and surface and subsurface soils. NYSDEC Site Investigation report is attached.	Data generated by TVGA are provided along with data validation memorandum. Full data packages were validated but not provided. Data latest sampling for most of the Flintkote property.	None of the data are available electronically. Results will need to entered from the summary tables and validation memos. NYSDEC should have coordinates from CAD drawings.	Data are usable for risk assessment and fate transport following entry of laboratory data.	Yes	Yes	Flintkote and Creek Channel	35	35	35	35	35
NYSDEC. 2006a. Remedial Investigation Report, Eighteenmile Creek Corridor, Lockport.	NYSDEC RI	OU1 and 2	Sediment and soil sampling in corridor site between NYS Barge Canal and the Flintkote Plant is presented. Sediment results include PCBs and select metals.	Sediment data are considered useable for nature and extent of contamination.	Sediment results for PCBs and lead were available electronically were imported into the GLNPO RI database. Additional data was entered from the original report for missing COPCs. Data from OU1 was validated and loaded into EPA Region 2 data format. Remaining data will be obtained from NYSDEC and validated as part of EPA RI.	Data are usable for risk assessment and fate transport following validation of data packages DEC provided.	Yes	Yes	Creek, Upson, White, and United Paperboard	85	85	85	85	85
EEEPC.2009a. Final Supplemental Remedial Investigation Report for the Eighteenmile Creek Corridor . Prepared for the NYSDEC.	NYSDEC SRI	OU1 and 2	Sediment, soil, waste, and groundwater samples from Upstream, Barge Canal, Upson Park, White Trans. Property, United Paperboard, Flintkote Plant, and downstream of Flintkote Plant are presented. PCB, TOC, Pesticides, PAH, and metals data are available for the sediments.	All data were formally validated and data packages and data usability memos are available. Data are considered usable for EPA RI.	Sediment data are included in the GLNPLO RI database, soils and water data need to be imported. SE matrix code indicates sediments from creek.	Data was validated and memos and field notes were provided in the DVD.	Yes		Creek, Upson, White, and United Paperboard	200	200	200	200	200

Table 1

Summary and Evaluation of Historical Data

Eighteen Mile Creek Superfund Site - Operable Unit 2

Investigations	Study Key	Area	Data Summary	Data Evaluation	Data Availability and Status	Data Use	Import Data for RI	Validate Data for RI	*Samples in Supplemental RI Database*			*Summary of Samples by Data Use*		
									Properties	PCBs	Other Tests	Risk	Nature and Extent	Fate and Transport
EEEPC. 2009b. Final Additional Investigation Addendum to the Supplemental Remedial Investigation Report for the Eighteenmile Creek Corridor . Prepared for the NYSDEC.	NYSDEC SRI-A	OU2	Report presents additional activities to support SRI, including groundwater, PISCES, and sediment samples from the Erie Canal were collected and analyzed for PCB, metals and TOC.	All data were formally validated and data packages and data usability memos are available. Data are considered usable for EPA RI.	Sediment data are included in the GLNPLO RI database, soils and water data need to be imported. SE matrix code indicates sediments from creek.	Data was validated and memos and field notes were provided in the DVD.	Yes		Erie Canal	12	12		12	12
NYSDEC. 2001a. Final Report, Eighteenmile Creek Sediment Study, Summary of August 17-20 and November 3, 1998 Results.	NYSDEC 2001	OU 2 and 3	Sediment sampling at 12 sites on Eighteenmile Creek, tributaries, and Barge Canal, water column sampling to evaluate sediment transport from Barge Canal to Eighteenmile Creek. Sampling was completed in 1998. Some of the sampling sites were the same location as the NYSDEC 1998. Provides a detailed description of dioxin and furan data. Report includes radiodating of cores behind Newfane and Burt Dam.	The report provides detailed description of data collection and data validation procedures. Laboratory results are attached in the appendix. The data is only source of dioxin data for the sediment and therefore can be used for screening purposes. Surface contamination and toxicity results are greater than 10 years old and not representative of current conditions.	A partial data set is available electronically for PCBs and metals as well as Dioxin/Furan and PCB Congener data from Trophic Trace Model. The available sediment data were imported into GLNPO RI database. Additional data was entered from the original report for missing COPCs. Only total concentrations were entered for PCBs, PAHs, and DDT metabolites. Additional data entry is needed for dioxins and individual compounds.	Dioxin data will be used for risk assessment. Subsurface sediment will be used for nature and extent. Radiodating will be used to evaluate historical deposition.			Creek	2	13	13		2
NYSDEC 2010c. Results From The Sampling Of Erie Canal Suspended Sediments And Creek Waters For PCBs. Eighteen Mile Creek Corridor Site.	NYSDEC 2010	OU2	Additional suspended sediment and water column above sediment sampling for PCB Aroclors in Erie Canal, creek, millrace, and offsite locations.	Data are used to evaluate fate and transport of sediment from Barge Canal. A limited set of pisces samples are available. Data may be useful for evaluation of alternatives.	Data could be usable for PCB comparison in the water column. Suspended sediment sampling was unsuccessful. Filter media used for sediment collection were cut submitted for PCB analysis (extracted, analyzed and reported similar to a “wipe” type samples). There were no positive detections found in these samples. Data were not available electronically and not directly related to nature and extent.	Data are usable for evaluating fateand transport.			Creek	6			6	0
Ecology and Environment, Inc. 2007. Final Report for the Eighteenmile Creek PCB Source Trackdown Project. Prepared for NCSWCD.	NCSWCD 2007	OU2	Presents sediment data from Reach 7 and tributaries. PCB and metals results from sediment cores and PCB screening results from sediment grab samples are available electronically.	Data was validated and data review memos are available. Sediment data from the cores are considered usable for the RI.	Sediment data are included in the GLNPO RI database.	Data are usable for risk assessment and fate and transport.	Yes		Creek	6	15	15	15	15
CH2MHILL and EEEPC 2012. Remedial Investigation Report. Eighteenmile Creek Area of Concern (AOC). Prepared for EPA GLNPO.	USEPA GLNPO	OU2 and OU3	Sediment data from Reaches 2 through 7 in the AOC. However sediment data was compiled for OU2 sediment samples only.	Summary of sediment results for PCB Aroclor, metals, PAHs, PCB Congeners and pesticide analysis. Results were evaluated for usability and verifyed against hard copy reports.	RI report is available electronically along with data packages. Sediment data are included in the GLNPO RI database.	Data are usable for risk assessment and fate and transport.			Creek	NA	NA	NA	NA	NA
						Totals	5	2		348	372	350	355	361

Table 2

Summary of Sampling Data for RI/FS OU2.

Eighteen Mile Creek Superfund Site - Creek Sediment (DEC OU1)

Sample Location	Number of Studies	Sample Date Range		Number of Samples												
				PCB Aroclors	PCB Congeners	Metals	Mercury	PAH/ SVOCs	Pesticides	Dioxins/ Furans	Total Organic Carbon	Lipids and Moisture Content	AVS/SEM	Sediment Toxicity	Sediment Bioaccumulation	Other
Sediment																
Creek	3	9/1/05	4/25/07	23	--	19	2	4	4	--	6	--	--	--	--	--
Creek	3	8/17/98	4/24/07	110	2	112	1	23	23	2	22	--	--	--	--	--
Creek_E	2	9/1/05	4/25/07	13	--	13	2	6	6	--	4	--	--	--	--	--
Totals				**146**	**2**	**144**	**5**	**33**	**33**	**2**	**32**	**0**	**0**	**0**	**0**	**0**
Canal	4	8/20/98	12/6/08	36	10	45	10	12	4	10	20	--	--	--	--	--
Upstream	1	8/17/98	4/25/07	2	1	3	--	3	3	1	2	--	--	--	--	--
Totals				**38**	**11**	**48**	**10**	**15**	**7**	**11**	**22**	**0**	**0**	**0**	**0**	**0**
Surface Water																
Creek	1	8/9/09	8/9/09	2	--	--	--	--	--	--	--	--	--	--	--	--
Creek	1	11/1/08	8/9/09	1	--	--	--	--	--	--	--	--	--	--	--	2
Creek_E	1	11/1/08	8/9/09	--	--	--	--	--	--	--	--	--	--	--	--	1
Totals				**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
Canal	1	11/1/08	8/9/09	2	--	--	--	--	--	--	--	--	--	--	--	3
Upstream	1			--	--	--	--	--	--	--	--	--	--	--	--	--
Totals				**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
Biological																
Property		N/A	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Key:

SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon
TSS = Total suspended solids

Table 3

Summary of Sampling Data for RI/FS OU2.

Eighteen Mile Creek Superfund Site - Flintkote Property (DEC OU2)

Sample Location	Number of Studies	Sample Date Range		Number of Samples											
				PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	Toxicity	TCLP
Surface Soil/ Fill															
Property	2	9/15/03	2/1/09	18	--	22	18	12	12	--	--	--	--	--
South Bank	2	9/15/03	2/1/09	14	--	14	14	2	2	--	--	--	--	--
Totals				**32**	**0**	**36**	**32**	**14**	**14**	**0**	**0**	**0**	**0**	**0**
Subsurface Soil															
Property	1	9/8/03	9/25/03	23	--	23	23	23	23	--	23	--	--	--
South Bank	1	9/8/03	9/25/03	2	--	2	2	2	2	--	2	--	--	--
Totals				**25**	**0**	**25**	**25**	**25**	**25**	**0**	**25**	**0**	**0**	**0**
Groundwater															
Property/ Millrace	1	10/2/03	10/3/03	13	--	13	13	13	--	--	13	--	--	--
Totals				**13**	**0**	**13**	**13**	**13**	**0**	**0**	**13**	**0**	**0**	**0**
Biological															
Property		N/A	N/A	--	--	--	--	--	--	--	--	--	--	--
Totals				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Key:

SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 4

Summary of Sampling Data for RI/FS OU2.

Eighteen Mile Creek Superfund Site - United Paper Property (DEC OU3)

Sample Location	Number of Studies	Sample Date Range		Number of Samples									
				PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	TCLP
Surface Soil/ Fill													
Property	2	4/1/05	2/1/09	44	--	41	30	22	15	--	--	--	2
South Bank	2	4/1/05	2/1/09	3	--	3	3	3		--	--	--	--
Totals				**47**	**0**	**44**	**33**	**0**	**15**	**0**	**0**	**0**	**2**
Subsurface Soil													
Property	2	4/1/05	2/1/09	33	--	31	28	16	--	--	--	--	4
South Bank	2	4/1/05	2/1/09	--	--	--	--	--	--	--	--	--	--
Totals				**33**	**0**	**31**	**28**	**16**	**0**	**0**	**0**	**0**	**4**
Groundwater													
Property/South Bank	2	7/1/07	2/1/09	6	0	6	6	6	6	--	7	--	--
Totals				**6**	**0**	**6**	**6**	**0**	**6**	**0**	**7**	**0**	**0**
Biological													
Property		N/A	N/A	--	--	--	--	--	--	--	--	--	--
Totals				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Key:

SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 5

Summary of Sampling Data for RI/FS OU2.

Eighteen Mile Creek Superfund Site - Upson Park (DEC OU4)

Sample Location	Number of Studies	Sample Date Range		Number of Samples									
				PCB Aroclors	PCB Congeners	Metals	Mercury	PAH/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	TCLP
Surface Soil/ Fill													
Creek Bank	2	4/1/05	2/1/09	26	--	26	22	11	7	0	--	--	0
Picnic Area	2	4/1/05	2/1/09	3	--	3	3	2	2	0	--	--	1
Totals				**29**	**0**	**29**	**25**	**13**	**9**	**0**	**0**	**0**	**1**
Subsurface Soil													
Property	2	4/1/05	2/1/09	19	--	19	20	4	--	--	--	--	6
Totals				**19**	**0**	**19**	**20**	**4**	**0**	**0**	**0**	**0**	**6**
Groundwater													
Property/South Bank	2	7/1/07	2/1/09	4	--	4	4	4	4	--	6	--	0
Totals				**4**	**0**	**4**	**4**	**4**	**4**	**0**	**6**	**0**	**0**
Biological													
Property		N/A	N/A	--	--	--	--	--	--	--	--	--	--
Totals				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Key:

SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 6

Summary of Sampling Data for RI/FS OU2.

Eighteen Mile Creek Superfund Site - White Transportation Property (DEC OU5)

Sample Location	Number of Studies	Sample Date Range		Number of Samples									
				PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	TCLP
Surface Soil/ Fill													
Property	2	4/1/05	2/1/09	20	--	20	16	10	6	--	--	--	1
Totals				**20**	**0**	**20**	**16**	**10**	**6**	**0**	**0**	**0**	**1**
Subsurface Soil													
Property	2	4/1/05	2/1/09	13	--	13	13	6	--	--	--	--	--
Totals				**13**	**0**	**13**	**13**	**6**	**0**	**0**	**0**	**0**	**0**
Groundwater													
Property/South Bank	1	7/1/07	2/1/09	4	--	4	4	4	4	--	4	--	0
Totals				**4**	**0**	**4**	**4**	**4**	**4**	**0**	**4**	**0**	**0**
Biological													
Property		N/A	N/A	--	--	--	--	--	--	--	--	--	--
Totals				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Key:

SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 7

Preliminary Selection of Exposure Pathways for Human Health Risk Assessment Purposes

Eighteenmile Creek Superfund Site - Operable Unit 2

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current and Future	Soil	Soil	Upson Park	Site Visitors	Children, Adolescents and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Public Park; Contaminants may be present.
				Maintenance Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Area is mostly wooded but grassy areas may require groundskeeper maintenance.
			White Transportation	Site Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Active commercial facility; contaminants may be present.
				Construction/ Utility Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Construction and/or subsurface Utility maintenance work may occur.
				Site Visitors/ Trespassers	Adults and Adolescents	Ingestion, Dermal Contact, Inhalation	Qualitative	Exposure expected to be less than Site Workers
			United Paperboard	Site Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Active industrial facility; contaminants may be present.
				Construction/ Utility Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Construction and/or subsurface Utility maintenance work may occur.
				Site Visitors/ Trespassers	Adults and Adolescents	Ingestion, Dermal Contact, Inhalation	Qualitative	Exposure expected to be less than Site Workers
			Flintkote	Site Visitors/ Trespassers	Adults and Adolescents	Ingestion, Dermal Contact, Inhalation	Qualitative	Exposure expected to be less than Site Workers
				Construction/ Utility Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Construction and/or subsurface Utility maintenance work may occur.
			Eighteenmile Creek Banks	Anglers and other Site Visitors	Children and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Anglers and other Site Visitors use the creek banks; contaminants are known to be present.
	Sediment	Sediment	Eighteenmile Creek Bed	Anglers and other Site Visitors	Children, Adolsecents and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Anglers and other Site Visitors may wade in the creek; contaminants are known to be present.
	Fish Tissue	Fish Tissue	Eighteenmile Creek	Sport Anglers and their families	Children, Adolescents and Adults	Ingestion	Quantitative	Anglers and their families may consume fish caught from the creek. Fish caught from the creek are known to be contaminated.
				Hmong Anglers (subsistance fishers?) and their families	Children, Adolescents and Adults	Ingestion	Quantitative	Hmong anglers and their families may consume fish caught from the creek at subsistance levels. Fish caught from the creek are known to be contaminated.
Future	Soil	Soil	Flintkote	Site Workers	Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Former industrial facility; may be used as a commercial or industrial facility in the future; contaminants known to be present.
	Soil	Soil	Eighteenmile Creek Bed	Recreational users	Children, Adolsecents and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Recreational users hike along the banks if the Canalway trail is expanded; contaminants are known to be present.
	Sediment	Sediment	Eighteenmile Creek Bed	Recreational users	Children, Adolsecents and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Recreational users may wade in the creeks; contaminants are known to be present.
	Groundwater	Tap Water	OU2-wide	Residents	Children and Adults	Ingestion, Dermal Contact, Inhalation	Quantitative	Groundwater might be used as a source of potable water in the future.

Table 8

Summary of Soil Sampling Data for RI/FS OU2, Data Gaps, and Recommended Additional Sampling Available for Human Health Risk Assessment Purposes

Eighteen Mile Creek Superfund Site - Operable Unit 2

				Sample Counts by Parameter Group							
Property	**Area (acres)**	**Human Exposure Area**	**Sample Depth**	**PCB Aroclors**	**PCB Congeners**	**Metals**	**Mercury**	**PAH/ SVOCs**	**Pesticides**	**Dioxins/ Furans**	**VOCs**
FORMER FLINTKOTE PLANT SITE	6	Plant Site	< 6 in	15		17	15	12	12		
		Plant Site	> 6 in < 1.5 ft	3		5	3				
		Across Bank	< 6 in	11		11	11	2	2		
		Across Bank	> 6 in < 1.5 ft	3		3	3				
		Total Surface		32		36	32	14	14		
		Plant Site	Subsurface	23		23	23	23	23		23
		Across Bank	Subsurface	2		2	2	2	2		2
FORMER UNITED PAPERBOARD COMPANY	4.8	Plant Site	< 6 in	32		31	22	18	13		
		Plant Site	> 6 in < 1.5 ft	10		8	6	2			
		Across Bank	< 6 in	3		3	3	3			
		Off Bank	< 6 in	2		2	2	2	2		
		Total Surface		47		44	33	25	15		
			Subsurface	33		31	28	16			
UPSON PARK	5.9	Creek Bank	< 6 in	17		17	15	9	7		
		Creek Bank	> 6 in < 1.5 ft	9		9	7	2			
		Picnic Area	< 6 in	3		3	3	2	2		
		Total Surface		29		29	25	13	9		
			Subsurface	19		19	20	4			
WHITE TRANSPORTATIO N	2.6	Plant Site	< 6 in	11		11	9	7	5		
		Plant Site	> 6 in < 1.5 ft	5		5	3	2			
		Off Bank	< 6 in	3		3	3	1	1		
		Off Bank	> 6 in < 1.5 ft	1		1	1	0			
		Total Surface		20		20	16	10	6		
			Subsurface	13		13	13	6			

Note: Highlight cells have sample counts below 10 the recommended frequency for ProUCL Tech Guide

Table 9

Preliminary List of Candidate Assessment Endpoints, Risk Questions, and Measures for the Baseline Ecological Risk Assessment

Eighteen Mile Creek Superfund Site - Operable Unit 2

Assessment Endpoint	Representative Species	Risk Question	Measure	Analysis Approach
Terrestrial Vegetation (OU2, all properties)				
Survival, growth, and reproduction of plants	All plants that obtain nutrients primarily from soil	Are contaminant concentrations in surface soil greater than screening levels for effects on survival, growth, or reproduction of plants?	Surface-soil contaminant concentrations.	Compare surface-soil contaminant concentrations with literature-based soil screening levels for effects on plants.
Soil Invertebrates (OU2, all properties)				
Survival, growth, and reproduction of soil invertebrates	All soil invertebrates	Are contaminant concentrations in surface soil greater than screening levels for effects on survival, growth, or reproduction of soil invertebrates?	Surface-soil contaminant concentrations.	Compare surface-soil contaminant concentrations with literature-based soil screening levels for effects on soil invertebrates.
Herbivorous, Insectivorous and Carnivorous Terrestrial Birds (OU2, all properties)				
Survival, growth, and reproduction or terrestrial birds	Sparrow, American robin, Red-shouldered hawk	Does the daily dose of contaminants received from ingestion of soil or sediment, surface water, and food items exceed TRVs for survival, growth, or reproduction of birds?	Contaminant concentrations in soil, sediment, surface water, and food items.	Modeled dose from ingestion of soil or sediment, surface water, and food items compared with literature-based TRVs.
Herbivorous, Insectivorous and Carnivorous Terrestrial Mammals (OU2, all properties)				
Survival, growth, and reproduction or terrestrial mammals	Meadow vole, Short-tailed shrew, weasel	Does the daily dose of contaminants received from ingestion of soil or sediment, water, and food items exceed TRVs for survival, growth, or reproduction of mammals?	Contaminant concentrations in soil, sediment, surface water, and food items.	Modeled dose from ingestion of soil or sediment, surface water, and food items compared with literature-based TRVs.
Herbivorous, Insectivorous, and Carnivorous Aquatic-Dependent Mammals (OU2 [creek] and OU3)				
Survival, growth, and reproduction or aquatic mammals	Muskrat, Raccoon, Mink, Bat	Does the daily dose of contaminants received from ingestion of sediment, water, and food items exceed TRVs for survival, growth, or reproduction of mammals?	Contaminant concentrations in sediment, surface water, and food items.	Modeled dose from ingestion of sediment, surface water, and food items compared with literature-based TRVs.
Herbivorous, Insectivorous, and Carnivorous Aquatic-Dependent Birds (OU2 [creek] and OU3)				
Survival, growth, and reproduction or aquatic birds	Mallard, Swallow, Heron	Does the daily dose of contaminants received from ingestion of sediment, water, and food items exceed TRVs for survival, growth, or reproduction of birds?	Contaminant concentrations in sediment, surface water, and food items.	Modeled dose from ingestion of soil or sediment, surface water, and food items compared with literature-based TRVs.

Table 9

Preliminary List of Candidate Assessment Endpoints, Risk Questions, and Measures for the Baseline Ecological Risk Assessment

Eighteen Mile Creek Superfund Site - Operable Unit 2

Assessment Endpoint	Representative Species	Risk Question	Measure	Analysis Approach
Benthic Macroinvertebrates (OU2 [creek] and OU3)				
Survival, growth, and reproduction of benthic macroinvertebrates	All freshwater benthic macroinvertebrates	Are contaminant concentrations in sediment greater than screening levels for effects on survival, growth, or reproduction of benthos?	Contaminant concentrations in sediment.	Compare sediment contaminant concentrations with literature-based sediment screening levels for effects on benthic macroinvertebrates.
		Is the survival and growth of lab-reared benthic organisms in site sediment less than their survival and growth in clean control sediment and reference area sediment?	Sediment toxicity test results	Compare survival and growth in site sediment with survival and growth in clean control sediment and reference area sediment as described in EPA protocols.
Aquatic Biota Exposed to Surface Water (OU2 [creek] and OU3)				
Survival, growth, and reproduction of aquatic organisms exposed to surface water	Fish, invertebrates, amphibians, and plants	Are contaminant concentrations in surface water greater than water quality criteria for protection of aquatic organisms?	Surface-water contaminant concentrations.	Compare surface-water contaminant concentrations with water quality criteria and standards.
		Is survival and growth of laboratory-reared organisms in site surface water less than survival and growth in clean control water?	Surface water toxicity test results	Compare survival and growth in site surface water with survival and growth in clean control water as described in EPA testing protocol.
		Are contaminant concentrations in fish tissues from the site greater than or equal to critical fish tissue concentrations?	Contaminant concentrations in fish tissue samples	Compare contaminant concentrations in fish tissue samples with critical fish tissue concentrations for effects on fish.

Key:

BAP = Biological Assessment Profile (of index values, NYSDEC 2009, page 62).

EPA = Environmental Protection Agency

NYSDEC = New York State Department of Environmental Conservation

OU2 = Operational Unit 2 (Corridor Site)

OU3 = Operational Unit 3 (Rest of Creek)

TRV = Toxicity Reference Value

Table 10

Summary of Data Gaps and Recommended Additional Sampling.

Eighteen Mile Creek Superfund Site - Creek Sediment (DEC OU1)

Matrix and Data Gap	Note	Number of Samples													Remarks
		PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	Total Organic Carbon	Lipids and Moisture Content	AVS/SEM	Sediment Toxicity	Sediment Bioaccumulation	Other	
Sediment	***Existing data adequate for determining extent of contamination. Additional sediment data needed for HHRA and BERA purposes for missing parameters. Full TCL/TAL scan for new sediment samples for risk assessment purposes.***														
BERA Data Gap (Sediment Toxicity)	Sediment toxicity tests with benthic macroinvertebrates have not been conducted with Corridor site sediment. The tests provide direct evidence of sediment toxicity, or lack thereof, and are a critical element of the sediment quality triad approach. Standard EPA tests with *Hyalella* (amphipod) and *Chironomus* (midge) are available. Testing would be focused on depositional areas.	--	--	--	--	--	--	--	--	--	--	8	--	--	Three *Chironomus* (midge) tests and three *Hyalella* (amphipod) tests for a total of six tests. A reference area also will be sampled for both tests.
BERA Data Gap (Sediment Chemistry)	Co-located samples collected at locations were sediment toxicity and bioaccumulation are assessed. Sediment chemistry is another element of the sediment quality triad approach. AVS/SEM is recommended to help evaluate metals bioavailability. Full TCL/TAL scan typically needed for Superfund. Existing sediment chemistry data < 10 years old is assumed to be usable for risk assessment purposes.	4	--	4	4	4	4	4	4	--	4	--	--	--	Three site samples and one reference sample. Analyze samples for TCL/TAL parameters at two depths to provide additional data for risk assessment.
HHRA and BERA Reference (Sediment Chemistry)	Background data are needed for risk assessment. Full TCL/TAL scan typically needed for risk assessment. Data also can be used for OU3.	10	--	10	10	10	10	10	10	--	--	--	--	--	The reference sample collected for sediment toxicity can be used for one of the locations.
Surface Water	***A surface water evaluation of dissolved PCBs was completed, but no other contaminants were analyzed for and no studies of general water quality are done.***														
HHRA and BERA Data Gap (Surface Water Chemistry)	All aquatic organisms are exposed to surface water and wildlife consume water from the creek. Existing surface water data for the Corridor site (one sample for PCBs) is inadequate for BERA purposes. Other includes TSS, TOC, and water-quality parameters (field measured). Full TCL/TAL scan needed for Risk Assessment.	--	4	4	4	4	4	4	--	--	--	4	--	4	Three site samples and one reference sample. Sample locations are co-located with the sediment chemistry samples. For low level analysis, analyze for PCB congeners.
BERA Data Gap (Surface Water Toxicity)	Surface water bioassays with laboratory-reared organisms have not been conducted at the Corridor site. The tests provide direct evidence of surface water toxicity, or lack thereof. Standard EPA tests with the fathead minnow and *Ceriodaphnia* (water flea) are available.	--	--	--	--	--	--	--	--	--	--	8	--	--	Three fathead minnow tests and three *Ceriodaphnia* (water flea) tests for a total of six tests at the site. Each test will also be run wirh a reference area sample.
Biological	***No fish tissue data. Fish-eating wildlife in the Corridor site were observed in previous studies. Fish and other tissue data are recommended to perform the HHRA and BERA.***														
BERA Data Gap (Forage Fish)	No data for PCBs and metals in forage fish (e.g., juvenile sunfish) from the Corridor site are available. The data are needed to develop reliable exposure estimate for piscivorous wildlife to site-related contaminants. Full TCL/TAL scan needed for Risk Assessment.	20	--	20	20	20	20	20	--	20	--	--	--	--	Ten site and 10 reference area samples. Metals to be analyzed for may be limited to those that are highly elevated in creek sediment in the Creek (lead, zinc, copper). Additional sampling may not be needed following SLERA. Reference locations may be shared with OU3.
HHRA Data Gap Sport Fish (Fillet)	No data for PCBs and metals in edible fish (e.g., largemouth bass, bullhead) from the Corridor site are available. The data are needed to develop reliable exposure estimate for human health to site-related contaminants. Full TCL/TAL scan needed for Risk Assessment.	20	--	20	20	20	20	20	--	20	--	--	--	--	Ten site and 10 reference area samples. Metals to be analyzed for may be limited to those that are highly elevated in creek sediment in the Creek (lead, zinc, copper). Additional sampling may not be needed following screening level HHRA. Reference locations may be shared with OU3.

Key:

AVS/SEM = Acid Volatile Sulfide / Simultaneously Extracted Metals
BERA = Baseline ecological risk assessment
BSAF = Biota soil (or sediment) accumulation factor
SLERA = Screening level ecological risk assessment
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TCL/TAL = Target compound list/Target Analytical List
TOC = Total organic carbon
TSS = Total suspended solids

Table 11

Summary of Data Gaps and Recommended Additional Sampling.

Eighteen Mile Creek Superfund Site - Flintkote Property (DEC OU2)

Matrix and Data Gap	Note		Number of Samples										Remarks
			PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	Toxicity	
Surface Soil/ Fill	***Insufficient recent surface soil data are available for ecological risk assessment purposes or characterize extent of contamination. Data has not been validated for full usability and is close to > 10 years old. Full TCL/TAL are required for risk assessment purposes.***												
BERA and HHRA Data Gap	Full TCL/TAL scan required for risk assessment. Existing database does not include all historical data. Surface intervals will be collected in conjunction with the subsurface borings.		*10*	--	*10*	*10*	*10*	*10*	*10*	*10*	--	--	Additional analytical parameters are needed for risk asssesment. Additional parameters will be analyzed with the borings and colocated soils with terrestrial biota.
BERA Data Gap (Property)	Needed at locations were terrestrial biota samples are collected (see below) so that site-specific soil-to-organism bioaccumulation factors (BAFs) can be calculated (i.e., soil and biota samples will be collcated). Full TCL/TAL scan required for risk assessment.		6	--	6	6	6	6	6	6	--	--	Samples are expected to collected near the bank in active habitat areas. Samples can be grouped with samples from other properties. Samples are collected at two depths for risk assessment purposes and analyzed for Full TCL/TAL.
HHRA and BERA Background Data	Background data are needed for risk assessment. Full TCL/TAL scan typically needed for Superfund. Data also can be used for all properties.		7	--	7	7	7	7	7	7	--	--	Reference location in conjunction with the colocated biota samples may be used for a total of 10 samples. Samples should be collected at two depths to compare to onsite data.
Subsurface Soil	***Insufficient recent subsurface data under the building to characterize PCB contamination.***												
Data Gap	Additional 10 Borings and 30 Samples to assess PCB contamination beneath building. Samples will be collected at the surface as noted above and two subsurface depths. Additional samples may be needed if staining is present.		20	--	20	20	20	20	20	20	--	--	Additional analytical parameters are needed for risk asssesment. Additional parameters will be analyzed with the borings subsamples.
Groundwater	***Groundwater migration to the surface water is established. Further investigation not required due to full excavation. The potential migration of PCB groundwater to the Creek sediment has not been assessed.***												
	Passive samplers will be used to estimate the flux of PCBs to the sediment from groundwater.		--	--	--	--	--	--	--	--	15	--	
Biological	***No biological tissue data have been collected. Such data are recommended to perform the baseline ecological risk assessment as described below.***												
BERA Data Gap (Tissue Data)	No tissue data have been collected from this property. Vegetation, earthworm, and small mammal data are needed to develop reliable exposure estimate for herbivorous, omnivorous, and carnivorous terrestrial wildlife species at the site. Tissue and soil sample data from this property can be pooled with data from other commercial properties in the Corridor site to develop site-specific BSAF equations.	Vegetation	3	3	3	3	3	3	3	--	3	--	Based on the SLERA results, it may be possible to omit PCBs, pesticides, dioxins/furans, and perhaps other contaminants for plants and other tissue sample types, but this will not be known for certain until the SLERA is completed.
		Earthworms	3	3	3	3	3	3	3	--	3	--	
		Small Mammal	3	3	3	3	3	3	3	--	3	--	
BERA Background (Tissue Data)	Background data are needed for risk assessment. ata also can be used for all properties.	Vegetation	3	3	3	3	3	3	3	--	3	--	Based on the SLERA results, it may be possible to omit PCBs, pesticides, dioxins/furans, and perhaps other contaminants for plants and other tissue sample types, but this will not be known for certain until the SLERA is completed.
		Earthworms	3	3	3	3	3	3	3	--	3	--	
		Small Mammal	3	3	3	3	3	3	3	--	3	--	

Key:

BERA = Baseline ecological risk assessment
BSAF = Biota soil (or sediment) accumulation factor
SLERA = Screening level ecological risk assessment
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TCL/TAL = Target compound list/Target Analytical List
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lip

Table 12

Summary of Data Gaps and Recommended Additional Sampling.

Eighteen Mile Creek Superfund Site - United Paper Property (DEC OU3)

Matrix and Data Gap	Note		Number of Samples										Remarks
			PCB Aroclors	PCB Congeners	Metals	Mercury	PAH/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	TCLP	
Surface Soil/ Fill	***Sufficient samples were collected for risk assessment and FS purposes for some parameters only. Additional sampling is recommended to evaluate the nature of contamination and to allow calculation of biota soil accumulation factors (biota samples and surface soil samples will be collocated for this purpose).***												
BERA Data Gap (Property)	Needed at locations were terrestrial biota samples are collected (see below) so that site-specific soil-to-organism bioaccumulation factors (BAFs) can be calculated (i.e., soil and biota samples will be collcated). Full TCL/TAL scan required for risk assessment.		3	--	3	3	3	3	3	3	--	--	Samples are expected to collected near the bank in active habitat areas. Samples can be grouped with samples from other properties. Samples are collected at two depths for risk assessment purposes and analyzed for Full TCL/TAL.
Subsurface Soil	***Sufficient samples were collected for risk assessment and FS. Additional sampling of to delineate fill may be needed as part of pre-design investigation.***												
	Sufficient samples were collected for risk assessment and FS except for pesticides. Pesticides are not expected to be found in subsurface samples because no sources were identied. Additional sampling of to delineate fill may be needed as part of pre-design investigation.		--	--	--	--	--	--	--	--	--	--	
Groundwater	***Groundwater contamination was found in well on west side of creek but attributed as upgradient not site-related contamination by DEC. Upgradient sources were not assessed. Contamination is same side as Upson Park.***												
Data Gap and HHRA	One additional upgradient well to assess the potential for offsite source of VOCs and metals and sampling of 2 existing monitoring wells. One well may be to be re-drilled.		3	--	3	3	3	--		3	--	--	Groundwater samples will be analyzed for full TCL/TAL for two rounds to provide current data for HHRA.
Biological	***No biological tissue data have been collected. Such data are recommended to perform the baseline ecological risk assessment as described below.***												
BERA Data Gap (tissue data)	No tissue data have been collected from this property. Vegetation, earthworm, and small mammal data are needed to develop reliable exposure estimate for herbivorous, omnivorous, and carnivorous terrestrial wildlife species at the site. Tissue and soil sample data from this property can be pooled with data from other commercial properties in the Corridor site to develop site-specific BSAF equations.	Vegetation	3	3	3	3	3	3	3	--	3	--	Based on the SLERA results, it may be possible to omit PCBs, pesticides, dioxins/furans, and perhaps other contaminants for plants and other tissue sample types, but this will not be known for certain until the SLERA is completed.
		Earthworms	3	3	3	3	3	3	3	--	3	--	
		Small Mammal	3	3	3	3	3	3	3	--	3	--	

Key:

BERA = Baseline ecological risk assessment
BSAF = Biota soil (or sediment) accumulation factor
ERA = Ecological risk assessment
SLERA = Screening level ecological risk assessment
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TCL/TAL = Target compound list/Target Analytical List
TOC = Total organic carbon
TSS = Total suspended solids

Table 13

Summary of Data Gaps and Recommended Additional Sampling.

Eighteen Mile Creek Superfund Site - Upson Park (DEC OU4)

Matrix and Data Gap	Note		Number of Samples: PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other[A]	TCLP	Remarks
Surface Soil/ Fill	***Samples collected along the creek bed were not analyzed for all TCL/TAL parameters. Only 2 samples were collected in the park area where potential exposure may be different for human health and /or ecological receptors.***												
BERA Data Gap (Property)	Needed at locations were terrestrial biota samples are collected (see below) so that site-specific soil-to-organism bioaccumulation factors (BAFs) can be calculated (i.e., soil and biota samples will be collcated). Full TCL/TAL scan required for risk assessment.		3	--	3	3	3	3	3	3	--	--	Samples are expected to collected near the bank in active habitat areas. Samples can be grouped with samples from other properties. Samples are collected at two depths for risk assessment purposes and analyzed for Full TCL/TAL.
BERA and HHRA Data Gap (Bank)	Full TCL/TAL scan required for risk assessment. Samples in the picnic area are insuffient to evaluate the risks as a separate exposure area.		10	--	10	10	10	10	10	10	--	--	Samples are collected at two depths for risk assessment purposes and analyzed for Full TCL/TAL.
Subsurface Soil	***Sufficient samples were collected for risk assessment and FS. Additional sampling of to delineate fill may be needed as part of pre-design investigation.***												
			--	--	--	--	--	--	--	--	--	--	
Groundwater	***Groundwater contamination was found in bedrock wells but attributed to upgradient not site-related contamination by DEC. Upgradient sources were not assessed.***												
Data Gap and HHRA	One additional upgradient well to assess the potential for offsite source of VOCs and metals and sampling of 4 existing monitoring wells.		5	--	5	5	5	5	--	5		--	Groundwater samples will be analyzed for full TCL/TAL for two rounds to provide current data for HHRA.
Biological/ Habitat	***No tissue data have been collected. Data are recommended to perform the ecological risk assessment.***												
BERA Data Gap (tissue data)	No tissue data have been collected from this property. Vegetation, earthworm, and small mammal data are needed to develop reliable exposure estimate for herbivorous, omnivorous, and carnivorous terrestrial wildlife species at the site. Tissue samples should be collected at selected surface soil sample locations. Tissue and soil sample data from this property can be pooled with data from other commercial properties in the Corridor site to develop site-specific BSAF equations.	Vegetation	3	3	3	3	3	3	3	--	3	--	Based on the SLERA results, it may be possible to omit PCBs, pesticides, dioxins/furans, and perhaps other contaminants for plants and other tissue sample types, but this will not be known for certain until the SLERA is completed.
		Earthworms	3	3	3	3	3	3	3	--	3	--	
		Small Mammal	3	3	3	3	3	3	3	--	3	--	

Key:

BERA = Baseline ecological risk assessment
BSAF = Biota soil (or sediment) accumulation factor
ERA = Ecological risk assessment
SLERA = Screening level ecological risk assessment
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TCL/TAL = Target compound list/Target Analytical List
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 14

Summary of Data Gaps and Recommended Additional Sampling.

Eighteen Mile Creek Superfund Site - White Transportation Property (DEC OU5)

Matrix and Data Gap	Note		Number of Samples										Remarks
			PCB Aroclors	PCB Congeners	Metals	Mercury	PAHs/ SVOCs	Pesticides	Dioxins/ Furans	VOCs	Other	TCLP	
Surface Soil/ Fill	***Sufficient samples were collected for risk assessment and FS purposes for some parameters only. Additional sampling is recommended to evaluate the nature of contamination and to allow calculation of biota soil accumulation factors (biota samples and surface soil samples will be collocated for this purpose).***												
BERA Data Gap (Property)	Needed at locations were terrestrial biota samples are collected (see below) so that site-specific soil-to-organism bioaccumulation factors (BAFs) can be calculated (i.e., soil and biota samples will be collcated). Full TCL/TAL scan required for risk assessment.		3	--	3	3	3	3	3	3	--	--	Samples are expected to collected near the bank in active habitat areas. Samples can be grouped with samples from other properties. Samples are collected at two depths for risk assessment purposes and analyzed for Full TCL/TAL.
Subsurface Soil	***Sufficient samples were collected for risk assessment and FS. Additional sampling of to delineate fill may be needed as part of pre-design investigation.***												
			--	--	--	--	--	--	--	--	--	--	
Groundwater	***Groundwater contamination was not found to be significant by DEC. No additional sampling is recommended.***												
			--	--	--	--	--	--	--	--	--	--	
Biological	***No tissue data have been collected. Data are recommended to perform the ecological risk assessment.***												
BERA Data Gap (tissue data)	No tissue data have been collected from this property. Vegetation, earthworm, and small mammal data are needed to develop reliable exposure estimate for herbivorous, omnivorous, and carnivorous terrestrial wildlife species at the site. Tissue and soil sample data from this property can be pooled with data from other commercial properties in the Corridor site to develop site-specific BSAF equations.	Vegetation	3	3	3	3	3	3	3	--	3	--	Based on the SLERA results, it may be possible to omit PCBs, pesticides, dioxins/furans, and perhaps other contaminants for plants and other tissue sample types, but this will not be known for certain until the SLERA is completed.
		Earthworms	3	3	3	3	3	3	3	--	3	--	
		Small Mammal	3	3	3	3	3	3	3	--	3	--	

Key:

BERA = Baseline ecological risk assessment
BSAF = Biota soil (or sediment) accumulation factor
ERA = Ecological risk assessment
SLERA = Screening level ecological risk assessment
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TCL/TAL = Target compound list/Target Analytical List
TOC = Total organic carbon
TSS = Total suspended solids

Notes:

A = For sediment, TOC and water content. For surface water, TOC and water quality parameters (field measured). For biota, lipids and moisture content.

Table 15

RI/FS OU2 -- Summary of Recommended Samples and Analysis.

Eighteen Mile Creek Superfund Site - Operable Unit 2

Sample Media	Notes	Number of Samples					Number of Samples per Method								Number of Data Packages				
		Number of Locations	Number of Reference Locations	No. of Samples	No. of QA/QC Samples	Total	CLP Routine - Organic SOM01.2 PCBs	CLP Routine - Organic SOM01.2 Pest/ SVOCs	CLP Routine - Organic SOM01.2 VOCS	CLP Routine - Inorganic ISM01.3	CLP Non-Routine - Dioxin/Furan DLM02.2	CLP Non-Routine - CB Congeners CBC01.2	Hexavalent Chromium	Other TOC/ Lipids	CLP Routine - Organic SOM01.2	CLP Routine - Inorganic ISM01.3	CLP Non-Routine	Hexavalent Chromium	Other
Subsurface soil	Ten borings after the Flintkote building is removed. Depths: 0-6", 1-2', and selected in field based on staining. Samples for both characterization of PCB contamination and risk assessment purposes.	10		30	6	36	36	36	36	36	4	4	4		2	2	1	1	
Ground water	3 New and 5 Existing Wells in and upgradient of VOCs detected south of the creek. Data to characterize upgradient VOC sources and provide data for HHRA. Round One	8		8	2	10	10	10	10	10			1		1	1		1	
	3 New and 5 Existing Wells. A second round of sampling is recommended for HHRA.	8		8	2	10	10	10	10	10			1		1	1		1	
Sediment	Sediment samples for chemical analysis associated co-located with toxicity samples from 3 locations in creek and one reference location.	3	1	4	1	5	5	5	5	5	1	1	1		1	1	1	1	
	Sediment sample for chemical analysis from an additional 9 background location for statistical comparison to existing sediment data.		9	9	2	11	11	11		11	2				1	1	1		
Sediment Toxicity	EPA 100.4 - Hyalella azteca (amphipod), 42-day test. Three site samples and one reference area sample.	3	1	4	1	5								5					1
	EPA 100.4 - Chironomus dilutus (midge), life-cycle test. Three site samples and one reference area sample.	3	1	4	1	5								5					1
Surface Water	Surface water samples chemical analysis associated co-located with toxicity samples from 3 locations in creek and one reference location.	3	1	4	1	5		5	5	5	1	5	5		1	1	1	1	
Surface Water Toxicity	EPA 1000.0 - Fathead Minnow Larval Survival and Growth Test. Three site samples and one reference area sample.	3	1	4	1	5								5					1
	EPA 1000.2 - Ceriodaphnia dubia Survival and Reproduction Test. Three site samples and one reference area sample.	3	1	4	1	5								5					1
Biological Tissue	Vegetation from 3 locations on each property and 3 background locations.	12	3	15	2	17	17	17	17	17	2	2			1	1	1		
	Earthworms from 3 locations on each property and 3 background locations.	12	3	15	2	17	17	17	17	17	2	2			1	1			
	Tissues collected from small mammals from 3 locations on each property and 3 background locations..	12	3	15	2	17	17	17	17	17	2	2			1	1			
Fish	Forage Fish - Ten site samples and ten reference area samples.	1	1	20	2	22	22	22	22	22	3	3	3	22	2	2	1	1	2
	Sport Fish Fillets. Ten site samples and ten reference area samples.	1	1	20	2	22	22	22	22	22	3	3	3	22	2	2		1	
Surface Soil	Soils collected at the same location as the biological tissue samples.	12	3	30	2	32	32	32	32	32	16	4	4		2	2	1	1	
	Additional surface soil collected Upson Park Picnic Area. Surface soil (0 to 0.5 feet) and near surface soil (0.5 to 2 feet).	10		20	2	22	22	22	22	22	3	3	3		2	2			
	Additional surface soil collected from background location for statistical evaluation. Surface soil (0 to 0.5 feet) and near surface soil (0.5 to 2 feet).		7	14	4	18	18	18		18	9	2	2		1	1			
Passive Samplers	Passive Samplers to Access PCBs in PoreWater	15		15	4	19								19					1
IDW	Toxicity characteristic leaching procedure (TCLP) parameters except herbicides, PCBs, corrosivity, and ignitibility	10		10		10								10					1
	Totals	119	36	243	40	283	239	244	215	244	48	31	27	83	19	19	7		7

Figures

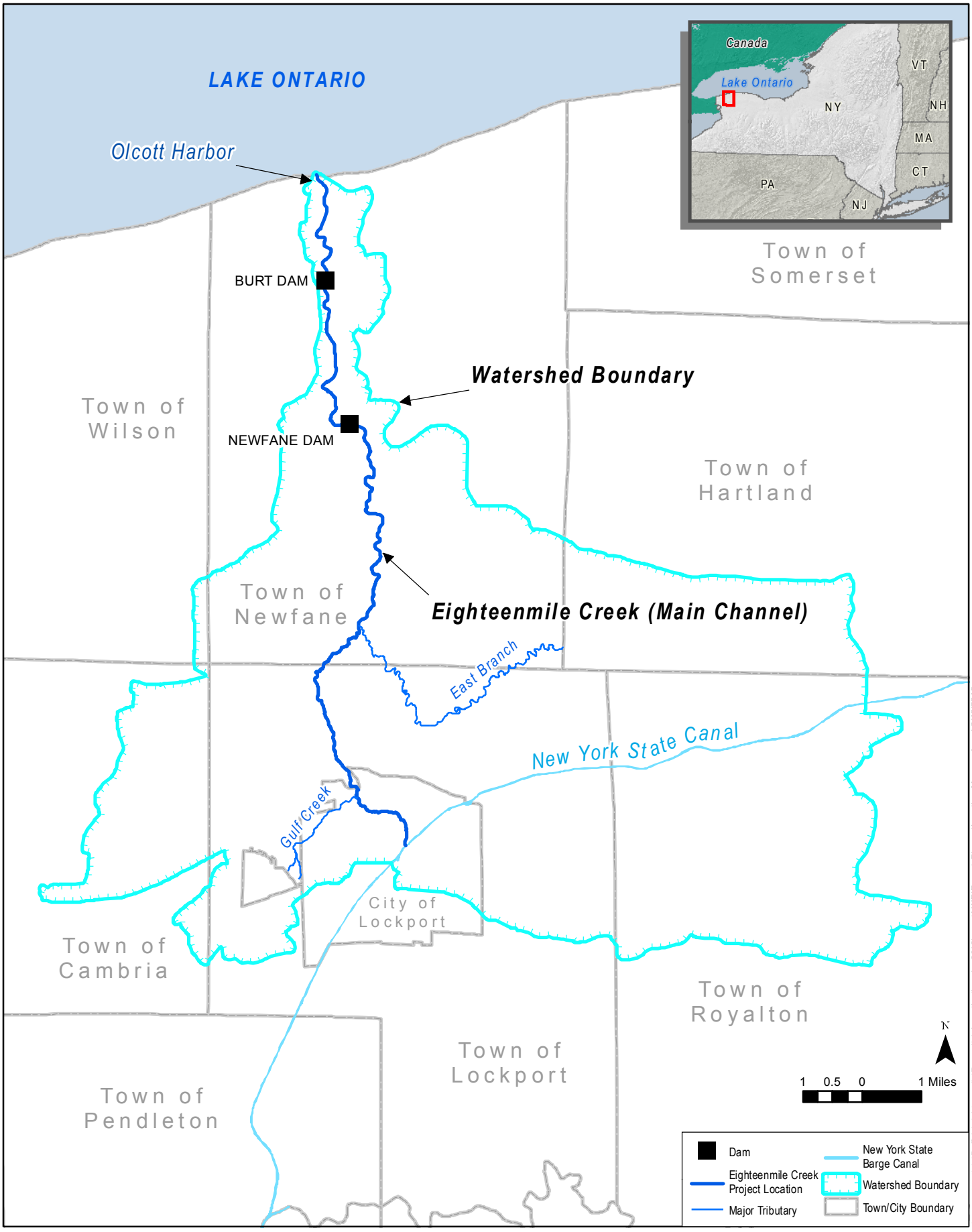

Figure 1 Eighteenmile Creek Site Location

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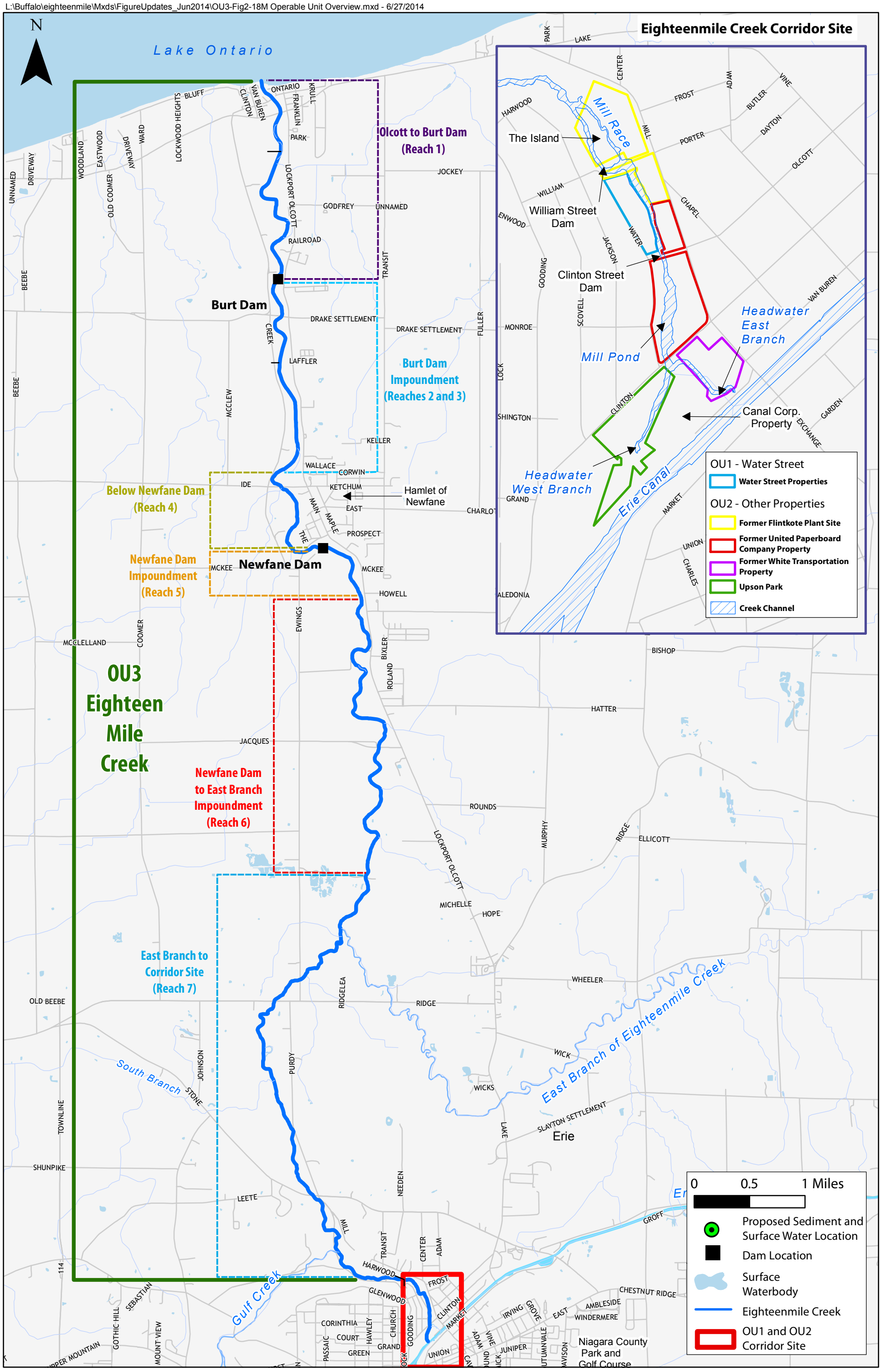

Figure 2 Eighteen Mile Creek Operable Unit Overview

F:\18 Mile Creek\2014\Operable Unit Boundaries.dwg

N

MILLRACE

OU-2
FORMER
FLINTKOTE
PROPERTY

OU-2
EIGHTEENMILE
CREEK AND MILLRACE
(SEDIMENTS)

OU-1
WATER STREET
RESIDENTIAL
PROPERTIES

OU-2
FORMER
UNITED
PAPERBOARD
COMPANY
PROPERTY

OU-2
WHITE
TRANSPORTATION

OU-2
UPSON
PARK

NOTE:

1. SITE INFORMATION REFERENCED FROM POPLI CONSULTING ENGINEERS AND SURVEYOR'S SUPPLEMENTAL RI DATED SEPTEMBER 2007.
2. PROPERTY BOUNDARIES SHOWN ARE FROM NIAGARA COUNTY OFFICE OF REAL PROPERTY (2006).

Mill Street
Center St.
Frost Street
Porter Street
Harwood St.
Jackson Street
William Street
Scovell Street
Chapel Street
Water Street
Olcott Street
EIGHTEENMILE CREEK
Monroe Street
Water St.
Clinton Street
Van Buren Street
Jackson Street
Scovell St.
Gooding Street
Grand Street
Green Street
BARGE CANAL

SCALE IN FEET
0 250 500 750

ecology and environment

FIGURE 3 OPERABLE UNIT BOUNDARIES, EPA OU1 AND OU2
EIGHTEENMILE CREEK CORRIDOR SITE,
LOCKPORT, NEW YORK

Google earth

feet 4000

km 1

Document Path: L:\Buffalo\eighteenmile\Mxds\FigureUpdates_Jun2014\OU2-Fig5-GroundwaterContanimationMap.mxd Date: 7/2/2014

MW-1 RK	Bedrock	Screened Interval 10.0 to 20.0	Screening Criteria [1]
Chloroform		2.0 ppb	7
Pentachlorophenol		200 ppb	1

MW-7 RK	Bedrock	Screened Interval 27.6 to 37.6

MW-2 OB	Overburden	Screened Interval 18.7 to 28.7

MW-2 RK	Bedrock	Screened Interval 9.0 to 29.0

MW-1 OB	Overburden	Screened Interval 9.6 to 19.6

MW-3 RK	Bedrock	Screened Interval 20.0 to 30.0

MW-5RK-	Bedrock	Screened Interval 15.0 to 23.0

MW-6 RK	Bedrock	Screened Interval 13.5 to 21.5

MW -06	Overburden Micro-Well	Screened Interval 6.5 to 11.5

198-E	Overburden Micro-Well	Screened Interval 13.0 to 18.0

MW-4 RK	Bedrock	Screened Interval 18.5 to 28.5

MCW-1	Overburden Micro-Well	Screened Interval 1.1 to 11.1

198-F	Overburden Micro-Well	Screened Interval 12.0 to 17.0	Screening Criteria [1]
PCB Aroclor (1254)		8.1 ppb	0.09

MW01 Overburden	Depth to Bedrock >22 ft	Screened Interval 12-22 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	7.6 J
Antimony Dissloved			3	7.7 J
Iron			300	1260 J
Iron Dissolved			300	919 J
Magnesium			35000 g	42800 J
Magnesium Dissolved			35000 g	39500 J
Sodium			20000	111000
Sodium Dissolved			20000	105000

MW02 Overburden	Depth to Bedrock >30 ft	Screened Interval 18-28 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	6.6 J
Antimony Dissloved			3	8.4 J
Iron			300	1070 J
Iron Dissolved			300	795 J
Magnesium			35000 g	40400 J
Magnesium Dissolved			35000 g	38100 J
Sodium			20000	173000
Sodium Dissolved			20000	168000

MW04 Overburden	Depth to Bedrock >26 ft	Screened Interval 16-26 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	5.6 J
Iron			300	868 J
Iron Dissolved			300	577 J
Sodium			20000	67200
Sodium Dissolved			20000	64300

MW05 Overburden	Depth to Bedrock >23 ft	Screened Interval 13-23 ft	Screening Criteria [1]	Round 1 Results above screening criteria	Round 2 Results above screening criteria
VOCs (µg/L)					
cis - 1,2-Dichloroethene			7	7.1	9.4
METALs (µg/L)					
Antimony			3	7 J	NA
Antimony Dissloved			3	7.6 J	NA
Iron			300	2260 J	NA
Iron Dissolved			300	1000 J	NA
Magnesium			35000 g	53400 J	NA
Magnesium Dissolved			35000 g	49500 J	NA
Manganese			300	444 J	NA
Manganese Dissolved			300	407 J	NA
Sodium			20000	113000	NA
Sodium Dissolved			20000	111000	NA

MW06 Overburden	Depth to Bedrock 26 ft	Screened Interval 15-25 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	5.3 J
Iron			300	888 J
Iron Dissolved			300	654 J
Magnesium			35000 g	37900 J
Magnesium Dissolved			35000 g	37600 J
Sodium			20000	155000
Sodium Dissolved			20000	162000

MW08 Overburden	Depth to Bedrock 16 ft	Screened Interval 6-16 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
VOCs (µg/L)				
Phenol			1	3.2 J
METALs (µg/L)				
Antimony			3	5.6 J
Iron			300	44900 J
Iron Dissolved			300	29700 J
Manganese			300	2030 J
Manganese Dissolved			300	1960 J
Sodium			20000	73100
Sodium Dissolved			20000	72800

MW09 Bedrock	Depth to Bedrock 9 ft	Screened Interval 9-14 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
Not Sampled - Dry				

MW10 Overburden	Depth to Bedrock 18 ft	Screened Interval 7-17 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	3.1 J
Iron			300	662 J
Sodium			20000	21600
Sodium Dissolved			20000	20600

MW11 Overburden	Depth to Bedrock 14 ft	Screened Interval 8.5-13.5 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	3.8 J
Iron			300	645 J
Iron Dissolved			300	325 J
Sodium			20000	88100
Sodium Dissolved			20000	87000

MW12 Overburden	Depth to Bedrock >14.5 ft	Screened Interval 9-14.5 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Antimony			3	5.4 J
Iron			300	793 J
Iron Dissolved			300	620 J
Magnesium			35000 g	5730 J
Magnesium Dissolved			35000 g	5490 J

MW12 Overburden	Depth to Bedrock 10 ft	Screened Interval 4-9 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Iron			300	561 J
Iron Dissolved			300	406 J
Sodium			20000	24200
Sodium Dissolved			20000	22500

MW14 Bedrock	Depth to Bedrock 20.5 ft	Screened Interval 20-25 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria	Round 2 2009 Results above screening criteria
VOCs (µg/L)					
cis - 1,2-Dichloroethene			7	33	29
TCE			5	20	19
METALs (µg/L)					
Antimony			3	5.5J	NA
Iron			300	1110 J	NA
Iron Dissolved			300	686 J	NA
Magnesium			35000 g	41100 J	NA
Magnesium Dissolved			35000 g	38800 J	NA
Sodium			20000	221000	NA
Sodium Dissolved			20000	210000	NA

MW15 Bedrock	Depth to Bedrock 16.7 ft	Screened Interval 16.7 ft 21.7 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria	Round 2 2009 Results above screening criteria
METALs (µg/L)					
Antimony			3	7.2 J	NA
Iron			300	1220 J	NA
Iron Dissolved			300	682 J	NA
Magnesium			35000 g	41800 J	NA
Magnesium Dissolved			35000 g	39300 J	NA
Sodium			20000	585000	NA
Sodium Dissolved			20000	574000	NA

MW16 Bedrock	Depth to Bedrock 9.5 ft	Screened Interval 15-25 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria	Round 2 2009 Results above screening criteria
METALs (µg/L)					
Antimony			3	5.1 J	NA
Iron			300	928 J	NA
Iron Dissolved			300	540 J	NA
Magnesium			35000 g	37200 J	NA
Sodium			20000	529000	NA
Sodium Dissolved			20000	499000	NA

MW17 Overburden	Depth to Bedrock >26 ft	Screened Interval 16-26 ft	Screening Criteria [1]	Round 1 2007 Results above screening criteria
METALs (µg/L)				
Iron			300	1350

Figure 5. Groundwater Contamination OU2

Notes for Groundwater Standards and Guidance Values:

[1] New York State Department of Environmental Conservation, Technical and Operational Guidance #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998 (and subsequent addenda).

g = Guidance Value

1:1,600

0 125 250 500 Feet

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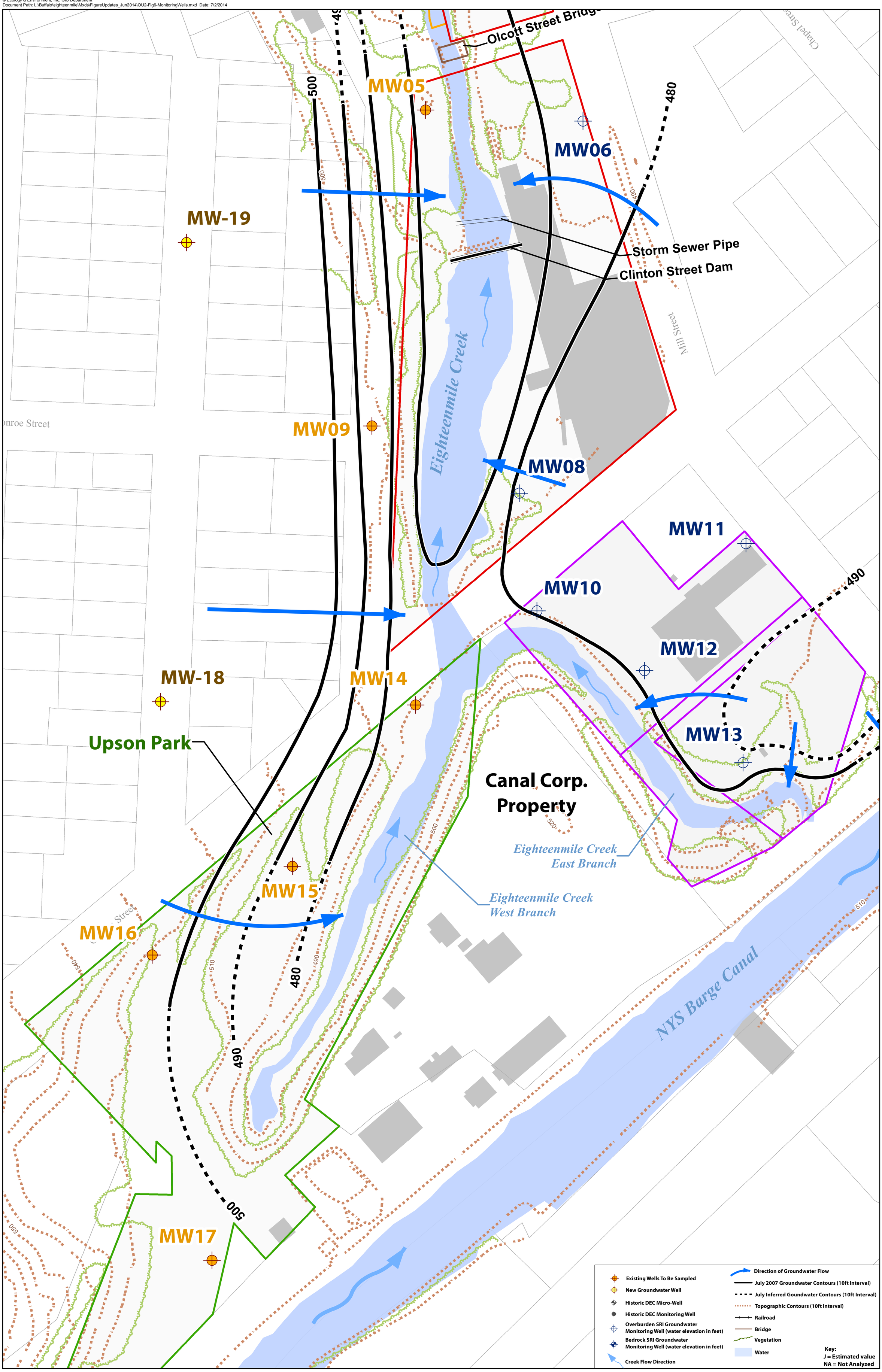

Figure 6. Eighteen Mile Creek OU2 Monitoring Well Locations

N

1 inch equals 60 feet

0 50 100 200 Feet

Notes for Groundwater Standards and Guidance Values:

[1] New York State Department of Environmental Conservation, Technical and Operational Guidance #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998 (and subsequent addenda).

g = Guidance Value

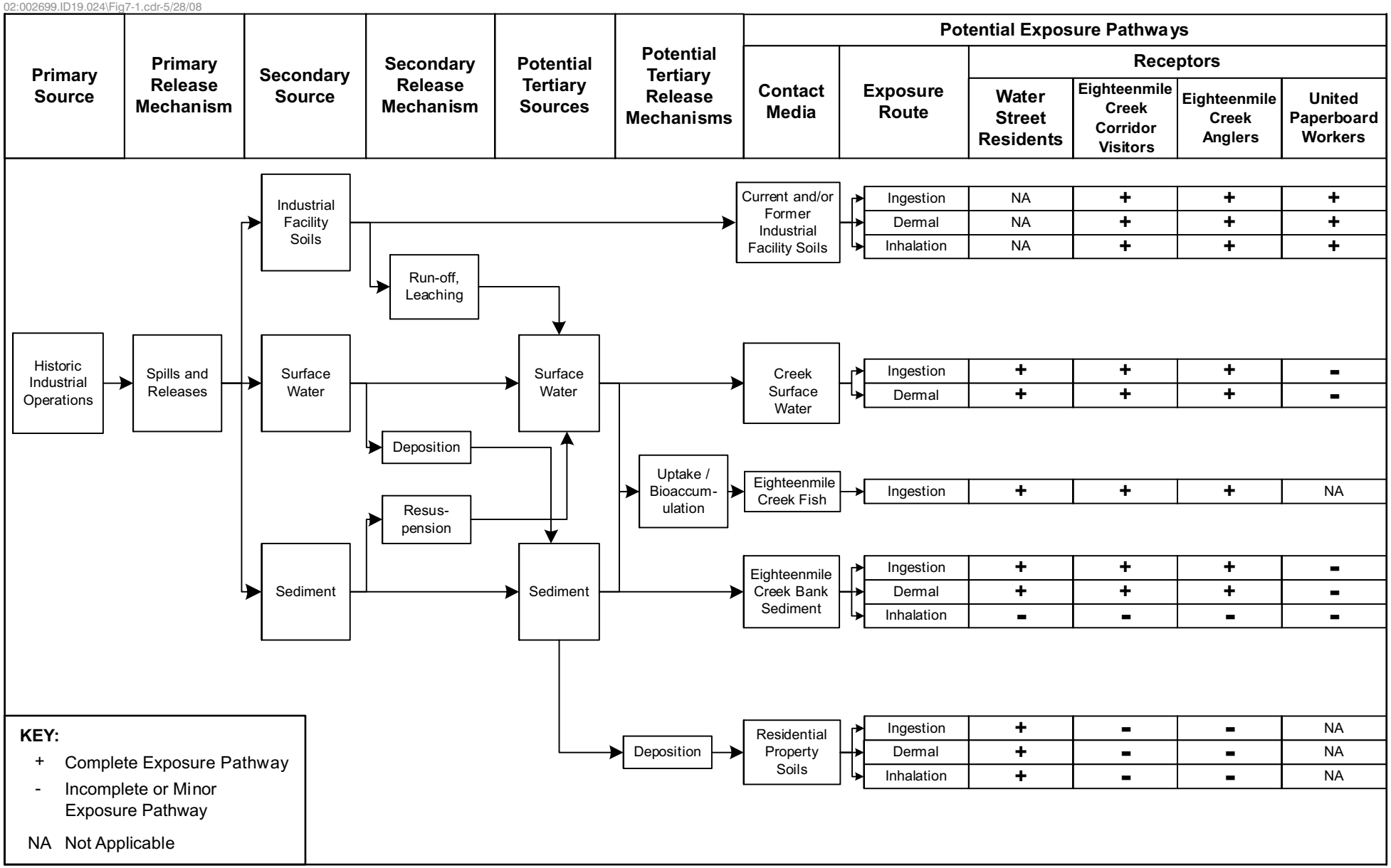

Figure 7-1 Conceptual Model of Potential Human Exposures to Contaminants in the Eighteenmile Mile Creek Corridor Site, Supplemental Remedial Investigation

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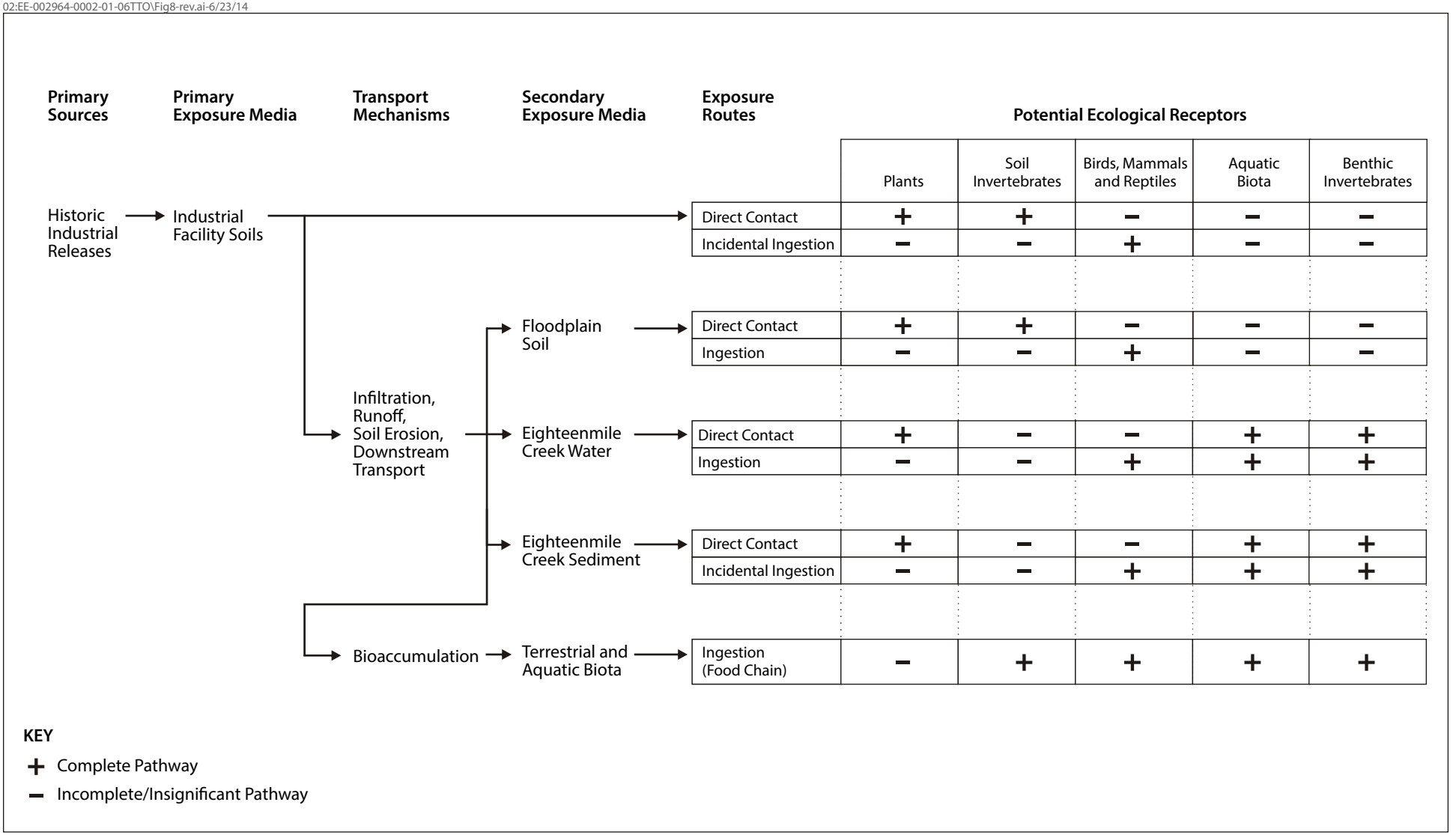

SOURCE: Ecology and Environment, Inc., 2014

Figure 8 Preliminary Ecological Conceptual Site Model, Eighteenmile Creek Corridor Site (OU2) and Downstream Areas (OU3)

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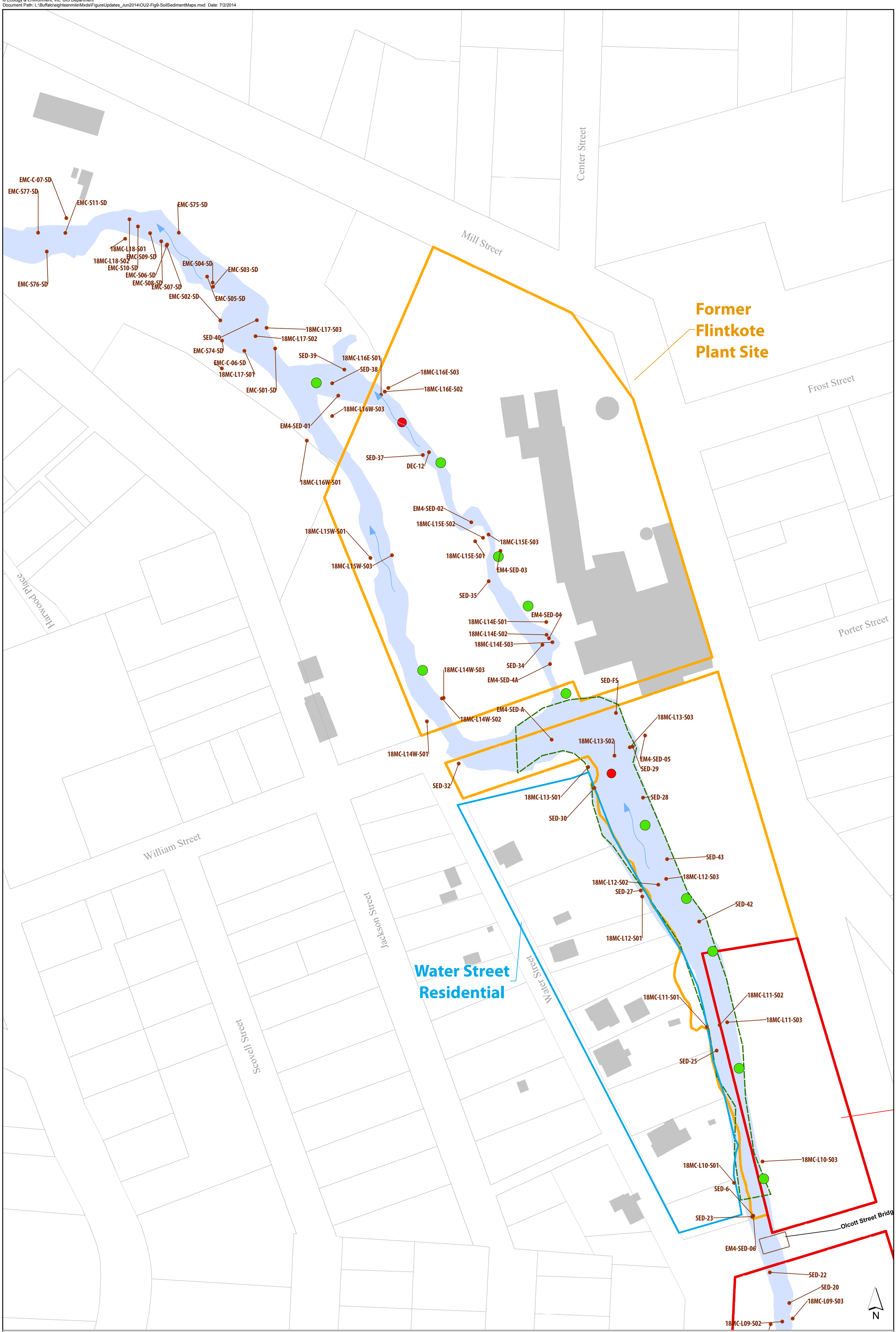

Figure 9. Eighteen Mile Creek Operable Unit 2 Sediment Sampling Locations
Creek Channel - Northern Section

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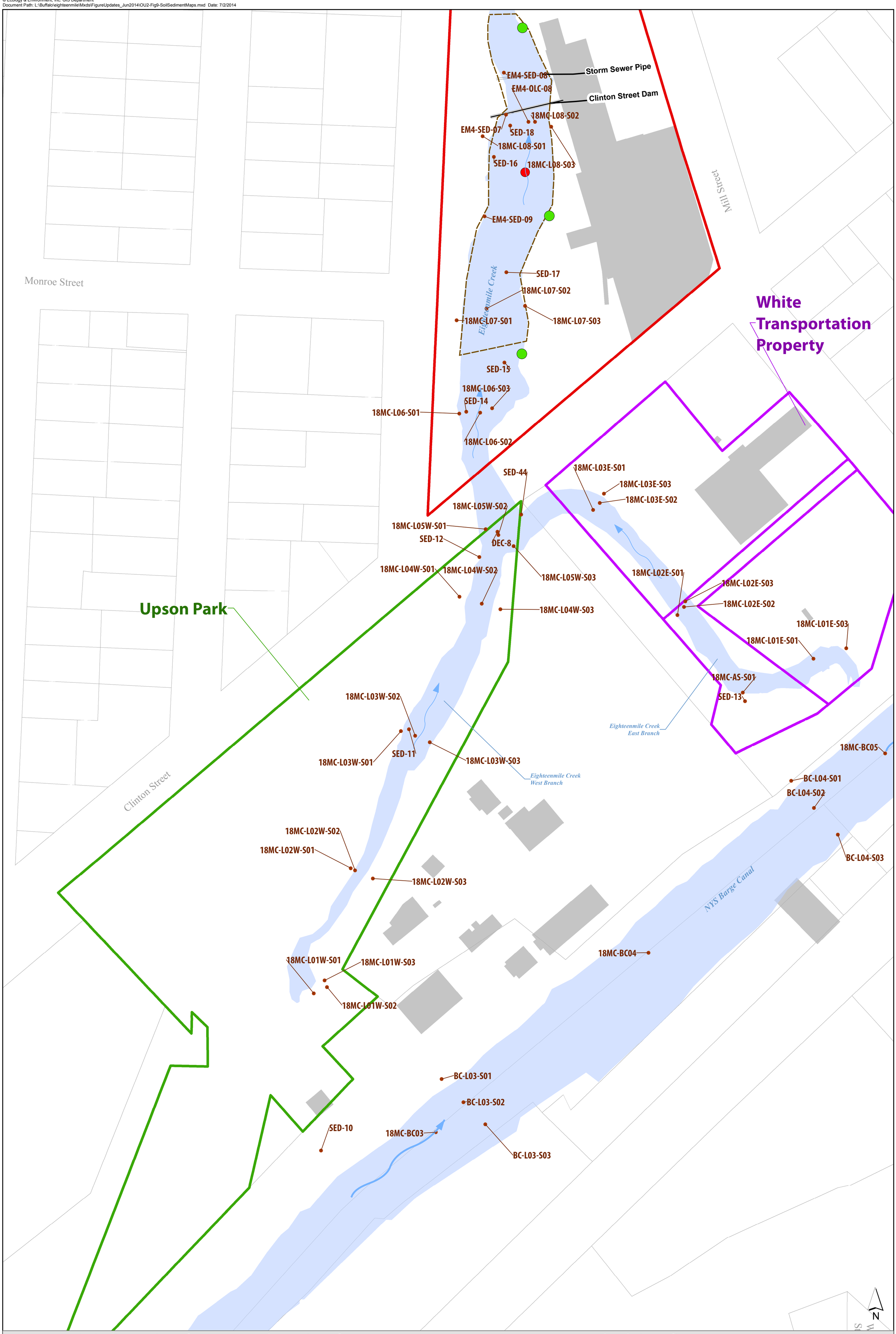

Figure 9. Eighteen Mile Creek Operable Unit 2 Sediment Sampling Locations
Creek Channel - Southern Section

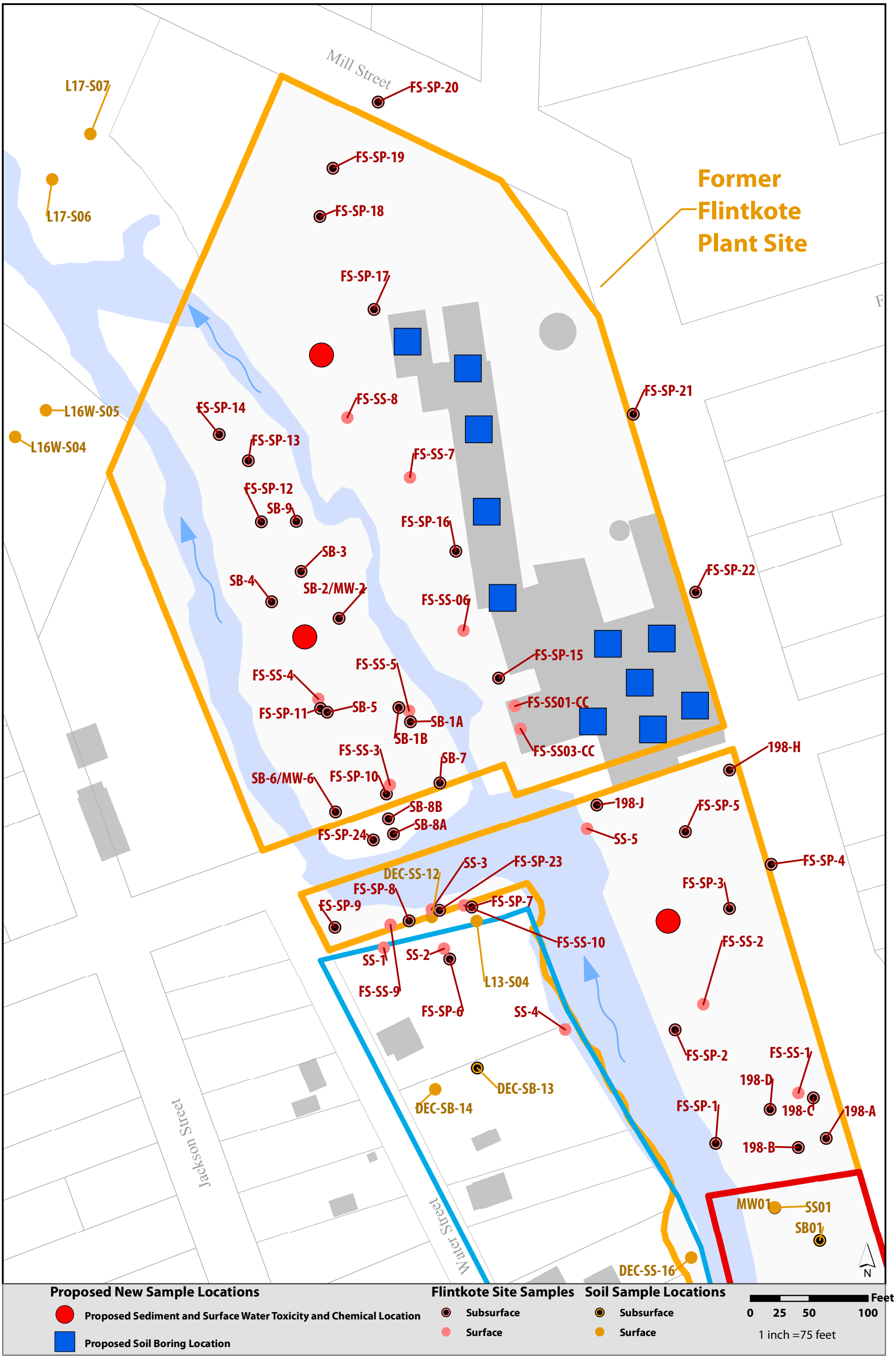

Figure 10. Eighteen Mile Creek OU 2 Soil Sample Locations - Historical and Proposed Former Flintkote Plant Site

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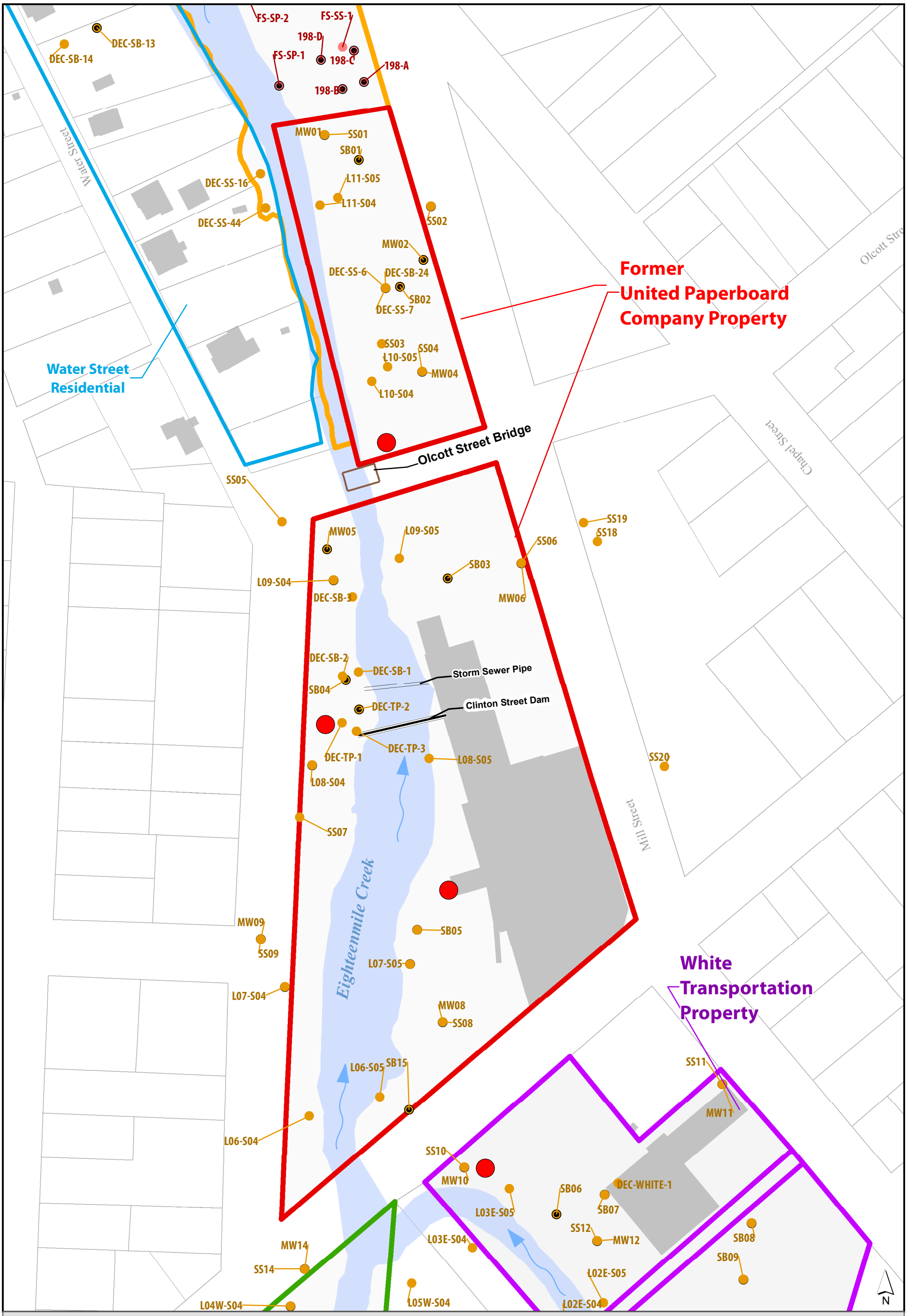

Figure 11. Eighteen Mile Creek OU 2 Soil Sample Locations - Historical and Proposed Former United Paperboard Site

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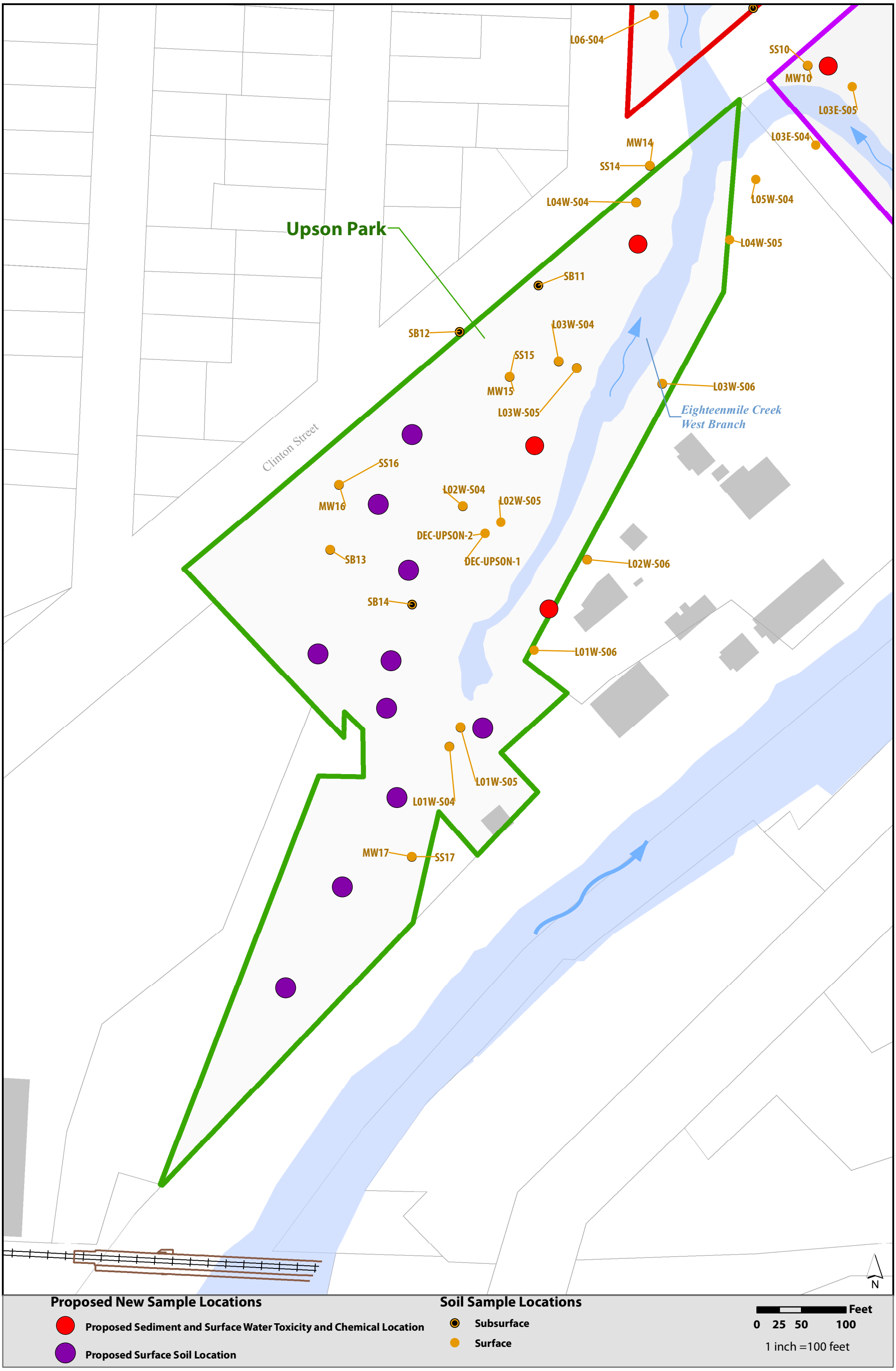

Figure 12. Eighteen Mile Creek OU 2 Soil Sample Locations - Historical and Proposed Upson Park

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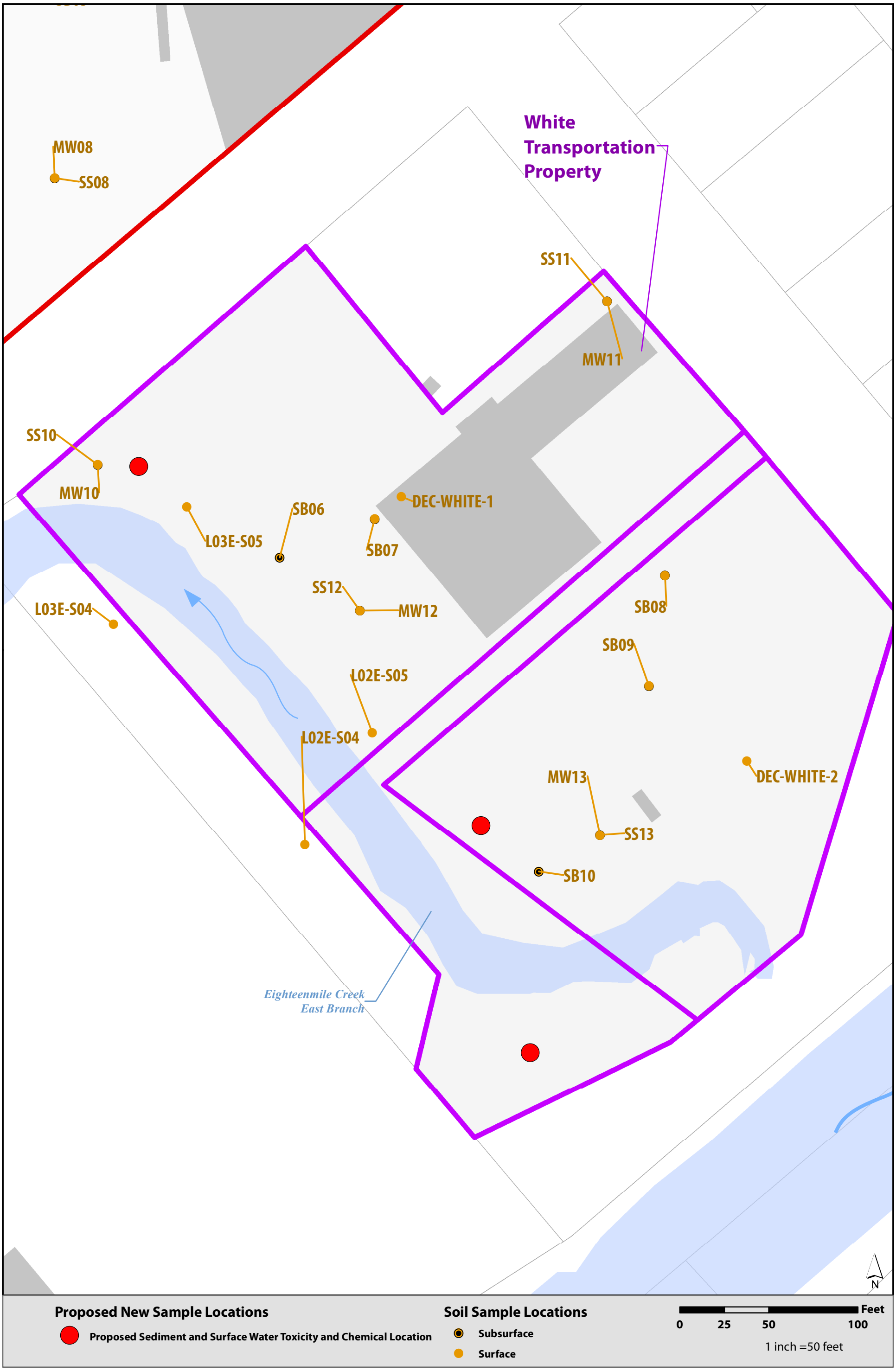

Figure 13. Eighteen Mile Creek OU 2 Soil Sample Locations - Historical and Proposed White Transportation

A Reports Reviewed

Table A-1

Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU2 and OU3	2005	Buffalo State Great Lakes Center (BSGLC). 2005. *Sediment Modeling for the Eighteenmile Creek Watershed, Niagara County.* Final project report. Prepared by Shreeram Inamdar, Ph.D., Great Lakes Center and Department of Geography, SUNY Buffalo State College, for the U.S. Army Corps of Engineers Buffalo District. December 2005.
	OU3	1983	Burt Dam Associates. 1983. *Application for Exemption for Licensing for the Burt Dam Hydroelectric Project* . Submitted to the Federal Energy Regulatory Commission.
	OU3	2009	CH2M HILL, Inc. and EEEPC. 2009a. *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.
	OU3	2009	CH2M HILL, Inc. and EEEPC. 2009b. *Field Sampling Plan for the Eighteenmile Creek AOC Site Characterization, Niagara County, New York* .
	OU3	2011	CH2M HILL, Inc. and EEEPC. 2011. *Data Summary Report, Site Characterization Eighteenmile Creek Area of Concern, Niagara County, New York.*
USEPA GLNPO	OU2 and OU3	2012	CH2M HILL, Inc. and EEEPC. 2012. *Draft Remedial Investigation Report, Eighteenmile Creek, Remedial Investigation / Feasibility Study, Niagara County, New York.* Prepared for USEPA Region 5 RAC2 by CH2M HILL, E & E, and others. WA No. 139-RICO-1527/Contract No. EP-S5-06-01.
	OU1 and OU2	2011	City of Lockport. 2011. CSO Longterm Control Plan - Draft, Niagara County, New York. Prepared by the Clough Harbor and Associates, September 16, 2011.
	OU1 and OU2	2006	City of Lockport. 2006. City of Lockport Zoning Map, Niagara County, New York. Prepared by the City of Lockport Engineering Department, February 2006.
	OU2 and OU3	2007	E & E. 2007a. Eighteenmile Creek State of the Basin Report. Prepared for the U.S. Army Corps of Engineers.
NCSWCD 2007	OU2 and OU3	2007	E & E. 2007b. *Final Report for the Eighteenmile Creek PCB Source Trackdown Project* . Niagara County, New York.

Table A-1

Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU2	2007	E & E. 2007C. *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.
	OU3	2009	E & E. 2009. *Eighteenmile Creek Beneficial Use Impairment Assessment* . Niagara County, New York. Prepared for the Niagara County Soil and Water Conservation District.
	OU3	2011	E & E. 2011. *Interim Eighteenmile Creek Area of Concern (AOC) Strategic Plan for Beneficial Use Impairment (BUI) Delisting, Contract Number W912P4-10-D-0002.* Prepared for the United States Army Corps of Engineers.
	OU3	2012	E & E. 2012a. Draft Eighteenmile Creek Baseline Fish Sampling Report. Prepared for Niagara County Soil and Water Conservation District, Lockport, NY by E & E, Lancaster, NY.
	OU3	2012	E & E. 2012b. Draft Eighteenmile Creek Baseline Benthic Community Sampling Report. Prepared for New York State Department of Environmental Conservation, Albany, NY by E & E, Lancaster, NY.
USACE 2010	OU3	2012	E Risk Sciences, LLP (ERS) and USACE. 2012. *Final Bioaccumulation Modeling and Ecological Risk Assessment, Eighteenmile Creek Great Lakes Area of Concern (AOC), Niagara County, New York.* Prepared by E Risk Sciences, LLP, Allston , Massachusetts, and U.S. Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, Mississippi.
	OU3	2011	EA Engineering P.C. and EA Science and Technology (EA Engineering). 2011. *Final Remedial Investigation Report Old Upper Mountain Road (932112) Lockport, New York, Site Number 932029, Town of Lockport, Niagara County* . Prepared for NYSDEC Region 9.
NYSDEC SRI	OU2	2009	EEEPC. 2009a. *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.
NYSDEC SRI-A	OU2	2009	EEEPC. 2009b. *Final Additional Investigation Addendum to the 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.
	OU2	2009	EEEPC. 2009c. *Final Feasibility Study Report for the Eighteenmile Creek Corridor Sit (Site 932121) and Adjacent Upland Properties (Water Street Residential Properties, Former United Paperboard Company, White Transportation, and Upson Park)* . City of Lockport, New York. Prepared for New York State Department of Environmental Conservation, Albany, NY by E & E, Lancaster, NY.

Table A-1

Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU3	2011	Environment Canada et al. 2011. Lake Ontario Lakewide Management Plan, Annual Report 2011. Prepared by a binational partnership of Environment Canada, Fisheries and Oceans Canada, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Ontario Ministry of Environment, Ontario Ministry of Natural Resources and New York State Department of Environmental Conservation. Available online at: http://binational.net/lamp/lo_ar_2011_en.pdf.
	OU3	2007	NCSWCD. 2007. *Eighteenmile Creek Remedial Action Plan, 2006 Status Report* . Prepared with funding provided by the U.S. Environmental Protection Agency. March 2007.
	OU3	2011	NCSWCD. 2011. *Eighteenmile Creek Remedial Action Plan, Stage II - Update* . Prepared with funding provided by the U.S. Environmental Protection Agency. Final Draft, December 2011.
	OU3	2011	New York State Department of Health (NYSDOH). 2011. *Health Advice on Eating Fish You Catch for Erie, Niagara, Cattaraugus, Genesee, Orleans, Wyoming, and Chautauqua Counties.*
	OU3	1987	New York State Department of State (NYSDOS). 1987. Coastal Fish and Wildlife Habitat Rating Form for Eighteenmile Creek – Lake Ontario.
	OU2	1998	Nutter Associates. 1998. *City of Lockport Comprehensive Plan.* Prepared for City of Lockport, Niagara County, New York. May 1998.
	Reference Data	2009	NYS GIS Clearinghouse. 2009. GIS Metadata from NYS Cyber Security. "NIAGARA_County_Ortho_4bed_1ft." Remote sensing image. NYS Digital Ortho-Imagery Program 2008 imagery in Niagara County. NYSCSCIC, Albany, NY. Accessed online at http://gis.ny.gov/gateway/mg/2008/niagara/.
	OU2	2000	NYS Canal Corporation. 2000. Evaluation of Sediment Quality of the Erie Canal between the Niagara River and Rochester, NY.
	OU3	1996	NYSDEC. 1996. *Trackdown of Chemical Contaminants to Lake Ontario from New York State Tributaries.*
	OU3	1997	NYSDEC. 1997. Eighteenmile Creek Remedial Action Plan. Prepared by the Division of Water.

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Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
NYSDEC 1998	OU 2 and 3	1998	NYSDEC. 1998. Eighteenmile Creek and Olcott Harbor Sediment Study, Niagara County, New York.
	Guidance	1999	NYSDEC. 1999. Technical Guidance for Screening Contaminated Sediments. Prepared by the Division of Fish, Wildlife and Marine Resources, Albany, New York.
NYSDEC 2000	OU 2 Flintkote	2000	NYSDEC. 2000. Site Investigation Report, Former Flintkote Plant Site, 198 & 300 Mill Street, City of Lockport, Niagara County, New York. Prepared by the Division of Environmental Remediation. September 2000.
NYSDEC 2001	OU 2 and 3	2001	NYSDEC. 2001a. Final Report, Eighteenmile Creek Sediment Study, Summary of August 17-20 and November 3, 1998 Results. Prepared by the Division of Water.
	OU2	2001	NYSDEC. 2001b. City of Lockport Sewer System, PCB Trackdown Project, 1998-2000, Draft Summary Report. Prepared by NYSDEC Division of Water. October 2001.
	OU 2 Flintkote	2002	NYSDEC. 2002. Sampling Report, Former Flintkote Plant Site, 143 Water Street, City of Lockport, Niagara County, New York. Prepared by the Division of Environmental Remediation.
	OU1	2003	NYSDEC. 2003. Sampling Report, Water Street Properties, City of Lockport, Niagara County, New York. Prepared by the Division of Environmental Remediation.
NYSDEC 2004	OU1 and 2	2004	NYSDEC. 2004. Site Investigation Scope of Work. Eighteenmile Creek Corridor: New York State Barge Canal to North Transit Road. August 2003, revised February 2004.
	Guidance	2005	NYSDEC. 2005. New York State Comprehensive Wildlife Conservation Strategy. Available online at: http://www.dec.ny.gov/docs/wildlife_pdf/ontarioswtxt.pdf
NYSDEC RI	OU1 and 2	2006	NYSDEC. 2006a. Remedial Investigation Report, Eighteenmile Creek Corridor, Lockport, Niagara County, New York, Site Number 932121. Prepared by the Division of Environmental Remediation.

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Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU 2 Flintkote	2006	NYSDEC. 2006b. Record of Decision for the Former Flintkote Plant Site.
	OU3	2007	NYSDEC. 2007a. Lake Ontario Annual Report 2007. Lake Ontario Tributary Creel Survey, Fall 2005 - Spring 2006, Fall 2006 - Spring 2007. Prepared by Scott Prindle and Daniel Bishop, Region 7 Fisheries, Cortland, New York.
	OU2	2007	NYSDEC. 2007b. PCB Sources - Flintkote. Internal Memorandum. Prepared by Glenn May August 2007.
	OU2 and OU3	2009	NYSDEC. 2009a. Toxic Chemicals in NYS Tributaries to Lake Ontario: A Report on Sampling Undertaken in 2007 and 2008 with Special Emphasis on the Polychlorinated Dibenzodioxins and Furans. Prepared for the U.S. Environmental Protection Agency.
	Guidance	2010	NYSDEC. 2010a. CP-51: Soil Cleanup Guidance Policy.

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Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU1 and OU2	2010	NYSDEC. 2010b. Record of Decision for the Eighteenmile Creek Corridor Site Operable Unit Nos. 1,3,4,5 and 6, State Superfund Project Lockport, Niagara County, New York Site No. 932121.
NYSDEC 2010	OU2	2010	NYSDEC. 2010c. Results from the Sampling of Erie Canal Suspended Sediments and Creek Waters for PCBs, Eighteenmile Creek Corridor Site, Site No. 932123, City of Lockport, Niagara County, New York.
	OU3	2012	NYSDEC. 2012. Personal communication, letter dated January 17, 2012, from Jean Pietrusiak, NYSDEC Information Services, to Marcy Werth, E & E, Inc., in response to a data request regarding rare and state-listed animal and plant species.
	OU 2 Flintkote	2005	TVGA. 2005a. Site Investigation Report: Site Investigation/Remedial Alternatives Report (SI/RAR) Former Flintkote Site.
	OU 2 Flintkote	2005	TVGA. 2005b. Final Remedial Alternatives Report Former Flintkote Site.
	OU2	2006	URS Corporation. 2006. Summary Report for PCBs Detected in NYS Barge Canal Sediments During the Investigation of NYSEG's Transit Street and State road Former MGP Sites, Sites #9-32-098 and #9-32-109, Lockport, NY. New York State Electric and Gas, Binghamton, New York.
USACE 2004	OU3	2004	USACE. 2004a. *Volume I (Project Report Overview): Sediment Sampling, Biological Analyses, and Chemical Analyses for Eighteenmile Creek OAC, Olcott, New York.* Prepared for USACE Buffalo District, by USACE Engineer Research and Development Center, Vicksburg, MS.
	OU3	2004	USACE. 2004b. Volume II (Laboratory Reports): Sediment Sampling, Biological Analyses, and Chemical Analyses for Eighteenmile Creek AOC, Olcott, New York. Prepared for USACE Buffalo District, Buffalo, NY by USACE Engineer Research and Development Center, Vicksburg, MS.
USEPA 2008	OU3	2008	USACE. 2008. Eighteenmile Creek, Great Lakes Area of Concern (AOC), Niagara County, New York: Concentrations, Bioaccumulation and Bioavailability of Contaminants in Surface Sediments.
	OU3	2010	USACE. 2010. Memo from Karl Gustavson, Ph.D., and Sara Hendrix, U.S. Army Engineer Research and Development Center, and Katherine von Stackelberg, Sc.D., E Risk Sciences, LLP, to Bryan Hinterberger, and Scott Pickard, USACE, Buffalo District, and Victor DiGiacomo, Jr., Niagara County Soil & Water Conservation District, regarding Eighteenmile Creek Area of Concern Food Web Modeling: Final Data Gaps. August 3, 2010.

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Inventory of Previous Studies and Guidance Reviewed

Eighteenmile Creek Superfund Site - Operable Unit 2 and 3

Reference Key	Area	Year	Reference
	OU3	2011	USACE. 2011. Memo from Katherine von Stackelberg, Sc.D., E Risk Sciences, LLP, and Karl Gustavson, Ph.D., U.S. Army Engineer Research and Development Center, to Bryan Hinterberger, USACE, Buffalo District, and Victor F. DiGiacomo, Jr., Eighteenmile Creek Remedial Action Plan Coordinator, Niagara County Soil & Water Conservation District, regarding Eighteenmile Creek Area of Concern: Final Conceptual Site Model (CSM). January 21, 2011.
	OU3	2013	USACE. 2013. Public Notice. Operationa and Maintenance Dredging and Dredged Material Placement. FY 14 Disaster Relief Appropriations Act (Hurricane Sandy) Supplemental Lake Ontario Harbor Maintenance Dredging. Notice No: LOHD-14
	Guidance	1989	USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume I Human Health Evaluation Manual (Part A),* Office of Emergency and Remedial Response, EPA/540/1-89/002, Washington, D.C., December 1989
	OU3	2008	USEPA. 2008. *Field Data Report, Eighteenmile Creek Sediment* .
	OU3	2011	USEPA. 2011. *Field Data Report, Lake Ontario Tributaries 2009-2010.* USEPA Monitoring and Assessment Branch

Key:

EEEPC	Ecology and Environment Engineering, P.C.
USEPA	U.S. Environmental Protection Agency
USACE	U.S. Army Corps of Engineers
E & E	Ecology and Environment, Inc.
NYSDEC	New York State Department of Environmental Conservation
NCSWCD	Niagara County Soil and Water Conservation District