AECOM Environment

Prepared For:
United Technologies Corp.
Shared Remediation Services
Farmington, CT

Prepared by:
AECOM
Latham, NY
60340856
January 2016

SANDERS CREEK
UTC/CARRIER SITE
THOMPSON ROAD, SYRACUSE, NY
Sampling and Analysis Plan

Corrective Action Order - Index CO 7-20051118-4

NYSDEC Site Registry #734043

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United Technologies

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List of Acronyms

AOC	Area of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	Cubic Feet Per Second
CLP	Contract Laboratory Program
COC	Contaminant of Concern
CSM	Conceptual Site Model
DER	Department of Environmental Remediation
DQO	Data Quality Objective
DUSR	Data Usability Summary Report
ft.	Foot/Feet
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
kg	Kilogram
mg	Milligram
MHW	Mean High Water
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NGVD	National Geodetic Vertical Datum
NYSDEC	New York State Department of Environmental Conservation
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PCB	Polychlorinated Biphenyl
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act of 1976
SAP	Sampling and Analysis Plan
SH&E	Safety, Health & Environmental
SPDES	State Pollutant Discharge Elimination System
SSO	Site Safety Officer
SVOC	Semivolatile Organic Compound

THA	Task Hazard Analysis
UFPO	Underground Facilities Protection Organization
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	United Technologies Corporation
VOC	Volatile Organic Compound

1.0 Introduction

1.1 Plan Objective

United Technologies Corporation (UTC) has prepared this Sampling and Analysis Plan (SAP) in support of a subsequent Corrective Action in Sanders Creek related to the requirements outlined in the NYSDEC Corrective Action Order - Index Consent Order CO 7-20051118-4 (Order) dated January 4, 2006. This SAP addresses sampling activities at Sanders Creek, which is located in the Town of DeWitt, Onondaga County, New York, approximately 1 mile south of the New York State Thruway. The portion of Sanders Creek that is subject to this SAP is located north of the Carrier Thompson Road facility (Facility) between Telergy Parkway and the confluence with South Branch of Ley Creek (hereinafter referred to as the Site). Sampling events and studies conducted by both the New York State Department of Environmental Conservation (NYSDEC) and Carrier Corporation (Carrier) have identified the presence of polychlorinated biphenyls (PCBs) in both the aquatic biota and the sediment of Sanders Creek.

The Order requires UTC/Carrier Corporation to “develop a plan to investigate releases of PCBs related to the Facility to determine the nature and extent of PCB contaminated sediments and their impact on fish in Sanders Creek”, and to “investigate the impact of PCBs that are related to the Facility on Sanders Creek. This must include both nature and extent of PCB contaminated sediments and their impact on fish.” This SAP was prepared to further meet this requirement. This SAP will specify a sampling program to document PCB and other constituent concentrations in clay below the stream bed bottom, side bed, banks and floodplains within the Site.

1.2 Plan Organization

This SAP was developed to meet the site investigation requirements specified in guidance prepared by the NYSDEC Department of Environmental Remediation (Document DER-10). The SAP is organized into the following sections:

- Section 1.0 contains an introduction, objective, and report organization details;
- Section 2.0 contains a site description and conceptual site model;
- Section 3.0 includes the SAP Scope of Work and description of field activities to be completed;
- Section 4.0 references the summary of quality assurance/quality control (QA/QC) protocols to be followed during the project; and
- Section 5.0 describes the reporting requirements and schedule.

2.0 Site Background

2.1 Site Description

The Site is the portion of Sanders Creek beginning at Telergy Parkway and continuing downstream to the confluence with South Branch of Ley Creek. A Corrective Action is required as outlined in the Order. The Corrective Action must address sediments impacted with PCBs documented to exist at the Site. The Site is formally referred to as Area of Concern E (AOC E) in the Order.

The Site is located in the Town of DeWitt, Onondaga County, New York, approximately 1 mile south of the New York State Thruway (**Figure 2.1**). Sanders Creek runs westward for approximately 8,900 feet (ft.) from New Venture Gear Drive northeast of the Carrier facility to the confluence with South Branch of Ley Creek (**Figure 2.2**). The portions of Sanders Creek that define the Site and an upgradient/background section have been described in terms of Sections. These conventions are explained below and shown on **Figure 2.3**.

- Section 0: The 750 ft. of Sanders Creek from Sanders Creek Parkway to Kinney Street is upstream of the Site, and is considered upgradient/background.
- Section 1: The 1250 ft. of the creek bounded by Kinney Street and a small driveway.
- Section 2: The 1400 ft. of the creek bounded by the small driveway and Thompson Road.
- Section 3: The 275 ft. of the creek bounded by Thompson Road and a culvert near an abandoned hotel.
- Section 4: The 700 ft. of the creek bounded by the culvert near the abandoned hotel and Old Court Street.
- Section 5: The 1675 ft. of the creek bounded by Old Court Street and a long culvert starting near a driveway.
- Section 6: The 725 ft. of the creek bounded by the culvert at Deere Road to the south branch of Ley Creek.

The Carrier facility property is bordered by Sanders Creek to the north. The Carrier facility property extends across an area of approximately 175 acres, and most is either paved or covered by manufacturing and office buildings, with a section of lawn located adjacent to the creek. Surface runoff is conveyed through a stormwater collection system to Sanders Creek or as direct non-point runoff. A monitoring program performed in compliance with the Carrier facility's State Pollutant Discharge Elimination System (SPDES) permit had detected PCBs in stormwater at the outfalls that discharge to Sanders Creek.

A stormwater management and treatment system was installed to address stormwater discharges with detectable concentrations of PCBs. Carrier submitted the "*Final Engineering Design Report, Treatment of PCBs in Stormwater"* to the NYSDEC on November 16, 2009, followed by a revised design on February 15, 2010, and a letter addendum on June 29, 2010. The NYSDEC approved the revised design report and addendum via correspondence dated July 2, 2010. Carrier has completed the installation process for the stormwater treatment system, which began operating in Spring 2011.

Sampling events and studies have been conducted in Sanders Creek by the NYSDEC and Carrier. These investigations have identified the presence and bioavailability of PCBs in both the aquatic biota and the sediment of the Site. As a result of these studies, PCBs within the sediment of Sanders Creek have been identified as the contaminants of concern (COCs) for the Site, as discussed in the following sections of this SAP.

2.2 Conceptual Site Model

A Conceptual Site Model (CSM) has been developed for the Site, which includes the source of the release, characteristics of Sanders Creek and the transport and deposition of PCBs.

2.2.1 **Contaminant Source**

As indicated above, PCBs in stormwater are believed to be the source of contaminants detected in sediments located in the Sanders Creek stream bed bottom between the Carrier outfalls and the confluence with South Branch Ley Creek.

Contaminant concentrations have also been detected in soil and groundwater samples collected in the area north of the former Building TR-3 and south of Sanders Creek. Delineation and remediation (as necessary) within this area (which lies south of Sanders Creek between Stations 64+00 and 69+00) will be coordinated with the Sanders Creek investigation and remediation activities, but the investigation activities will be conducted under a separate SAP. As such, sampling locations for the areas adjacent to Sanders Creek associated with the former Building TR-3 are not included in this SAP.

2.2.2 **Stream Morphology**

Long sections of unstable side bed and stream banks persist throughout most of the Site, as reported in *Sanders Creek Habitat Assessment and Physical Characterization* (EnSafe, 2013) (**Appendix A**), and in *Beartrap-Ley Creek Drainage District Study Final Report, Onondaga County, New York* (Clough Harbour and Associates, 2006). Sanders Creek exhibits areas of unstable side bed and stream banks with significant variations in channel width and depth. West of Thompson Road, the Sanders Creek channel becomes more consistent in cross-sectional profile. Banks and side beds are steep, bottom width remains fairly constant and banks become more stable. Within the lower half of the Site, Sanders Creek flows through a buried culvert pipe for approximately 1,300 ft., and then emerges aboveground for approximately 750 ft. before its confluence with the South Branch of Ley Creek. Natural meanders appear to have been prohibited as is typical in streams that fall within an urban drainage district to facilitate efficient conveyance of stormwater.

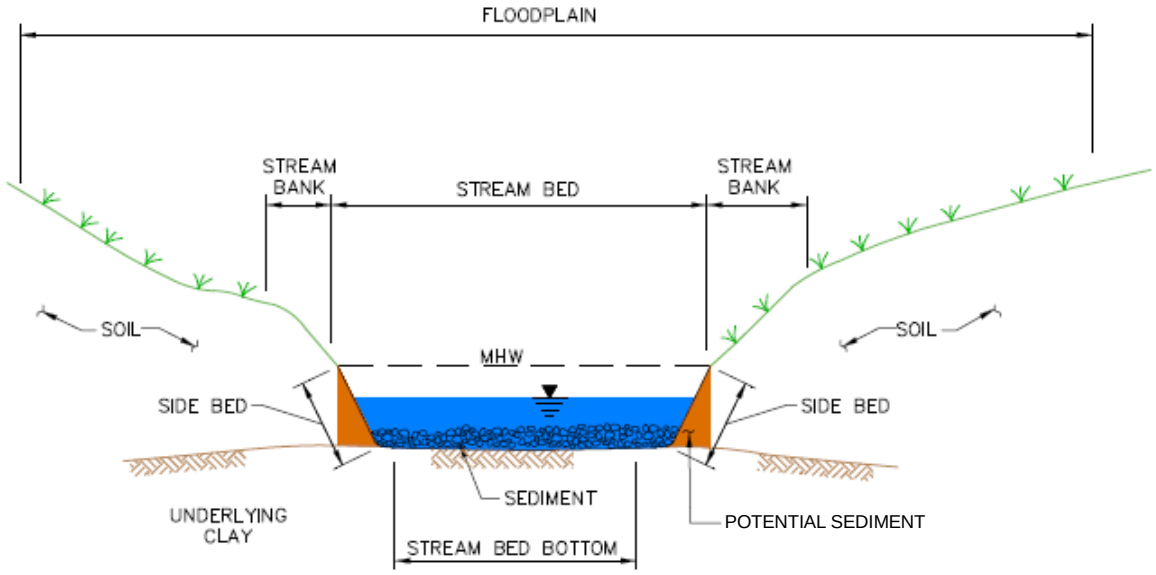
Key features of the stream morphology for the CSM are defined below and depicted in the following Figure:

- Stream Bed – As stated in 6NYCRR Part 608, the bed of the stream is defined as the area covered by water at mean high water (MHW – see Section 2.3 for further discussion of MHW).
- Stream Bed Bottom – For purposes of this SAP, the stream bottom is defined as the base of the stream bed, which is relatively flat and generally contains the loose non-cohesive sediment.
- Sediment – NYSDEC-10, 1.3(b)(64) defines sediment as unconsolidated particulate material found at the bottom of lakes, rivers, streams and other water bodies at bed elevations equal

to or lower than the mean high water level as defined in 6 NYCRR 608.1(r). [Note: Materials present in enclosed sumps, sewers or piping systems not accessible to fish and wildlife and not forming any benthic or aquatic habitat are not considered sediments for the purpose of comparison to NYSDEC's *Technical Guidance for Screening Contaminated Sediment*.] NYSDEC's Screening and Assessment of Contaminated Sediments states that, in flowing waters (e.g., streams and rivers), sediment is constantly being moved. Moving sediment in waterways is referred to as the load. These sediments have been sampled and submitted for PCB analysis during previous field activities associated with Sanders Creek. Analytical results of sediment samples collected in 2013 ranged from no detection to 8.3 milligrams per kilogram (mg/kg) with a mean of 1.0 mg/kg, median of 0.36 mg/kg and standard deviation of 2.1 mg/kg.

- Side Bed – For purposes of this SAP, the side of the bed is defined as the portion of the stream bed, which slopes up on either side of the stream bottom to the MHW.
- Bank – As stated in 6NYCRR Part 608, The banks of the stream are the land area adjacent to, and which slopes towards the bed of the watercourse (but does) not extend more than 50 feet horizontally from the MHW. The top of bank for Sanders Creek is typically characterized by a break in slope above MHW.
- Floodplain – For purposes of this SAP, the floodplain of Sanders Creek is the adjacent terrestrial area (above the bank), potentially inundated during high flow events.
- Underlying Clay – As identified during recent field activities (See Section 2.3), the underlying native material generally consists of clay, which also represents the bottom of the unconsolidated sediment.
- Potential Sediment – For purposes of this SAP, the potential sediment cross-sectional area is defined by the vertical line drawn from MHW down to underlying clay, the horizontal line along the top of the underlying clay to the toe-of-slope of the side bed and along the slope of the side bed back to the MHW. As depicted below, this cross-sectional area is triangular in shape and consists of material that falls within the stream bed, below MHW down to the underlying clay. The degree to which this material is actually sediment depends on its composition which will be assessed during upcoming sampling activities. The presence of sediment will be assessed by advancing a sampler 2 feet into the bank, perpendicular to the Side Bed. Materials will be logged and classified by a New York State-licensed geologist.

Conceptual Site Model Cross-Section



2.2.3 Contaminant Transport and Deposition

As indicated above, the PCBs released in stormwater are believed to be the source of contaminants detected in sediments in the stream bottom. There is also a potential that contaminants may be present in the side of the bed, the bank and in the floodplain. Transport and deposition of contaminants within the Site, if present in areas outside of the stream bed bottom, is believed to have occurred by one of the following transport mechanisms:

- PCBs adsorbed to sediment and deposited on the side bed, bank or floodplain during high flow events. Based on observations of Sanders Creek, there are few indications of significant sediment deposits on the side bed, or on soils located above MHW.
- PCBs in floating oils, which may have accumulated during all flow stages and may be detected outside of the stream bed bottom. There is also a potential of oil accumulation in the immediate vicinity of the plant outfalls.
- Although no records have been identified, PCBs may be present in bank or floodplain areas as a result of historic dredging activities associated with stream bed maintenance. Dredge spoils may have been dumped on the bank or floodplain and incorporated into the existing grade.

2.3 Establishment of Mean High Water and Underlying Confining Layer

In preparation of this SAP, the MHW elevation and depth to the underlying clay confining layer were established during a survey conducted on April 23 and 24, 2015 at the location of the previous sediment samples as well as at the culverts at either end of each section.

MHW was established for the purpose of determining the location of the transition from the stream bed to the bank as defined in the NYSDEC Part 608.1(r), which defines MHW as:

Mean *low water or mean high water means, respectively, the approximate average low water level or high water level for a given body of water at a given location**, that distinguishes between predominantly aquatic and predominantly terrestrial habitat** as determined, in order of use, by the following**:***

(1) available hydrologic data, calculations, and other relevant information concerning water levels (e.g., discharge, storage, tidal, and other recurrent water elevation data)[Note: Mean high water elevations are established, using this method, for certain waterbodies as presented in Section 608.11 of this Part];

(2) vegetative characteristics (e.g., location, presence, absence or destruction of terrestrial or aquatic vegetation);

(3) physical characteristics (e.g., clear natural line impressed on a bank, scouring, shelving, or the presence of sediments, litter or debris); and

(4) other appropriate means that consider the characteristics of the surrounding area.

The regulation does not provide specific methodology for doing so, nor has NYSDEC published a separate field guide or manual for making these determinations. A brief summary of the MHW survey results is presented below, with a more detailed description of the methodologies used to determine MHW elevations, the data for the surveyed locations, and a photographic record of the locations in **Appendix B**. In a December 22, 2015 letter to UTC, NYSDEC has stated they do not agree with the MHW field delineation. The delineation of the MHW may be revisited once the data from the sampling effort described in this SAP has been evaluated.

The survey was conducted during relatively low flow conditions at the end of a descending limb of a recent rain event as monitored at the United States Geological Survey (USGS) station on Ley Creek. Flow was measured in Sanders Creek each of the two days (2.8 cubic feet per second [cfs] and 1.7 cfs, respectively). At each transect (located by global positioning system [GPS]), both edges of the stream and the MHW were marked and surveyed. The depth to clay was determined at one or both edges of the stream. Measuring the depth of clay at the edge of the stream allowed a visual assessment of the surface material and for GPS survey, as well as improving sample recovery from the core, all of which are made more difficult by standing in turbid water as was present in the middle of the stream. Other ancillary measurements were taken (i.e., stream depth and width, width at MHW, and height of adjacent bank). The MHW was also marked and surveyed at each culvert. The MHW survey locations are presented on **Figures 2.4-1 through 2.4-10** and MHW survey results are shown graphically on **Figure 2.5**.

As stated above, cores were advanced during the survey at the water's edge to record a measurement of the depth to the underlying clay. The purpose of these measurements was to confirm the presence of a confining layer below the sediment of the stream bed and to evaluate the composition of this confining layer. The confining layer was encountered at all locations and was generally characterized as a light grey, stiff clay with medium plasticity. In **Figure 2.5**, it is noted that at some transect locations, the underlying clay elevations are actually above the channel bottom measurement. These observations indicate the degree to which the stream has been incised into the underlying clay (i.e., the stream is potentially more incised into the underlying clay layer at these locations).

3.0 Scope of Work

The objective of this SAP is to specify a sampling and analysis program capable of yielding representative samples sufficient to identify the distribution of hazardous constituents within the Site. The specific objectives of this SAP include:

- Measuring the lateral and vertical extent of constituents of interest (in particular PCBs) in soil, if present, in the estimated floodplain of Sanders Creek;
- Assessing for the presence of constituents of interest (in particular PCBs) in soil at specific locations (i.e., former outfall areas or other locations of interest observed in the field);
- Measuring the extent of constituents of interest (in particular PCBs), if present, within the side bed of Sanders Creek; and
- Confirming that the clay which underlies the Stream Bed Bottom is free of site related contamination.

The subtasks below describe the procedures to be completed in support of these objectives. Additional information regarding these procedures is included in the sampling and analytical protocols described in Section 4, and in detailed descriptions of the analytic protocols listed in the Quality Assurance Project Plan (QAPP, **Appendix C**).

3.1 General Field Activities

General field activities include site meetings, mobilization, health and safety planning, hand soil auguring or coring, sampling and analytical testing, decontamination and handling of investigation wastes, and surveying.

3.1.1 **Mobilization**

Following approval of the SAP by NYSDEC, the Underground Facilities Protection Organization (UFPO) will be contacted at 1-800-962-7962 to clear exploration locations. Utility clearance requires three working days by UFPO. All field work on Carrier-owned property will be coordinated with Carrier.

3.1.2 **Health & Safety**

Personnel performing work at the job site will be qualified for Hazardous Waste Operations and Emergency Response (HAZWOPER) duty in accordance with 29 CFR 1910.120, and will be provided with information on hazards specific to the project as conveyed in Task Hazard Analyses (THAs), and the site specific Health and Safety Plan (HASP). Personnel will meet the medical monitoring and training requirements specified in AECOM's North America Safety, Health and Environmental (SH&E) Standard Operating Procedures, and will complete UTC Contractor Environment, Health & Safety Training.

It is anticipated that the work to be completed at Sanders Creek will be performed with Level D personal protection equipment. Should health and safety monitoring during field activities indicate a threat to field personnel or warrant an upgrade beyond Level D protection, work will stop and site conditions will be re-evaluated.

Prior to the commencement of sampling and analysis activities, a daily tailgate meeting will be conducted by the Site Safety Officer (SSO) to review the site specific health and safety requirements and applicable THAs. Attendance at the daily tailgate meeting is mandatory for all personnel at the Site covered in this plan and will be documented on the attendance form. All safety training documentation is to be maintained in the project file by the SSO. All field personnel have the right and duty to stop work when, in their opinion, conditions are unsafe and to assist in correcting these conditions. Additional health and safety details will be provided in the site-specific HASP.

3.1.3 Floodplain, Bank, Side Bed and Stream Bed Bottom (Underlying Clay) Characterization

In areas where a broad, gradual sloping floodplain exists, sampling will be conducted along transects perpendicular to the flow of Sanders Creek. The location and orientation of these transects is designed to provide a stratified random sampling regime, which will also result in adequate sample density within the bank and floodplain study area.

The Flood Map including the Site vicinity was reviewed from the Federal Emergency Management Agency (FEMA) Flood Map Service Center. The current FEMA Map (effective 1979), and the 2015 "Preliminary FIRM Panel" (not yet adopted) show the entirety of Sanders Creek to be Zone C: areas of minimal flooding, and no mapped "Floodway Area" exists within the vicinity of the Site. Due to the lack of floodway mapping, the extent of the floodplain was estimated in a June 2014 survey of the stream. The extent of the floodplain was determined using visible evidence including an observed debris line (particularly focused on areas surrounding culvert inlets but also including observations of debris trapped in low hanging branches and bushes along the bank) to estimate the surface inundated during times of high flows.

The estimated extent of the floodplain was confirmed after a June 30, 2014 rain event. On June 30, 2014, 2.64 inches of rainfall was recorded at the Syracuse Airport, with the majority falling within a 2-hour time period (between 20:54 and 22:54). The peak instantaneous flow measured at the Ley Creek Park Street gauging station (downstream of Sanders Creek) was 1,610 cubic feet per second (cfs) at 05:30 on July 1, 2015, which was higher than the historic peak flow at this location (dating back to 1974). The previous peak flow was approximately 1,400 cfs. The approximate high water elevation along Sanders Creek was marked with flagging and paint later that morning.

While not derived quantitatively (e.g., not based on a specific recurrence interval), the extent of the floodplain areas provides an estimated area on which to base the proposed sampling locations. It is assumed that any PCBs present will have been deposited via high flow events. Based on this assumption, each successive location in a transect increases in elevation. If the upper most samples contain no PCBs, it could be assumed that that location was beyond the highest flood elevation for the period of potential PCB releases. If the highest elevation in the transect contains PCBs, the floodplain has not been fully defined, and additional sampling may be required. Proposed floodplain and bank sampling locations are shown on **Figures 3.1-1** through **3.1-11**. The exact location of samples will be determined in the field, with a priority given to locations likely to accumulate sediment or oil. Floodplain and bank sample locations will be positioned above the delineated MHW mark. Flow velocities during high flow events is anticipated to be less conducive to sediment deposition in areas where the floodplain and bank is narrow and steep. Generally, one sample location (rather than a three-sample transect as used at broader and more gradually sloped areas) is proposed to represent floodplain and bank areas with these characteristics.

Samples of the underlying clay in the stream bed bottom will be collected to document the absence of PCBs. Twenty clay samples will be collected, evenly spaced along the centerline of the creek, with emphasis on locations where previous sediment sampling yielded concentrations of PCBs greater than 1 mg/kg. An additional three clay samples will be collected upgradient of Telergy Parkway for comparison to background conditions. Proposed clay sampling locations are shown on **Figures 3.1-1** through **3.1-11**.

Samples will be collected from the side bed in areas where deposition of sediment or accumulation of oil is likely to occur. At each of 20 locations downstream of Telergy Parkway, a side bed sample will be collected from each side of the creek. Side bed samples will be collected from between the water level and the MHW mark. An additional three side bed samples will be collected upgradient of Telergy Parkway to evaluate presence or absence of contamination. Proposed side bed sampling locations are shown on **Figures 3.1-1** through **3.1-11**.

Floodplain and side bed samples collected from Carrier property will be analyzed for a complete suite of PCBs, metals (Resource Conservation and Recovery Act [RCRA] 8), semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs), with a 1 week turnaround time from the laboratory. Floodplain samples will be collected from intervals in accordance to DER-10 3.5.1 (b) (0 to 6 inches [VOCs only], 0 to 2 inches [other analytes], 6 to 12 inches, and 12 to 24 inches). Side bed samples will be collected from 0 to 6 inches, 6 to 12 inches, and 12 inches to 24 inches. An evaluation comparing PCB detections to other chemical compounds will be conducted to evaluate: 1) the presence of other compounds, and 2) if present, whether the detected compounds are collocated with PCBs.

Floodplain and side bed samples collected from 0 to 6 inches at locations not on Carrier property will be analyzed for a complete suite of PCBs, metals (Resource Conservation and Recovery Act [RCRA] 8), semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs). . Samples from those locations below 6 inches will be initially analyzed for PCBs only. Analysis of samples collected from below 6 inches may be performed on other compounds: 1) if these compounds are detected upstream, and 2) if upstream sample results indicate that the contaminants are not collocated with PCBs.

All underlying clay samples collected from the stream bed bottom will be analyzed for PCBs. Every other clay sample collected east of Thompson Road will also be analyzed for metals (RCRA 8), SVOCs, and VOCs.

The number and types of samples to be collected are summarized in **Table 3.1**, and the total number (including QA/QC) and types of analyses are summarized in **Table 3.2**.

The total number of sample locations is presented in **Table 3.3** along with the areas of Sanders Creek and the adjoining floodplain. These are compared to the number of sample locations required by the Balduck Method. The total surface area for each sampling area (i.e., floodplain and banks, side bed and stream bed bottom) were derived from the base map created from the November 2013 aerial photography and field measurements. The number of samples required by the Balduck method are provided from Table B-1 of Appendix B of the NYSDEC Division of Water TOGS 5.1.9, using the dredging factor, Df, equal to 3 (since the Site has documented contamination in the sediment). The number of samples proposed for each area exceed the Balduck number associated with the respective calculated areas. It is noted that the area calculated for the side bed (3,875 square yards) is below the minimum area listed on the Balduck table. To be conservative, forty-six sample locations are planned in this area, which is more than twice the maximum of the smallest Df3

sample number range provided on the table. In addition, the proposed number of floodplain and bank sample locations exceeds the number determined using the Balduck equation using a Df equal to 3.

3.1.4 Former Outfall Area Sampling

Samples will be collected from two locations at each of nine former outfalls identified on Carrier property. One sample location will be located downstream from the end of the outfall (between the outfall and Sanders Creek) and will be sampled with the same field methods and analytical suite as the floodplain samples. The other sample location will be from the pipe bedding material associated with the outfall pipe and will consist of one sample of pipe bedding material. The method of sampling for pipe bedding material will depend on the outfall construction at each location and will be determined in the field.

3.1.5 Other Proposed Sample Locations

Additional samples may be collected on Carrier property at the discretion of the field team from areas where impacts are observed during field effort. These locations will be sampled with the same field methods and analytical suite as the floodplain samples. If warranted, additional samples may be collected after data from this sampling effort are evaluated. For example, these additional samples may be required to delineate a removal area.

3.1.6 Decontamination Procedures and IDW Management

To avoid cross contamination, sampling equipment such as hand augers or cores, stainless steel sampling devices, and mixing bowls will be decontaminated using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse; and
- Distilled/deionized water rinse.

The sampling methods and equipment selected will limit both the need for decontamination and the volume of waste material to be generated. Decontamination procedures specific to each of the field activities are described in a later section of this SAP. Personal protective equipment (i.e., latex gloves) and disposable sampling equipment (i.e., polyethylene core sleeves) will be placed in plastic garbage bags for disposal as a solid waste. Soil cuttings will be minimal, and will be placed back in the holes from which they were taken.

3.1.7 Environmental Analytical Testing Program

The number and types of environmental samples to be collected is summarized in **Table 3.2,** while bottle type, preservation and other information is provided in **Table 3.4**. The samples collected as part of this SAP will be analyzed according to the United States Environmental Protection Agency (USEPA) SW-846 methods with an equivalent Category B deliverable package and third-party data validation. To the extent allowed by existing physical conditions at the Site, sample collection efforts will adhere to the specific methods presented in this SAP. If alternative sampling locations or procedures are implemented in response to Site specific constraints, each will be selected on the basis of meeting data objectives. Further information regarding analytic protocols and quality criteria can be found in the QAPP (**Appendix C**).

3.1.8 **Survey**

Each sample location will be surveyed upon the completion of the fieldwork. A licensed land surveyor will be contracted to conduct the survey. Vertical measurements will include a ground surface elevation. Vertical measurements will be made relative to the National Geodetic Vertical Datum (NGVD). Horizontal measurements and ground surface elevations will be accurate to within 0.1 foot. The survey will include pertinent Site features, as applicable.

4.0 Quality Assurance/Quality Control

A QAPP has been prepared in support of the SAP activities (**Appendix C**) to ensure the accuracy and precision of data collection during the Site characterization and data interpretation activities. The QAPP specifies the Data Quality Objectives (DQOs) for the project and identifies the principal organizations involved in verifying achievement of data collection goals. Data collected and analyzed in conformance with the DQO process described in the QAPP will be used in assessing the overall level of uncertainty associated with decisions related to this Site. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the USEPA Region II Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

4.1 Scope of the QAPP

The QAPP was prepared to provide QA guidelines to be implemented during the SAP activities. This document may be modified for subsequent phases of investigative work, as necessary. The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when;
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations);
- A historical record that documents the investigation in terms of the methods used, calibration standards and frequencies planned, and auditing planned;
- A document that can be used by the Program Manager and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data;
- A plan to document and track project data and results; and
- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples, field testing, record keeping, data management, chain-of-custody procedures, laboratory analyses, and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be verified.

4.2 Organization and Responsibility

The principal organizations involved in verifying achievement of data collection goals for the project include the NYSDEC, UTC, AECOM, the independent environmental laboratory, and the independent third party data validator.

Roles, responsibilities, and required qualifications of these organizations are discussed in Section 1.2 of the QAPP.

4.3 Objectives for Measurement Data

DQOs for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended use. Data collected and analyzed in conformance with the DQO process described in the QAPP will be used in assessing the uncertainty associated with decisions related to this Site. The overall objectives and criteria for assuring quality for this effort are discussed in Section 4.2 of the QAPP.

4.4 Data Usability Evaluation

Data evaluation will be performed by the third party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, and CLP National Functional Guidelines for Inorganic Data Review. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. In addition, results of blanks, surrogate spikes, matrix spike/matrix spike duplicates (MS/MSDs), and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

5.0 Reporting and Schedule

Upon receipt of the laboratory analytical reports and Electronic Data Deliverables, the data will be uploaded into an EQuIS database. The database and laboratory hardcopy reports will be forwarded to the data validator, who will insert the appropriate qualifiers into the data tables and prepare a Data Usability Summary Report (DUSR). The validated data will then be uploaded into the EQuIS database. Upon receipt of these deliverables, data generated by SAP activities will be incorporated and presented within a revised Remedial Action Work Plan (RAWP).

5.1 Reporting

The revised RAWP will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

- Introduction, Site history, summary, and description of Sanders Creek.
- A description of the field procedures and methods used during sampling and analysis.
- The data obtained during sampling and analysis that may include field measurements and geochemical data.
- Comparative criteria that may be used to determine cleanup levels during analysis of analytical data, such as NYSDEC Soil Cleanup Objectives.
- Conclusions regarding the extent and character of constituents of interest in the media being investigated.
- Supporting documents for the revised RAWP that may include boring logs, laboratory analytical reports, etc.

The DUSR and tabulated, validated data will be appended to the revised RAWP.

5.2 Schedule

Sampling will begin on UTC/Carrier property and from within the stream bed (clay and side bed sampling). Sampling of floodplain soils on non-UTC/Carrier property will proceed as access is granted.

Tables

TABLE 3.1

Sampling and Analysis Plan Field and Laboratory Sample Summary
Sanders Creek

FIELD TASK	DEPTHS	LOCATIONS	QUAN.	ANALYTICAL
Floodplain and Bank Soil Sampling (All Areas)	Surface (see note)	Collect soil samples at each location shown on Figure 3-1	72	VOCs; SVOCs; PCBs; RCRA 8 Metals
Floodplain and Bank Soil Sampling on UTC/Carrier Property	6 -12 inches	Collect soil samples at each location shown on Figure 3-1	38	VOCs; SVOCs; PCBs; RCRA 8 Metals
	12-24 inches		38	VOCs; SVOCs; PCBs; RCRA 8 Metals
Floodplain and Bank Soil Sampling off UTC/Carrier Property	6 -12 inches	Collect soil samples at each location shown on Figure 3-1	34	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals hold)
	12-24 inches		34	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals hold)
Sampling of Side Bed on UTC/Carrier Property	0 - 6 inches	Collect one sample at each location shown on Figure 3-1 midway between water and mean high water elevation.	20	VOCs; SVOCs; PCBs; RCRA 8 Metals
	6 -12 inches		20	VOCs; SVOCs; PCBs; RCRA 8 Metals
	12-24 inches		20	VOCs; SVOCs; PCBs; RCRA 8 Metals
Sampling of Side Bed off UTC/Carrier Property	0 - 6 inches	Collect one sample at each location shown on Figure 3-1 midway between water and mean high water elevation.	26	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals hold)
	6 -12 inches		26	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals hold)
	12-24 inches		26	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals hold)
Sampling of Clay	0-6 inches	Collect one sample at each location shown on Figure 3-1 from within clay. Analyze every other sample between Telergy Parkway and Thompson Road for all analytes rather than PCBs only.	19	PCBs only
			5	VOCs; SVOCs; PCBs; RCRA 8 Metals
Sampling of Outfalls	0 - 6 inches	Collect samples from nine former Carrier outfall areas and outfall pipe bedding as shown on Figure 3-1	18	VOCs; SVOCs; PCBs; RCRA 8 Metals
	6 -12 inches		9	VOCs; SVOCs; PCBs; RCRA 8 Metals
	12-24 inches		9	VOCs; SVOCs; PCBs; RCRA 8 Metals
Sampling of Areas of Interest	As appropriate	As appropriate	As needed	PCBs immediately (VOCs; SVOCs; RCRA 8 Metals as appropriate)

VOCs: Volatile Organic Compounds
SVOCs: Semi-Volatile Organic Compounds
PCBs: Polychlorinated Biphenyls
RCRA: Resource Conservation and Recovery Act of 1976 (8 Metals)
Surface samples: for VOC analysis will be from 0 to 6 inches; for all other analyses will be from 0 to 2 inches.

Table 3.2
Sampling and Analysis Plan - Laboratory Analyses
UTC/Carrier Sanders Creek Site

Reporting Limits and QA/QC Sample Quantity Summary

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit -Typical (units as specified)	Field Sample Quantity	Matrix Spike (MS) or LCS	MS Duplicate or Matrix Duplicate	Field Duplicate	Equipment/ Field Blank [2]	Trip Blank	Total Analyses [3]
Soil/Sediment Samples										
Volatile Organics	SW 846 8260C	ACCUTEST	5 µg/kg (typical) [1]	395	20	20	20	20	12 [4]	487 [5]
Semivolatile Organics	SW 846 8270D	ACCUTEST	330 µg/kg (typical) [1]	395	20	20	20	20	0	475 [5]
PCBs	SW 846 8082A	ACCUTEST	57 - 70 µg/kg [1]	414	21	21	21	21	0	498 [5]
RCRA 8 Metals	SW 846 6010C	ACCUTEST	Analyte-specific	395	20	20	20	20	0	475 [5]

PCBs = Polychlorinated Biphenyls
RCRA = Resource Conservation and Recovery Act of 1976 (8 Metals)
µg/kg = micrograms per kilogram
LCS = Laboratory Control Sample

Notes:
1 Reporting limits for soils, when adjusted for dry weight, will be higher. Detections above the method detection limits but less than reporting limits will be reported and flagged as estimated (J).
2 Field equipment rinsate blank quantity will vary depending on sample collection rate and types of sampling equipment used; quantity may be greater or less than that shown.
3 MS/MSDs not included in the total.
4 Total number of trip blanks estimated.
5 Samples collected on Carrier property will immediately be extracted and analyzed for all compounds and locations upon receipt by the laboratory. Samples collected from off-site will immediately be extracted, but not analyzed, pending review of sample results from Carrier property. The field sample quantity shown assumes that all analyses will be performed for all compounds and sample locations.

Table 3.3 Sampling Areas

	Area[1] (square yards)	Number of Sample Locations[2]	Balduck[3] Number Df3
Floodplain and Bank Sample Locations	42,076	72	27 - 30
Side Bed Sample Locations	3,875	46	15 - 18
Clay Sample Locations	8,140	23	15 - 18

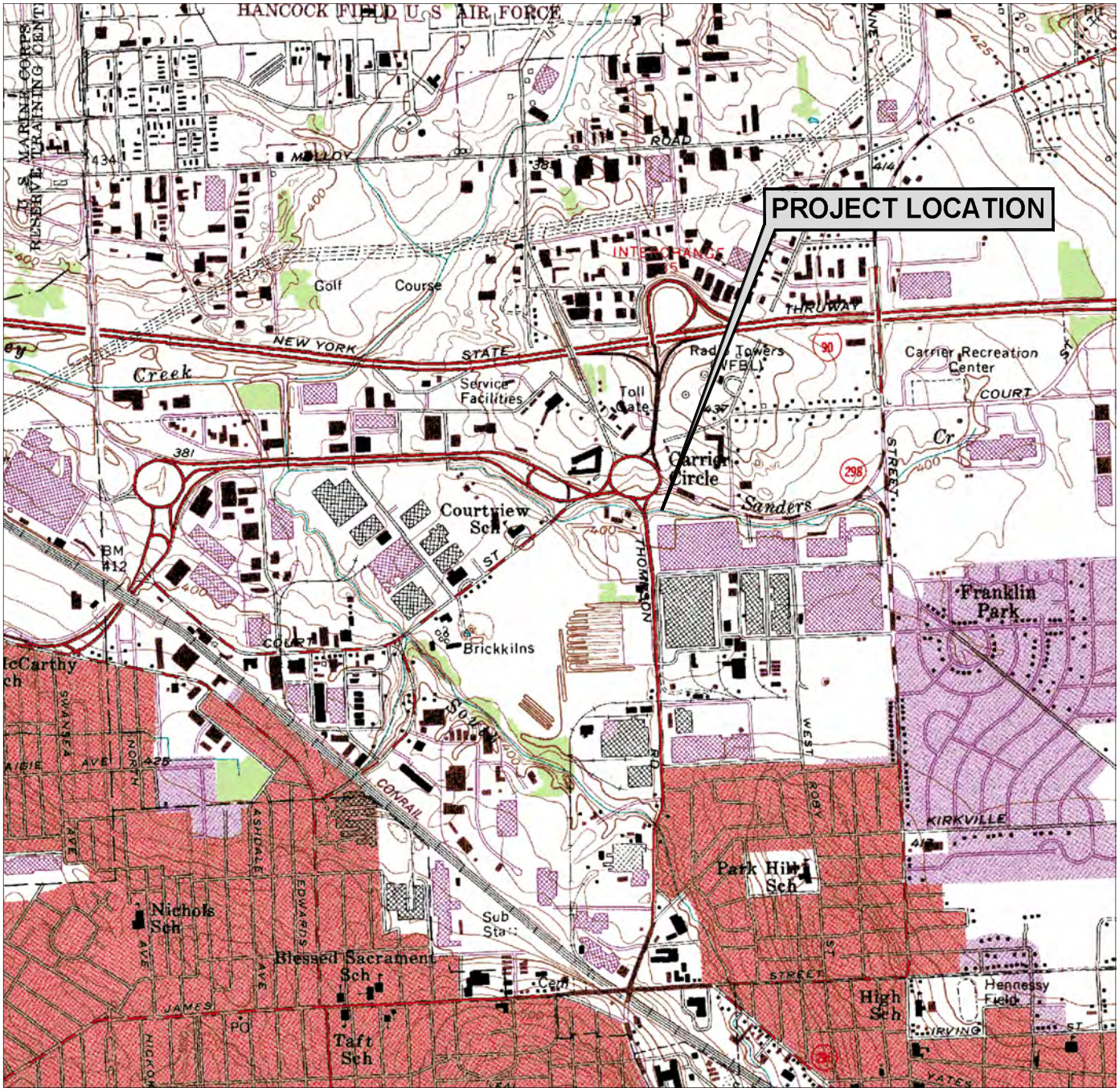
1 - Areas taken from map constructed from 2013 survey. Floodplain and bank area estimated as shown on Figure 2.1 based on June 2014 site visit; side of the bed and clay areas based on field measurements.
2 - As shown on Figure 3-1
3 - Taken from Table B-1 in NYSDEC TOGS 5.1.9:
http://www.dec.ny.gov/docs/water_pdf/togs519.pdf
Df3 = Dredging Factor 3, used for sites with documented contamination from past sediment data.

Table 3.4
Sample Bottle, Volume, Preservation, and Holding Time Summary
UTC/Carrier Sanders Creek Site Sampling and Analysis Plan

MATRIX/ANALYSIS	Sample Prep Method [1]	Analytical Method [(2)]	Sample Bottles (3)				Minimum Vol Rqd	Preservation (4)	Holding Time (4, 5)	
			Mat'l	Size	Qty	Source			Extraction	Analysis
Non-Aqueous Samples										
Volatile Organics	SW 846 5035A	SW 846 8260C	TerraCore	5 or 25 g	3 or 1	Vendor [7]	5 g	None	NA	48 hours [8]
Semivolatile Organics	SW 846 3540C/3541/3545A	SW 846 8270D	G	8 oz [(6)]	1	Lab	30 g	None	14 days	40 days
Polychlorinated Biphenyls	SW 846 3540C/3541/3545A	SW 846 8082A	G	"	"	Lab	30 g	None	14 days	40 days
RCRA 8 Metals	SW 846 3050B/3051A/3052	SW 846 6010C	G	"	"	Lab	10 g	None	NA	180 days

Notes:
(1) Laboratory may propose alternate extraction/preparation methods, subject to AECOM approval.
(2) More recent versions of SW-846 methods may be used subject to AECOM approval.
(3) Bottles typical. TerraCore samplers for Volatile Organics in soil will be provided by laboratory or AECOM on a case-by-case basis.
(4) All samples for chemical analysis should be held at 4 degrees Celsius in addition to any chemical preservation required.
(5) Holding time calculated from day of collection, unless noted as being from time of extraction. Laboratory holding times (ASP 2005, Exhibit I) are two days shorter to allow for field handling and shipping.
(6) A single 8-oz. sample is sufficient for Semivolatile Organics, Polychlorinated Biphenyls, and RCRA 8 Metals.
(7) TerraCore samplers are typically purchased from an outside supplier by AECOM but may also be requested (for a fee) from the analytical laboratory.
(8) TerraCore samplers must be prepared/preserved in the laboratory within 48 hours of collection. Soil samples in glass bottles and preserved TerraCores have a 14 day (total) holding time.
G = Glass
RCRA = Resource Conservation and Recovery Act of 1976 (8 Metals)
SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.

Figures



MAP REFERENCE:
PROJECT AREA CAN BE FOUND ON THE U.S.G.S. 7.5 MINUTE QUADRANGLE, SYRACUSE EAST SERIES, DATED 1957, PHOTO REVISED 1978.

0' 1000' 2000' 4000'

Issue Status: DRAFT

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

SITE LOCATION PLAN

AECOM

Figure: 2.1

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Issue Status: DRAFT

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

SITE PLAN

AECOM

Figure: 2.2

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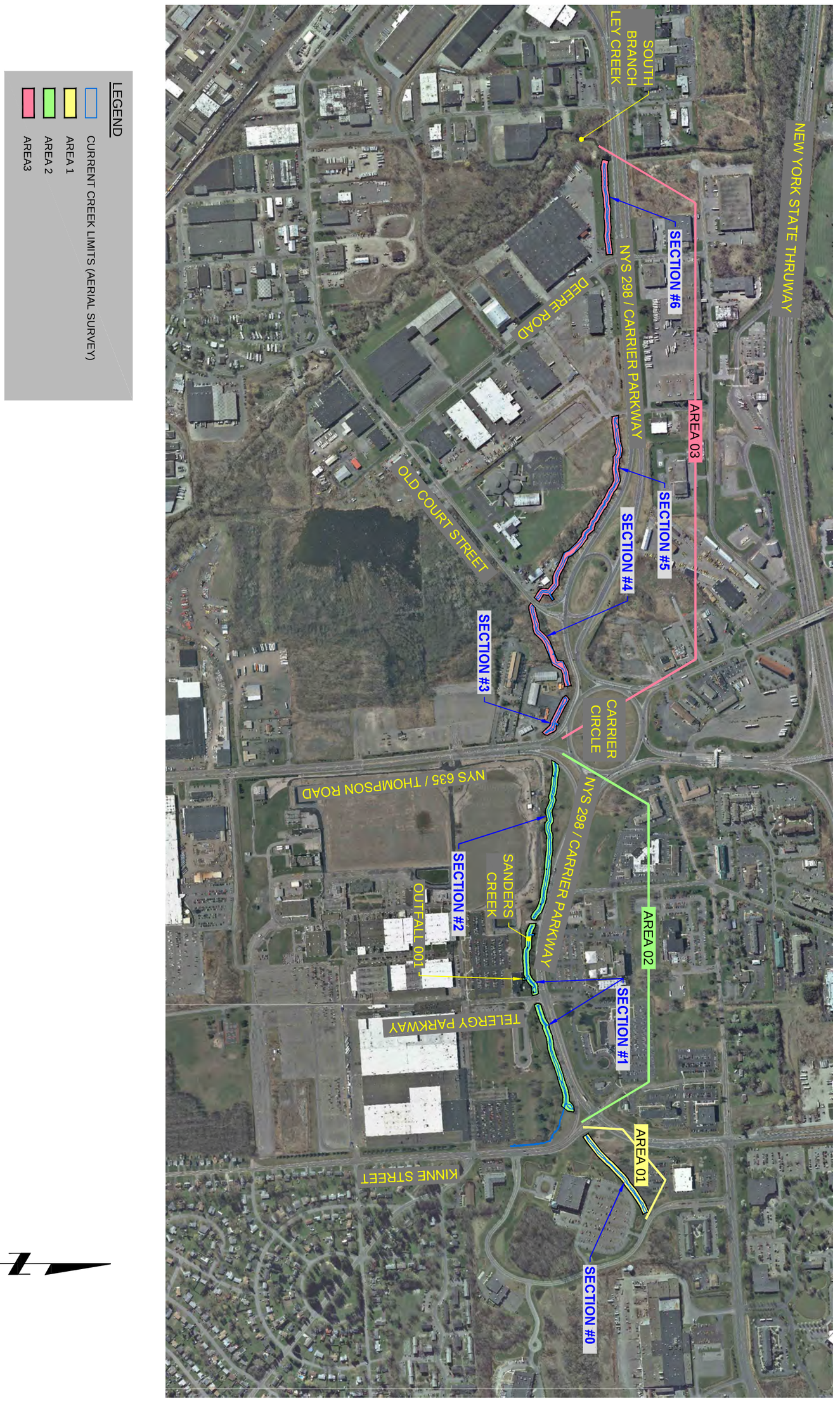


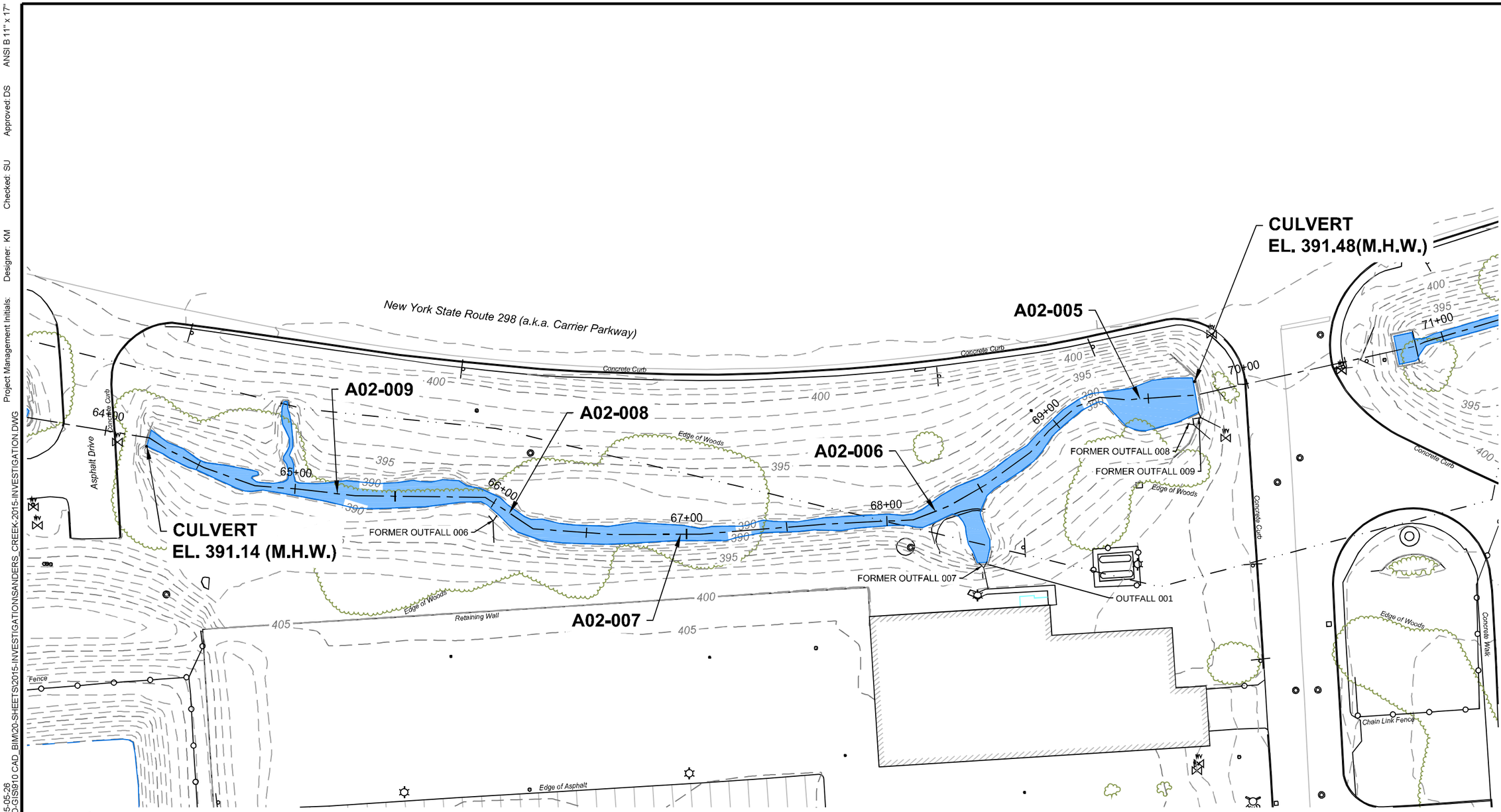
Issue Status: DRAFT

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

SANDERS CREEK
INVESTIGATION AREAS

AECOM

Figure: 2.3



LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- CENTERLINE OF CREEK ALIGNMENT (49+00)
- CHAIN LINK FENCE
- GAS VALVE (GV)
- WATER VALVE (WV)
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
- GUY WIRE
- LIGHT POLE
- TREE
- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

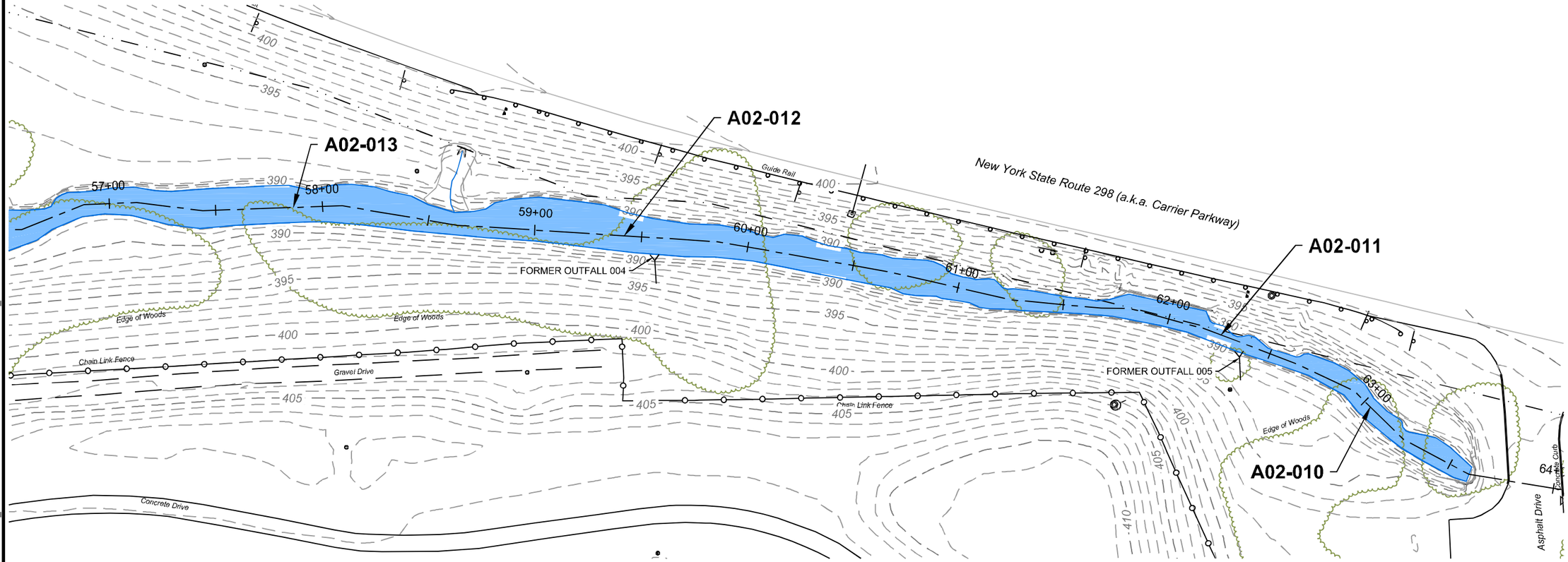
Issue Status: DRAFT

AECOM

Figure: 2.4-1

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
1 OF 10



LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- 49+00 CENTERLINE OF CREEK ALIGNMENT
- CHAIN LINK FENCE
- GV GAS VALVE
- WV WATER VALVE
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
- GUY WIRE
- LIGHT POLE
- TREE
- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 2.4-2

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
2 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

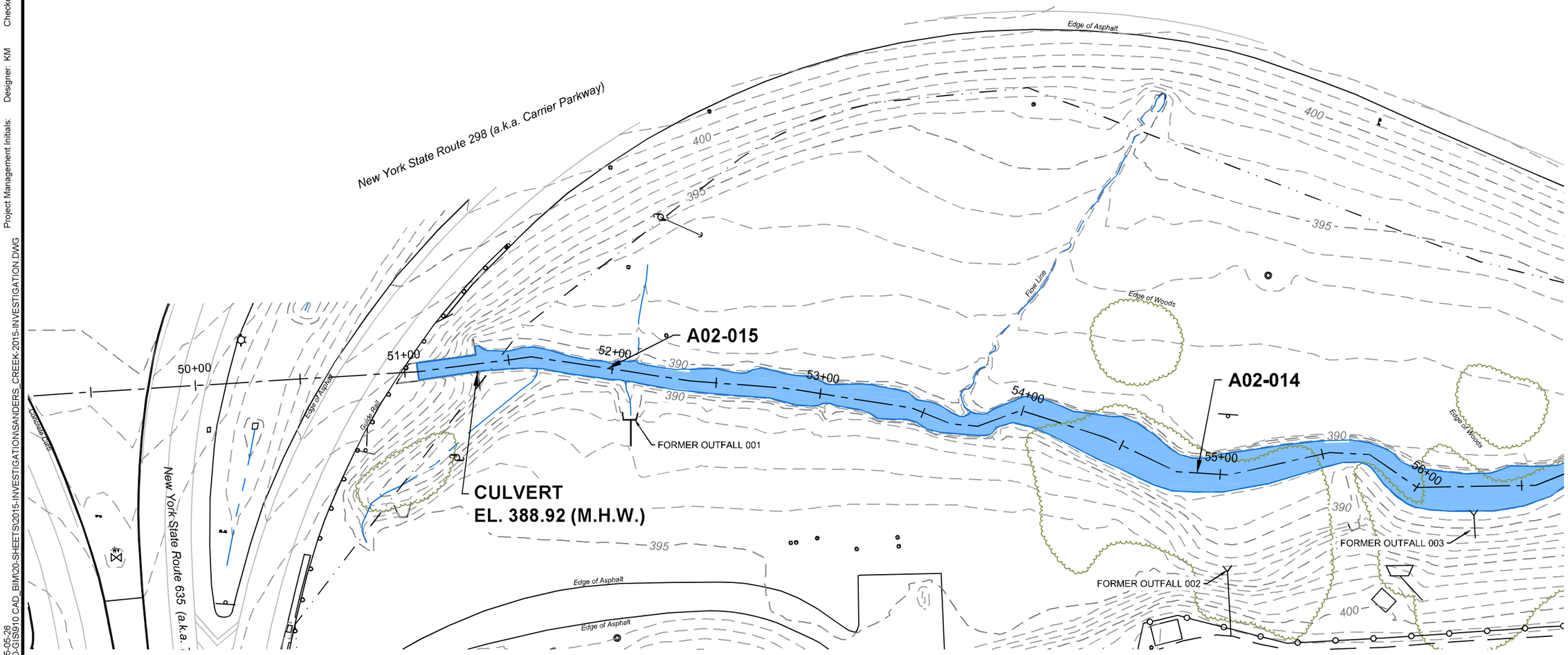
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

Issue Status: DRAFT

AECOM

Figure: 2.4-3

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
3 OF 10



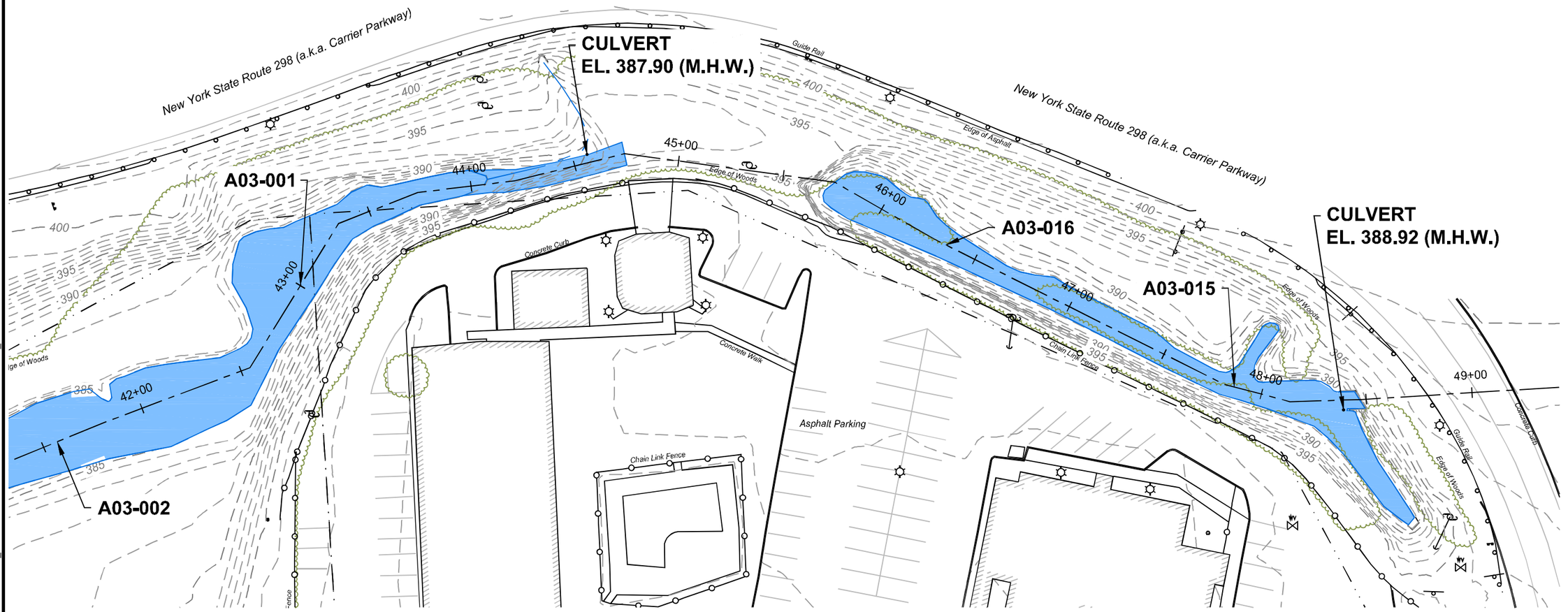
LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- CENTERLINE OF CREEK ALIGNMENT (49+00)
- CHAIN LINK FENCE
- GAS VALVE (GV)
- WATER VALVE (WV)
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
- GUY WIRE
- LIGHT POLE
- TREE
- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015



LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- 49+00 CENTERLINE OF CREEK ALIGNMENT
- CHAIN LINK FENCE
- GV GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
- GUY WIRE
- LIGHT POLE
- TREE
- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 2.4-4

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
4 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

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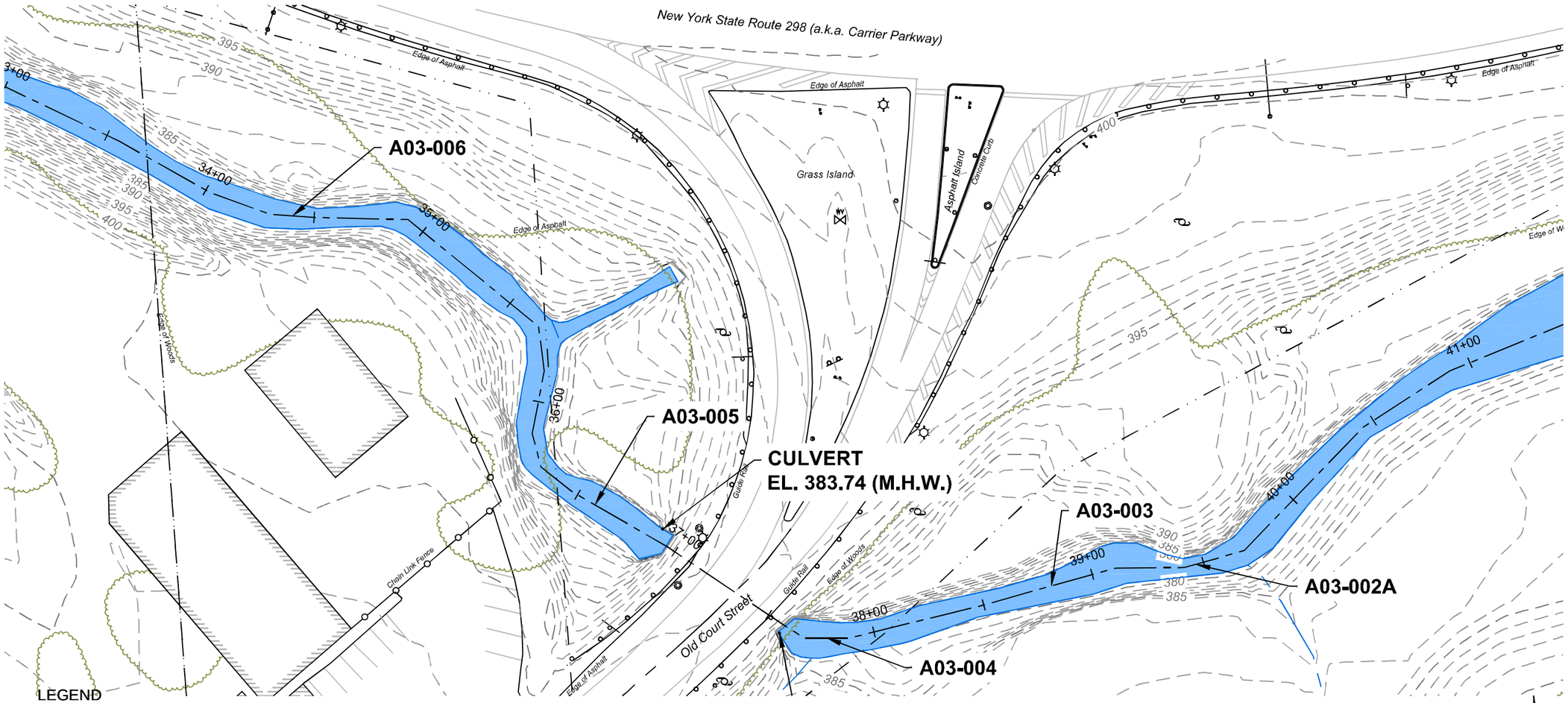


LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- CENTERLINE OF CREEK ALIGNMENT (49+00)
- CHAIN LINK FENCE
- GAS VALVE (GV)
- WATER VALVE
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
- GUY WIRE
- LIGHT POLE
- TREE
- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

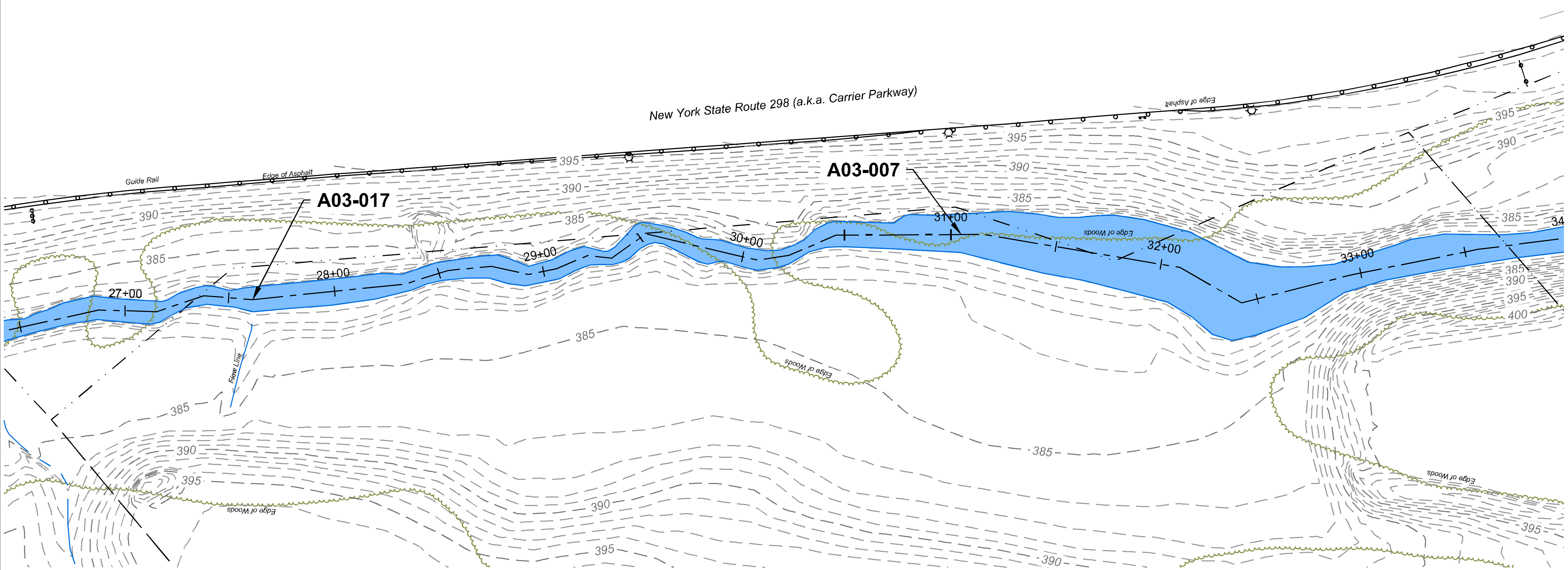
Issue Status: DRAFT

AECOM

Figure: 2.4-5

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
5 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015



LEGEND

400	MAJOR CONTOUR		WATER VALVE		SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
	EDGE OF WOODS		MANHOLE	A03-008	MHW FIELD SURVEY LOCATIONS
	EDGE OF WATER		UTILITY POLE		
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 2.4-6

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
6 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

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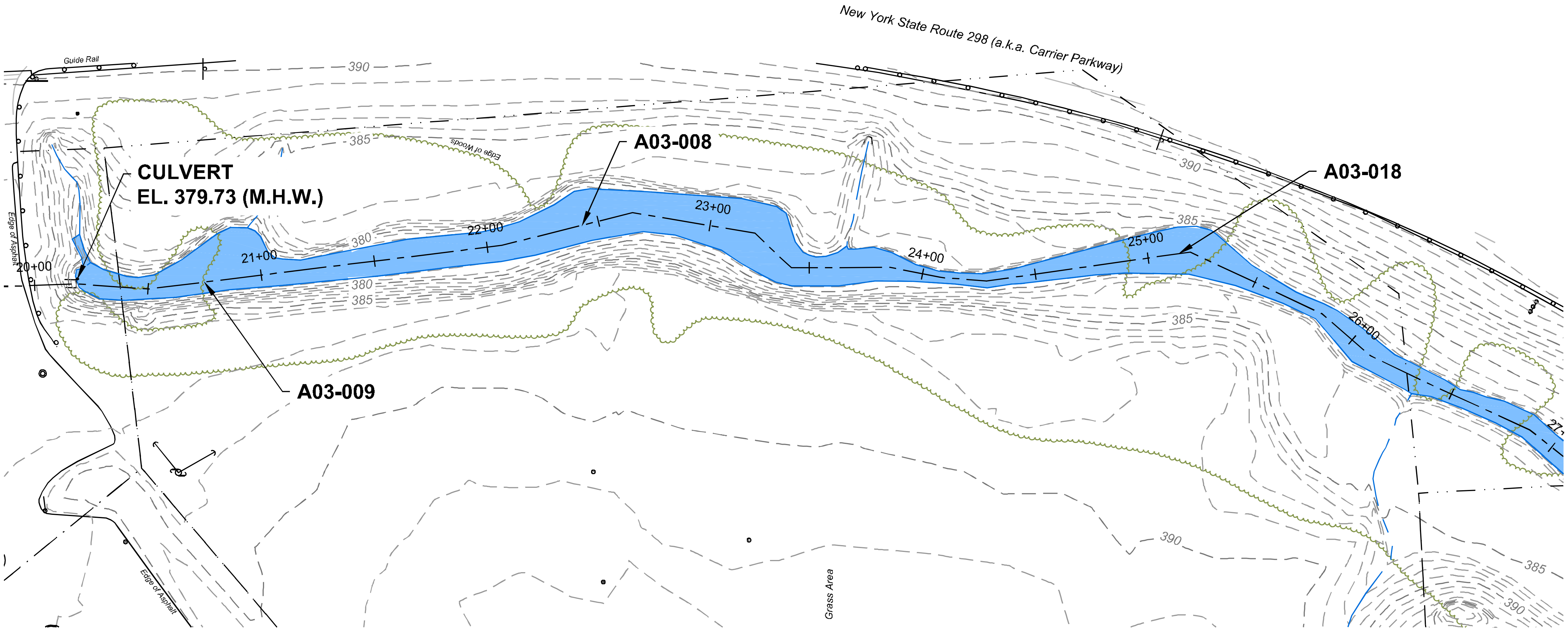

LEGEND

— 400 —	MAJOR CONTOUR		WATER VALVE		SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
	EDGE OF WOODS		MANHOLE	A03-008	MHW FIELD SURVEY LOCATIONS
	EDGE OF WATER		UTILITY POLE		
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 2.4-7

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
7 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

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Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

LEGEND

- MAJOR CONTOUR (400)
- MINOR CONTOUR
- EDGE OF WOODS
- EDGE OF WATER
- EDGE OF GRAVEL
- GUIDE RAIL
- 49+00 CENTERLINE OF CREEK ALIGNMENT
- CHAIN LINK FENCE
- GV GAS VALVE
- WV WATER VALVE
- FIRE HYDRANT
- MANHOLE
- UTILITY POLE
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- LIGHT POLE
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- SIGN
- SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
- APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
- A03-008 MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

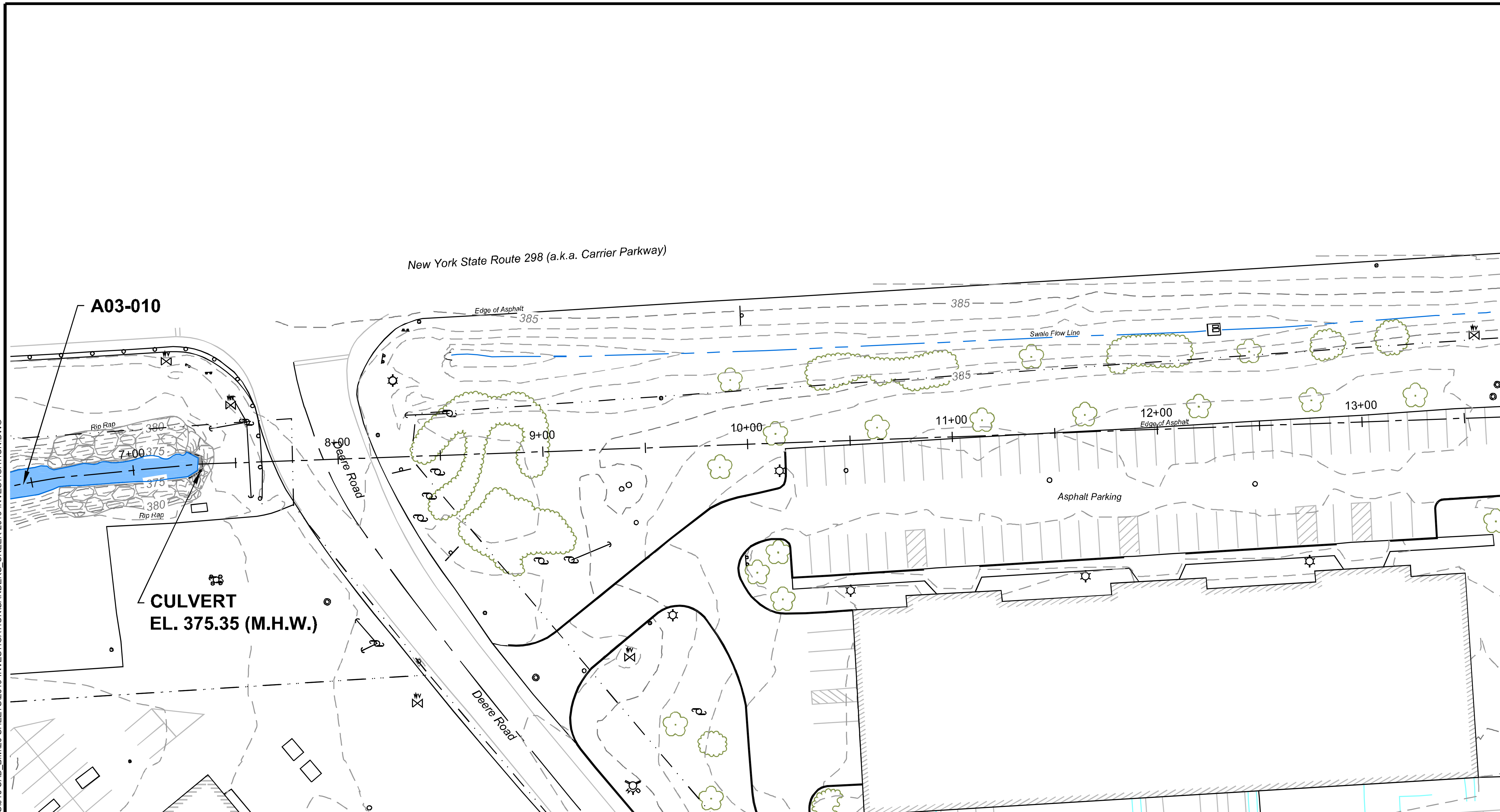
AECOM

Figure: 2.4-8

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
8 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

Issue Status: DRAFT



LEGEND

400	MAJOR CONTOUR
	MINOR CONTOUR
	EDGE OF WOODS
	EDGE OF WATER
	EDGE OF GRAVEL
	GUIDE RAIL
49+00	CENTERLINE OF CREEK ALIGNMENT
	CHAIN LINK FENCE
GV	GAS VALVE
WV	WATER VALVE
	FIRE HYDRANT
	MANHOLE
	UTILITY POLE
	GUY WIRE
	LIGHT POLE
	TREE
	SIGN
	SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
	APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
A03-008	MHW FIELD SURVEY LOCATIONS

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

AECOM

Figure: 2.4-9

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
9 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

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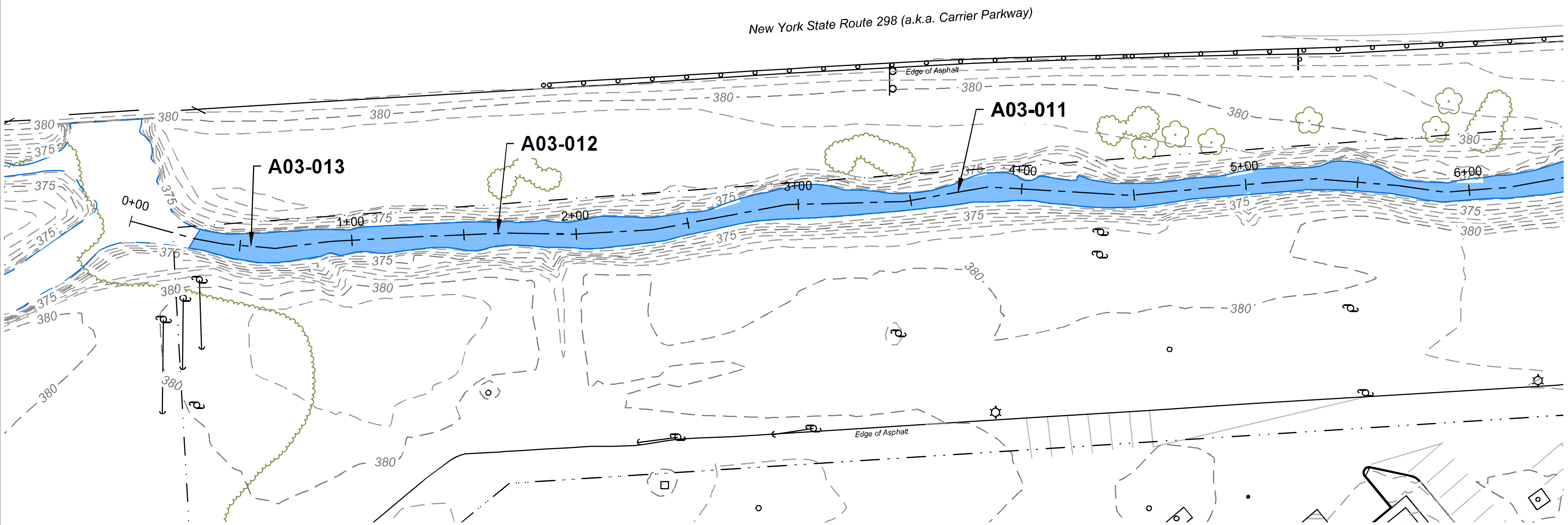
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"



LEGEND

400	MAJOR CONTOUR		WATER VALVE		SANDERS CREEK - AERIAL MAPPING - NOVEMBER 2013
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - TAX MAPPING
	EDGE OF WOODS		MANHOLE	A03-008	MHW FIELD SURVEY LOCATIONS
	EDGE OF WATER		UTILITY POLE		
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

NOTE:
MHW FIELD SURVEY LOCATIONS COINCIDE AND ARE IDENTIFIED CONSISTENTLY WITH 2013 SEDIMENT SAMPLE LOCATIONS.

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 2.4-10

SANDERS CREEK
MEAN HIGH WATER FIELD SURVEY LOCATIONS
10 OF 10

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: MAY 2015

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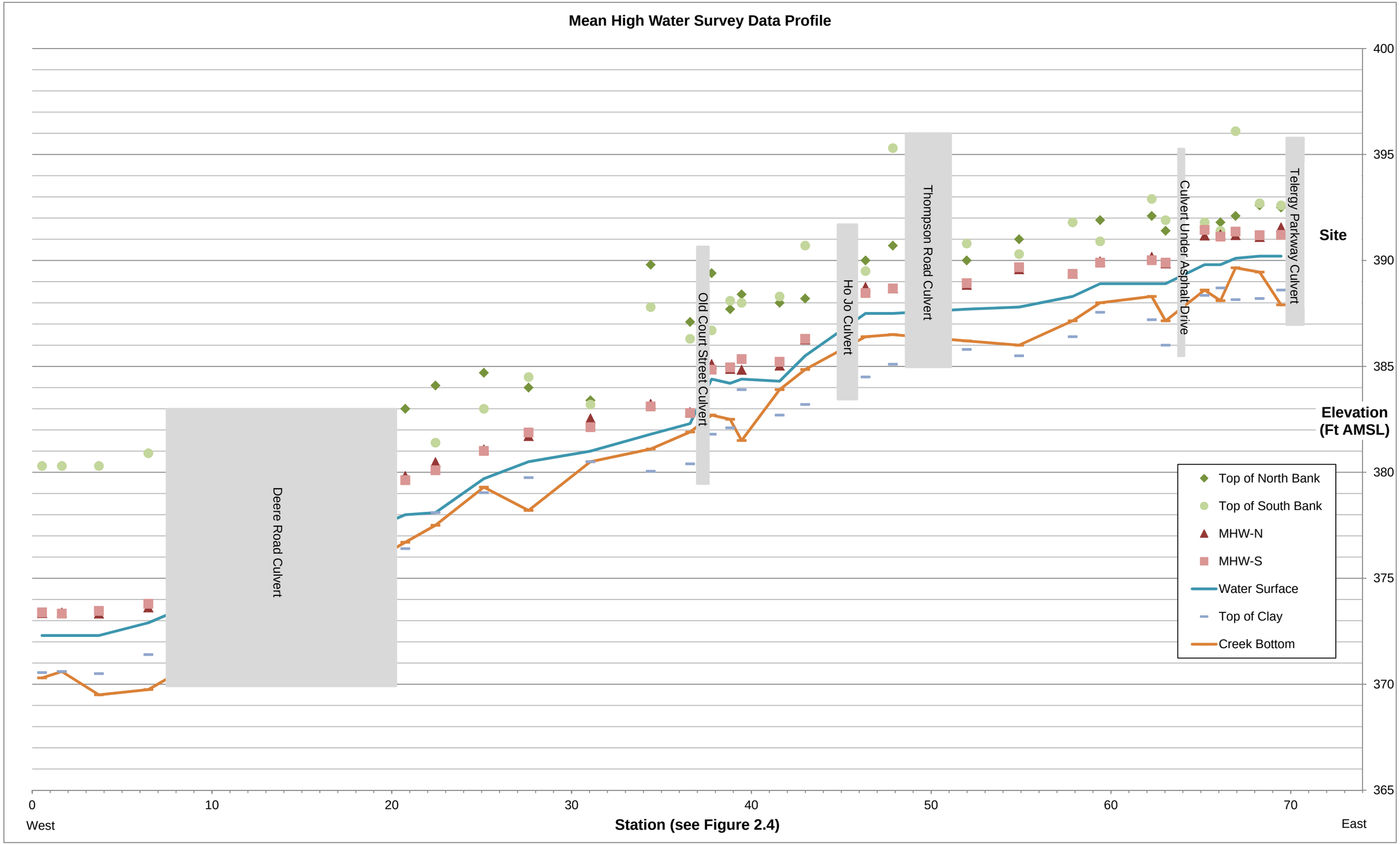
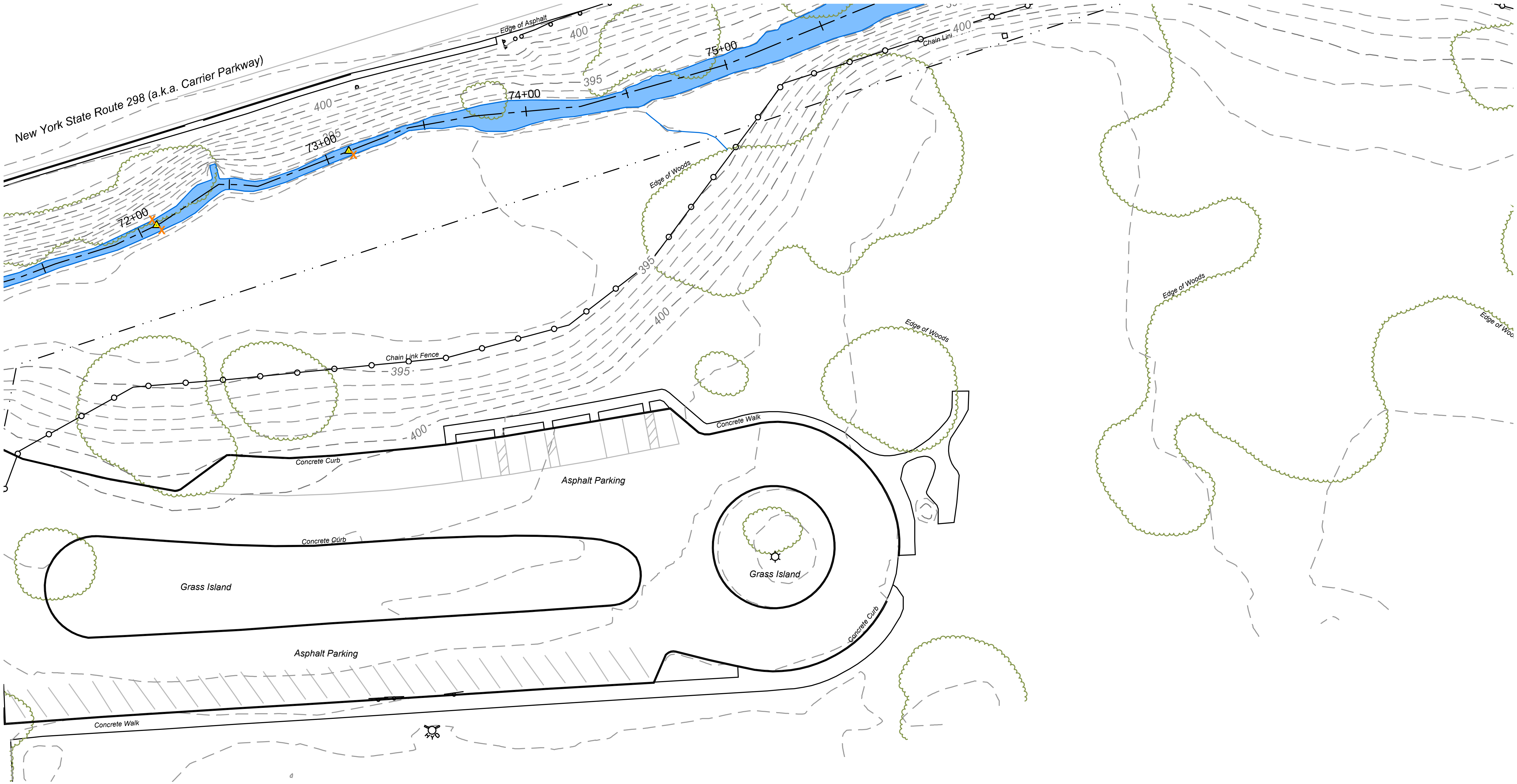
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

Figure 2.5
UTC/Carrier Site - NYSDEC Site #734043
Sanders Creek, Syracuse, NY





LEGEND

400	MAJOR CONTOUR		WATER VALVE		APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	EDGE OF WOODS		MANHOLE		APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	EDGE OF WATER		UTILITY POLE		APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-1

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
1 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

ANSI B 11" x 17" Approved: DS Checked: SU Designer: KM Project Management Initials:

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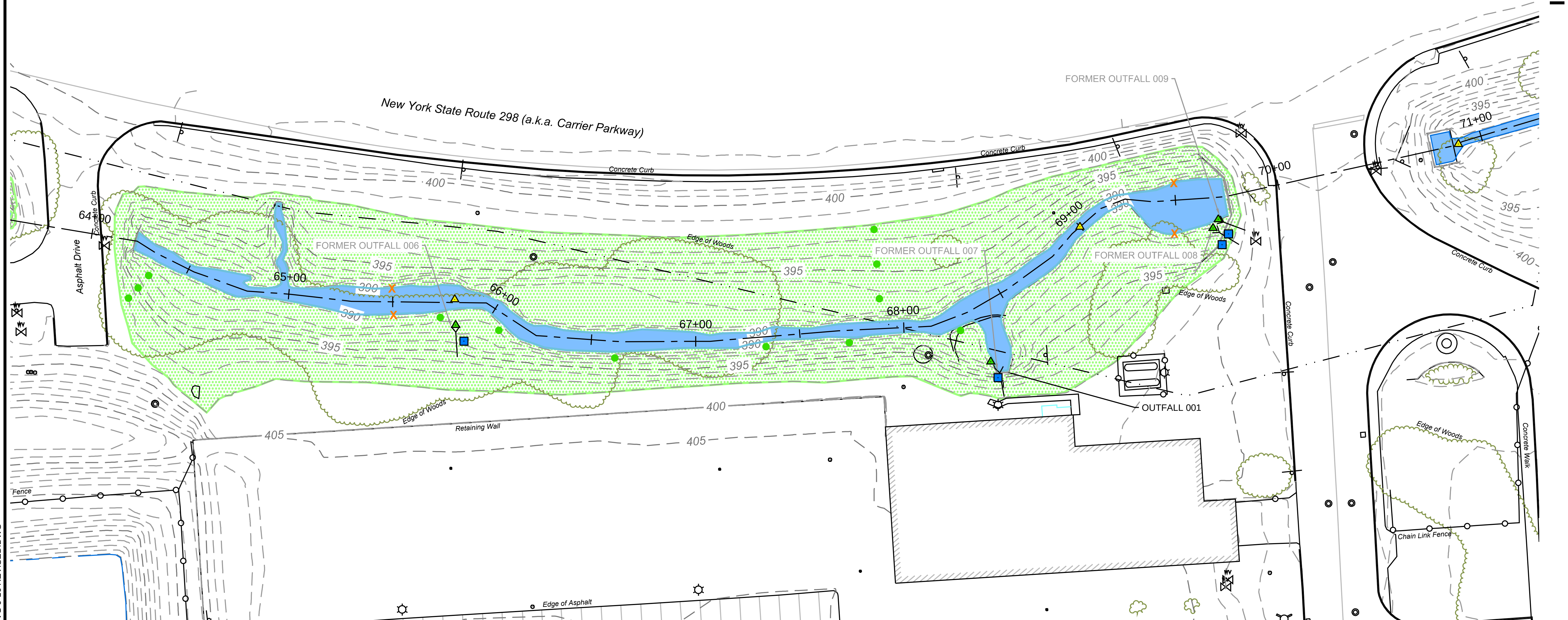

LEGEND

400	MAJOR CONTOUR		WATER VALVE
	MINOR CONTOUR		FIRE HYDRANT
	EDGE OF WOODS		MANHOLE
	EDGE OF WATER		UTILITY POLE
	EDGE OF GRAVEL		GUY WIRE
	GUIDE RAIL		LIGHT POLE
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE
	CHAIN LINK FENCE		SIGN
GV	GAS VALVE		

APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION

APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING

APPROXIMATE BOUNDARY OF FLOODPLAIN AREA

APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-2

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
2 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

ANSI B 11" x 17" Approved: DS Checked: SU Designer: KM Project Management Initials:

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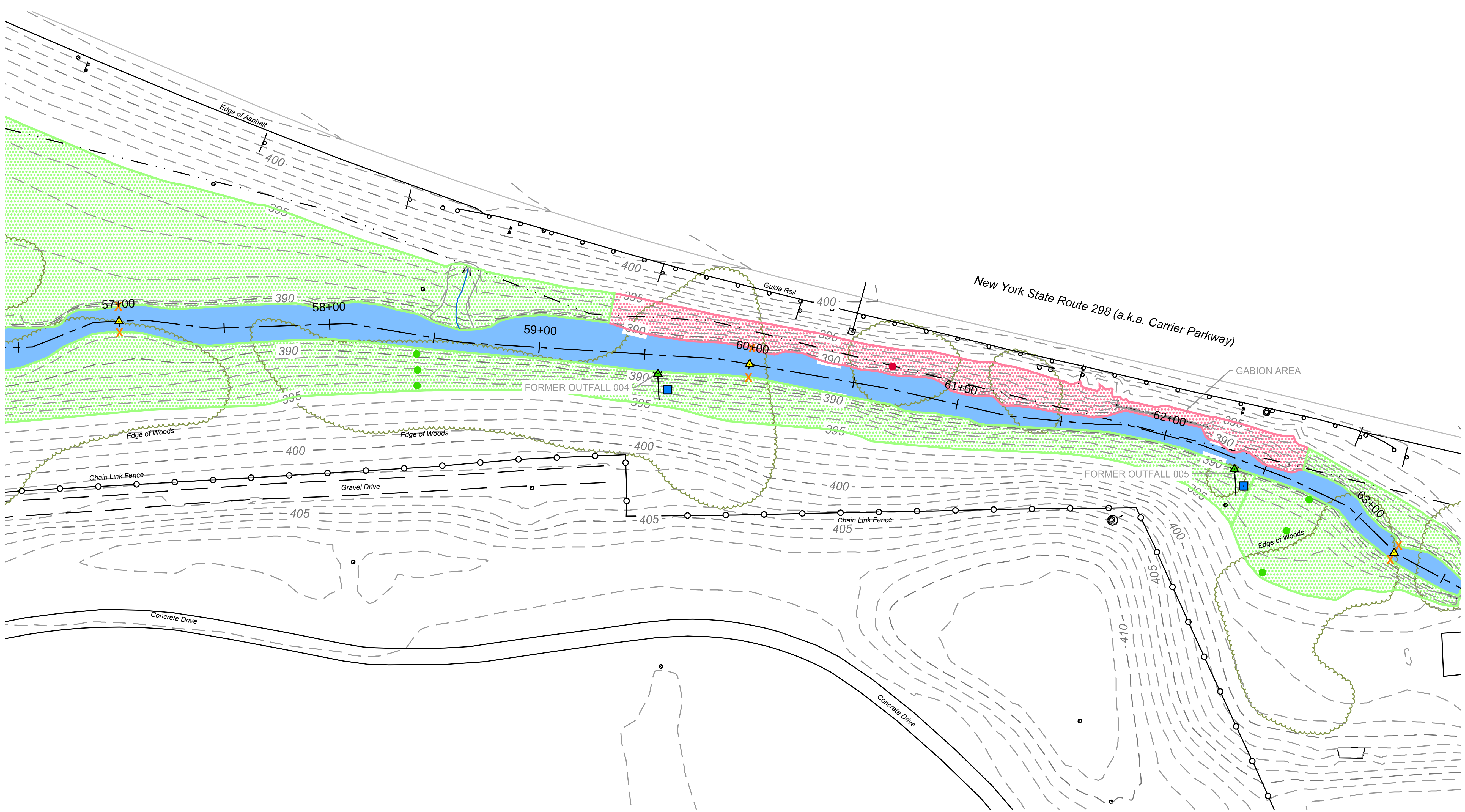
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

Issue Status: DRAFT

AECOM

Figure: 3.1-3



LEGEND

— — 400 — —	MAJOR CONTOUR
	MINOR CONTOUR
	EDGE OF WOODS
	EDGE OF WATER
	EDGE OF GRAVEL
	GUIDE RAIL
49+00	CENTERLINE OF CREEK ALIGNMENT
	CHAIN LINK FENCE
GV	GAS VALVE
	WATER VALVE
	FIRE HYDRANT
	MANHOLE
	UTILITY POLE
	GUY WIRE
	LIGHT POLE
	TREE
	SIGN
	APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
3 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

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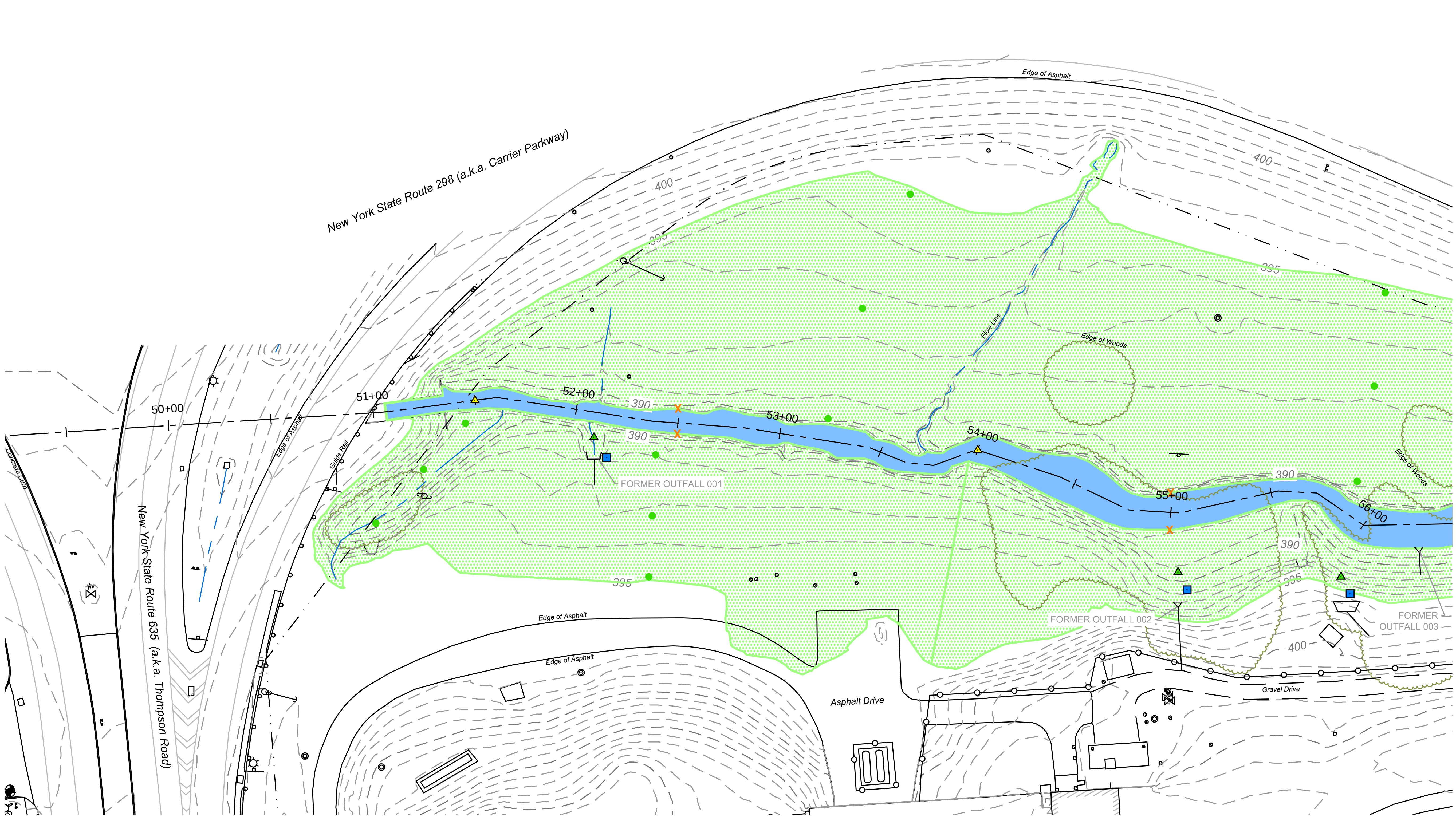

LEGEND

400	MAJOR CONTOUR
	MINOR CONTOUR
	EDGE OF WOODS
	EDGE OF WATER
	EDGE OF GRAVEL
	GUIDE RAIL
49+00	CENTERLINE OF CREEK ALIGNMENT
	CHAIN LINK FENCE
GV	GAS VALVE
WV	WATER VALVE
	FIRE HYDRANT
	MANHOLE
	UTILITY POLE
	GUY WIRE
	LIGHT POLE
	TREE
	SIGN
	APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- X PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-4

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
4 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

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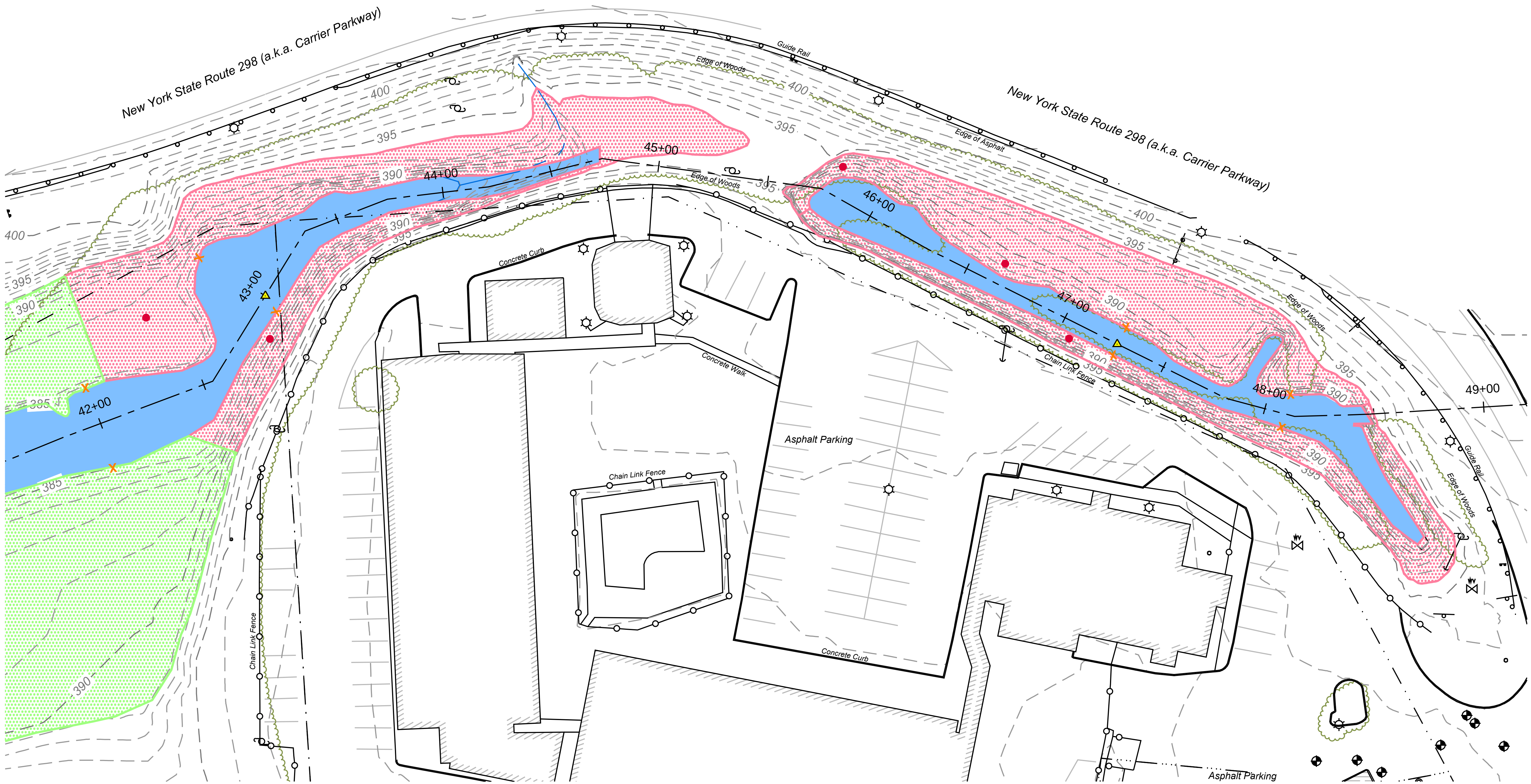
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"



LEGEND

400	MAJOR CONTOUR		WATER VALVE		APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	EDGE OF WOODS		MANHOLE		APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	EDGE OF WATER		UTILITY POLE		APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- X PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-5

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
5 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

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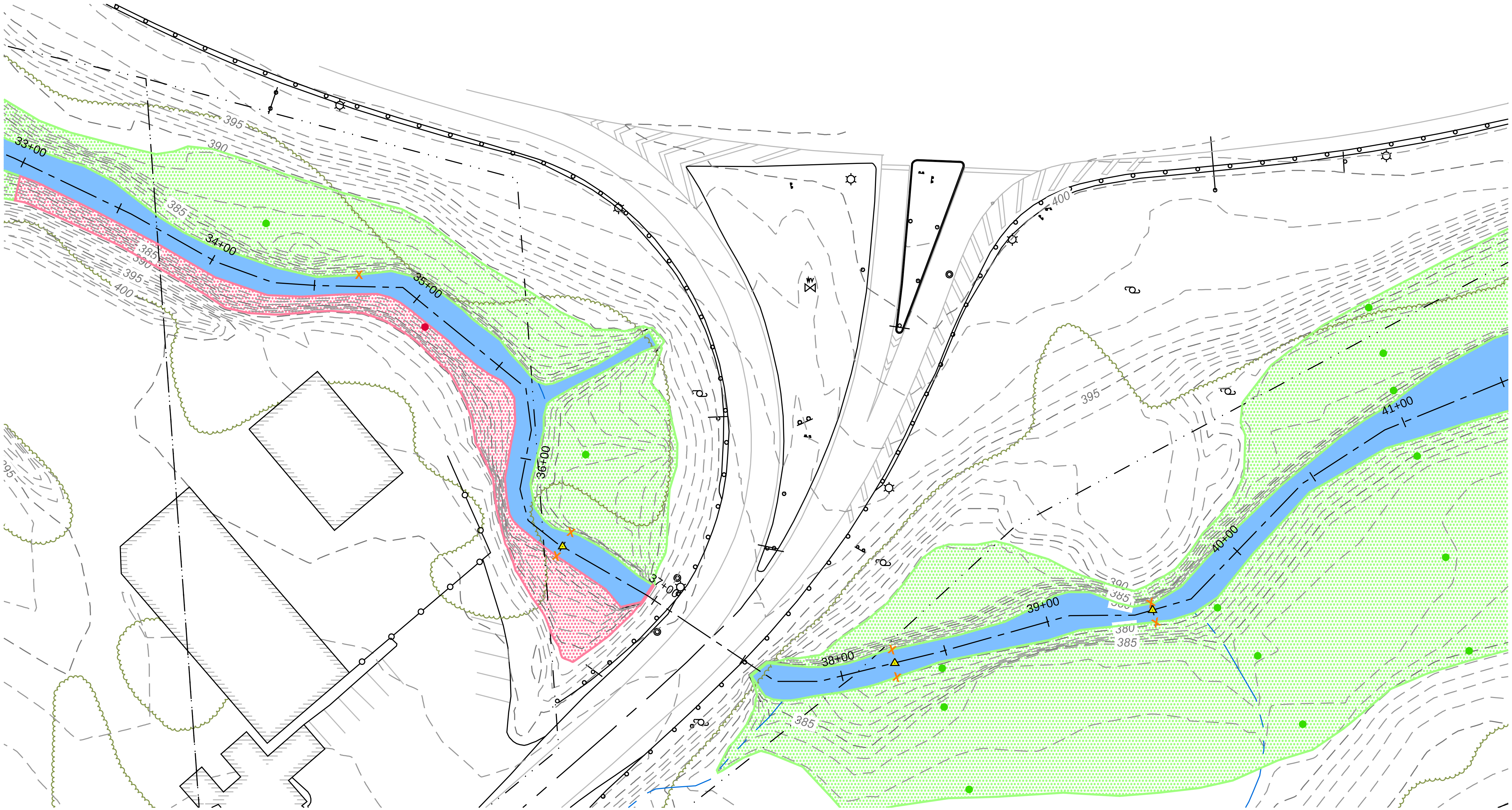


LEGEND

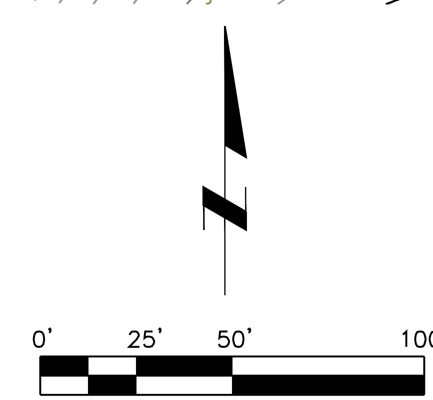
MAJOR CONTOUR (400)
MINOR CONTOUR
EDGE OF WOODS
EDGE OF WATER
EDGE OF GRAVEL
GUIDE RAIL
CENTERLINE OF CREEK ALIGNMENT (49+00)
CHAIN LINK FENCE
GAS VALVE
WATER VALVE
FIRE HYDRANT
MANHOLE
UTILITY POLE
GUY WIRE
LIGHT POLE
TREE
SIGN
APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

PROPOSED FLOODPLAIN SAMPLES
PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
PROPOSED SIDE BED SAMPLE
PROPOSED CLAY SAMPLE
PROPOSED OUTFALL AREA SAMPLE
OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD



Issue Status: DRAFT

AECOM

Figure: 3.1-6

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
6 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

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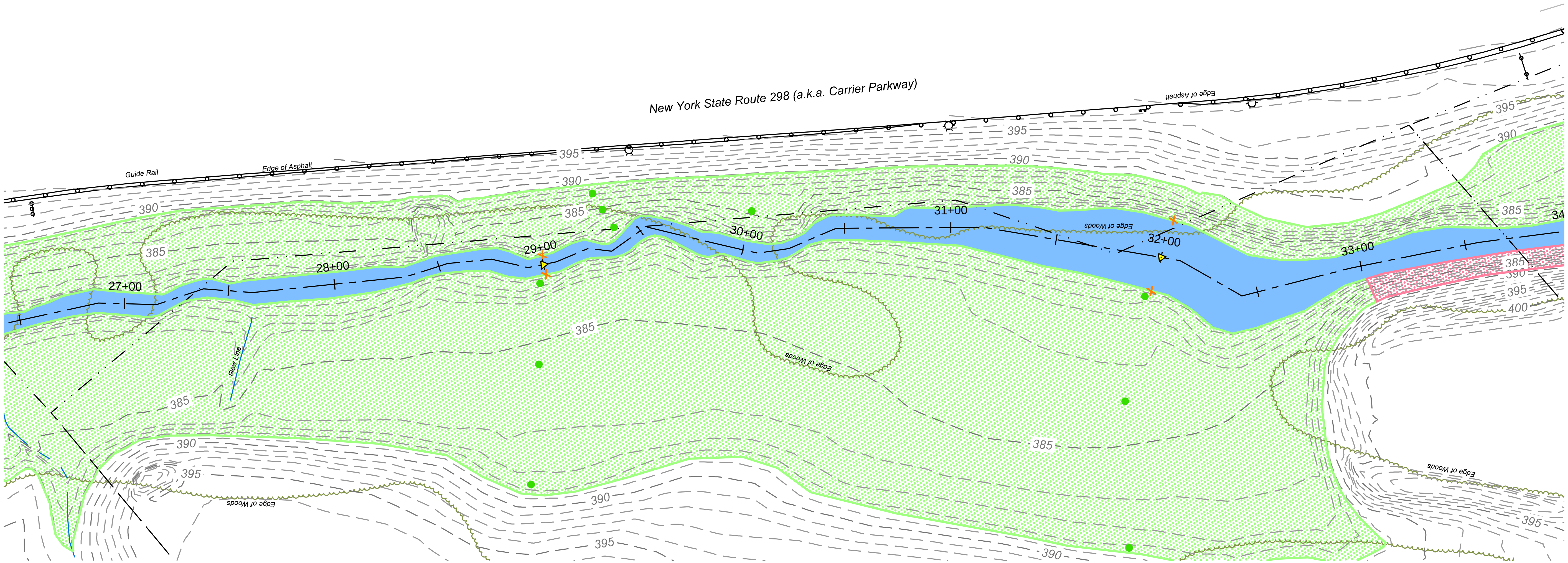
Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

Issue Status: DRAFT



LEGEND

400	MAJOR CONTOUR		WATER VALVE
	MINOR CONTOUR		FIRE HYDRANT
	EDGE OF WOODS		MANHOLE
	EDGE OF WATER		UTILITY POLE
	EDGE OF GRAVEL		GUY WIRE
	GUIDE RAIL		LIGHT POLE
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE
	CHAIN LINK FENCE		
GV	GAS VALVE		SIGN

APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION

APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING

APPROXIMATE BOUNDARY OF FLOODPLAIN AREA

APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- X PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

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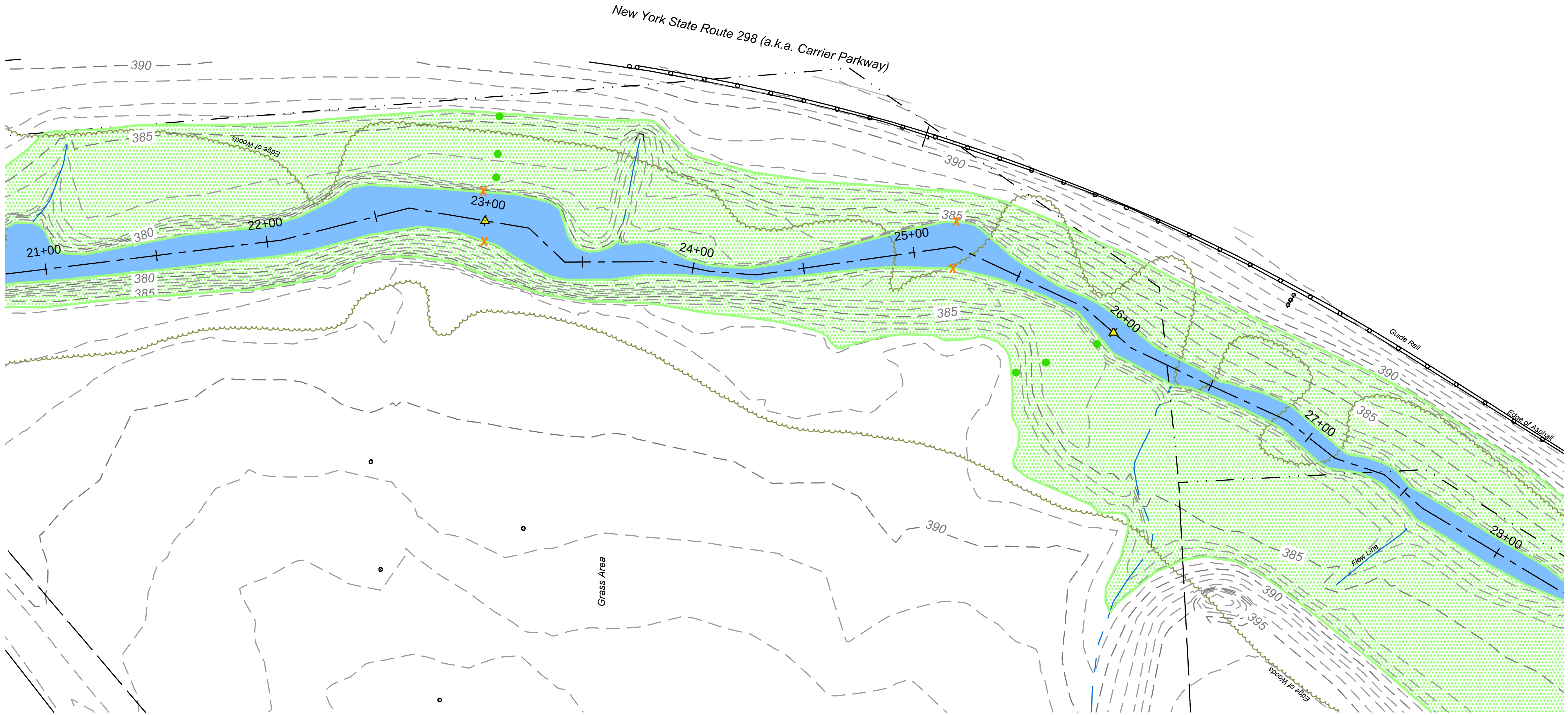
Figure: 3.1-7

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
7 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016



LEGEND

MAJOR CONTOUR (400)	WATER VALVE		APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
MINOR CONTOUR	FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
EDGE OF WOODS	MANHOLE		APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
EDGE OF WATER	UTILITY POLE		APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA
EDGE OF GRAVEL	GUY WIRE		
GUIDE RAIL	LIGHT POLE		
CENTERLINE OF CREEK ALIGNMENT (49+00)	TREE		
CHAIN LINK FENCE	SIGN		
GAS VALVE (GV)			

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-8

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
8 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

LEGEND

400	MAJOR CONTOUR		WATER VALVE		APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	EDGE OF WOODS		MANHOLE		APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	EDGE OF WATER		UTILITY POLE		APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

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Issue Status: DRAFT

AECOM

Figure: 3.1-9

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
9 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

LEGEND

400	MAJOR CONTOUR		WATER VALVE		APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
	MINOR CONTOUR		FIRE HYDRANT		APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
	EDGE OF WOODS		MANHOLE		APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
	EDGE OF WATER		UTILITY POLE		APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA
	EDGE OF GRAVEL		GUY WIRE		
	GUIDE RAIL		LIGHT POLE		
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE		
	CHAIN LINK FENCE		SIGN		
GV	GAS VALVE				

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

Issue Status: DRAFT

AECOM

Figure: 3.1-10

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
10 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

Project Management Initials: Designer: KM Checked: SU Approved: DS ANSI B 11" x 17"

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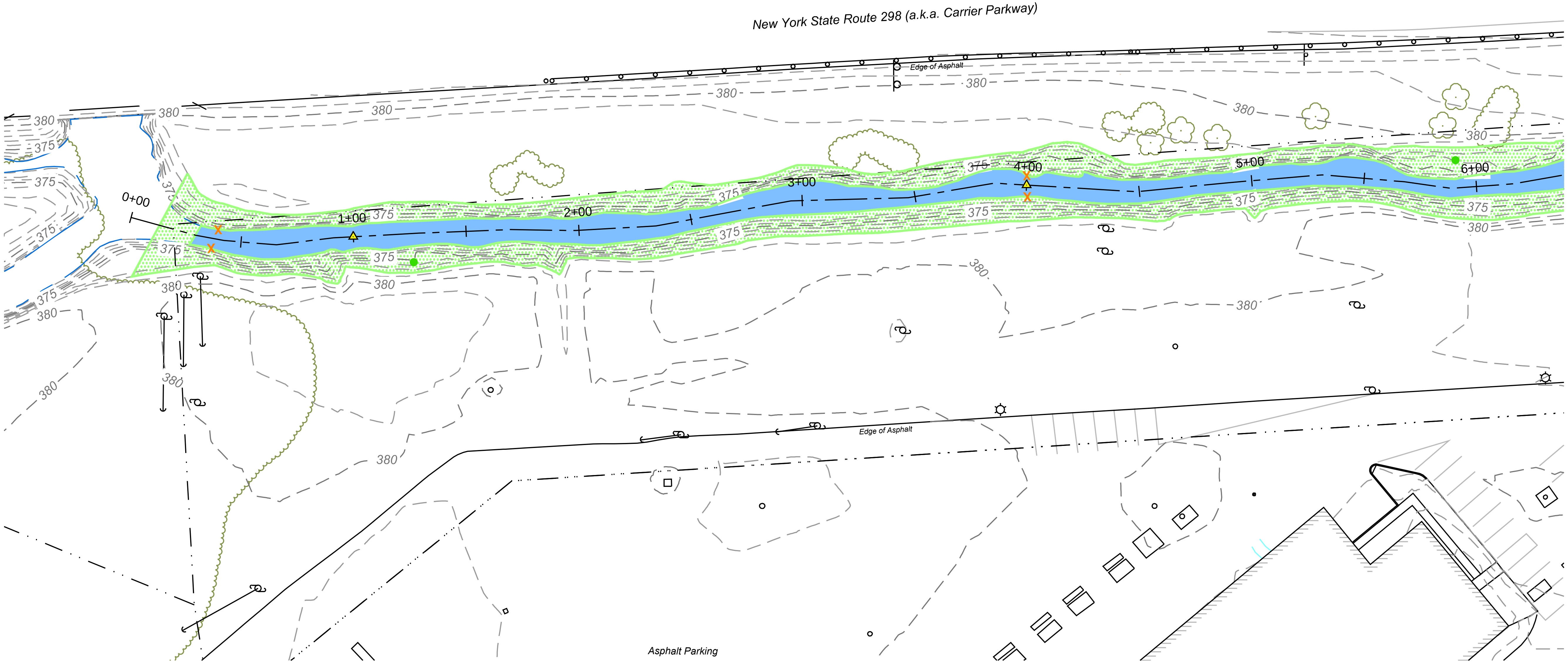
Issue Status: DRAFT



LEGEND

400	MAJOR CONTOUR		WATER VALVE
	MINOR CONTOUR		FIRE HYDRANT
	EDGE OF WOODS		MANHOLE
	EDGE OF WATER		UTILITY POLE
	EDGE OF GRAVEL		GUY WIRE
	GUIDE RAIL		LIGHT POLE
49+00	CENTERLINE OF CREEK ALIGNMENT		TREE
	CHAIN LINK FENCE		SIGN
GV	GAS VALVE		

- APPROXIMATE LIMITS OF SANDERS CREEK / BANK EXCAVATION
- APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
- APPROXIMATE BOUNDARY OF FLOODPLAIN AREA
- APPROXIMATE BOUNDARY OF FLOODPLAIN STEEP BANK / INFRASTRUCTURE AREA

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

SAMPLE KEY

- PROPOSED FLOODPLAIN SAMPLES
- PROPOSED FLOODPLAIN SAMPLE FOR DOCUMENTATION OF STEEP BANK / INFRASTRUCTURE AREA
- PROPOSED SIDE BED SAMPLE
- PROPOSED CLAY SAMPLE
- PROPOSED OUTFALL AREA SAMPLE
- OUTFALL BEDDING SAMPLE

NOTE: SAMPLE LOCATIONS ARE APPROXIMATE, ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD

0' 25' 50' 100'

AECOM

Figure: 3.1-11

SANDERS CREEK
PROPOSED SAMPLE LOCATIONS
11 OF 11

SAMPLING AND ANALYSIS PLAN
UTC/CARRIER SITE - NYSDEC SITE #734043
SANDERS CREEK, SYRACUSE, NY
Project No.: 60321789 Date: JANUARY 2016

ANSI B 11" x 17" Approved: DS Checked: SU Designer: KM Project Management Initials:

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Appendix A

Sanders Creek Habitat Assessment and Physical Characterization

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December 13, 2013

Submitted via e-mail on December 3, 2013

Tara M. Blum, PE
Environmental Engineer
NYSDEC Region 7
Division of Environmental Remediation
615 Erie Boulevard West
Syracuse, New York 13204-2400

Re: Carrier Corporation, Thompson Road Facility, Syracuse, New York
Corrective Action Order — Index CO 7-20051118-4
Sanders Creek Habitat Assessment and Physical Characterization — June 2013,
(Downgradient from Kinne Street to Confluence with Ley Creek)

Dear Ms. Blum:

In accordance with the referenced order, Carrier Corporation is providing one hard copy and one electronic copy (PDF via email) of the following report to establish the current habitat conditions and physical characteristics of a portion of Sanders Creek. This assessment supports sediment sampling in response to comments dated February 24, 2009, made by the New York State Department of Environment and Conservation (NYSDEC) on the Focused Corrective Measures Study (FCMS), dated September 2008. It was conducted to further support the selected preferred corrective measure (sediment removal or dredging) to reduce potential continued exposure to polychlorinated biphenyls (PCBs) by various ecosystems in Sanders Creek.

Per email correspondence from your department on September 12, 2011, and follow-up email on October 25, 2011, a hard copy and an electronic copy of this letter will be submitted (via U.S. Mail) to the New York State Department of Health (NYSDOH) contacts, Ms. Krista Anders (replacement for Mr. Steven Bates), with the Bureau of Environmental Exposure Investigation, and Mr. Mark Sergott (NYSDOH).

Please call me at (901) 372-7962 if you have any questions.

Sincerely,
EnSafe Inc.

By: Danny Adams, TN-QHP

Enclosure: Sanders Creek Habitat Assessment and Physical Characterization — June 2013
cc: Mr. Mark Sergott — NYSDOH Ms. Krista Anders — NYSDOH
Mr. John Wolski — UTC
Mr. Nelson Wong — Carrier Corporation
Ms. Kathleen McFadden — UTC

SANDERS CREEK HABITAT ASSESSMENT AND PHYSICAL CHARACTERIZATION — JUNE 2013

(Downgradient from Kinne Street to Confluence with Ley Creek)

CARRIER THOMPSON ROAD FACILITY
CARRIER PARKWAY
SYRACUSE, NEW YORK

EnSafe Project Number
0888814014

Revision: 0

Corrective Action Order — Index CO 7-20051118-4

Prepared for:

United Technologies

UTC Shared Remediation Services
United Technologies Building
Hartford, Connecticut 06101

Prepared by:

ENSAFE

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December 2013

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1.0 INTRODUCTION

EnSafe Inc. on behalf of Carrier Corporation (Carrier), a wholly owned subsidiary of United Technologies Corporation (UTC), has prepared this report to establish the current habitat conditions and physical characteristics of a portion of Sanders Creek. The assessment supports sediment sampling in response to comments dated February 24, 2009, made by the New York State Department of Environment and Conservation (NYSDEC) on the Focused Corrective Measures Study (FCMS), dated September 2008. The FCMS was prepared in response to the requests outlined in the NYSDEC letter dated May 23, 2008. Specifically, the FCMS identified, screened, developed, evaluated, and compared remedial action alternatives to reduce exposure to polychlorinated biphenyls (PCBs) by various ecosystems in Sanders Creek, and therefore reduce the concentration of PCBs in the tissue of wildlife over time. Sediment removal (dredging) has been selected as the preferred corrective measure.

In a letter dated February 24, 2009, NYSDEC brought forth their concern as to the total extent of the PCB impact downstream. In response, Carrier submitted a *Sediment Sampling Work Plan* (April 2009) to address the extent of PCBs in Sanders Creek up to its confluence with Ley Creek. The plan was approved by NYSDEC, and sediment samples were obtained in October 2009 from Sanders Creek between Court Street and its confluence with Ley Creek. Sediment samples beyond the Ley Creek confluence were not obtained due to unknown source(s) of contamination that may be contributed via Ley Creek. Additionally, sediment samples were obtained upgradient of the Carrier facility from just west of the Kinne Street culvert to a point just before the creek passes under the Sanders Creek Parkway culvert, in order to develop a Clean-up Objective or a Background threshold value (BTV). Based upon findings of the October 2009 downgradient sampling, a Draft Remedial Action Plan (RAP) for Sanders Creek was submitted to NYSDEC in April 2011, describing the extent of corrective actions proposed for Sanders Creek.

NYSDEC's June 15, 2011 letter, responding to the Draft RAP, questioned if data obtained during the October 2009 upgradient and downgradient sediment sampling within Sanders Creek were still representative of current conditions and/or PCB concentrations of sediments within Sanders Creek. The letter requested updated sediment sampling data along the entire length of Sanders Creek from the Site to the Ley Creek culvert under Route 298, as well as utilizing "the previously calculated background concentration" as a Clean-up objective for Sanders Creek remediation efforts. Because NYSDEC deemed that Sanders Creek sediment PCB concentration data from the October 2009 assessment was no longer representative of current conditions/concentrations, the previously calculated BTV should also be considered not representative of current conditions/concentrations.

Carrier prepared and submitted a *Sanders Creek Sediment Sampling Work Plan* to NYSDEC on May 15, 2013, proposing three areas for sampling: upgradient (to re-establish the BTV), across the length of the Site, and downgradient from the Thompson Road culvert to the confluence with Ley Creek (Figure 1).

As previously stated, sediment removal (dredging) has been selected as the preferred corrective measure for Sanders Creek. Carrier and NYSDEC agreed that before dredging operations are initiated, a "baseline" or current condition of the Sanders Creek ecosystem should be documented in order to develop any necessary restoration plans after remedial actions are completed. Carrier and NYSDEC also agreed that this study would not be in the form of an ecological risk assessment, but rather should document the current physical and habitat characteristics of the portions of Sanders Creek that could be impacted by sediment removal activities.

After discussions with personnel from NYSDEC, the decision was made to use only the Habitat Assessment — High Gradient Streams and the Physical Characterization protocols that are part of the U.S. Environmental Protection Agency's (U.S. EPA) *Rapid Bioassessment Protocols* (RBP) *for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Second Edition) to establish the current habitat quality of portions of Sanders Creek that could be included in the sediment removal activities. Physical stream characteristics and habitat quality parameters should provide an accurate portrayal of current stream conditions and will provide an integral component of the state of impairment in this portion of the stream. These parameters will also provide a general assessment of the aquatic life use and any existing limitations to the aquatic biota.

The plan to establish current stream conditions in this manner was approved by NYSDEC, and NYSDEC representatives Tara Blum and Mary Jo Crance were on Site June 11, 2013 to view Sanders Creek, coordinate sediment sampling locations, and observe habitat assessment evaluations in the portion of Sanders Creek near Kinne Street.

Legend

- Sanders_Creek_Revised_SampleLocs
- Outfall
- Pipe
- Seep

Sediment Sample

- Area 1 - 0 Sample
- Area 2 - 17 Sample
- Area 3 - 14 Sample

Note:
Width value beneath Sample IDs were measured in feet from bank to bank of the creek at each pertaining sample location.

FIGURE 1
SANDERS CREEK HABITAT ASSESSMENT
LOCATIONS (COURT ST. TO LEY CREEK)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	S. Goodnight
DRAWN BY:	S. Swan
DATE:	07/26/2013
PROJECT NO:	0888808838

ENSAFE
1-800-588-7962
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X:\UTC\Syracuse\Carrier Campus\Projects\Sanders_Creek_Sediment_Sampling_ss.mxd

2.0 SANDERS CREEK HABITAT ASSESSMENT AND PHYSICAL CHARACTERIZATION

2.1 Habitat Assessment

Carrier collected habitat data within two areas (A02 — A03) of Sanders Creek from a point just before the creek passes under the Sanders Creek Parkway culvert downstream to the creek's confluence with Ley Creek (Figure 1). Assessment locations and rationale were based on stream morphology and were generally classified as riffles, runs, pools, riffle/run, riffle/pool or run/pool complexes. Therefore, several reaches were evaluated and identified as mixed-morphology stream types. Where possible, habitat assessment reaches were co-located with sediment sampling locations that were ongoing concurrently.

Each stream reach was evaluated based on the RBP protocols for high gradient streams, following the U.S. EPA's RBP guidance. Scoring data were entered onto datasheets in the field and entered in electronic format for final scoring evaluation and analyses. Physical characteristics of the reach were also recorded in the field for subsequent evaluation. Decisions regarding sediment sampling for each reach were made in the field based on discussions with NYSDEC.

The portion of Sanders Creek included in this study is adjacent to Carrier Parkway (SR 298), and includes several road crossings and other channel modifications. Most of the study area appears to have been highly modified in the past to support road construction, stormwater management, and industrial activities. Several reaches of the study area have been channelized in the past, and other areas (e.g., between A03011 and A03012, Figure 1) have been encapsulated within culverts and were not included in the habitat or physical characterization study.

2.2 Habitat and Physical Characterization Assessment Locations

The distance from the Sanders Creek Parkway culvert to the Sanders Creek's confluence with Ley Creek is approximately 8,900 feet (Figure 1). A total of 31 stream reaches, totaling 1,676 meters of Sanders Creek, were assessed during June 10-14, 2013. Morphology of these reaches was divided in the following manner: pool — 4; riffle — 2; run — 16; riffle/pool — 3; riffle/run — 3; and run/pool — 2. In addition, morphology for one location (A03003) was not recorded.

Habitat assessment locations are depicted on Figure 1 and are described as follows:

- Area A01: This portion of Sanders Creek was included in the concurrent sediment sampling effort to re-establish the BTV, but was not included in habitat assessments.

- Area A02: This area is the section of Sanders Creek that is along Carrier's northern boundary (parallel to Highway 298), from the Kinne Street culvert outlet to a culvert which passes beneath Thompson Road. There were 17 habitat assessments made in this section.

- Area A03: This section of Sanders Creek is downgradient of the property boundary, from the Thompson Road culvert to the Sanders Creek confluence with the South Branch of Ley Creek. There were 17 habitat assessments made in this section.

  — Sanders Creek enters a culvert as it crosses under Mautz Road and continues in the culvert for approximately 1,200 feet before it exits at Deere Road. No habitat evaluations were made in this encapsulated portion of the stream.

  — Based on data evaluation utilizing global positioning system (GPS) data obtained during the June 2013 sampling event, one stream-reach data gap in Area A03 was observed. This portion of the stream reach between Thompson Road and A03001 was not accessible during the site visit, and is not included in the habitat or physical characterization assessments.

Stream conditions during the field study ranged from near-normal flow to flood stage. No stream assessments were conducted during high-water or flood conditions. Field personnel identified changes to stream morphological conditions to establish the beginning of each type of reach and recorded the length of the reach and average width at the downstream end-of-reach. They also completed the habitat evaluation and physical characterization data sheets (Appendices A and B). In-stream structures (e.g., large woody debris) were observed while traversing the reach and recorded on the data sheets.

Table 1 summarizes Sanders Creek habitat assessment scores collected during the June 2013 assessment event. Table 2 summarizes the physical characteristics (i.e., reach length, depth of water, and channel width) that were recorded during the June 2013 site visit. Table 3 summarizes average site characteristics and habitat assessment scores. Photographs of select sediment sample locations and/or portions of Sanders Creek are depicted on Figure 2. These photographs are also indicative of the stream reaches that were included in the habitat assessment evaluation.

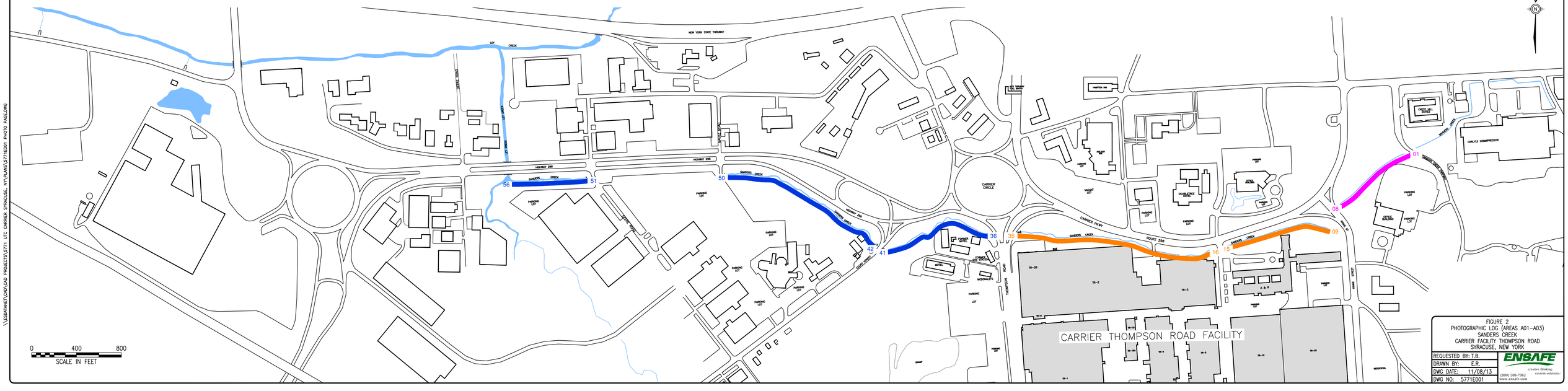

FIGURE 2
PHOTOGRAPHIC LOG (AREAS A01–A03)
SANDERS CREEK
CARRIER FACILITY THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	T.B.
DRAWN BY:	E.R.
DWG DATE:	11/08/13
DWG NO:	5771E001

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Table 1. Habitat Assessment Scores for Sanders Creek Down-gradient from Kinne Street to Confluence with Ley Creek

		Habitat Parameters Optimal (20-16) Suboptimal (15-11) Marginal (10-6) Poor (5-0)										
Sample Location	**Channel Morphology**	**1. Epifaunal Substrate / Available Cover**	**2. Embeddedness**	**3. Velocity / Depth Regime**	**4. Sediment deposition**	**5. Channel Flow Status**	**7. Frequence of Riffles (or bends)**	**8. Bank Stability**	**9. Vegetative Protection**	**10. Riparian Vegetative Zone Width**	**Total Score**	**Habitat* Condition**
A02001	Pool	9	8.5	4	14	19	1	13	15	10	101.5	Suboptimal
A02002	Run	3	5	2	5	19	1	14	12	8	76	Marginal
A02003	Run	6	7	3	3	19	3	7	12	2	70	Marginal
A02004	Riffle/Run	14	16	10	10	20	18	2	9	8	116	Suboptimal
A02005	Riffle	16	16	10	16	20	16	11	9	4	124	Suboptimal
A02006	Pool	6	5	2	7	19	2	11	9	4	76	Marginal
A02007	Run	6	6	3	8	19	3	8	7	2	74	Marginal
A02008	Riffle/Pool	6	6	2	13	19	2	3	2	2	66	Marginal
A02009	Riffle/Pool	6	6	2	5	19	2	9	9	2	66	Marginal
A02010	Run	3	3	2	5	19	1	9	4	2	57	Marginal
A02011	Run	11	13	5	10	19	4	14	3	8	91	Marginal
A02012	Run	7	5	2	5	19	1	6	14	9	74	Marginal
A02013	Run	13	12	5	7	19	8	11	11	8	102	Suboptimal
A02014	Run	8	5	6	8	19	7	7	9	7	83	Marginal
A02015	Run	7	7	2	8	19	2	8	9	7	79	Marginal
A02016	Pool	2	2	2	18	19	0	6	9	7	81	Marginal
A02017	Run	3	6	2	2	19	1	2	2	2	44	Poor
A03001	Riffle/Run	18	18	13	18	19	16	19	20	9	163	Optimal
A03002	Run/Pool	13	11	4	13	19	4	12	18	11	123	Suboptimal
A03003	-	20	19	14	19	20	18	18	18	17	183	Optimal
A03004	Run	13	3	3	4	20	0	18	19	18	115	Suboptimal
A03005	Run	13	3	3	4	20	0	18	19	18	115	Suboptimal
A03006	Run	10	9	5	11	16	5	18	18	18	129	Suboptimal
A03007	Run	11	8	2	9	19	2	18	18	14	121	Suboptimal
A03008	Run	10	4	8	6	19	5	10	10	15	97	Marginal
A03009	Run	8	6	2	17	20	2	18	18	17	126	Suboptimal
A03010	Riffle/Run	16	16	7	16	15	16	18	17	17	157	Optimal
A03011	Run/Pool	6	6	2	14	20	1	14	16	15	102	Suboptimal
A03012	Riffle	20	19	2	0	19	19	20	2	2	104	Suboptimal
A03013	Pool	1	16	1	18	20	0	18	2	2	80	Marginal
A03014	Riffle/Pool	9	7	8	19	20	3	16	12	2	102	Suboptimal

Notes:

Average 100

* Total Sample Reach Habitat Condition

Optimal 154-200 Suboptimal 101-153 Marginal 48-100 Poor 0-47

Table 2. Stream Characterization for Sanders Creek Down-gradient from Kinne Street to Confluence with Ley Creek

		Stream Characterization				
Sample Location	**Morphology Type**	**Reach Length (meters)**	**Stream Width (meters)**	**Stream Depth (meters)**	**Channelized?**	**Sampling Reach Area (square meters)**
A02001	Pool	16.09	7.29	1.04	yes	117.22
A02002	Run	48.77	4.42	0.67	yes	215.54
A02003	Run	48.46	6.71	0.49	yes	324.95
A02004	Riffle/Run	48.40	5.64	0.21	yes	273.31
A02005	Riffle	89.76	4.27	0.46	yes	383.28
A02006	Pool	14.81	9.45	1.13	yes	139.95
A02007	Run	21.64	3.96	0.27	yes	85.69
A02008	Riffle/Pool	12.19	4.94	0.37	yes	60.22
A02009	Riffle/Pool	62.79	5.79	0.30	yes	365.55
A02010	Run	54.56	4.27	0.55	yes	232.97
A02011	Run	73.76	3.96	0.23	yes	292.09
A02012	Run	69.80	4.11	0.46	yes	286.88
A02013	Run	35.97	6.58	0.41	yes	236.68
A02014	Run	19.20	5.94	0.30	yes	114.05
A02015	Run	70.41	4.72	0.49	yes	332.34
A02016	Pool	12.50	11.58	>1	yes	144.75
A02017	Run	86.87	3.96	0.30	yes	344.00
A03001	Riffle/Run	42.37	5.94	<.30	yes	257.68
A03002	Run/Pool	24.38	11.92	0.38	**no**	290.61
A03003	-	25.30	4.42	0.30	-	111.83
A03004	Run	84.73	5.52	0.53	**no**	467.44
A03005	Run	52.73	3.81	0.69	**no**	200.90
A03006	Run	52.12	5.91	0.30	**no**	308.03
A03007	Run	21.64	4.45	0.15	**no**	96.30
A03008	Run	77.72	6.77	0.18	yes	525.93
A03009	Run	111.25	3.93	0.30	**no**	437.21
A03010	Riffle/Run	86.26	4.51	0.15	**no**	389.03
A03011	Run/Pool	124.66	4.02	0.67	yes	501.13
A03012	Riffle	17.37	4.36	0.15	yes	75.73
A03013	Pool	17.68	4.21	0.91	yes	74.43
A03014	Riffle/Pool	151.79	4.79	0.30	yes	727.07
		1675.98	172.13	12.73	0.00	8412.79
		54	6	0	0	271

Table 3. Average Habitat Scores and Physical Characteristics for Sanders Creek Down-gradient from Kinne Street to Confluence with Ley Creek

Morphology	Average Habitat Assessment Score	Total Stream Length (meters)	Average Stream Width (meters)
Riffle	114	107	4
Run	91	930	5
Pool	86	61	8
Riffle/Run	145	177	5
Riffle/Pool	78	227	5
Run/Pool	113	149	8
Total	100	54	6

2.3 Habitat Assessment and Site Characterization Data Analyses

Carrier was unable to identify regional or local ecological surveys that presented background habitat scores for streams in the Ontario Lowlands ecoregion around Onondaga Lake. Therefore, all scores were compared to the condition category scoring ranges that are inherent to the Habitat Assessment Field Data Sheet. For purposes of this evaluation, the following habitat conditions were used for data analyses: Optimal — 154 to 200; Suboptimal — 101 to 153; Marginal — 48 to 100; and Poor — 0 to 47.

2.3.1 Habitat Scores

Based on the June 2013 habitat assessments (Table 1), only three stream reaches (A03001, A03003, and A03010) scored in the Optimal range. One reach (A02017) was in the Poor range. Other reaches were scored as either Marginal (45%) or Suboptimal (42%).

The only average Condition Category that scored above the Optimal range of values was Channel Flow Status (average 19.1); the next highest average score was Bank Stability (12.1). The lowest average Condition Category scores were Frequency of Riffles (5.3) and Velocity/Depth Regime (4.5). Given the historic modifications to the study area portion of Sanders Creek, these Condition Categories would generally be expected to be the most affected by past anthropomorphic changes.

When similar stream morphologies were analyzed (Table 3), average scores were either in the Suboptimal (Run/Pool and Run) or Marginal ranges.

2.3.2 Site Characterization

The physical characteristics of the portion of Sanders Creek included in the study for the habitat assessment evaluation are fairly homogeneous (Tables 2 and 3). Stream widths by morphological type ranged from approximately 4 meters in runs to greater than 11 meters in the pool locations. In addition, stream depths were also greatest in the pools (> 1 meter). Based on this study, habitats classified as pools were generally approximately one-half the length of the next lowest morphology class (riffle), and runs were the longest at nearly 1,000 feet average length.

3.0 FUTURE ACTIVITIES

No further sediment sampling activities conducted as part of the order are scheduled, pending review of sediment data package by NYSDEC; however, those data are being utilized to prepare a revised RAP for Sanders Creek. In addition, no further habitat assessments are scheduled for Sanders Creek until after stream actions are completed.

Future activities to be conducted at the site as part of the Consent Order include creek dredging related activities as outlined below:

Sediment Sampling Report submittal to NYSDEC	October 3, 2013
Habitat Assessment and Physical characterization Report Submitted to NYSDEC	December 3, 2013
Revised Remediation Action Plan Submittal	To be determined
NYSDEC Review/Approval	60 days after Submittal of RAP
U.S. Army Corps of Engineers Nationwide 38 Permitting	TBD
Cleanup actions in Sanders Creek	Tentatively scheduled for fall 2015
Preparation of Sanders Creek Restoration Plan (if required)	To be determined following cleanup actions in Sanders Creek (if required)

Note: Dates are conditional based upon approval date of report and proposed work plan, site conditions, and other factors.

Appendix A
Habitat Assessment Field Data Sheets — High Gradient Streams

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02001	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 1215 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 8.5	20 19 18 17 16	15 14 13 12 11	10 **9** **8** 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 **4** 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	**5** 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	**5** 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	**5** 4 3	2 1 0

Total Score 101.5

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02002	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 1243 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 76

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02003	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0100 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 **3**	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through **grazing or mowing minimal or not evident**; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more **than one-half of the potential plant stubble** height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 **6**	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 **6**	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 **1** 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 70

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02004	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0125 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 116

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02005	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0133 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 124

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02006	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0418 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 76

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02007	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0433 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 74

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02008	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0447 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 66

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02009	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME 0404 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	**2** 1 0
SCORE 7 RB)	Right Bank 10 9	8 **7** 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	**2** 1 0
SCORE 7 RB)	Right Bank 10 9	8 **7** 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 **1** 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 66

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02010	
SITE ID #_____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/11/13 TIME .0517 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 **7** 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	**2** 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through **grazing or mowing minimal or not evident;** almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more **than one-half of the potential plant stubble** height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	**2** 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	**2** 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 **1** 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 57

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02011	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0850 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 91

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02012	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0907 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 **3**	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 **3**	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through **grazing or mowing minimal or not evident**; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more **than one-half of the potential plant stubble** height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	**5** 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	**8** 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 74

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02013	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0930 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 LB)	Left Bank 10 9	**8** 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 **3**	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	**2** 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 **7** 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 102

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02014	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0940 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 83

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02015	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0956 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 79

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02016	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 1005 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 **0**
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	**2** 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 **4** 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	**8** 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 **6**	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 **1** 0

Total Score 81

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A02017	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 1024 AM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 44

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03001	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0133 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 163

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03002	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME .0153 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 **4** 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 **4** 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 **6**	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 **6**	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 **7** 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 **4** 3	2 1 0

Total Score 123

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03003	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0405 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 183

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03004	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0233 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 **4** 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 115

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03005	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0250 PM	REASON FOR SURVEY Current condition/Backgroun

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 **17** 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 **0**
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 LB)	Left Bank **10** 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0

Total Score 115

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03006	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0413 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 129

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03007	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0430 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 121

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03008	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0443 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 97

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03009	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0516 PM	REASON FOR SURVEY Current conditions/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 17	20 19 18 **17** 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0

Total Score 126

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03010	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0535 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 157

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03011	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0557 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 **7** 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 **7** 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 **7** 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 **6**	5 4 3	2 1 0

Total Score 102

Form # EH2 -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03012	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0637 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET---HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 104

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03013	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0548 PM	REASON FOR SURVEY Current condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 80

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Sanders Creek	LOCATION A03014	
SITE ID # _____ REACH ID _____	STREAM CLASS Class C	
UTM N _____ UTM E _____	RIVER BASIN Oswego-Seneca-Oneida Basin (HUC 8-04140201)	
STORET #	AGENCY EnSafe, Inc	
INVESTIGATORS D. Adams, T. Bomar		
FORM COMPLETED BY T. Bomar	DATE 6/12/13 TIME 0701 PM	REASON FOR SURVEY Current Condition/Background

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Form # EH - _____

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 102

Appendix B
Physical Characterization / Water Quality Field Data Sheets

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2B01
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY Ensafe, Inc.
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 1106 (AM) PM
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☒	rain (steady rain)	☐
☐	showers (intermittent)	☐
____%	%cloud cover	____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Maple (sugar)

INSTREAM FEATURES

Estimated Reach Length 16.09 m

Estimated Stream Width ~~23~~ 23 m 1.285

Sampling Reach Area 117.216 m²

Area in km² (m²/1000) .117216 km²

Estimated Stream Depth 1.0363 m

Surface Velocity _____ m/sec
(at thalweg) ↳ moderate

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ❑ Run _____ %
☒ Pool 100 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 6 m²

Density of LWD _____ m²/km² **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ ° C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR2002
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 1230 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 48.99 m
Estimated Stream Width 4.4196 m
Sampling Reach Area 215.543 m^2
Area in km^2 (m^2x1000), .215543 km^2
Estimated Stream Depth 0.6705 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 0.67 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2
Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present Typha spp.

Portion of the reach with aquatic vegetation 5 %

WATER QUALITY

Temperature _____ ° C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AW2803
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0100 AM (PM)
	REASON FOR SURVEY Current condition / Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☐ Mixture of origins
☒ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 48.46 m

Estimated Stream Width 6.7056 m

Sampling Reach Area 324.953 m^2

Area in km^2 (m^2x1000) .324953 km^2

Estimated Stream Depth 0.4877 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 0.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle_____% ☒ Run 100 %
❑ Pool_____%

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature_____ ° C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other_____

Water Surface Oils
❑ Slick ☒ Sheen ❑ Globs ❑ Flecks
❑ None ❑ Other_____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other_____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ❑ None
☒ Other_____

Oils
❑ Absent ❑ Slight ☒ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2884
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0115 AM (PM)
	REASON FOR SURVEY Current Condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
☒ None ❑ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present _____

INSTREAM FEATURES

Estimated Reach Length 48.46 m
Estimated Stream Width 5.64 m
Sampling Reach Area 273.31 m^2
Area in km^2 (m^2x1000) .273314 km^2
Estimated Stream Depth 0.213 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 90 % ☒ Run 10 %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2
Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present Polygonum

Portion of the reach with aquatic vegetation 10 %

WATER QUALITY

Temperature _____ °C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2085
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 10-11-13 TIME 0130 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present _____

INSTREAM FEATURES

Estimated Reach Length 89.76 m
Estimated Stream Width 4.29 m
Sampling Reach Area 383.28 m^2
Area in km^2 (m^2x1000) .383275 km^2
Estimated Stream Depth 0.46 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 100 % ❑ Run _____ %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2
Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2886
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0412 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 %☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 14.81 m

Estimated Stream Width 9.45 m

Sampling Reach Area 139.95 m^2

Area in km^2 (m^2/1000) ~~139.951~~ km^2 .139954

Estimated Stream Depth 1.13 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ❑ Run _____ %
☒ Pool 100 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present Common Bulrush

Portion of the reach with aquatic vegetation < 5 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR2807
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams; T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0430 AM (PM)
	REASON FOR SURVEY Current condition / Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 %☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present _____

INSTREAM FEATURES

Estimated Reach Length 21.64 m
Estimated Stream Width 3.96 m
Sampling Reach Area 85.69 m^2
Area in km^2 (m^2x1000) .085694 km^2
Estimated Stream Depth 0.29 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2
Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
☒ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ❑ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2888
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0445 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 %☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 12.19 m
Estimated Stream Width 4.94 m
Sampling Reach Area 60.22 m²
Area in km² (m²x1000) .00218 km²
Estimated Stream Depth 0.3676 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 10 % ❑ Run _____ %
☒ Pool 90 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m²
Density of LWD _____ m²/km² **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ ° C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2009
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0500 AM (PM)
	REASON FOR SURVEY Current condition / Background

WEATHER CONDITIONS

Now		Past 24 hours
❑	storm (heavy rain)	❑
❑	rain (steady rain)	❑
❑	showers (intermittent)	❑
____% ❑	%cloud cover	❑ ____%
❑	clear/sunny	❑

Has there been a heavy rain in the last 7 days? ❑ Yes ❑ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ❑ Intermittent ❑ Tidal

Stream Type
☒ Coldwater ❑ Warmwater

Stream Origin
❑ Glacial
❑ Non-glacial montane
❑ Swamp and bog
❑ Spring-fed
☒ Mixture of origins
❑ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ❑ Grasses ☒ Herbaceous

dominant species present Scirpus

INSTREAM FEATURES

Estimated Reach Length 62.79 m

Estimated Stream Width 5.79 m

Sampling Reach Area 363.55 m²

Area in km² (m²x1000) .363554 km²

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 5 % ❑ Run _____ %
☒ Pool 95 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m²

Density of LWD _____ m²/km² **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2B1B
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-11-13 TIME 0515 AM (PM)
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☒
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 54.56 m

Estimated Stream Width 4.27 m

Sampling Reach Area 232.97 m^2

Area in km^2 (m^2x1000) .000233 km^2

Estimated Stream Depth 0.55 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle ____ % ☒ Run 100 %
❑ Pool ____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2811
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0845 (AM) PM
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
____%	%cloud cover	____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☐ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 73.76 m

Estimated Stream Width 3.96 m

Sampling Reach Area 292.09 m²

Area in km² (m²x1000) .292089 km²

Estimated Stream Depth 0.2286 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 2 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 6 m²

Density of LWD 0.020 m²/km² (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present Scirpus

Portion of the reach with aquatic vegetation <5 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
☒ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2012
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0905 (AM) PM
REASON FOR SURVEY Current condition / Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
20 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☐ Commercial
☐ Field/Pasture ☒ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Black willow, Green ash

INSTREAM FEATURES

Estimated Reach Length 69.80 m

Estimated Stream Width 4.11 m

Sampling Reach Area 286.88 m^2

Area in km^2 (m^2x1000) .286878 km^2

Estimated Stream Depth 0.457 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark 0.5 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle _____ % ☒ Run 100 %
☐ Pool _____ %

Channelized ☒ Yes ☐ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD < 10 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present Cattails

Portion of the reach with aquatic vegetation < 1 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other _____

Turbidity (if not measured)
☐ Clear ☒ Slightly turbid ☐ Turbid
☐ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☒ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other _____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AWAB13
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0935 (AM) PM
REASON FOR SURVEY Current condition / Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
95 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Dogwood

INSTREAM FEATURES

Estimated Reach Length 35.97 m

Estimated Stream Width 6.58 m

Sampling Reach Area 236.68 m^2

Area in km^2 (m^2x1000) .236683 km^2

Estimated Stream Depth 0.411 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle ____ % ☒ Run 100 %
❑ Pool ____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 10 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 8 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR2014
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0935 (AM) PM
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
70 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Dogwood

INSTREAM FEATURES

Estimated Reach Length 19.20 m

Estimated Stream Width 5.94 m

Sampling Reach Area 114.05 m^2

Area in km^2 (m^2x1000) .114048 km^2

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle_____% ☒ Run 100 %
❑ Pool_____%

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD <5 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature_____ ° C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other_____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other_____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other_____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other_____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2815
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY Ensafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0955 (AM) PM
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
30 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Dogwood

INSTREAM FEATURES

Estimated Reach Length 70.41 m

Estimated Stream Width 4.72 m

Sampling Reach Area 332.34 m^2

Area in km^2 (m^2x1000) .332335 km^2

Estimated Stream Depth 0.488 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle_____% ☒ Run 100 %
❑ Pool_____%

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD <5 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature_____ °C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other_____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other_____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other_____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other_____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB2816
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 1003 (AM) PM
REASON FOR SURVEY Current condition / Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
60 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Dogwood

INSTREAM FEATURES

Estimated Reach Length 12.5 m

Estimated Stream Width 11.58 m

Sampling Reach Area 144.75 m²

Area in km² (m²x1000) .144750 km²

Estimated Stream Depth .21 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 0.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle ____ % ❑ Run ____ %
☒ Pool 100 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m²

Density of LWD _____ m²/km² (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ ° C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR2017
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-13-13 TIME 1030 (AM) PM
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
90 % ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial ☐ Spring-fed
☐ Non-glacial montane ☒ Mixture of origins
☐ Swamp and bog ☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ☒ Grasses ❑ Herbaceous

dominant species present Ryegrass

INSTREAM FEATURES

Estimated Reach Length 86.87 m

Estimated Stream Width 3.96 m

Sampling Reach Area 344 m^2

Area in km^2 (m^2x1000) .344005 km^2

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ☒ Sheen ❑ Globs ❑ Flecks
❑ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ☒ Slightly turbid ❑ Turbid
❑ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR3001
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego-Seneca-Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 13 01 25 AM (PM) TB
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
30 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☒ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☐ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Dogwood

INSTREAM FEATURES

Estimated Reach Length 42.37 m

Estimated Stream Width 5.94 m

Sampling Reach Area 251.68 m^2

Area in km^2 (m^2x1000) .251677 km^2

Estimated Stream Depth <0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☐ Partly open ☒ Partly shaded ☐ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 70 % ☒ Run 30 %
☐ Pool _____ %

Channelized ☒ Yes ☐ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present Phragmites

Portion of the reach with aquatic vegetation _____ %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other _____

Turbidity (if not measured)
☐ Clear ☐ Slightly turbid ☐ Turbid
☒ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other _____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3BB2
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0150 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
30 % ☒	%cloud cover	☐ ____%
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ☒ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ❑ Shrubs ❑ Grasses ☒ Herbaceous

dominant species present Phragmites

INSTREAM FEATURES

Estimated Reach Length 24.38 m

Estimated Stream Width 11.92 m

Sampling Reach Area 290.61 m^2

Area in km^2 (m^2x1000), 290609 km^2

Estimated Stream Depth 0.381 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle ____ % ☒ Run 40 %
☒ Pool 60 %

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 8 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 8 %

WATER QUALITY

Temperature _____ ° C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR3003
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0900 AM (PM)
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
20 % ☒	%cloud cover	☐ ___ %
☒	clear (sunny)	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☒ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Maple (sugar)

INSTREAM FEATURES

Estimated Reach Length 25.30 m

Estimated Stream Width 4.42 m

Sampling Reach Area 111.83 m^2

Area in km^2 (m^2x1000) .111826 km^2

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☐ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle_____% ☐ Run_____%
☐ Pool_____%

Channelized ☐ Yes ☐ No

Dam Present ☐ Yes ☐ No

LARGE WOODY DEBRIS

LWD 8 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 8 %

WATER QUALITY

Temperature_____ ° C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other_____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other_____

Turbidity (if not measured)
☐ Clear ☐ Slightly turbid ☐ Turbid
☒ Opaque ☐ Stained ☐ Other_____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other_____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3004
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0230 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
50 % ☒	%cloud cover	☐ ____ %
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____ ° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☒ Forest ❑ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Black willow

INSTREAM FEATURES

Estimated Reach Length 84.73 m

Estimated Stream Width 5.5168 m

Sampling Reach Area 467.4384 m²

Area in km² (m²x1000) .467438 km²

Estimated Stream Depth 0.5334 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 8 m²

Density of LWD _____ m²/km² (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ ° C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ☒ Sheen ❑ Globs ❑ Flecks
❑ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3B05
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0845 AM (PM)
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
10 % ☒	%cloud cover	☐ ____ %
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem ☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type ☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☒ Forest ❑ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Black willow

INSTREAM FEATURES

Estimated Reach Length 52.73 m

Estimated Stream Width 3.81 m

Sampling Reach Area 200.90 m^2

Area in km^2 (m^2x1000) .000901 km^2

Estimated Stream Depth 0.6858 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 10-15 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3 006
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0410 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
15 % ☒	%cloud cover	☐ ____ %
☒	clear (sunny)	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ☒ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Green ash

INSTREAM FEATURES

Estimated Reach Length 52.12 m

Estimated Stream Width 5.91 m

Sampling Reach Area 308.03 m^2

Area in km^2 (m^2x1000) .308029 km^2

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle_____% ☒ Run 100 %
❑ Pool_____%

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 8 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature_____ ° C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used_____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other_____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other_____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other_____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other_____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AX3087
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0435 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
☒ 20 %	%cloud cover	☐ ____ %
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ☒ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Black willow

INSTREAM FEATURES

Estimated Reach Length 21.64 m

Estimated Stream Width 4.45 m

Sampling Reach Area 96.30 m^2

Area in km^2 (m^2x1000) .096298 km^2

Estimated Stream Depth 0.1524 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ☒ Partly shaded ❑ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ☒ Run 100 %
❑ Pool _____ %

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD <10 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AO3008
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0940 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
10 % ☒	%cloud cover	☐ ___ %
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☒ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Boxelder

INSTREAM FEATURES

Estimated Reach Length 77.72 m

Estimated Stream Width 6.767 m

Sampling Reach Area 525.93 m²

Area in km² (m²x1000) .525931 km²

Estimated Stream Depth 0.183 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☐ Partly open ☒ Partly shaded ☐ Shaded

High Water Mark 1.5 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle _____ % ☒ Run 100 %
☐ Pool _____ %

Channelized ☒ Yes ☐ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD <10 m²

Density of LWD _____ m²/km² (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☒ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present Scirpus

Portion of the reach with aquatic vegetation <1 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other _____

Turbidity (if not measured)
☐ Clear ☐ Slightly turbid ☐ Turbid
☒ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other _____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3889
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY En.Safe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0513 AM (PM)
	REASON FOR SURVEY Current condition/Background

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
___% ☐	%cloud cover	☐ ___%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☒ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Boxelder

INSTREAM FEATURES

Estimated Reach Length 111.25 m

Estimated Stream Width 3.93 m

Sampling Reach Area 437.21 m^2

Area in km^2 (m^2x1000) .437212 km^2

Estimated Stream Depth 0.3048 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle _____ % ☒ Run 100 %
☐ Pool _____ %

Channelized ☐ Yes ☒ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD 10-15 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other _____

Turbidity (if not measured)
☐ Clear ☒ Slightly turbid ☐ Turbid
☐ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other _____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AR3818
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams; T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0530 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
___%	%cloud cover	___%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Black willows

INSTREAM FEATURES

Estimated Reach Length 86.26 m

Estimated Stream Width 4.51 m

Sampling Reach Area 389.03 m^2

Area in km^2 (m^2x1000) .389032 km^2

Estimated Stream Depth 0.1524 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 2 m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 80 % ☒ Run 20 %
❑ Pool _____ %

Channelized ❑ Yes ☒ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3811
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0550 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
___%	%cloud cover	☐ ___%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____ °C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem ☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type ☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other_____

Catchment Area_____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☒ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☒ Other Transportation
☐ Residential

Local Watershed NPS Pollution
☒ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Green ash

INSTREAM FEATURES

Estimated Reach Length 124.66 m

Estimated Stream Width 4.02 m

Sampling Reach Area 501.13 m^2

Area in km^2 (m^2x1000) .501133 km^2

Estimated Stream Depth 0.6706 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
☒ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark 2 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle ____ % ☒ Run 80 %
☒ Pool 20 %

Channelized ☒ Yes ☐ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD _____ m^2/km^2 (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature_____ °C

Specific Conductance_____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other_____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☒ None ☐ Other_____

Turbidity (if not measured)
☐ Clear ☒ Slightly turbid ☐ Turbid
☐ Opaque ☐ Stained ☐ Other_____

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☒ None
☐ Other_____

Oils
☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
☐ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AW3B12
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0635 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☑
☐	showers (intermittent)	☐
___%	%cloud cover	☐ ___%
☑	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☑ Yes ☐ No

Air Temperature _____ °C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☑ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☑ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☑ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ☒ Commercial
❑ Field/Pasture ❑ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present Phragmites and Dogwood

INSTREAM FEATURES

Estimated Reach Length 17.37 m

Estimated Stream Width 4.36 m

Sampling Reach Area 75.73 m^2

Area in km^2 (m^2x1000) .075733 km^2

Estimated Stream Depth 0.1524 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 100 % ❑ Run _____ %
❑ Pool _____ %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 8 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 8 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3813
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0545 AM (PM)
REASON FOR SURVEY Current condition/Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
___%	%cloud cover	___%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature_____° C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

In New York Right-of-Way

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial ☐ Spring-fed
☐ Non-glacial montane ☒ Mixture of origins
☐ Swamp and bog ☐ Other_____

Catchment Area_____km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present _____

INSTREAM FEATURES

Estimated Reach Length 19.68 m

Estimated Stream Width 4.21 m

Sampling Reach Area 74.43 m^2

Area in km^2 (m^2x1000) .074432.8 km^2

Estimated Stream Depth 0.9144 m

Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
❑ Riffle _____ % ❑ Run _____ %
☒ Pool 100 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 8 m^2

Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present _____

Portion of the reach with aquatic vegetation 8 %

WATER QUALITY

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks. wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Sanders Creek	LOCATION AB3814
STATION # _____ RIVERMILE _____	STREAM CLASS Class C
LAT _____ LONG _____	RIVER BASIN Oswego - Seneca - Oneida Basin
STORET #	AGENCY EnSafe
INVESTIGATORS D. Adams, T. Bomar	
FORM COMPLETED BY T. Bomar	DATE 6-12-13 TIME 0900 AM (PM)
REASON FOR SURVEY Current condition / Background	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☒
☐	showers (intermittent)	☐
___% ☐	%cloud cover	☐ ___%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature _____ ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem
☒ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☒ Mixture of origins
☐ Other _____

Catchment Area _____ km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
❑ Forest ❑ Commercial
❑ Field/Pasture ☒ Industrial
❑ Agricultural ☒ Other Transportation
❑ Residential

Local Watershed NPS Pollution
☒ No evidence ❑ Some potential sources
❑ Obvious sources

Local Watershed Erosion
❑ None ☒ Moderate ❑ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
❑ Trees ☒ Shrubs ❑ Grasses ❑ Herbaceous

dominant species present ① Dogwood ② Phragmites

INSTREAM FEATURES

Estimated Reach Length 151.79 m
Estimated Stream Width 4.79 m
Sampling Reach Area 727.07 m²
Area in km² (m²x1000) .727074 km²
Estimated Stream Depth 0.3048 m
Surface Velocity (at thalweg) _____ m/sec

Canopy Cover
❑ Partly open ❑ Partly shaded ❑ Shaded

High Water Mark 1 m

Proportion of Reach Represented by Stream Morphology Types
☒ Riffle 60 % ❑ Run _____ %
☒ Pool 40 %

Channelized ☒ Yes ❑ No

Dam Present ❑ Yes ☒ No

LARGE WOODY DEBRIS

LWD 0 m²
Density of LWD _____ m²/km² (LWD/ reach area)

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
❑ Rooted emergent ☒ Rooted submergent ❑ Rooted floating ❑ Free floating
❑ Floating Algae ❑ Attached Algae

dominant species present Unknown

Portion of the reach with aquatic vegetation <1 %

WATER QUALITY

Temperature _____ °C
Specific Conductance _____
Dissolved Oxygen _____
pH _____
Turbidity _____
WQ Instrument Used _____

Water Odors
☒ Normal/None ❑ Sewage
❑ Petroleum ❑ Chemical
❑ Fishy ❑ Other _____

Water Surface Oils
❑ Slick ❑ Sheen ❑ Globs ❑ Flecks
☒ None ❑ Other _____

Turbidity (if not measured)
❑ Clear ❑ Slightly turbid ❑ Turbid
☒ Opaque ❑ Stained ❑ Other _____

SEDIMENT/ SUBSTRATE

Odors
❑ Normal ❑ Sewage ❑ Petroleum
❑ Chemical ❑ Anaerobic ☒ None
❑ Other _____

Oils
☒ Absent ❑ Slight ❑ Moderate ❑ Profuse

Deposits
❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand
❑ Relict shells ☒ Other Sediment

Looking at stones which are not deeply embedded, are the undersides black in color?
❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

Appendix B

Mean High Water Survey Memo and Photographic Record

Memorandum

May 4, 2015

To: Robert Montione

From: Jeffrey Briggs, PhD.

Subject: Method of Field Delineation of NYSDEC Mean High Water (MHW) at Sanders Creek

Definition from Codes, Rules and Regulations of the State of New York (NYCRR), Chapter V - Resource Management Services, Part 608: Use and Protection of Waters

Mean High Water means the approximate average high water level for a given body of water at a given location, that distinguishes between predominantly aquatic and predominantly terrestrial habitat as determined, in order of use, by the following:

> (1) available hydrologic data, calculations, and other relevant information concerning water levels (e.g. discharge, storage, tidal, and other recurrent water elevation data) [Note: Mean high water elevations are established, using this method, for certain waterbodies *(Lakes)* as presented in Section 608.11 of this Part];
>
> (2) vegetative characteristics (e.g., location, presence, absence or destruction of terrestrial or aquatic vegetation);
>
> (3) physical characteristics (e.g., clear natural line impressed on a bank, scouring, shelving, or the presence of sediments, litter or debris); and
>
> (4) other appropriate means that consider the characteristics of the surrounding area.

Further clarification of the definition is presented in the project permitting guidance for NYSDEC Region 5 where it is defined as follows:

"Mean High Water Level (mhwl) is the average springtime high water level. Specific mhwl elevations have been established, and should be used, for the following lakes: …"

"…For other water bodies, the mhwl can be determined by observing along the shoreline:

- vegetative characteristics such as the presence, absence or destruction of terrestrial or aquatic vegetation, and
- physical characteristics such as a clear natural line impressed on a bank, scouring, shelving, or the presence of sediments or debris."

Procedure used to establish Mean High Water levels in Sanders Creek.

1. Determine the current state of flow of the Creek. The elevation of the creek should be relatively low so that bank characteristics are clearly visible. There should be several days of little or no rain or snow melt prior to the assessment visit.
2. Establish transect lines perpendicular to the line of flow at several locations throughout the stream reach of interest. For Sanders Creek, historic sediment sample locations were used to locate transects. The locations were identified using GPS equipment.
3. At each location, enter the stream and walk upstream and downstream from the transect location examining both banks for physical evidence of the transition from aquatic habitat to terrestrial habitat. Different forms of evidence may be present at different locations along the banks (physical signs of MHW on the banks are discussed below).
4. Taking into consideration all physical evidence from upstream (about 30 to 50 feet) and downstream (about 30 to 50 feet), extrapolate the transition line (MHW level) back to the transect point (where no signs may be present).
5. Place a pin flag at the current water level and a second flag at the MHW line. Measure the difference with a tape measure. Return to several places along the bank where physical marks on the bank are clear and measure the difference between the current water level and the marks of MHW. Return to the transect location and adjust the MHW flag if necessary. Cross the stream to locate the MHW line on the opposite side of the Creek at the transect location.
6. Survey the elevation of current water level and MHW on both sides of the Creek.
7. The difference between current water level and MHW may vary with the presence or absence of flow restrictions (narrowing or widening of the banks) downstream of the transect.

Field signs used to estimate Mean High Water Level on stream banks

1. *Banks* means that land area immediately adjacent to, and which slopes toward, the bed of a watercourse, and which is necessary to maintain the integrity of a watercourse (NYCRR, Chapter V, Part 608.1). In Sanders Creek the bank is the surface of the ground extending from the delineated MHW line of the stream to the first major break (flattening) of slope.
2. The following physical characteristics were considered when making a MHW determination:

- Scour and undercutting on banks
- Sediment sorting
- Deposition of sediment
- Water staining on rocks, wing walls, and culverts
- Shelving, bank-full benches, point bars
- Changes in the character of soil
- Destruction of terrestrial or aquatic vegetation
- Natural line impressed on the bank
- Presence of litter and debris on bank and in vegetation (drift line)
- Vegetation matted down, bent, or absent
- Leaf litter disturbed or washed away

Mean High Water Level GPS Data

The following table contains the GPS coordinates (elevation, easting and northing) of the MHW at each of the survey locations. The attached photo log shows the pin flags described above at each survey location.

		Mean High Water (North)			Mean High Water (South)		
Description	Station	Elevation	Northing	Easting	Elevation	Northing	Easting
Confluence w Ley Creek	0+00						
A03-013	0+55	373.4	1125486.292	947457.71	373.4	1125470.807	947457.516
A03-012	1+65	373.4	1125489.952	947566.705	373.3	1125476.825	947568.885
A03-011	3+71	373.3	1125508.134	947770.276	373.5	1125494.488	947775.927
A03-010	6+46	373.6	1125518.365	948045.957	373.8	1125501.547	948044.636
Deere Road Culvert	7+32 to 20+18						
A03-009	20+75	379.8	1125583.781	949469.062	379.6	1125568.271	949472.472
A03-008	22+43	380.5	1125611.216	949635.176	380.1	1125595.692	949637.557
A03-018	25+12	381.1	1125588.173	949904.265	381.0	1125576.245	949898.739
A03-017	27+61	381.7	1125468.782	950118.606	381.9	1125460.956	950113.917
A03-007	31+05	382.5	1125298.25	950406.038	382.1	1125284.856	950398.05
A03-006	34+40	383.2	1125108.496	950667.779	383.1	1125093.034	950663.334
A03-005	36+59	382.8	1124984.144	950803.749	382.8	1124968.266	950797.535
Old Court St Culvert	36+96 to 37+59						
A03-004	37+79	385.1	1124923.499	950903.469	384.8	1124912.196	950902.715
A03-003	38+82	384.9	1124954.524	950998.725	385.0	1124939.328	951003.88
A03-002A	39+46	384.8	1124955.262	951064.886	385.3	1124939.311	951068.983
A03-002	41+57	385.0	1125081.489	951234.916	385.2	1125059.015	951240.788
A03-001	42+99	386.3	1125155.273	951329.711	386.3	1125141.714	951345.402
Ho Jo Culvert	44+75 to 45+75						
A03-016	46+35	388.7	1125156.469	951665.372	388.5	1125149.762	951654.828
A03-015	47+87	388.7	1125094.825	951800.257	388.7	1125080.796	951794.436
Thompson Rd Culvert	48+47 to 51+06						
A02-015	51+98	388.8	1125101.771	952206.192	388.9	1125090.119	952204.003
A02-014	54+89	389.6	1125056.566	952491.855	389.7	1125044.804	952484.521
A02-013	57+87	389.4	1125063.959	952775.737	389.4	1125049.047	952775.175
A02-012	59+40	390.0	1125051.389	952932.439	389.9	1125040.764	952929.884
A02-011	62+27	390.2	1124998.421	953211.494	390.0	1124986.545	953205.728
A02-010	63+04	389.9	1124962.641	953283.028	389.9	1124957.022	953275.639
Driveway Culvert	63+79 to 64+04						
A02-009	65+21	391.2	1124895.727	953480.482	391.4	1124883.981	953478.192
A02-008	66+09	391.2	1124882.368	953566.764	391.1	1124876.534	953562.487
A02-007	66+93	391.2	1124875.37	953650.563	391.4	1124866.083	953650.304
A02-006	68+27	391.1	1124887.534	953774.669	391.2	1124875.559	953780.157
A02-005	69+46	391.6	1124945.0	953878.4	391.2	1124921.0	953880.6
Telergy Parkway Culvert	69+73 to 70+74						

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 1	**Date:** 4/23/15

Direction Photo Taken:
Upstream (south bank)

Description:

Transect A02-005 a. South bank of stream. Lower yellow flag at current water elevation; upper flag at MHW. Bankfull bench forming in foreground.

Photo No. 2	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A02-005 b. Lower yellow pin flag at current water elevation; upper yellow pin flag at MHW. Stake with blue flag shows historical sediment sample location.
Bankfull bench and undercut banks in distance.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 3	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-006. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location.

Photo No. 4	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-007. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 5	**Date:** 4/24/15

Direction Photo Taken:
Upstream

Description:

Transect A02-008. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location.

Photo No. 6	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A02-008 Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
7	4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A02-009. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location.

Photo No.	**Date:**
8	4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-010. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location. Shows upper bank collapsed (left and background) into area below MHW due to undercutting erosion.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
9	4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A02-011 a. Lower yellow pin flag at current water elevation; Upper yellow pin flag at MHW.

Photo No.	**Date:**
10	4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-011 b. North bank. Lower yellow pin flag at current water elevation; Upper yellow pin flag at MHW. Stake with blue flag shows historical sediment sample location.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 11	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-012. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Shows upper bank collapsed (left) into area below MHW due to undercutting erosion.

Photo No. 12	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-013. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location. Shows upper bank collapsed (left) into area below MHW due to undercutting erosion.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 13	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-014 a (south bank). Yellow pin flag at MHW. Notice bank swept clean of debris.

Photo No. 14	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-014 b (north bank). Lower yellow pin flag at current water elevation; Upper yellow pin flag at MHW. Stake with blue flag shows historical sediment sample location. Shows upper bank collapsed (left) into area below MHW due to undercutting erosion.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 15	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Downstream from transect A02-014.

Downstream restriction. Note difference between current water level and MHW at A02-014 b (previous photo) is greater here than at other sites due to this downstream restriction of channel width.

Photo No. 16	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Transect A02-015 a. Lower yellow pin flag at current water elevation; Upper yellow pin flag at MHW. Stake with blue flag shows historical sediment sample location. Left pin flags not visible.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
17	4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A02-015 b with crew. Upper yellow pin flag at MHW. Stake with blue flag shows historical sediment sample location. Note grass sod collapsed into the area of MHW due to undercutting erosion (right).

Photo No.	**Date:**
18	4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-001. Lower orange pin flags at current water elevation; Upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 19	**Date:** 4/23/15

Direction Photo Taken:
North Bank

Description:

Transect A03-001. North bank showing undercutting. Stake with blue flag shows historical sediment sample location.

Photo No. 20	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-002A. Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Stable river channel with MHW at bankfull elevation.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 21	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-003. Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Tree roots on opposite bank show undercutting at MHW elevation

Photo No. 22	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-004. Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Note MHW staining on wing wall of culvert (left) and undercutting of bank (right).

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 23	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-005. Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Note undercutting of bank at MHW (right).

Photo No. 24	**Date:** 4/24/15

Direction Photo Taken:
Upstream

Description:

Transect A03-006. Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sample location. Note undercutting and staining of tree roots (left beyond blue flag) and accumulation of forest debris above roots.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
25	4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-007 (wide view).
Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Note undercutting of roots and slumping bank (right)

Photo No.	**Date:**
26	4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-007 b. Close up view of right bank showing slumping from MHW and undercut of vegetation roots.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 27	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-007 c. Left bank showing bank swept clear of debris to MHW. Lower orange pin flag at current water elevation; upper orange pin flag at MHW. Stake with blue flag shows historical sediment sample location. .

Photo No. 28	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-008. Two lower yellow pin flags at current water elevation; 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location. Bank over flow (left) swept bank clean; undercutting of bank and slumping (background).

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 29	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Transect A03-009. Right lower yellow pin flag at current water elevation (left not visible); 2 upper yellow pin flags at MHW. Stake with blue flag shows historical sediment sample location.

Photo No. 30	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

A03-009 Culvert upstream opening showing MHW elevation marked with paint (approximately ½ the pipe height.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 31	**Date:** 4/24/15

Direction Photo Taken:
Upstream

Description:

Transect A03-010 (wide view).
Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location.

Photo No. 32	**Date:** 4/24/15

Direction Photo Taken:
South bank

Description:

Transect A03-010 close up view of south bank. Lower orange pin flag at current water elevation; upper orange pin flag at MHW.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
33	4/24/15

Direction Photo Taken:
Upstream

Description:

Transect A03-010
Close up of north bank. Lower orange pin flag at current water elevation; upper orange pin flag at MHW. Stake with blue flag shows historical sediment sample location.

Photo No.	**Date:**
34	4/24/15

Direction Photo Taken:
Upstream

Description:

Transect A03-011.
Two lower orange pin flags at current water elevation; 2 upper orange pin flags at MHW. Stake with blue flag shows historical sediment sample location. Note slumping of undercut bank (left).

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
35	4/24/15

Direction Photo Taken:
Downstream

Description:

Transect A03-013. Right bank. Lower orange pin flags at current water elevation; upper orange pin flag at MHW. Stake with blue flag shows historical sediment sample location. Near confluence with Ley Creek

Photo No.	**Date:**
36	4/24/15

Direction Photo Taken:
Downstream

Description:

Transect A03-013 left bank. . Lower orange pin flags at current water elevation; upper orange pin flag at MHW. Stake with blue flag shows historical sediment sample location. Near confluence with Ley Creek

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 37	**Date:** 4/24/15

Direction Photo Taken:
North

Description:

A03-013 Staff Gage showing current water level at time of visit.

Photo No. 38	**Date:** 4/24/15

Direction Photo Taken:
North

Description:

A03-013 Staff Gage wide view showing bank context.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 39	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-018 a. Lower orange pin flag at current water elevation; upper orange pin flag at MHW. Stake with blue flag shows historical sediment sample location. Note cleared bank below MHW under the red osier dogwood.

Photo No. 40	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Transect A03-018 b. Lower orange pin flag at current water elevation; upper orange pin flag at MHW. Bank undercut at MHW line. Collapsed bank in background. Top of bank well above MHW.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 41	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Howard Johnson Culvert outfall with MHW marked in orange

Photo No. 42	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

Sanders Creek @ Gabion 1- showing grass sod collapsed from undermining at the MHW level

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
43	4/23/15

Direction Photo Taken:
Downstream

Description:

Sanders Creek @ Gabion 2- showing MHW staining just below seam between upper and lower gabion baskets

Photo No.	**Date:**
44	4/23/15

Direction Photo Taken:
Upstream

Description:

Sanders Creek @ Gabion 3 - showing MHW staining just below seam between upper and lower gabion baskets

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 45	**Date:** 4/23/15

Direction Photo Taken:

Description:

Sanders Creek Below Gabion 2- showing flood debris collected on branch. Bank in photo shows MHW at bankfull (behind left) and undercutting bank (forward left).

Photo No. 46	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

UTC Culvert @ pulloff Upstream MHW staining inside culvert. MHW just above bankfull on left and right banks.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 47	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

UTC Culvert @ pulloff downstream end. MHW stain visible in culvert. MHW drops as stream drops.

Photo No. 48	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

UTC Gate Culvert 1- MHW staining inside culvert about 1/3 pipe height

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 49	**Date:** 4/23/15

Direction Photo Taken: Downstream

Description:

UTC Gate Culvert 2

Photo No. 50	**Date:** 4/23/15

Direction Photo Taken: Downstream

Description:

UTC Gate Culvert 3 upstream

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 51	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

UTC Gate Culvert downstream end showing inside coating removed at approximately MHW level.

Photo No. 52	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

UTC Gate Culverts downstream ends (outfalls)

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 53	**Date:** 4/23/15

Direction Photo Taken:
North

Description:

UTC Gate Staff gage

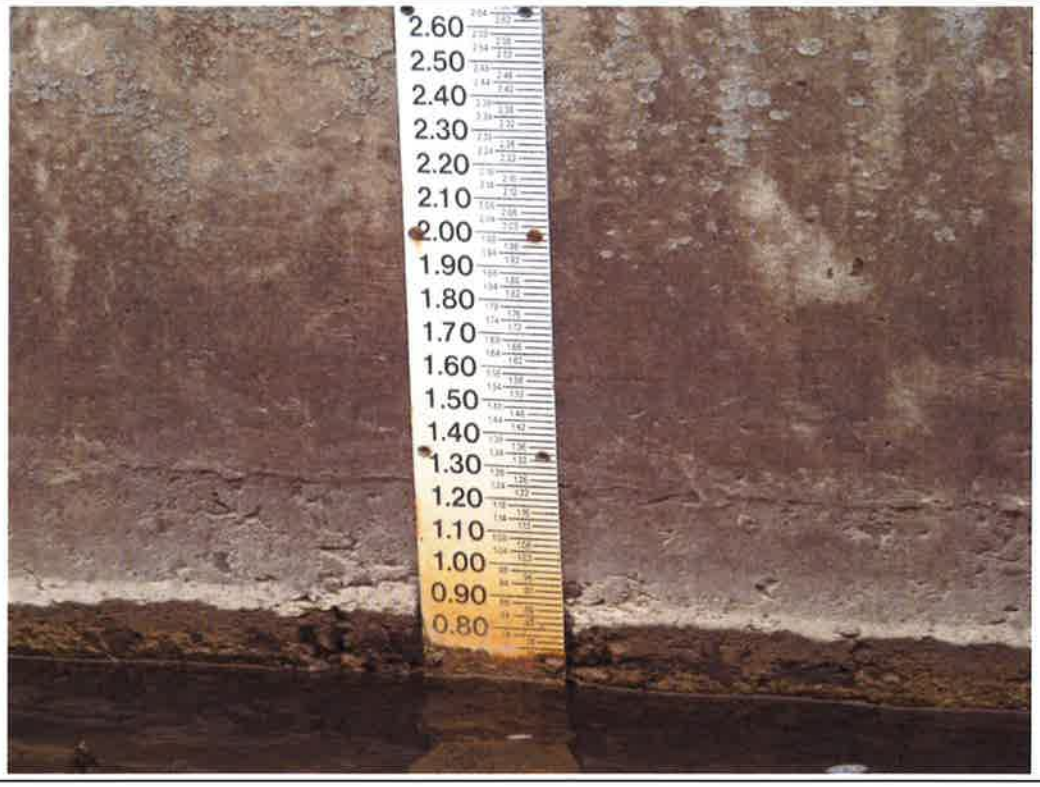

Photo No. 54	**Date:** 4/23/15

Direction Photo Taken:
Downstream

Description:

UTC Gate Stilling well for staff gage

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 55	**Date:** 4/23/15

Direction Photo Taken:
Upstream

Description:

Upstream from UTC Gate culvert "normal" flow.

Photo No. 56	**Date:** 4/23/15

Direction Photo Taken:
Upstream into outfall.

Description:

UTC Outfall 1 Shows boom in place and MHW staining on culvert walls approximately ½ pipe height.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No.	**Date:**
57	4/23/15

Direction Photo Taken:
Upstream

Description:

UTC Outfall. MHW approximately at bankfull in the stream. Outfall cover plate will be approximately ¾ submerged at MHW.

Photo No.	**Date:**
58	4/23/15

Direction Photo Taken:
Downstream

Description:

UTC Outfall from opposite direction of previous photo.

AECOM

PHOTOGRAPHIC RECORD

Client Name: United Technologies Corporation	**Site Location:** Carrier Corporation, Thompson Rd., East Syracuse, NY 13057 Sanders Creek	**Project No.** 60340856

Photo No. 59	**Date:** 4/23/15

Direction Photo Taken:
Southeast

Description:

UTC Outfall MHW Stain on east wall.

Appendix C

Quality Assurance Project Plan (QAPP)

AECOM Environment :

Prepared by:
AECOM
Latham, NY
June 2015

QUALITY ASSURANCE PROJECT PLAN (QAPP)

SANDERS CREEK UTC/CARRIER SITE SYRACUSE, NEW YORK

Corrective Action Order – Index CO 7-20051118-4
NYSDEC Site Registry #734043

Prepared for:

United Technologies

UTC Shared Remediation Services
9 Farm Springs Road
Farmington, Connecticut 06032

Prepared by:

AECOM USA, Inc.
40 British American Boulevard
Latham, New York 12110

AECOM Environment :

Prepared by:
AECOM
Latham, NY
June 2015

QUALITY ASSURANCE PROJECT PLAN (QAPP)

SANDERS CREEK UTC/CARRIER SITE SYRACUSE, NEW YORK

Corrective Action Order – Index CO 7-20051118-4
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United Technologies

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Farmington, Connecticut 06032

Prepared by:

AECOM USA, Inc.
40 British American Boulevard
Latham, New York 12110

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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned investigative activities and establish the criteria for performing these activities at a predetermined quality for the work conducted by AECOM USA, Inc. (AECOM) for United Technologies Corporation (UTC) under Corrective Action Order – Index CO 7-20051118-4.

Project work will be conducted in general accordance with the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010a), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The QAPP is intended to be a companion document to the Sampling and Analysis Plan (SAP).

1.2 PROJECT MANAGEMENT AND ORGANIZATION

1.2.1 Personnel

The general responsibilities of key project personnel are listed below. Resumes for the listed personnel are included in Attachment 2.

Program Manager – Mr. Robert E. Murphy, P.E. will have responsibility for overall project management and coordination with UTC, and will coordinate the initiation and implementation of the investigation activities.

Health and Safety Manager – Mr. Phillip Jones will be responsible for oversight of the preparation of the project health and safety plan, approving it, and tracking of its implementation.

Quality Assurance Officer – Ms. Kelly Lurie will serve as the Quality Assurance Officer (QAO) for work completed under the Corrective Action Order. The QAO will be responsible for oversight of the data validation and laboratory subcontractors, as well as data usability reports. The QAO will work with the AECOM database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC requirements, as needed.

Site Investigation Lead – Mr. John Santacroce will be responsible for overseeing all site investigation activities.

Polychlorinated Biphenyl (PCB) Expert – Ms. Mary Beth Hayes will be the project PCB expert as needed.

Database Manager – Ms. Amy Sulborski will be responsible for verifying that laboratory deliverables meet AECOM and NYSDEC electronic deliverable specifications, and for preparing the final EQuIS deliverable for submission to NYSDEC as needed.

1.2.2 Specific Tasks and Services

AECOM has or will obtain the following subcontractor specialists for services relating to laboratory/analytical services and data validation services.

- Laboratory Analysis – ACCUTEST Laboratories has been assigned to the project and is certified for aqueous and non-aqueous matrices.
- Data Validation – A third-party data validator will be assigned for data quality review and data usability summary report (DUSR) preparation as needed.
- Field surveying – Thew Associates has been assigned to the project for all field surveying work.

1.3 SITE DESCRIPTION AND LOCATION

Background data on the site, including the site description and location, site history, previous investigations, and current conditions, are summarized in the SAP.

2.0 SITE INVESTIGATION

Site investigation procedures are provided below.

2.1 Field Sampling Procedures

Field activities are detailed in the SAP and are not repeated in the QAPP.

2.2 Equipment Decontamination

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated as specified below. Cross contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

2.2.1 Decontamination Procedures

For this project, a decontamination pad will not be constructed on the site.

2.2.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as hand augers, etc., will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse; and
- Distilled/deionized water rinse.

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g., Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute.

Equipment should be allowed to dry prior to use. Steam cleaning or high pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

2.2.3 Personnel Decontamination

Wash buckets and potable water will be set up as indicated in the SAP or Health and Safety Plan (HASP). This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

3.0 SAMPLE HANDLING

3.1 SAMPLE IDENTIFICATION AND LABELING

Samples will be assigned a unique identification using the sample location identifiers listed below.

CL = Clay (Bottom)

SB = Side Bed

FP = Flood Plain

FB = Field (Equipment Rinsate) Blank

TB = Trip Blank

XX = Numerical Sample Identifier.

Specific Sample IDs for these samples will be determined with input from AECOM's database manager prior to initiation of the field sampling program.

Quality Control (QC) field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original by adding 50 to the original sample ID (e.g., SB-501 would be a field duplicate of SB-001, or similar nomenclature as dictated by AECOM's database manager). The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain of custody kept by the sampler and copied to the AECOM Project Manager. As the field duplicates are blind to the laboratory, the NYSDEC Valid Value for a field duplicate (FD) along with the identification of the parent sample will be done by AECOM after the EQuIS deliverable is received from the laboratory.

Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent waterproof ink:

- Site name, location, and job number;
- Sample name;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment, air); and
- Requested analyses.

3.2 SAMPLE BOTTLES, PRESERVATION, AND HOLDING TIME

Table 1 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed under this Corrective Action Order. Sample bottle requirements, preservation, and holding times are discussed further below.

3.2.1 Sample Containers

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements, and any regulatory protocol requirements.

Sample bottles will be provided by the analytical laboratory and will conform to the requirements of the USEPA Specifications and Guidance for Contaminant-Free Sample Containers. Aqueous samples for volatile organic compound (VOC) analysis will be collected in 40-mL vials with Teflon septa.

3.2.2 Sample Preservation

Samples will be preserved as indicated below and summarized on Table 1.

Aqueous Samples:

Volatile organics - cooled to 4º C; HCl added to pH ≤ 2.

Metals - cooled to 4º C; HNO_3 added to pH ≤ 2.

Other organic fractions (semivolatiles, pesticides/herbicides, PCBs) – no chemical preservation.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the AECOM Quality Assurance Officer (QAO). If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified, or additional preservative will be added in the field by the sampling team.

Non-Aqueous (e.g., soil and sediment) Samples:

No chemical preservatives are added to non-aqueous samples

3.2.3 Holding Times

Contractual holding times (see Table 1) are calculated from the validated time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.3 CHAIN OF CUSTODY AND SHIPPING

A chain of custody form will trace the path of sample containers from the project site to the laboratory. Chain of custody forms are typically provided by the analytical laboratory.

Sample bottle tracking sheets or the chain of custody will be used to track the containers from the laboratory to the containers' destination. The AECOM Project Manager will notify the laboratory of

upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4ºC. The field sampler will indicate the sample designation/location number in the space provided on the chain of custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing “Environmental Samples” and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain of custody form.

3.4 LABORATORY SAMPLE RECEIPT

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the chain of custody/analytical task order form. Discrepancies are addressed at this point and documented on the chain of custody form and the cooler checklist. Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO for resolution.

When the shipment and the chain of custody are in agreement, the custodian enters the samples into the Laboratory Information Management System and assigns each sample a unique laboratory number. This number is affixed to each sample bottle. The custodian then enters the sample and analysis information into the laboratory computer system.

3.4.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain of custody requirements by implementing the following procedures for laboratory/sample security:

- Samples are stored in a secure area;
- Access to the laboratory is through a monitored area;
- Visitors sign a visitor’s log and are escorted while in the laboratory;
- Only the designated sample custodians have keys to sample storage area(s); and
- Transfers of samples in and out of storage are documented.

3.4.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at 4°C ± 2°C are maintained in a locked refrigerator unless they are being used for analysis. The laboratory is responsible for sample storage and security so that:

- Samples and extracts are stored for 60 days after the final analytical data report has been submitted to AECOM. The samples, extracts, and digestates are then disposed by the laboratory in accordance with laboratory standard operating procedures (SOPs) and applicable regulations.
- Samples are not stored with standards or sample extracts.

4.0 DATA QUALITY REQUIREMENTS

4.1 ANALYTICAL METHODS

Soil sample analyses for this Corrective Action Order will utilize USEPA SW-846 methods as listed below. Analytical and extraction/sample preparation methods typically used are shown on Table 1 and summarized below:

- Volatile Organics - SW-846 Method 8260C
- Semivolatile Organics – SW-846 Method 8270D
- PCBs – SW 846 Method 8082A
- Resource Conservation and Recovery Act (RCRA) 8 metals – SW-846 Method 6010C.

Analytical methods used for this Corrective Action Order are presented in the NYSDEC Analytical Services Protocol (ASP), 2005. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it pertaining to New York State work. Full Category B deliverables will be required.

AECOM has assigned ACCUTEST Laboratories to this project. ACCUTEST is certified by the NYSDOH Environmental Laboratory Approved Program and is in good standing for the applicable parameter groups.

4.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP will be used in assessing the uncertainty associated with decisions related to this site.

4.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is based on the DQOs established for the project. The method detection limit (MDL) is determined in accordance with the procedure in ASP Exhibit A, section 4.9.2.12, which is consistent with the procedure in 40 CFR Part 136 Appendix B.

The reporting limit (RL) for nondetected analytes will be the lowest calibration standard associated with the analysis. RLs will be equal to or lower than those presented in Exhibit C of ASP 2005 for the applicable method. Analytes detected at concentrations below the RL but above the MDL will be flagged "J" (estimated) by the laboratory. Typical RLs are summarized on Table 2.

The reporting limits and MDLs of ACCUTEST will be reviewed by AECOM's QAO to verify that the laboratory sensitivity is sufficient to meet the project objectives. These will typically include meeting the applicable standards, criteria, and guidance (SCGs) including soil cleanup objectives (6 NYCRR 375-6.8), supplemental soil cleanup objectives (NYSDEC, 2010b), and groundwater and surface water criteria (compiled in TOGS 1.1.1).

4.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. Matrix spike/matrix spike duplicate (MS/MSD) analyses will be performed once for every 20 samples.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (RPD):

$$RPD = 100 \times 2(|X_1 - X_2|) / (X_1 + X_2)$$

where:

> X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is ≤ 50% RPD for all matrices for analytes detected at concentrations at least 2 times the reporting limit. Where one or both analytes are detected at less than 2 times the RL, the criterion is the absolute difference “D” ($X_1 - X_2$), and D should be less than the RL for the analyte.

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent method recovery criteria and those determined from laboratory performance data are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike or laboratory control will be performed once for every analytical batch or as specified in the method or ASP. Other method-specific laboratory QC samples (such as continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\% \text{ Recovery} = 100 \times (SSR-SR)/SA$$

Where:

SSR = Spiked Sample Result;

SR = Sample Result; and

SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples. Accuracy values can be presented in a variety of ways. For projects under this UTC contract, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (R/S) \times 100$$

Where:

S = surrogate spike concentration

R = reported surrogate compound concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the US Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability within any specific project is also assessed by comparison of the project data to data generated previously; and, if available, comparison of the data for multiple sampling events conducted for the project. Comparability (consistency) of sampling techniques is also assessed, to some extent, by analysis of field duplicates; although it should be noted that large differences between field duplicates may result from a wide variety of causes, not just inconsistent sampling.

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data for all planned samples. Completeness of 100 percent indicates that all planned samples were collected; and the resultant data were fully valid and acceptable. As completeness is a function of both field activities and laboratory activities, separate completeness goals are established for each.

The default goal for sampling completeness is 95 percent, as is calculated as

$$\text{Sampling Completeness (\%)} = (Sc/Sp) \times 100$$

Where:

Sc = Samples collected (submitted) for analysis (documented from field records or COC)

Sp = Samples planned (as documented in the FAP or QAPP)

The default goal for analytical completeness is also set at 95 percent. Analytical completeness may be less than 100 percent either due to systemic failures that result in the rejection or loss of data for an entire sample; or compound-specific rejection (e.g., 2-hexanone) within an otherwise valid analysis.

For typical projects, the default overall completeness goal is 90 percent useable data. The impact of rejected or unusable data will be made on a case-by-case basis. If the goals of the project can be achieved without the missing datum or data, or if data from a different sampling event can be used to fill the data gap, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be “demonstrated analyte-free.” The criteria for analyte-free water are based on the USEPA-assigned values for the Contract Required Quantitation Limits (CRQLs) for CLP analyses, or the RL for SW-846 or other methods.

However, specifically for the common laboratory contaminants (acetone and 2-butanone), the allowable limits are five times the CRQL (or RL). For methylene chloride, the limit is 2.5 times the CRQL. For common SVOC contaminants (phthalate esters such as bis(2-ethylhexyl) phthalate), the limit is 5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte-free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

Table 2 of this QAPP shows typical QA/QC samples and reporting limits. QA/QC samples are discussed below.

4.3.1 Field Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Rinsate blanks are not required when samples are collected directly into laboratory-provided sample containers (e.g., if specified as such in the SAP).

Typically, one rinsate blank will be collected for every 20 field samples collected or one per week, whichever is more frequent, for each type of sampling equipment. The rinsate blanks will be collected from the soil and groundwater sampling equipment.

4.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method.

Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day.

Soil or sediment duplicate samples are collected from a single location and device (e.g., hand auger). Soil duplicates for VOC analysis are collected first, without homogenization. If other parameters are being analyzed, the remaining soil or sediment is homogenized (e.g., by mixing in a clean stainless steel bowl) and prior to generating the sample and duplicate.

The default field duplicate precision (RPD) objective is ≤50% percent RPD for all matrices where the sample concentration is at least two times the reporting limit. Where the analyte is detected in both samples but the concentration is less than 2 times the reporting limit, precision is assessed by the absolute difference, which should be less than the reporting limit. The RPD is not calculable when the analyte is not detected in one or both analyses. A more detailed discussion of the calculation is provided in Section 4.2.2 (Precision), above.

Field duplicates will be collected at a frequency of one per 20 environmental samples for analysis.

4.3.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. Split samples may also be generated if a site owner or PRP requests them. A split sample will be defined as at least two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples may be conducted only when specifically requested by NYSDEC or UTC.

4.3.4 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis.

Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

4.3.5 Temperature Blanks

The laboratory will use either an infrared instrument to measure the temperature of liquid samples, or a temperature blank will be used to measure the temperature of liquid samples. If used, temperature blanks will be supplied by the analytical laboratory. If multiple coolers are necessary to store and transport aqueous samples, then each cooler will contain an individual temperature blank (if used).

4.4 LABORATORY QUALITY ASSURANCE

4.4.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

4.4.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a MS/MSD for volatile organics.

4.4.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: matrix spikes and matrix spike duplicates, which are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD samples will be analyzed at a frequency of one (pair) for every 20 samples. In addition, matrix spike blanks (MSBs) will also be prepared and analyzed by the laboratory as required by NYSDEC ASP.

4.4.4 Laboratory Control Sample

A fortified clean matrix (laboratory control sample, or LCS) is analyzed with each analysis. In some cases a “Laboratory-Fortified Blank” (LFB) may serve as the LCS. These samples generally consist of a standard aqueous or solid matrix fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS may be analyzed in duplicate for some methods (LCSD). The analyte recovery from each analysis (LCS and LCSD) is used to monitor analytical accuracy; analytical precision can be assessed from evaluation of the LCS/LCSD in the same manner as the MS/MSD.

5.0 FIELD DATA DOCUMENTATION

Field reporting documentation, including field logbooks and field data reporting forms, is discussed in the SAP and not repeated here.

6.0 EQUIPMENT CALIBRATION AND MAINTENANCE

Quality assurance for instrumentation and equipment used for a project is controlled by a formal calibration program, which verifies that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. Calibration is performed using reference standards or externally by calibration agencies or equipment manufacturers.

6.1 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment will be calibrated according to the method-specific requirements of the 2005 NYSDEC ASP**,** Exhibit E, Parts II and III, and maintained following professional judgment and the manufacturer's specifications, and additional requirements as specified in the Environmental Laboratory Accreditation Program (ELAP) certification manual.

6.1.1 Calibration Procedure

Written procedures are used for all instruments and equipment subject to calibration. For chemical analyses typically performed for this contract, the calibration procedures are specified in the methods as compiled in the ASP. If established procedures are not available, a procedure is developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured.

6.1.2 Calibration Frequency

Calibration frequency is based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

6.1.3 Calibration Reference Standards

Two types of reference standards will be used by the standby laboratories for calibration:

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration.

Chemical standards, such as Standard Reference Materials (SRMs) provided by the National Institute of Standards and Technology (NIST) or USEPA, may also include vendor-certified materials traceable to NIST or USEPA SRMs. These are primarily used for operational calibration.

6.1.4 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable is removed from service. Such equipment must be repaired and satisfactorily recalibrated before re-use. For laboratory equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken and the analyst achieves an acceptable calibration.

Laboratory managers are responsible for development and implementation of a contingency plan for major equipment failure. The plan includes guidelines on waiting for repairs, use of other instrumentation, subcontracting analyses, and evaluating scheduled priorities.

6.1.5 Calibration Records

Records are prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of preparation, stability, and proof of continuity of reference standards are also maintained. Copies of the raw calibration data are kept with the analytical sample data.

6.2 OPERATIONAL CALIBRATION

Operational calibration is generally performed as part of the analytical procedure and refers to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Included are the preparation of a standard response (calibration) curve and often the analysis of blanks.

Preparation of a standard calibration curve is accomplished by the analysis of calibration standards, which are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards are chosen to cover the working range of the instrument or method. For most methods, five calibration standards are used, with the concentration of the lowest calibration standard being the reporting or quantitation limit for that analysis. Sample measurements are made and reported within this working range; apparent concentrations which exceed the high end of the calibrated range (“E”-flagged data for organic analyses) are diluted (or a smaller sample is used) and re-analyzed. The calibration curve is prepared by plotting or performing a linear regression of the instrument responses against the analyte concentration.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

7.1 LABORATORY DATA REPORTING AND REDUCTION

Data reduction is the process by which raw analytical data generated from laboratory instrument systems is converted into usable concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, are processed by the laboratory and converted into concentrations expressed in the parts per million (mg/kg or mg/L) or parts per billion (µg/kg or µg/L) range. Raw data from these systems include compound identifications, concentrations, retention times, and data system print-outs. Raw data are usually reported in graphic form, bar graph form, or tabular form. The laboratory will follow standard operating procedures consistent with the data handling requirements of the applicable methods.

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2005 revision of the NYSDEC ASP. ASP Deliverables will be Category B (full deliverables). Laboratory data reports will conform to NYSDEC Category B deliverable requirements, as specified in Exhibit B, Part II.E, Sections 2 and 3, respectively.

Copies of the laboratory's generic Quality Assurance Management Plan (QAMP, as defined in ASP 2005 Exhibit E, Part I) will be maintained at AECOM's office (Latham, NY). The laboratory's QAMP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

To meet NYSDEC electronic data deliverable (EDD) requirements, the laboratory for this work will be required to submit electronic deliverables in an EQuIS 4-file format consistent with AECOM standards (see Attachment 1). AECOM's database manager will be responsible verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel (or Access) file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, etc.), and submitting a final EQuIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form (submitted electronically or on computer diskette). The data spreadsheet will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

7.2 DATA VALIDATION

Data generated for projects under this contract will be typically be validated by a third-party subcontractor (not affiliated with the laboratory or with AECOM). The validator will follow guidelines established in the USEPA Region 2 SOPs applicable to the analytical method(s) being reviewed. These SOPs are checklists which are designed to formally and rigorously assess the quality and

completeness of SW-846 analysis data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-10-011, January 2010, and the National Functional Guidelines for Organic Data Review, EPA-540-R-08-01, June 2008).

Validation reports and DUSRs will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Results with validation qualifiers may also be added to the Excel EDD data file provided by the lab. Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text. Where QC failures caused the laboratory to perform a re-analysis, the data validator will make a recommendation as to which of the two analyses should be used. Data review will also include an assessment of sensitivity (i.e., are reporting limits appropriate to determine if contaminants are present at or above action levels or other applicable threshold values).

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the Region 2 SOPs and EPA Functional Guidelines as much as possible, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use.

7.3 DATA USABILITY

Subsequent to review of the items evaluated in the subcontractor data validator reports (DUSRs) and accompanying tables, AECOM's QA staff then prepares a brief data usability summary, which encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets.

The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Data which has not been validated and field data used for the project will be discussed in the data usability summary, including any limitations on the use of such data.

7.4 FIELD DATA VERIFICATION

Field personnel will record all field data in bound field logbooks and on standard forms. After checking the validity of the data in the field notes, the AECOM Project Manager or his/her designee will reduce the data to tabular form, when possible, by entering the data into data files. Where appropriate, the data files will be set up for direct input into the project database. Subjective data will be filed as hard copies for later review by the Project Manager and incorporation into technical reports, as appropriate.

Verification of field data will be performed at two different levels. The first level of data verification will be performed at the time of collection by following standard procedures and QC checks. The second level of review consists of the Project Manager, Task Manager, or other competent personnel, reviewing the data to confirm that the correct codes and units have been included. After data reduction into tables and arrays is complete, the Site Investigation Lead will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data.

8.0 PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. Field audits are conducted to verify adherence to proper field and sampling procedures. Audits are of two types, as described below:

- Performance audits are independent safety and health, procedure, and/or sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process.
- System audits are onsite qualitative inspections and reviews of the QA system used by some part of or the entire measurement system. The audits are performed against the QAPP. A checklist is typically generated from the requirements and becomes the basis for the audit. The results of any deficiencies noted during the audit are summarized in an audit report.

Laboratory performance and system audits are performed by the laboratory's QA staff to assess the effectiveness of the quality system. These internal audits are performed on a routine basis. Audits are also performed by certifying agencies. Audit reports and corrective actions are available to NYSDEC for review.

8.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QA Officer will keep a tentative schedule on record that details the number and types of audits.

8.2 FIELD AUDITS

The need for field audits will be determined on an ongoing basis. Not all the aspects listed below may be necessary or appropriate for all circumstances.

Field performance audits, if specified, will be conducted during the project as field data are generated, reduced, and analyzed. Numerical manipulations, including manual calculations, will be documented. Records of numerical analyses will be legible, of reproduction quality, and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator.

Indicators of the level of field performance include the analytical results of the blank and replicate samples. Each blank analysis will be considered an indirect audit of the effectiveness of measures taken in the field to maintain sample integrity (e.g., field decontamination procedures).

The results of the field replicate analyses are an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

System audits of site activities will be accomplished by an inspection of all field site activities. During this audit, the auditor(s) will compare current field practices with standard procedures. The following elements will be evaluated during a field system audit:

- Field activities conducted in substantial compliance with the SAP
- Procedures and analyses conducted according to procedures outlined in the QAPP
- Sample documentation

- Working order of instruments and equipment
- Level of QA conducted by field personnel
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency with which each team conducts planned activities at one site and proceeds to the next
- Sample packaging and shipment.

After completion of the audit, any deficiencies will be discussed with the field staff and corrections identified. If any of these deficiencies could affect the integrity of the samples being collected, the auditor(s) will inform the field staff and corrections will be implemented immediately. The audit will be performed by the Project QA/QC Coordinator or the Site Investigation Lead.

8.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

The laboratory assigned to this project will be verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the matrices and analytical protocols to be used. Therefore, no project-specific audit of the laboratory(s) will be performed unless warranted by a problem(s) that cannot be resolved by any other means.

8.4 AUDIT PROCEDURES

Prior to an audit, the designated lead auditor prepares an audit checklist. During an audit and upon its completion, the auditor(s) will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will then prepare and submit an audit report to the manager of the audited group and the Project Manager.

The manager of the audited group will then prepare and submit, to the Project QA Officer and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

8.5 AUDIT DOCUMENTATION

A checklist will be completed during each audit so that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures. The checklist will detail the activities to be executed as part of the auditing plan. Audit checklists will be prepared in advance and will be available for review. Following each system, performance, and data audit, the auditor or QAO will prepare a report to document the findings of the specific audit.

9.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its quality management system (QMS) program, AECOM provides relevant excerpts and conclusions from data validation reports to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made.

The objectives of the corrective action procedures presented below are to ensure that recognized errors in performance of sample and data acquisition lead to effective remedial measures and that those steps are documented to provide assurance that any data quality deficiencies are recognized in later interpretation and are not recurrent.

9.1 RATIONALE

Many times corrective measures are undertaken in a timely and effective fashion but go undocumented. In other cases, corrective actions are of a complex nature and may require scheduled interactions between departmental groups. In either case, documentation in a formal or informal sense can reinforce the effectiveness and duration of the corrective measures taken.

9.2 CORRECTIVE ACTION METHODS

9.2.1 Immediate Corrective Actions

Immediate corrective actions are of a minor or routine nature such as correcting malfunctioning equipment, correction of data transcription errors, and other such activities routinely made in the field, laboratory, or office by technicians, analysts, and other project staff.

9.2.2 Long-Term Corrective Actions

Long-term corrective action will be used to identify and eliminate causes of non-conformances which are of a complex nature and that are formally reported between management groups.

9.2.3 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action system are as follows:

- Define the problem;
- Assign responsibility for investigating the problem;

- Investigate and determine the cause of the problem;
- Determine a corrective action to eliminate the problem;
- Assign and accept responsibility for implementing the corrective action; and
- Verify that the corrective action has eliminated the problem.

Non-conformance events associated with analytical work are documented by the laboratory's Non-Conformance Records, which are reviewed and approved by the laboratory's Quality Assurance Manager.

9.2.4 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an Audit Finding Report.

9.3 CORRECTIVE ACTION REPORT REVIEW AND FILING

Immediate and long-term corrective actions require review to assure that, during the time of non-conformance, erroneous data were not generated or that, if possible, correct data were acquired instead. Such confirmation and review is the responsibility of the supervisor of the staff implementing the corrective action. Confirmation will be acknowledged by notation and dated signature on the affected data record or appropriate form or by memorandum to AECOM project management.

10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Fundamental to the success of this QA/QC is the active participation of the AECOM Project Manager and the Project QA Officer. The Project QA Officer will be advised of project activities and will participate in development, review, and operation of the project. Project management will be informed of QA activities through the receipt, review, and/or approval of:

- Project-specific work plans;
- Corrective action notices; and
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit and, where applicable:

- Assessment of adherence to work scope and schedule for the audited task;
- Assessment of the precision, accuracy, and completeness of sample batches;
- Subsequent status of data processing and analyses;
- Significant QC problems and the status of any ongoing corrective actions;
- Changes to the QAPP; and
- Status of implementation of the QAPP.

The Sampling and Analysis Plan final Report will include aspects of quality control that were pertinent during the project. Problems revealed during review of the month’s activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The Project Manager, through task managers, will be responsible for verifying that records and files related to the project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

11.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocol (ASP) Manual*. July.

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Tables

Table 1
Sample Bottle, Volume, Preservation, and Holding Time Summary
UTC/Carrier Sanders Creek Site Quality Assurance Project Plan

MATRIX/ANALYSIS	Sample Prep Method [1]	Analytical Method [(2)]	Sample Bottles (3)				Minimum Vol Rqd	Preservation (4)	Holding Time (4, 5)	
			Mat'l	Size	Qty	Source			Extraction	Analysis
Non-Aqueous Samples										
Volatile Organics	SW 846 5035A	SW 846 8260C	TerraCore	5 or 25 g	3 or 1	Vendor [7]	5 g	None	NA	48 hours [8]
Semivolatile Organics	SW 846 3540C/3541/3545A	SW 846 8270D	G	8 oz [(6)]	1	Lab	30 g	None	14 days	40 days
Polychlorinated Biphenyls	SW 846 3540C/3541/3545A	SW 846 8082A	G	"	"	Lab	30 g	None	14 days	40 days
RCRA 8 Metals	SW 846 3050B/3051A/3052	SW 846 6010C	G	"	"	Lab	10 g	None	NA	180 days

Notes:
(1) Laboratory may propose alternate extraction/preparation methods, subject to AECOM approval.
(2) More recent versions of SW-846 methods may be used subject to AECOM approval.
(3) Bottles typical. TerraCore samplers for Volatile Organics in soil will be provided by laboratory or AECOM on a case-by-case basis.
(4) All samples for chemical analysis should be held at 4 degrees Celsius in addition to any chemical preservation required.
(5) Holding time calculated from day of collection, unless noted as being from time of extraction. Laboratory holding times (ASP 2005, Exhibit I) are two days shorter to allow for field handling and shipping.
(6) A single 8-oz. sample is sufficient for Semivolatile Organics, Polychlorinated Biphenyls, and RCRA 8 Metals.
(7) TerraCore samplers are typically purchased from an outside supplier by AECOM but may also be requested (for a fee) from the analytical laboratory.
(8) TerraCore samplers must be prepared/preserved in the laboratory within 48 hours of collection. Soil samples in glass bottles and preserved TerraCores have a 14 day (total) holding time.
G = Glass
RCRA = Resource Conservation and Recovery Act of 1976 (8 Metals)
SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.

Table 2
Quality Assurance Project Plan - Laboratory Analyses
UTC/Carrier Sanders Creek Site

Reporting Limits and QA/QC Sample Quantity Summary

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit -Typical (units as specified)	Field Sample Quantity	Matrix Spike (MS) or LCS	MS Duplicate or Matrix Duplicate	Field Duplicate	Equipment/ Field Blank [2]	Trip Blank	Total Analyses [3]
Soil/Sediment Samples										
Volatile Organics	SW 846 8260C	ACCUTEST	5 µg/kg (typical) [1]	309	16	16	16	16	12	353 [4]
Semivolatile Organics	SW 846 8270D	ACCUTEST	330 µg/kg (typical) [1]	309	16	16	16	16	0	341 [4]
PCBs	SW 846 8082A	ACCUTEST	57 - 70 µg/kg [1]	329	17	17	17	17	0	363 [4]
RCRA 8 Metals	SW 846 6010C	ACCUTEST	Analyte-specific	309	16	16	16	16	0	341 [4]

PCBs = Polychlorinated Biphenyls
RCRA = Resource Conservation and Recovery Act of 1976 (8 Metals)
µg/kg = micrograms per kilogram
LCS = Laboratory Control Sample

Notes:
1 Reporting limits for soils, when adjusted for dry weight, will be higher. Detections above the method detection limits but less than reporting limits will be reported and flagged as estimated (J).
2 Field equipment rinsate blank quantity will vary depending on sample collection rate and types of sampling equipment used; quantity may be greater or less than that shown.
3 MS/MSDs not included in the total.
4 Samples collected on Carrier property will immediately be extracted and analyzed for all compounds and locations upon receipt by the laboratory. Samples collected from off-site will immediately be extracted, but not analyzed, pending review of sample results from Carrier property. The field sample quantity shown assumes that all analyses will be performed for all compounds and sample locations.

Attachments

Attachment 1

AECOM Electronic Data Deliverable Specification

AECOM Electronic Data Deliverable Specification

Documentation of the structure and contents of the EDD is now provided directly by the EQuIS Data Processor (EDP). Click the **EDD Description** button in the **Tools** section of the **Home** ribbon section of EDP. The AECOM format file and EDP software (for data providers that do not have it already) are available from http://www.earthsoft.com/products/edp/edp-format-for-aecom/ The format will have to be "registered" when first launched in EDP.

Each EDD will comprise 4 files, to describe samples, tests, results, and batches. The format file has two different sections for samples, Field and Lab, only one of which can be included in the EDD. Which sample section to use will be communicated by the AECOM data manager at project setup.

Submittal

The EDD file can be in one of the following formats:

- ZIP archive of tab-delimited text files (.txt)
- spreadsheet (.xls or .xlsx)
- database (.mdb)

Regardless of the method of EDD Submittal, EDD Packages must be named using a specific naming convention.

EDD File Name:

<Unique ID>.<Facility Code>.AECOM.{zip | xls | xlsx | mdb}

ZIP archive text file EDD section names:

<Unique ID>.<EDD Section Name>.txt

Or XLS worksheet *or* MDB table EDD section names:

<EDD Section Name>

Where:

<Unique ID> = A unique identifier which will be the Sample Delivery Group name unless other arrangements have been made.

<Facility Code> = The facility code for the facility to which this EDD will be loaded, will be communicated by the AECOM data manager at project setup.

<EDD Section Name> = The name of the section within the EDD (i.e. AECOMLabSMP or AECOMFSample, AECOMLabTST, AECOMLabRES, AECOMLabBCH) as it appears in EDP.

Between each of the name elements is a "." (period). It is very important that it is a period and not a "-" (dash), "_" (underscore), or any other character.

Resubmittal

EDD packages may be resubmitted. However, in order to resubmit corrected EDDs, the files must each be renamed, regardless of the reason(s) for resubmittal.

Example: A lab originally submits an EDD Package (.zip) file named "20100129.MySite.AECOM.zip" which contains EDDs named "20100129.AECOMFSample.txt," etc. If the lab later makes a change to one of the EDDs, it would have to submit a new EDD Package named "20100129R.MySite.AECOM.zip" with EDDs named "20100129R.AECOMFSample.txt," etc.

Reference Values

A Reference Values file should be delivered from the AECOM data manager to the data provider at project setup. No EDDs will be accepted that do not strictly adhere to the project-specific reference values. If new values need to be used, they must be identified and explained to the AECOM data manager who will provide approval or alternate codes to use before any EDD should be submitted.

Attachment 2

Personnel Resumes

Robert E. Murphy, P.E.
Program Manager

Education
BS, Civil Engineering, State University of New York at Buffalo, 1980

Experience
With AECOM: 29
With Other Firms: 5

Mr. Murphy is an expert in the field of environmental remediation. He has performed all phases of such work from initial site investigations through RI/FS, design, construction, scheduling, cost estimating, construction management, and operations and maintenance. This experience has included all manner of: soil, groundwater, surface water, sediment, wetland, and air remediation; as well as plant decommissioning and environmental compliance. He has acted as program manager for complex, multi-site programs involving hundreds of millions of dollars in construction.

Former Sinclair Refinery Superfund Site, Wellsville, NY. New York State Licensed Professional Engineer responsible for certifying design and construction of the environmental remediation. The project involved river sediment removal through the excavation of dewatered sheet pile cells; groundwater collection through a leachate collection trench/pump station system; leachate treatment through phyto-remediation.

Fletcher Paint Superfund Site, NH. Selected by a confidential Fortune 100 company as a remediation expert to provide a constructability review of this Superfund site remedial design, which included excavation and offsite disposal of PCB impacted soils utilizing sophisticated excavation support techniques.

Project Engineer Confidential Client, NY. Participated in a team of experts for development of a project cost model for planning of a large river sediment remediation project.

Newport Delaware Superfund Site, Christina River Remediation, DE. The design and construction management of a river sediment remediation project; a 7-acre landfill cover; and a 16-acre landfill closure (cap, slurry wall, reactive barrier wall). The river work included cofferdam design for sediment control during dredging, and design of a sheet pile barrier wall for groundwater control.

Lipari Landfill Superfund Site, NJ. Value engineering design services provided to the remedial action contractor, and general investigation, design, and construction phase services for the site's potentially responsible party (PRP), The project involved removal and treatment (thermal desorption) of contaminated marsh sediments, and dewatering and sediment removal from an adjacent lake. Services also included investigation, design, and construction phase services, relative to the delineation and removal of six additional areas of contamination. Remedial actions included braced excavations and the use of sheet pile cutoff walls.

Marathon Battery Superfund Site, NY. Value engineering design services provided to the remedial action contractor. The project involved removal and stabilization of contaminated marsh sediments. Value engineering concepts included: use of a temporary water structure in lieu of an earthen dike; replacement of a proposed settling basin with a land-based water treatment system; optimization of a sediment solidification/stabilization process; redesign of the wetlands restoration plan.

Helen Kramer Landfill, NJ. Construction Phase Engineering Services. The project features included a soil-bentonite containment wall (8,400 LF x 70 ft deep), site cap, (80-acre) gas collection and treatment system, groundwater collection system (3,300 LF x 40 ft deep), groundwater pretreatment plant (120 gallons per minute (gpm)), roller-compacted concrete retaining wall, geotechnical soil stabilization utilizing in situ deep soil mixing, and an aboveground dual containment force main.

Feasibility Studies, NY. Project Engineer for three New York State Department of Environmental Conservation (NYSDEC) Hazardous Waste Superfund Feasibility Studies. Responsible for design of final site capping alternatives, as well as design of various groundwater containment and leachate collection systems.

Remedial Investigations (RI), NY. Project Engineer on three NYSDEC Superfund site remedial investigations including one Title 3 funding contract. Participated in all phases of RI activities from coordination of field activities to reduction and reporting of geological, hydrogeological, geophysical, geotechnical, chemical, and environmental data.

PAS Superfund Site, NY. New York State's first federal Superfund remedial construction project at the PAS Superfund Site in Oswego, New York. Work involved slurry wall, leachate collection trenches and landfill cap.

Former UNISYS Facility, Great Neck, New York, NY. State Licensed Professional Engineer responsible for review, upgrade and certification of an existing design for a double-walled HDPE force main with continuous leak detection cable, and addition to subslab depressurization system.

Hyatt Clark Industries Facility, NJ. Various phases of decommissioning, site remediation, and site development of

an 85-acre former General Motors Corporation manufacturing plant. Remediation involved capping of contaminated soils and development of a golf course complete with club house.

Dunlop Tire Corporation, NY. Project Manager for the closure of three inactive waste sites for Dunlop Tire Corporation in Tonawanda, New York.

Rohm and Haas Company, (now DOW), Ammonia-Nitrogen Plume, IL. Project Manager for the evaluation of treatment options and final design of a groundwater treatment system (260 gpm) required to address volatile organic compounds as well as high concentrations of ammonia-nitrogen and lower levels of 1,4 dioxane.

Rohm and Haas Company, (now DOW), PA, and NY. Project Manager and Technical Lead on multiple projects. One was the design of a leachate collection trench at the Philadelphia Plant. Another involved the structural and hydraulic design of a cofferdam and tide control sluice gate/flap valve to allow landfill work at the Bristol, Pennsylvania, plant to proceed without tidal interruption. A third involved a remedial investigation of Freon 113 contamination in groundwater at a formerly owned property in order to have the site removed from NYSDEC's list of hazardous waste sites.

DuPont, Various Assignments. A number of remedial design and construction projects at sites in New York, Delaware, New Jersey, West Virginia, Wisconsin, and Indiana. The projects involved sheet pile cutoff walls, river sediment removal, landfill capping, slurry walls, groundwater collection, reactive barrier walls, shoreline protection, bluff and riverbank stabilization, and sediment handling.

New York City Department of Design and Construction (NYCDDC) UST Program, NYC. 17 individual contracts for tank replacement design, environmental investigation, and site remediation covering over four hundred sites. This program was performed in compliance with a NYSDEC Order of Consent. Remedial technologies and approaches implemented included; excavation, free product recovery, pump and treat, dual phase extraction, bioslurp, bioremediation, biosparging, air sparging, natural attenuation, oxygen-releasing compound (ORC), enhanced vapor recovery, and Risk Based Corrective Action (RBCA). A database and GIS system were utilized to manage site documents and data.

New York City Transit (NYCT) Underground Storage Tank Management Program, NYC. Six consecutive 3-year contracts totaling over $28 million in fees, and over $100 million in project construction. This program was performed in compliance with a NYSDEC Order of Consent. It involved site assessment, Remedial Investigations, Feasibility Studies, remedial design, and remedial action oversight services, encompassing 350 tanks at 54 facilities. The project involved remedial actions including four large excavation projects, in situ soil solidification and stabilization: numerous in situ treatment technologies; numerous free product recovery technologies and systems; and numerous water treatment systems, up to 200+ gpm in size.

Phillip Jones, CIH
Health and Safety Manager

Education
MS, Industrial Hygiene, Temple University, 1977

BA, Chemistry, Houghton College, 1974

Experience
With AECOM: 30
With Other Firms: 10

Mr. Jones' nearly 40 years of experience includes safety and health management at chemical process plants, construction safety, and hazardous waste operations health and safety. Mr. Jones' former role was Vice President of Safety for the URS Corporation Infrastructure and Environment Business. Responsibilities included management of the HSE program for over 19,000 employees, including 8,000 outside the US.

Mr. Jones' extensive experience in health and safety training includes behavior based safety, management seminars on safety and health, worker training on specific hazards (lead, drum handling, platinum allergy, asbestos), confined space entry, underground construction, hazard communication classes, and seminars for industrial hygiene graduate courses.

Mr. Jones has taught over 200 safety classes with clients including the U.S. Environmental Protection Agency, U.S. Army COE (Philadelphia District), New York City Department of Environmental Protection, U.S. Air Force, U.S. Postal Service, consulting engineers, construction personnel, and university students.

Mr. Jones' construction safety experience includes over 50 site audits of active construction sites, review of project safety plans, incident investigations (including root cause analysis), worker training, and handling regulatory inspections. Mr. Jones' underground construction experience includes teaching the 8-hour underground safety class, entry into tunnels to perform audits (including tunnels under compressed air), review of air monitoring systems, health and safety plan development, and procedure development for tunnels in contaminated soils.

Industrial hygiene experience includes management of multi-site air monitoring projects for chemical manufacturers, indoor air quality studies in office buildings, extensive studies in secondary metals refining (platinum group metals, lead, silver, gold), specialty chemicals, pharmaceutical manufacturing, and catalyst manufacturing. Additional experience is noted in oil refineries, pigment manufacturing, semiconductor production, textile manufacturing, electroplating and foundries.

Project experience in hazardous waste includes on-site safety supervision and preparation of health and safety plans for remedial cleanup projects and remedial investigations. Sites have included a waste incineration site (Louisiana), construction operations at hazardous waste sites (New York), and a solvent cleanup site (New York). Mr. Jones has reviewed and approved over four hundred site-specific safety and health plans. Site audits are conducted by Mr. Jones to evaluate health and safety plan implementation.

Expert witness experience includes assistance to law firms with cases including possible worker health effects while working at a hazardous waste site (Louisiana), possible health effects from indoor air quality in an office environment (New Jersey), and printing ink product liability (Virginia).

Regulatory experience includes preparation of contingency plans for compliance with the Resource Conservation and Recovery Act (RCRA) and preparation of a product application under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Over twenty separate OSHA inspections were handled while at Johnson Matthey, Inc. Hazardous waste health and safety regulatory experience includes work with the EPA and the Corps of Engineers on site-specific health and safety plans and testimony before OSHA on the training certification (29 CFR 1910.121) proposed regulations.

Mr. Jones served for two years as chairman of the Hazardous Waste Action Coalition (HWAC) Health and Safety Committee. He provided written and oral testimony to OSHA regarding the certification of HAZWOPER training classes (OSHA 1910.121) and the recommendations of the HWAC. He also led a task force regarding content of the 40-hour course.

Kelly Lurie
Quality Assurance Officer

Education

MPH, SUNY Albany, in progress for May 2015

MS, Geology, Rensselaer Polytechnic Institute, 2002

BS, Hydrogeology, Rensselaer Polytechnic Institute, 1999

AS, Environmental Studies, Hudson Valley Community College, 1996

Experience

With AECOM: 13
With Other Firms: 0

Ms. Lurie is responsible for environmental and geochemical analyses; data management and analyses; computer modeling; ecological and human health risk assessments; environmental sampling; document control, review, and QA/QC; and management of public outreach activities. She has over thirteen years of experience providing technical support, project support, technical review, project management, and QA/QC review for the development of Remedial Investigations, Feasibility Studies, Proposed Remedial Action Plans, Records of Decision, and Remedial Design studies.

New York State Department of Environmental Conservation, Beaver Smelting, Fallsburg, NY. Project manager for site management activities for a small capped landfill containing metals contamination from a former aluminum recycling facility. Activities include monitoring levels of groundwater contamination; performing semi-annual landfill inspections; and preparation of a Site Management Plan and Periodic Review Report.

New York State Department of Environmental Conservation, Schatz Federal Bearings, Poughkeepsie, NY. Project manager for site management activities for a small capped landfill containing metals and volatile organic compounds. Activities include monitoring levels of groundwater contamination; performing semi-annual landfill inspections; and preparation of a Site Management Plan and Periodic Review Report.

New York State Department of Environmental Conservation, NY Air Brake, Watertown, NY. Deputy project manager for post remediation performance monitoring program. Responsible for evaluating residual contaminant levels for PCBs and cadmium in a stream system in order to provide documentation of the effectiveness of completed remediation.

Lockheed Martin, West Branch of Bloody Brook Remedial Design and Construction, Liverpool, NY. Responsible for providing technical and field support as well as task management for a remedial design and construction program for removal of contaminated soil and sediment.

Constitution Pipeline, NY. Project manager for support of public outreach activities related to the Constitution Pipeline Project including development and maintenance of a database for tracking stakeholders' information and records pertaining to outreach activities.

U.S. Army Corps of Engineers, Forest Glen Annex Remedial Investigation, Silver Spring, MD. Responsible for providing technical support for the preparation of an ecological risk assessment for potentially impacted water, soil, and sediment as part of a remedial investigation being completed under the Army's Installation Restoration Program and CERCLA.

Confidential Client, NY. Responsible for technical support and management and review of analytical data for an interim remedial measure design and implementation that includes removal of mercury-contaminated soil from up to 150 residential properties.

New York State Department of Environmental Conservation, Midtown Shopping Center RI/FS, South Glens Falls, NY. Deputy Project Manager for the preparation of a remedial investigation and feasibility study to define the extent of previously identified soil and groundwater impacts resulting from dry cleaning activities.

General Electric, Hudson River Sediment Remediation 2010 Dredging, Contract 5 – Habitat Construction Proposal, Fort Edward, NY. Provided project control/support that included the coordination of deliverables to the client and document control.

Exide Corporation, Hi-Volume Ambient Air Monitoring, Muncie, IN. Responsible for sampling high volume ambient air monitoring systems for total lead. Also responsible for completing performance audits on the systems for quality control.

New York State Department of Environmental Conservation, Onondaga Lake RI/FS, Syracuse, NY. Environmental scientist for the preparation of a remedial investigation and feasibility study (RI/FS) at Onondaga Lake, a 3,000-acre polluted water body on the National Priorities List (NPL). Provided data management and analysis, field sampling, hydrogeologic investigations, risk assessments, and an analysis of interim remedial measures. Co-authored the re-write of the RI/FS remedial investigation report describing the nature and extent of contamination resulting from numerous inorganic and organic compounds, including mercury, BTEX, chlorinated benzenes, PAHs, PCBs, and dioxins/furans.

Participated in surface water sampling throughout Onondaga Lake for a low-level mercury analysis to assess external sources of mercury and sediment resuspension.

Provided technical review and comments to New York State Department of Environmental Conservation (NYSDEC) on sediment capping and natural attenuation models included in the draft FS report prepared by the potential responsible party (PRP). The sediment capping model predicted breakthrough times and concentrations for key parameters, including mercury, chlorobenzene, and BTEX. Responsible for participating in numerous meetings with NYSDEC and the PRP to resolve technical issues within the FS report. Also assisted NYSDEC with the preparation of the proposed plan for remediation (PP) and with the package for the National Remedy Review Board (NRRB).

Attended public meetings, public availability sessions, and the presentation to the NRRB for the PP as technical support for NYSDEC. Assisted NYSDEC in the preparation of the record of decision (ROD) and the responsiveness summary (RS).

Responsible for providing technical review and comments to NYSDEC on work plans and data reports prepared by the PRP for the purpose of detailing the environmental sampling and analyses completed during the predesign investigation (PDI). Task leader responsible for coordinating the update of the Onondaga Lake database.

New York State Department of Environmental Conservation, Geddes Brook / Ninemile Creek RI/FS, Syracuse, NY. Environmental scientist for re-write of remedial investigation and risk assessment reports for Geddes Brook / Ninemile Creek, a sub-site to the Onondaga Lake NPL site. Responsible for providing review and technical comments to NYSDEC based on RI and RA reports prepared by the PRP. Deputy task manager for re-writes of these documents based on NYSDEC disapproval. Co-authored the re-write of the RI/FS remedial investigation reports.

Responsible for data management and analysis and report preparation, including statistical summaries, sediment and soil screening, data summaries, and contaminant depth profiles. Authored sections and prepared graphics for documenting contaminant distribution in floodplain soils, sediment, and water and reviewed contaminant distribution maps for soil/sediment prepared in GIS. Provided oversight during a floodplain soil sampling event for the purpose of assessing the extent of contamination of Ninemile Creek floodplain.

Provided assistance for review of interim remedial measure document for Geddes Brook sediment and floodplain soils. Provided technical review and comments to NYSDEC on the draft FS report prepared by the PRP. Participated in meetings with NYSDEC and the PRP to resolve technical issues within the FS report. Provided technical comments on the supplemental FS prepared by the PRP. Co-authored the PP.

New York State Department of Environmental Conservation, Harbor Brook / Wastebed B RI/FS, Syracuse, NY. Provided NYSDEC with analysis of data collected during a preliminary site assessment (PSA) of the Harbor Brook / Wastebed B site, a sub-site of Onondaga Lake NPL site, to determine sampling requirements for remedial investigation. Also responsible for review and technical comments for RI work plan and draft RI report prepared by the PRP.

New York State Department of Environmental Conservation, Willis Avenue Chlorobenzene Site RI/FS, Syracuse, NY. Assisted in review of hydrogeological investigation and pumping test report for a sub-site of the Onondaga Lake NPL site. Evaluated hydraulic conductivities of the hydrogeologic units along the Onondaga lakeshore area, which is contaminated with BTEX and chlorinated benzenes. Analysis was based on pumping test data from the site using groundwater-modeling software, AQTESOLV. Provided review, technical comments, and verification of calculations for the remedial investigation and human health risk assessment reports prepared by the PRP.

New York State Department of Environmental Conservation, General Motors Former Inland Fisher Guide Facility and Ley Creek Deferred Media RI/FS, East Syracuse, NY. Provided technical comments to NYSDEC for supplemental remedial investigation and human health risk assessment reports prepared by the PRP.

New York State Department of Environmental Conservation, Wastebeds 1 through 8 RI/FS, Syracuse, NY. Provided technical comments to NYSDEC for the RI/FS Work Plan prepared by the PRP.

John Santacroce
Site Investigation Lead

Education
BS, Geology, State University of New York, Albany, 2002

Experience
With AECOM: 6
With Other Firms: 9

Mr. Santacroce has nine years of experience in site investigations and remedial activities for industrial sites impacted with petroleum, coal tar, chlorinated solvents, and other constituents of concern. He has experience with both Phase I and Phase II projects for a wide range of clients including several Fortune 500 companies. He has participated in all phases of project execution from the pursuit phase through project closeout. Mr. Santacroce has been responsible for design and implementation of the installation of monitoring and extraction wells, injection of in-situ remedial technologies, and soil gas and indoor air sampling. He has also been responsible for the preparation of work plans and the evaluation and reporting of these activities, including groundwater monitoring programs, monitored natural attenuation evaluations, in-situ enhanced attenuation, chemical oxidation treatment analysis, and soil vapor intrusion studies. He has managed projects for GE, El Paso, NYSEG, National Grid, Chevron Texaco, Hercules, Philips, Honeywell, and the New York State Department of Environmental Conservation (NYSDEC). Mr. Santacroce's experience includes managing projects for several NYSDEC Superfund sites including the completion of feasibility studies, remedial design, O&M of active remediation systems, and several predesign remedial investigations. He has completed project management work plans and budgets for several sites under the NYSDEC Superfund program. He has also acted as a task manager for two projects for the Kansas City District US Army Corps of Engineers (USACE) for the Hudson River dredging project. He has completed field investigation work plans for the environmental investigations related to the alternate Waterford-Troy water line and the investigation of the village of Stillwater well field. He managed the fieldwork including CLP sampling, the management of laboratory data, and reporting to the USACE and EPA.

Petroleum Client, Former Coastal Oil Storage Facility Remediation, Flushing, NY. Project manager responsible for preparation of remedial action selection, remedial action work plan, and remedial action completion reports for the former garage facility. Remediation oversight, including the removal of underground structures; the installation of a NAPL recovery/groundwater treatment system; and weekly O&M. Assisted client with quarterly cash flow forecasting in support of the business plan for the site and the divestiture of the property. Responsible for interaction with state regulators during all phases of site investigation and remediation. Obtained a no-further-action letter for the site in 2007 after the remediation of site soil and groundwater.

Petroleum Client, Former Major Oil Storage Facility Remediation, Syracuse, NY. Project manager for preparation of remedial action selection and remedial action plan reports for the former storage facility. Preparation of the design-bid package for the site based on pilot test. Support of clients' business plan for the site including divestiture of the property negotiations with the state regulators for RAS report approval and to commence remediation, which included a large-scale oxygen release compound (ORC) and the construction of a land farm with site subsurface soil. Oversaw the construction and operation of biocells containing more than 8,000 cubic yards of soil. Obtained a no-further-action letter for the site in 2008 after the remediation of site soil and groundwater.

New York State Department of Environmental Protection, RFI and ICM Implementation Petrochemical Research and Development Facility, Mid-Hudson Valley, NY. Project manager and project geologist responsible for field work for a multiple-phase project at a petrochemical research and development facility as a requirement of the facility's hazardous waste storage permit. Project phases included the completion of a RCRA facility investigation (RFI), investigation and closure of the facility's industrial sewer, corrective measures study (CMS) implementation, and closure of regulated waste storage areas and tanks. Completed a comprehensive soil investigation as part of the RFI in order to delineate solvent and petroleum impacts at the facility's hazardous waste storage unit. Supported the client with regulatory interfacing and the divestiture of the property.

US Environmental Protection Agency, RCRA Landfill Brownfield Remediation Quality Assurance/Quality Control, Fort Edward, NY. Directed construction personnel under the direction of the project engineer. Responsible for checking as-built drawings, documentation of daily site activities, and the collection of soil, groundwater, process water and air samples for laboratory analysis. Project included river dredging, construction of a RCRA landfill cap, installation of a groundwater extraction system, installation of a stormwater conveyance system and a design-build water treatment facility to remove heavy metals from site waters.

National Grid, Manufactured Gas Plant Site - IRM Design and Implementation - Remedial Investigation, Fort Edward, NY. Project manager responsible for a remedial investigation for a former MGP site that had been converted into a residential structure. The investigation included Geoprobe / split spoon soil sampling, the installation of a monitoring well network with HSA drilling, exploratory test pits, surface soil sampling, and groundwater sampling. Prior to the demolition of the residence which was the former gas

house, oversaw the characterization of the building. Responsible for the design and implementation of an IRM, which included the excavation of soil impacted with MGP residuals and the drafting of deed restrictions.

Former Electronics Manufacturer, In-situ Remediation of Groundwater, Mid-Hudson Valley, NY. Project geologist for a pilot test to evaluate using hydrogen release compound (HRC) as a substrate to enhance biodegradation of TCA in groundwater. The pilot test included installation of monitoring wells, low-flow groundwater sampling with analysis of multiple monitored natural attenuation parameters, and the injection. The pilot study led to a full remediation at the site using HRC. Performed in-situ chemical oxidation treatment of chlorinated compounds in groundwater at a former electronics manufacturing plant. Responsible for field work involved with the remediation of the groundwater at the site including monitoring groundwater parameters, sodium permanganate introduction into groundwater, and monitoring well sampling. Responsible for reporting of the results to the project manager and evaluating the treatment.

New York State Department of Environmental Protection, Manufactured Gas Plant Site - Remedial Investigation - Feasibility Study - Air-Sampling Program, Ithaca, NY. Project manager responsible for daily oversight of remedial investigation, including drilling subcontractor and analytical laboratory. Drilling activities included characterization of soils, collection and packaging of samples for laboratory analysis, coordination with city utility workers, underground facilities protective organization, and customer liaison. Developed and performed a soil vapor intrusion sampling plan for 30 private residences, and implemented an air-sampling program for three on-site facilities. Prepared RI/FS reports and participated in public meetings.

Mary Beth Hayes
PCB Expert

Education
BA, Biology, Smith College

Experience
With AECOM: 15
With Other Firms: 12

Ms. Mary Beth Hayes has twenty-five years of experience in remedial investigation, hazardous waste site cleanup, regulatory compliance, and project management. At AECOM, Ms. Hayes was project manager (PM) for several hazardous waste site remediation projects with active groundwater remediation systems. Ms. Hayes was responsible for bringing these sites to closure under the Massachusetts Contingency Plan (MCP) and Toxics Substances Control Act (TSCA). She has worked on TSCA cleanups in USEPA Regions 1, 2, 3, 5, 6 and 9. Ms. Hayes has also worked on the assessment and decommissioning of industrial facilities in New England states, including abatement of PCB-impacted building materials. Her work includes writing site assessment and remedial action work plans for agency submittal, managing site remediation, long term O&M and site closure activities.

Prior to AECOM, Ms. Hayes was responsible for state oversight in Washington State for hazardous waste site cleanups. Her work included reviewing technical reports, setting cleanup standards, evaluating remedial technologies, permitting, site closure and post-closure monitoring. Ms. Hayes was the PM for a state-lead cleanup of hexavalent chromium in groundwater that threatened a public water supply.

Industrial Client, CT. Developed sampling and abatement plan for the assessment and abatement of PCB-impacted soil, sediment and concrete in subsurface turbine engine exhaust tunnel. PCBs were delineated and remediated in accordance with the TSCA regulations, using both self-implementing remediation and performance-based disposal approaches. Soil remediation also addressed PCBs in exceedance of Connecticut Remediation Standard Regulation (RSR) soil cleanup criteria. This project is ongoing, and is being conducted prior to decommissioning and demolition of the jet engine testing facility.

Stanley Industrial Fastening Systems, Decommissioning of Industrial Facility, Clinton, CT. Project manager for the decommissioning of a former industrial plant and wastewater treatment building in Clinton, Connecticut. This work was conducted in compliance with state (CT) and federal regulations, including RCRA and TSCA. Decommissioning included cleaning the building interiors, tanks and trenches, and collecting confirmation samples. A 25,000-gallon underground storage tank was emptied, cleaned and tightness-tested. A Hazardous Waste Storage Area was closed in accordance with CT DEP guidance and RCRA regulations. A caulking abatement was conducted for PCB-impacted building material under TSCA with EPA Region 1 approval.

Electric Utility Client, Washington DC. Developed characterization and remediation plan for PCB-impacted cooling tower basins at generating station. PCB impacts were due to PCB-containing caulk which leached into concrete basins. The cooling tower demolition was slated for 2014. PCB waste is being managed under the October 2012 EPA Re-interpretation Policy, which allows a stream-lined approach to demolition and disposal.

Industrial Client, PCB Survey, MA. Prepared work plan for pre-demolition survey of an eight-acre industrial complex containing twenty-six buildings dated from 1931 to 1978, to determine the presence and extent of PCB-impacted building materials. The materials sampled included door and window caulking, window glazing and paint. Developed a survey approach to maximize the exclusion of low-level PCB-impacted building materials. The survey was implemented prior to demolition of the buildings.

Former Ferry Terminal, ME. Conducted assessment of PCBs in building materials of former ferry terminal and associated buildings in Maine, as part of a due diligence survey made by the property owner prior to a real estate transaction. Survey also included lead-based paint and asbestos-containing material. Made recommendations to the client based on findings.

Fordham University, NY. Developed a work plan to assess and remediate PCB-impacted building materials encountered during a campus excavation. PCBs were not known to be present in the excavation area but were encountered in roofing shingles above 50 ppm and above RCRA hazardous waste levels for VOCs. The work was conducted under the performance-based provision of TSCA (761.61(b)). Approximately 100 cubic yards of PCB-impacted materials were disposed off-site at a RCRA landfill, and post-excavation sampling was conducted under Subpart O of TSCA.

El Segundo Energy Center, CA. Worked with energy client to conduct PCB assessment and remediation at a power plant in accordance with TSCA regulations. The power station was in the process of demolition when PCBs were found above 50 ppm. Several state and local agencies were involved with the demolition and planned repowering construction at the facility. Ms. Hayes assisted with writing an in-place soil and concrete characterization plan, a natural gas pipeline assessment plan, and developing SOPs for a variety of remedial activities. Remedial action work plans for the site were submitted to and approved by EPA Region 9.

The remediation was successfully completed in a short time frame to accommodate the planned power plant re-construction.

Compo Chemical Company, Remediation of Industrial Landfill, Mansfield, MA. Project Manager for the remediation of a one-acre unlined industrial landfill impacted with VOCs and PCBs. A remedial action work plan was submitted to the MassDEP and the USEPA Region 1. The remediation included in-place characterization sampling for PCBs; excavation and segregation of landfill contents; on-site soil treatment of non-TSCA soil; off-site disposal of TSCA soil and waste material; dewatering and onsite treatment and discharge of groundwater; post-excavation sampling; and backfilling and capping of the excavation. Over 18,000 cubic yards of soil and waste were excavated. The site was fully remediated under the MCP with no restrictions on future use.

Major Chemical Manufacturer, NJ. Developed an in-place characterization plan for PCBs in soils and concrete, which are also impacted with hexavalent chromium. The sampling plan was created in accordance with TSCA regulations. AECOM is providing environmental consulting services for a remedial action program involving several legacy sites associated with former chromate ore production in Hudson County, New Jersey. The sites are regulated under consent orders established with the New Jersey Department of Environmental Protection (NJDEP).

Industrial Client, IL. Conducting third party review on behalf of client for PCB characterization and remediation conducted under the TSCA program. PCBs were found in fill material across the site and are believed to result from onsite use in heat transfer fluids. This work involves review and evaluation of sampling plans, resulting data, remedial plans and summary reports, to ensure that the work is being conducted cost-effectively and in compliance with TSCA regulations. This project has been completed.

McNeil Island Department of Corrections, Soil Remediation, McNeil Island, WA. Site manager for state oversight of cleanup of contaminated soils at prison facility located on an island in Puget Sound. The facility was a former federal prison with numerous support facilities including fuel storage, ship repair, electric power transmission and a landfill. These activities resulted in soil contamination at several sites on the island. Contaminants were PCBs, lead, and polycyclic aromatic hydrocarbons (PAHs). Oversight of the cleanup included review of site characterization, establishing cleanup standards for soils and sediments, and technical review of remedial activities.

Amy Sulborski
Database Manager

Education
BS University of New Hampshire, Durham, Civil Engineering, 1993

Experience
With AECOM: 8
With Other Firms: 22

Ms. Sulborski is based in AECOM's Chelmsford, MA office. Working directly with Project Managers, staff scientists, and engineers, Ms. Sulborski is responsible for the management of geologic/hydrogeologic, geophysical and chemical data, the support of human and ecological risk evaluations, and the development and support of several custom databases. Ms. Sulborski has consulting and management experience in environmental engineering. She has acted as a project coordinator, project manager, and database manager. She specializes in database administration and management for remediation projects and has been involved in contracts for various federal agencies including DOD, DOE, EPA, and for various state and local agencies. She is skilled in the use of EQuIS for data management. Ms. Sulborski is also skilled in MS Access Development, SQL Server and Client Relations.

UTC AOC G, NY. Database manager for chemistry data managed in EQuIS database on SQL server. Responsibilities included interfacing with the laboratories to ensure accurate reporting and to streamline electronic delivery. Responsible for data reporting and statistics through custom reports using a variety of reporting tools in MS Access, MS Excel and SQL server.

Confidential Client, Remedial Investigation. Database manager and scientist for remedial investigation of a tidally influenced river in an industrial area. Management of EQuIS databases in SQL server for multiple programs and tasks. Ensure data integrity, review and maintain sampling data and field collection parameters and sample tracking. Interface with laboratories to ensure accurate reporting and to streamline electronic delivery. Create custom reports for data analysis. Report analytical data using a variety of reporting tools in MS Access, MS Excel and SQL Server.

Confidential Client, Database Automation for Phase 1 Investigations. Member of team responsible for automation and streamlining Phase 1 investigation data collection and reporting. A customized Access database was used to collect data from the field. The database was used to track the data review process through multiple review levels, add additional report verbiage where applicable, and automate report generation utilizing MS Word.

Confidential Client, Nuclear Industry. Lead programmer responsible for nuclear dose-tracking model. Responsibilities included database design and normalization and implementation of new algorithms, responsible for extending reporting and graphing modules.

Textron, Newington, Connecticut. Management of EQuIS databases in SQL server. Ensure data integrity, review and maintain sampling data. Interface with laboratories to ensure accurate reporting and to streamline electronic delivery. Create custom reports for data analysis. Report analytical data using a variety of reporting tools in MS Access, MS Excel and SQL server. Incorporate Connecticut criteria for data analysis.

International Paper, IP, Various Locations throughout United States. Management of EQuIS databases in SQL server. Ensure data integrity, review and maintain sampling data. Create custom reports for data analysis. Report analytical data using a variety of reporting tools in MS Access, MS Excel and SQL server.

City of Boston, Boston Water and Sewer, MA. Acted as lead for the application development of database and custom GIS application used to assist the identification of buildings with illegal sewer connections throughout the City of Boston. Included interfacing GIS with database and writing custom procedures that assisted engineers in making project decisions and perform necessary tasks utilizing data visualization.

CALPUFF Air Quality Modeling System. Acted as lead for developer of GUI systems interfacing with Air Quality Models, including preprocessors and postprocessors of CALPUFF, a leading air quality modeling system recommended for use by the EPA, and various nuclear energy plant air quality models including RadDose and WinDose. Responsibilities include database design and normalization, updating, improving, maintaining prior code versions, incorporating Fortran dll's as required, and visualization utilizing VB and third party tools. Applications written in Visual Basic 6.0 and interface with Access version 97 to current version.