

September 16, 2025

Mr. Mark Domaracki, P.G.
New York State Department of Environmental Conservation
625 Broadway
Albany, NY, 12233-7014

**Subject: Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Hercules, LLC. Site #356001
Port Ewen, New York**

Dear Mr. Domaracki,

This *Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope* (“Phase 2 Sampling Scope”) has been developed by EHS Support LLC (“EHS Support”) on behalf of Hercules LLC (“Hercules”), a wholly owned subsidiary of Ashland, Inc. (“Ashland”), and Dyno Nobel, Inc. (“Dyno Nobel”; collectively, “the Parties”), to present the approach for additional investigation of Plantasie Creek downstream of the Hercules/Dyno Nobel Port Ewen Site (“Site”) in accordance with New York State Department of Environmental Conservation (NYSDEC) Administrative Order on Consent (Consent Order [CO]) Index # CO 3-20180508-85 effective August 3, 2018. The Site is located at 161 Ulster Avenue, approximately 1 mile south of the Village of Port Ewen in Ulster County, New York (**Figure 1**), and is listed on the New York State Inactive Hazardous Waste Site Index as Site No. 356001.

The Phase 2 Sampling Scope was prepared to support and complement the *Plantasie Creek Ecological Impact Assessment Work Plan* (“May 2023 Work Plan” [EHS Support, 2023]) that was approved by NYSDEC in a letter dated June 6, 2023. The May 2023 Work Plan presents the approach for evaluating potential ecological impacts and human health exposure to target metals, specifically copper, mercury, selenium, and zinc in Plantasie Creek downstream of the Site. The technical approach for evaluating potential ecological impacts was developed in accordance with the Fish and Wildlife Resource Impact Assessment (FWRIA) process, as outlined in the NYSDEC *Technical Guidance for Site Investigation and Remediation* (DER-10; NYSDEC, 2010). Additional guidance was drawn from the NYSDEC *DFWMR Screening and Assessment of Contaminated Sediment* (2014), *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (1994), and relevant federal guidance documents (USEPA, 2007; 2005). This Phase 2 Sampling Scope has been revised based on NYSDEC comments received on May 22, 2025.

To streamline the development and review process, the Phase 2 Sampling Scope presents the rationale for the selection of sampling stations to support the sampling design presented in the May 2023 Work Plan. Further details on the investigation background, sampling approach and methodology, sampling project quality control (QC) and quality assurance (QA), and project health and safety planning are provided in the May 2023 Work Plan. The following sections present a summary of the phased ecological impact assessment approach, the scope of the Phase 2 Ecological Impact Assessment, and the plan for implementation of the Phase 2 scope of work.



Summary of Phased Ecological Impact Assessment Approach

The investigations proposed in the May 2023 Work Plan were designed to collect adequate data to support a FWRIA Part 2: Ecological Impact Assessment to further evaluate the potential for adverse effects to fish and wildlife resources exposed to target metals within Plantasie Creek downstream of the Site (EHS Support, 2023). A phased investigation approach was developed to maximize the efficiency of the investigation in providing focused data to support risk assessment and potential remedial decision-making:

- Phase 1 – Preliminary Bioavailability Assessment: The purpose of the Preliminary Bioavailability Assessment was to provide a preliminary assessment of the bioavailability of target metals at representative stations where NYSDEC Class C Sediment Guideline Values (SGVs) were exceeded during the phased delineation sampling based on total recoverable metals concentrations (EHS Support, 2020). The Phase 1 sampling program was implemented in November 2023 to collect fish tissue, surface water, sediment, and pore water samples from Plantasie Creek.
- Phase 2 – Comprehensive Ecological Impact Assessment: The purpose of the Comprehensive Ecological Impact Assessment is to collect data to support multiple lines-of-evidence to evaluate direct contact and bioaccumulative exposure pathways to aquatic and semi-aquatic ecological receptors in accordance with DER-10 and FWRIA guidance (NYSDEC, 1994).

Figure 2 illustrates the study elements and conceptual progression of the phased investigation approach, as presented in the May 2023 Work Plan. Results from the Phase 1 Preliminary Bioavailability Assessment sampling conducted in November 2023 were submitted to NYSDEC in the *Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report* (“Phase 1 Report”; EHS Support, 2025). A summary of key findings from the Phase 1 Preliminary Bioavailability Assessment and a summary of the current ecological conceptual site model (ECSM) for Plantasie Creek are provided in the following sections.

Phase 1: Preliminary Bioavailability Assessment Summary

The Phase 1 Report presented the results and preliminary analyses of target metals concentrations in fish tissue, surface water, sediment, and pore water data collected from Plantasie Creek in November 2023. Decision criteria established in the May 2023 Work Plan that indicate highly bioavailable and likely toxic target metal concentrations were evaluated relative to Phase 1 sampling results (EHS Support, 2025). A summary of findings from the preliminary bioavailability assessment are presented in **Table 1** and summarized below:

- Target metal concentrations in a limited fish tissue dataset did not exceed decision criteria established for critical body residue lowest observed effect concentrations (CBR_{LOEC}) and dietary screening lowest observed effect concentrations (DSB_{LOEC}) at PBA-04-TI, the farthest downstream sampling reach. Mercury DSB_{LOEC} and copper CBR_{LOEC} decision criteria were exceeded at PBA-02-TI, but DSB_{LOEC} and CBR_{LOEC} decision criteria values were not exceeded for selenium or zinc at this location.
- Target metal concentrations in filtered surface water samples did not exceed decision criteria established as NYSDEC Acute Ambient Water Quality Standards (AWQS) at any surface water sampling stations.



- The organic carbon-normalized difference in the molar concentrations of summed simultaneously extracted metals and acid volatile sulfide (SEM-AVS/ f_{OC}) did not exceed the decision criterion (3,000 $\mu\text{mol/g}_{OC}$) at any sediment sampling station.
- Target metal concentrations in filtered pore water samples did not exceed decision criteria (NYSDEC Acute AWQS) at any pore water sampling stations.
- Less than 50 percent of copper in bulk sediment was associated with bioavailable sequential extraction (SE) fractions (F-1 and F-2) at stations where SE was evaluated. Non-detected results for mercury in the F-1 and F-2 SE fractions were rejected during data validation due to percent recoveries less than 40 percent in laboratory control samples and laboratory control sample duplicates. However, low mercury recovery may be a function of the spiking procedure and not an indication of the ability to detect mercury in the F-1 and F-2 fractions.¹

Collectively, these preliminary lines of evidence evaluated during the Phase 1 bioavailability assessment do not indicate high bioavailability or toxicity of target metals in sediments within the Plantasie Creek assessment reach. A more detailed evaluation of sampling results with reference to Phase 1 decision criteria is presented in the Phase 1 Report (EHS Support, 2025).

Plantasie Creek Conceptual Site Model Summary

An ecological conceptual site model (ECSM) presented in the *Fish and Wildlife Impact Analysis Step IIC Investigation Report* (URS, 2011) describes the potential migration of target metals from historical Site operations to downstream areas of Plantasie Creek. This ECSM was summarized and further refined in Section 2.2 of the May 2023 Work Plan based on phased sediment sampling and substrate surveys conducted within Plantasie Creek from the Site downstream to the Rondout Creek floodplain (EHS Support, 2020). Further refinement of the ECSM based on the findings of Phase 1 Preliminary Bioavailability Assessment sampling completed in November 2023 were presented in Section 3 of the Phase 1 Report (EHS Support, 2025). Key elements of the Plantasie Creek ECSM are described below.

Substrate mapping survey findings indicate that the distribution of fine-grained depositional sediment within the extent of the delineation sampling is consistent with stream gradient (**Figure 3**). As described in the ECSM presented in the May 2023 Work Plan, a low-gradient (0.2 percent) reach from the Site Boundary to Salem Street is the primary sediment depositional reach that is characterized by fine-grained sediment deposition over a native clay layer. Downstream of Salem Street, there is an abrupt increase in stream gradient (3.9 percent) and the streambed is characterized primarily by bedrock with boulder, cobble, gravel, and fine-medium sand substrates within the higher gradient, higher energy reach. As stated in the ECSM presented in the May 2023 Work Plan, the distribution of target metals in Plantasie Creek sediment is consistent with the distribution of fine-grained depositional sediments. Results from the phased delineation sampling indicated that the greatest potential in-stream exposure to target metals in Plantasie Creek sediments downstream of the Site is within the low gradient reach from the Site boundary to Salem Street (**Figure 4**; EHS Support, 2020).

¹ Low analyte recoveries have been documented when attempting to sequentially extract simple binary mixtures of bentonite, MnO_2 , and humic acid spiked with metals; low analyte recoveries were attributed to post-extraction re-adsorption of analytes on residual solids or incomplete dissolution of the target phase (Bacon and Davidson, 2008).



As presented in the Phase 1 Report, key findings from data collected in November 2023 support the conceptual fate and transport mechanisms for target metals in Plantasie Creek as presented in the original ECSM. Target metal concentrations in Plantasie Creek sediments were consistent with the trends expected based on depositional patterns described in the ECSM presented in the May 2023 Work Plan. As described in Phase 1 Report, target metal concentrations in Plantasie Creek sediments generally decreased with increasing downstream distance from the Site. Concentrations of target metals downstream of Salem Street were delineated to NYSDEC Class A or Class C Sediment Guideline Values (SGVs) (**Figure 4**; EHS Support, 2020; NYSDEC, 2014).

Results from the November 2023 Phase 1 Preliminary Bioavailability Assessment indicate limited bioavailability of target metal constituents in Plantasie Creek sediments downstream of the Site. Further data collection and evaluation are warranted, consistent with the Phase 2 Comprehensive Ecological Impact Assessment outlined in the May 2023 Work Plan. This effort will support conclusions regarding the potential for adverse effects to ecological receptors from exposure to target metals, specifically copper and mercury.

Phase 2 Ecological Impact Assessment Scope

The Phase 2 Sampling Scope was developed in accordance with the phased assessment approach presented in the May 2023 Work Plan and informed by the results of the Phase 1 Preliminary Bioavailability Assessment and the ECSM presented in the preceding sections. The following sections present the Phase 2 Sampling Scope, including the rationale for the selection of Phase 2 sampling stations and the sampling design developed to collect data necessary to evaluate the assessment and measurement endpoints specified for the Comprehensive Ecological Impact Assessment in the May 2023 Work Plan (**Table 1**).

Phase 2 Investigation Objectives

As stated in the May 2023 Work Plan, the overall purpose of the investigations is to collect adequate data to support a FWRIA Part 2: Ecological Impact Assessment to further evaluate the potential for adverse effects to fish and wildlife resources within Plantasie Creek downstream of the Site. Specific objectives of the investigation include:

1. Assess the bioavailability of target metals, specifically copper, mercury, selenium, and zinc, at representative stations within the extent of downstream sediment delineation sampling from the Site to Salem Street where sediments exceeding NYSDEC Class C freshwater SGVs have been delineated (EHS Support, 2020).
2. Evaluate the potential for adverse ecological effects associated with direct contact and dietary exposure to target metals for aquatic and semi-aquatic receptors associated with Plantasie Creek.
3. Provide data to support potential risk-based remedial decision-making for sediments in Plantasie Creek downstream of the Site.

In addition to the FWRIA Part 2: Ecological Impact Assessment objectives, data collected as part of the investigation will be used to evaluate potential human health exposure to target metals in sediments within Plantasie Creek through dermal contact or incidental ingestion pathways.



Phase 2 Sampling Station Selection

The number and distribution of Phase 2 sampling stations were selected to collect data representative of the exposure gradient of target metals concentrations in sediment, as established by phased delineation sampling (**Figure 4**; EHS Support, 2020). Sampling stations were strategically distributed to capture the full range of target metal exposure concentrations identified by previous delineation sampling. This design supports the evaluation of potential dose-response relationships between sediment metal concentrations and ecological effects, as measured using the lines of evidence (LoE) established for the Phase 2 Comprehensive Ecological Impact Assessment (EHS Support, 2023). Reliable dose-response relationships must be established with empirical field data to identify a range of potential ecological effects thresholds that may inform remedial decision-making.

In addition to capturing the exposure gradient of target metals concentrations in sediment, proposed Phase 2 sampling station locations provide for data collection at spatial bounds established in previous investigations. Phase 2 sampling stations extend from CEIA-01, the approximate downstream limit of the mass sediment removal alternative identified in the 2014 Corrective Measure Study (“2014 CMS”; EHS Support, 2014), to CEIA-09 located immediately downstream of Mill Brook Road (**Figure 5**). Station CEIA-01 will provide representative data at a potential upstream boundary of remedial action based on the 2014 CMS; Station CEIA-09 will provide representative data at a downstream boundary of depositional sediments that have been delineated to NYSDEC Class C SGVs for target metals. The approximate locations of the three background stations (CEIA-BKG01, CEIA-BKG02, and CEIA-BKG03) are provided on **Figure 6**.

The locations of proposed Plantasie Creek and background stations illustrated in **Figure 5** and **Figure 6** are approximate; final placement of Phase 2 stations will be determined in the field based on the alignment of observed conditions and data objectives (e.g. availability of fine grain sediment deposits), as well as the ability of the project team to obtain access the property where the sampling station is located. If property access cannot be obtained for a proposed station, the proposed station may be relocated to an adjacent, accessible property if similar data objectives can be satisfied from the alternate location.

Phase 2 Sampling Design Overview

Study elements for the Phase 2 Comprehensive Ecological Impact Assessment are illustrated in **Figure 2**. The following sections provide an overview and implementation of each study element. Further details regarding sampling approach and methodologies, and sampling project QA/QC procedures provided in the May 2023 Work Plan (EHS Support, 2023). Project health and safety procedures are provided in the site Health and Safety Plan (HASP; EHS Support, 2024).

Sediment Quality Triad

As outlined in the May 2023 Work Plan, a sediment quality triad (SQT) approach will be used to establish multiple spatially and temporally aligned lines of evidence (LoEs) to evaluate potential direct contact exposure of target metals to benthic invertebrates (EHS Support, 2023). The SQT approach includes the following LoEs:



- Benthic invertebrate community analyses: Three replicate samples will be collected at each SQT station and sieved through a 500-micron (μm) mesh sieve; samples will be preserved and submitted to a benthic laboratory for taxonomic analysis.
- Sediment toxicity testing: Chronic sediment toxicity tests will be performed in accordance with USEPA *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (USEPA, 2000) and will include a 42-day *Hyalella azteca* test evaluating survival, growth, and reproduction consistent with USEPA Method 100.4 (USEPA, 2000) and a 28-day *Chironomus riparius* test evaluating survival, growth, and emergence consistent with Organization for Economic Co-operation and Development (OECD) Guideline 218 (OECD, 2004).
- Chemical analyses of bulk sediment and pore water: Co-located bulk sediment and pore water samples will be collected and analyzed for the analytes listed in **Table 2**; analytical methods and sample handling requirements are also provided in **Table 2**.

The SQT investigation will evaluate potential impacts to benthic invertebrate communities within Plantasie Creek downstream of the Site relative to the benthic invertebrate community in the NYSDEC-approved background area located in Twaalfskill Brook that was sampled as part of the Phase 1 Preliminary Bioavailability Assessment (**Figure 5**). Based on comments received from NYSDEC Fish and Wildlife Service (FWS) on May 22, 2025, additional background areas will be evaluated to identify an alternative background area with greater similarity in substrate (e.g., sediment grain size distribution, organic carbon content) and habitat suitability to Plantasie Creek. Alternative background areas will be reviewed with NYSDEC prior to sampling. If a suitable alternative background area cannot be identified, differences in substrate and habitat suitability between Twaalfskill Brook and Plantasie Creek will be considered in the interpretation of SQT results, particularly the benthic community analysis. SQT sampling will be conducted between June and September, consistent with the *Standard Operating Procedure: Biological Monitoring of Surface Waters in New York State* (NYSDEC, 2021) for the evaluation of benthic invertebrate communities.

Consistent with the May 2023 Work Plan, a total of 12 stations between the Site and immediately downstream of Mill Brook Drive ($n=9$) and background area ($n=3$) have been identified for the SQT investigation (**Figure 5 & Figure 6**). As previously discussed, Phase 2 SQT stations were selected to capture the exposure gradient of target metal concentrations from the Site to just downstream of Mill Brook Drive. The selected locations also ensure adequate spatial coverage within the upstream and downstream bounds established by previous delineation sampling.

Surface Water

Surface water samples will be collected at Phase 2 stations as part of the Comprehensive Ecological Impact Assessment. This will reduce temporal uncertainty in surface water exposure conditions and provide a contemporaneous surface water dataset for target metals to support the SQT investigation. Consistent with the Preliminary Bioavailability Assessment, near-bottom surface water samples will be collected and analyzed to evaluate the potential mobility and bioavailability of target metals in the water column (EHS Support, 2023). Near-bottom filtered and unfiltered surface water chemistry samples will be analyzed for the constituents listed in **Table 2**; analytical methods and sample handling requirements are also provided in **Table 2**.



Biological Tissue

As specified in the May 2023 Work Plan, biological tissue samples will be collected and analyzed as part of the Phase 2 Comprehensive Ecological Impact Assessment to assess potential exposure to fish and benthic invertebrates, as well as wildlife consumers of fish and benthic invertebrates.

Five (5) composite forage fish tissue samples will be collected from four sampling reaches between CEIA-01 and the area immediately downstream of Mill Brook Drive (**Figure 5**). Additionally, five (5) composite forage fish tissue samples will be collected from the NYSDEC-approved background area located in Twaalfskill Brook or an alternative NYSDEC-approved background area. Fish tissue samples will consist of whole-body composite samples of five to ten fish of the same species within each sampling reach. Every attempt will be made to maintain consistency in the target species and size of fish included in samples between stations. If consistent species cannot be sampled within each sampling reach, alternate species with similar functional feeding groups will be targeted. Composite fish tissue samples will be analyzed for the constituents listed in **Table 2**; analytical methods and sample handling requirements are also provided in **Table 2**.

Benthic invertebrate tissue concentrations will be estimated based on 28-day laboratory bioaccumulation tests with sediments collected from five (5) SQT stations between the Site and immediately downstream of Mill Brook Drive (**Figure 5**). The number of SQT stations where sediments will be collected to perform laboratory bioaccumulation testing are consistent with the May 2023 Work Plan, with the addition of two (2) stations between the Site and Salem Street. These additional stations were selected to ensure appropriate representation of the target metal exposure gradient in this reach. Sediment will also be collected from one background SQT station in Twaalfskill Creek or an alternative NYSDEC-approved background area (**Figure 6**). Oligochaete (*Lumbriculus variegatus*) test organisms will be exposed to field-collected sediments in a 28-day exposure conducted in accordance with USEPA *Test Method 100.3 Lumbriculus variegatus Bioaccumulation Test for Sediments* (USEPA, 2000). Exposed test organisms will be analyzed for target metal concentrations following the 28-day exposure (**Table 2**). The resulting whole body tissue concentrations will be used to estimate representative benthic invertebrate tissue concentrations for the Phase 2 Comprehensive Ecological Impact Assessment.

Sequential Extraction

A limited number of bulk sediment samples (n=3) will be analyzed for SE analyses of target metals as part of the Phase 2 Comprehensive Ecological Impact Assessment. SE analyses will quantify the distribution of metals in sediment in five solid phase fractions (F-1 through F-5). The proportion of metals in bioavailable fractions (generally F-1 and F-2) will provide an indicator of target metal bioavailability to supplement and interpret other lines of evidence in the SQT, including the analysis of SEM-AVS/f_{oc} (EHS Support, 2023). As illustrated in **Figure 5**, bulk sediment samples collected from stations CEIA-2, CEIA-4, and CEIA-8 will be submitted for SE analyses to supplement SE results from the Phase 1 Preliminary Bioavailability Assessment (EHS Support, 2025).



Given that low analyte recoveries have been documented when attempting to sequentially extract mercury and other metals (Bacon and Davidson, 2008),² percent recoveries in laboratory control samples and laboratory control sample duplicates for sequential extraction samples will be used qualitatively in the data quality review, but not as the basis for rejecting results. Data validation criteria for percent recovery mercury and metals in laboratory control samples and laboratory control sample duplicates are intended for standard analytical methods and are not directly applicable or appropriate for sequential extraction procedures.

Phase 2 Ecological Impact Assessment

Data generated as part of the Phase 2 Sampling Scope will be used to evaluate potential ecological impacts based on the assessment and measurement endpoints for direct contact and wildlife ingestion pathways (EHS Support, 2023). A summary of assessment endpoints selected for each receptor category is provided in **Table 3**.

Direct contact exposure pathways will be evaluated based on the analysis of SQT results, surface water sampling, and critical body residues for fish and invertebrate tissues. Consistent with the FWRIA (URS, 2011) and guidance provided by NYSDEC (2014), the multiple LoEs in the SQT investigation will be integrated into a weight-of-evidence evaluation of potential sediment toxicity within Plantasie Creek downstream of the Site. The approach for evaluating multiple LoEs will be consistent with approaches presented by NYSDEC (2014) and other guidance documents (e.g., Bay and Weisberg, 2012). The approach for evaluating direct contact endpoints is further discussed in Section 4.1 in the May 2023 Work Plan (EHS Support, 2023).

The evaluation of potential exposure via direct and incidental ingestion pathways will be conducted using deterministic wildlife ingestion models to quantitatively assess potential risks to representative wildlife receptors. Model development and structure is outlined in Section 4.2 of the May 2023 Work Plan (EHS Support, 2023).

Human Health Exposure Assessment

The potential for human health exposure to sediments within Plantasie Creek will be evaluated based on likely scenarios for dermal and incidental ingestion exposure pathways. Target metal concentrations measured in sediments through current and previous investigations will be initially compared to current NYSDEC Soil Cleanup Objectives (SCOs) for Unrestricted and Residential Use for the protection of human health (6 NYCRR Part 375). If the upper confidence of the mean (UCL_{mean}) of target metal concentrations are below Unrestricted Use SCOs for target metals, no further assessment of human health exposure will be warranted for that metal (NYSDEC, 2010).

If sampling results indicate that the UCL_{mean} of target metal concentrations for one or more target metals exceeds Unrestricted Use SCOs, further Site-specific assessment will be conducted, consistent with DER-10 (NYSDEC, 2010) and outlined in the May 2023 Work Plan (EHS Support, 2023). Key

² Low analyte recoveries have been documented when attempting to sequentially extract simple binary mixtures of bentonite, MnO₂, and humic acid spiked with metals; low analyte recoveries were attributed to post-extraction re-adsorption of analytes on residual solids or incomplete dissolution of the target phase



considerations in the Site-specific evaluation of potential human health exposure to target metal concentrations in sediments include the frequency and duration of exposure, the rate of incidental sediment ingestion, and sediment adherence to the skin.

Reporting

The findings of the phased Ecological Impact Assessment described in the May 2023 Work Plan will be submitted to NYSDEC in a Comprehensive Ecological Impact Assessment Report. The report will be prepared consistent with DER-10 and FWRIA guidance (NYSDEC, 2010; NYSDEC, 2014; NYSDEC, 1994). The report will incorporate the Phase 1 and Phase 2 investigation data and support ecological exposure evaluations outlined in the May 2023 Work Plan. The evaluation of potential human health exposure to target metal concentrations sediments within Plantasie Creek will also be presented as a section within the Comprehensive Ecological Impact Assessment Report. The results of the ecological and human health exposure evaluations will be used to refine the conceptual exposure model for the downstream study area and support risk conclusions presented in the Comprehensive Ecological Impact Assessment Report. The conclusions of the Comprehensive Ecological Impact Assessment Report will be used to support risk management and remedial decision-making for Plantasie Creek downstream of the Site.

Phase 2 Scope Implementation

This Phase 2 Sampling Scope will be implemented for the Parties by EHS Support, an environmental contractor (“Contractor”), who will arrange for field investigation and analytical services and provide an on-site field representative(s) to oversee all subcontractors under the direction of NYSDEC. EHS Support will also perform the data interpretation and reporting tasks. Key contacts for this project are as follows:

- *Hercules Project Manager*
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- *Contractor Project Director/Project Engineer*
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Access Agreements

EHS Support will use its best efforts to obtain access agreements from the present property owners. Once a property has been identified, county tax records will be reviewed to determine the current ownership and contact information. EHS Support will reach out to the owners by mailing letters to request access, by reaching out in-person, or by other methods. If access agreements are unable to be obtained, EHS Support will notify NYSDEC. NYSDEC may need to assist in reaching out to the owners to obtain access approval.

Investigation Schedule

Within 30 days of NYSDEC approval of the Phase 2 Sampling Scope, the Parties will develop the project schedule, in cooperation with the NYSDEC project manager, for submittal to NYSDEC. The Parties and their technical consultants will establish routine communication with the NYSDEC technical staff to assist in resolving any issues that may delay the schedule. The Parties cannot be held responsible for any delays due to inclement weather, NYSDEC review and approval time, applicable citizen participation requirements, or any other delays outside of the Parties' control.

Implementation of the schedule is contingent upon securing access agreements as discussed in the preceding section.

Mr. Mark Domaracki, P.G.
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Hercules, Inc. Site #356001; Port Ewen, New York
September 16, 2025



We appreciate your time in review of this report. Please contact me at 850-251-0582 or k.vanlandingham@ehs-support.com regarding any questions.

Sincerely,

Kristin A. VanLandingham, P.E.
Project Manager/Senior Project Engineer

cc:

Kerry Maloney, NYSDEC
Sean Madden, NYSDEC F&W
Jenna Dodge, NYSDEC F&W
Kristin Kulow, NYSDOH

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Enclosures

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Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Hercules, Inc. Site #356001; Port Ewen, New York
August 26, 2025



Tables

Table 1
Summary of Phase 1 Decision Criteria Evaluation
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Dyno Nobel Port Ewen Site
Port Ewen, NY

Station ID	Fish Tissue								Surface Water				Sediment						Pore Water			
	CBR _{LOEC}				DSB _{LOEC}				NYSDEC Acute AWQS				(SEM-AVS)/f _{OC}				Bioavailable SE		NYSDEC Acute AWQS			
	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Copper	Mercury	Selenium	Zinc
PBA-BKG	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	NA	--	--	--	--
PBA-01	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--	--	--	--	--	--	R	--	--	--	--
PBA-02	X	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	R	--	--	--	--
PBA-03	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--	--	--	--	--	--	R	--	--	--	--
PBA-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	NA	--	--	--	--

Notes:

- = no exceedance of relevant decision criteria
- R = Non-detected results for THg in the F-1 and F-2 fractions were rejected during data validation due to percent recoveries less than 40 percent in laboratory control samples and laboratory control sample duplicates.
- AVS = acid-volatile sulfides
- CBR = critical body residue
- DSB = dietary screening benchmark
- f_{OC} = fraction organic carbon
- LOEC = lowest observed effect concentration
- NA = not assessed at this station
- NS = sufficient sample not available
- NYSDEC = New York State Department of Environmental Conservation
- SE = sequential extraction
- SEM = simultaneously extracted metals
- SGV = sediment guidance value
- X = exceedance of relevant decision criteria

Table 2
Summary of Analytical Methods and Sample Handling Requirements
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Dyno Nobel Port Ewen Site
Port Ewen, NY

Analytical Group	Analytical and Preparation Method	Required Sample Mass	Sample Containers	Preservation Requirements	Maximum Holding Time
Solid media (bulk sediment) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	EPA Method 6020A	100 gram	Glass or plastic	Cool to 4°C	180 days to analysis
Total Mercury	EPA Method 7471B	100 gram	Glass or plastic	Cool to 4°C	28 days to analysis.
Methylmercury	EPA Method 1630	100 gram	Glass	Cool to 4°C	28 days to analysis.
AVS-SEM	EPA-821-R-91-100	113 g (4 oz.)	Glass with Teflon septa cap	Cool to 4°C	14 days
Total Organic Carbon	Lloyd Kahn	100 gram	Amber glass, Teflon cap	Cool to 4°C	14 days
Grain Size Distribution	ASTM D422	500 gram	Glass or plastic	None	No hold
% Moisture and Total Solids	SM 2540G	113 g (4 oz)	Glass	Freeze at less than -20 °C	1 year
Solid media (biological tissue) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	EPA Method 6020A	100 gram	Glass or plastic	Cool to 4°C	180 days to analysis
Total Mercury	EPA Method 1631	100 gram	Glass or plastic	Cool to 4°C	1 year
Methylmercury	EPA Method 1630	100 gram	Glass	Cool to 4°C	28 days to analysis.
% Moisture and Total Solids	SM 2540G	113 g (4 oz)	Glass	Freeze at less than -20 °C	1 year
Aqueous media (surface water) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	EPA Method 6020B	250 mL	Plastic	HNO ₃ , pH<2, 4°C	180 Days
Total Mercury	EPA Method 1631	250 mL	Fluoropolymer or Glass bottles with fluoropolymer cap	Cool to 4°C	90 days from extraction to analysis
Methylmercury	EPA Method 1630	250 mL	Plastic or Glass	H ₂ SO ₄ , pH<2, 4°C	180 days to analysis
TOC	EPA Method 5310C	40 mL vial	Amber glass	H ₃ PO ₄ , pH<2, 4°C	28 days
DOC	EPA Method 5310C	40 mL	Glass with Teflon septum	4°C (no headspace)	28 days
Alkalinity	SM 2320B	150 mL	Plastic or glass	Cool to 4°C	14 days
Hardness	SM 2320C	100 mL	Plastic or glass	Cool to 4°C	180 days
TSS	SM 2540D	1000 mL	Plastic or glass	Cool to 4°C	7 days
pH	EPA Method 9040C	50 mL	Plastic or glass	Cool to 4°C	as soon as possible
Aqueous media (pore water) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	EPA Method 6020B	250 mL	Plastic	HNO ₃ , pH<2, 4°C	180 Days
Total Mercury	EPA Method 1631	250 mL	Fluoropolymer or Glass bottles with fluoropolymer cap	Cool to 4°C	90 days from extraction to analysis
Methylmercury	EPA Method 1630	250 mL	Plastic or Glass	H ₂ SO ₄ , pH<2, 4°C	180 days to analysis
Hardness	SM 2320C	100 mL	Plastic or glass	Cool to 4°C	180 days
pH	EPA Method 9040C	50 mL	Plastic or glass	Cool to 4°C	as soon as possible

Notes:

AVS-SEM = acid volatile sulfide/simultaneously extracted metals

DOC = Dissolved organic carbon

SM = Standard method

TAL = Target analyte list

TCL = Target compound list

TOC = Total organic carbon

TSS = Total suspended solids

H₂SO₄ = sulfuric acid

H₃PO₄ = phosphoric acid

HNO₃ = nitric acid

VOC = volatile organic compound

SVOC = semi-volatile organic compound

°C = degrees Celsius

g = gram

L = liter

mL = milliliter

oz = ounce

*holding times and volume requirements may vary by laboratory.

Table 3
Summary of Candidate Receptors, Risk Questions, Assessment/Measurement Endpoints, and Proposed Data Collections
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Dyno Nobel Port Ewen Site
Port Ewen, NY

Ecological Receptor Category	Focal Species / Level of Organization	Assessment Endpoints	Risk Questions	Candidate Measurement Endpoints	Proposed Data Collection(s) to Evaluate Measurement Endpoints
Benthic Invertebrates					
Benthic invertebrates	Population	Survival Growth Reproduction	Are target metal concentrations in Plantasie Creek sediments, pore water, or surface water greater than effects thresholds for survival, growth, or reproduction of benthic invertebrates?	SQT Lines of Evidence: 1) Comparison of target metal concentrations measured in Plantasie Creek surficial sediments to NYSDEC SGVs or literature-based ecological benchmarks for the protection of benthic invertebrates. 2) Comparison of target metal concentrations measured in Plantasie Creek pore water and surface water to NYSDEC AWQS or literature-based ecological benchmarks for the protection of benthic invertebrates.	Surficial sediment and pore water samples at 9 co-located Plantasie Creek stations and 3 background area stations: • Bulk sediment analyses: copper, THg, selenium, zinc, TOC, grain size (sieve only) • Pore water analyses: copper, THg, MeHg, selenium, zinc, total hardness • <i>In situ</i> water quality parameters Surface water samples (filtered/unfiltered) from 9 co-located Plantasie Creek stations and 3 background area station3: • Unfiltered analyses: copper, THg, MeHg, selenium, zinc, total hardness, TOC, alkalinity, major ions/anions, sulfide, and TSS • Filtered analyses: copper, THg, MeHg, selenium, zinc, DOC, TDS • <i>In situ</i> water quality parameters
	Population	Survival Growth	Is survival or growth of benthic invertebrate test organisms exposed to bulk sediments from Plantasie Creek significantly lower than comparable endpoints for test organisms exposed to bulk sediments from the background area?	SQT Line of Evidence: Statistical comparisons of survival and growth endpoints from chronic, long-term sediment toxicity testing of whole sediments from Plantasie Creek to comparable endpoints for chronic, long-term exposures to whole sediment from the background area.	Sediment toxicity testing at 9 co-located Plantasie Creek stations and 3 background area stations: • 42-day <i>Hyalella azteca</i> test for survival and growth (USEPA Method 100.4; USEPA, 2000) • 28-day <i>Chironomus riparius</i> test for survival and growth (OECD, 2004)
	Community	Structure Function	Is benthic community structure in Plantasie Creek different from benthic community structure in the background area with similar habitat? If differences in structure are observed, are those differences explained by target metal concentrations in abiotic or biotic exposure media or other habitat parameters?	SQT Line of Evidence: Statistical comparisons of multiple metrics (e.g., richness, composition, tolerance measures) that measure structure and function of benthic invertebrate communities between Plantasie Creek and background area stations; statistical evaluation (e.g., ANOVA, ANCOVA) of results of multi-metric community analyses with target metal concentrations in exposure media and other habitat parameters. SQT Line of Evidence: If supported by the available data, multivariate statistical comparisons (e.g., ordination) of benthic invertebrate taxa-abundance data to evaluate structure and function of benthic communities between Plantasie Creek and background area stations; statistical evaluation (e.g., ANOVA, ANCOVA) of results of multivariate analyses of community data with target metal concentrations in exposure media or other habitat parameters.	Benthic community samples at 9 co-located Plantasie Creek stations and 3 background area stations: • 3 replicates per station • Analysis: genus-level taxonomic identification, as practicable

Table 3
Summary of Candidate Receptors, Risk Questions, Assessment/Measurement Endpoints, and Proposed Data Collections
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Dyno Nobel Port Ewen Site
Port Ewen, NY

Ecological Receptor Category	Focal Species / Level of Organization	Assessment Endpoints	Risk Questions	Candidate Measurement Endpoints	Proposed Data Collection(s) to Evaluate Measurement Endpoints
Benthic invertebrates	Population	Survival Growth Reproduction	Are target metal concentrations in benthic invertebrate tissues from Plantasie Creek greater than: 1) CBRs for survival, growth, and/or reproduction of benthic invertebrates; or 2) benthic invertebrate tissue concentrations measured for the background area?	1) Comparisons of 95 percent upper confidence limit of the mean concentrations (UCL ₉₅) of target metals measured in benthic invertebrate tissues or similar measure to CBRs representative of benthic invertebrates present in Plantasie Creek; and 2) Comparisons of target metal concentrations measured in benthic invertebrate tissues between Plantasie Creek and background areas.	Benthic invertebrate tissue samples based on laboratory bioaccumulation testing using sediments from 5 co-located Plantasie Creek stations and 1 background area station: • 28-day <i>Lumbriculus variegatus</i> bioaccumulation study (USEPA Test Method 100.3; USEPA, 2000) • Analyses: copper, THg, MeHg, selenium, zinc and percent moisture
Fish					
Forage fishes	Cyprinidae	Survival Growth Reproduction	Are target metal concentrations in surface water greater than effects thresholds for survival, growth, and/or reproduction of fish?	Comparison of target metal concentrations in surface water to NYSDEC AWQS or literature-based ecological benchmarks for the protection of fish.	Surface water samples (filtered/unfiltered) from 9 co-located Plantasie Creek stations and 3 background area stations: • Unfiltered analyses: copper, THg, MeHg, selenium, zinc, total hardness, TOC, alkalinity, major ions/anions, sulfide, and TSS • Filtered analyses: copper, THg, MeHg, selenium, zinc, DOC, TDS • <i>In situ</i> water quality parameters
			Are target metal concentrations in forage fish tissue greater than: 1) CBRs for survival, growth, and/or reproduction of fish; or 2) Forage fish tissue concentrations in the background area?	1) Comparisons of UCL ₉₅ target metal concentrations in forage fish tissue to CBRs; and 2) Comparisons of target metal concentrations in forage fish tissue between the Plantasie Creek and background area.	Forage fish tissue samples: • 5 whole body composite samples (min 5 individuals/composite sample) from 4 reaches in Plantasie Creek and 5 whole body composite samples (min 5 individuals/composite sample) from the background reach • Analyses: copper, THg, MeHg, selenium, zinc and percent moisture
Birds					
Small piscivorous birds	Belted kingfisher (<i>Megaceryle alcyon</i>)	Survival Growth Reproduction	Does the daily dose of target metals received by small piscivorous birds through direct ingestion of dietary items from Plantasie Creek exceed TRVs for survival, growth, and/or reproduction of birds?	Comparison of TRVs to dietary doses modeled using site-specific concentrations of target metals measured in forage fish tissue.	Apportionment of dietary items in dose model based on whole body forage fish tissue samples collected, as described above, and analyzed for target metals.
Aerial insectivorous songbirds	Tree swallow (<i>Tachycineta bicolor</i>)	Survival Growth Reproduction	Does the daily dose of target metals received by aerial insectivorous songbirds through direct ingestion of dietary items from Plantasie Creek exceed TRVs for survival, growth, and/or reproduction of birds?	Comparison of TRVs to dietary doses modeled using concentrations of target metals estimated in emergent aquatic insect tissues based on site-specific measurements in benthic invertebrates in the bioaccumulation study.	Apportionment of dietary items in dose model based on data collected as described above and estimated for target metals.

Table 3
Summary of Candidate Receptors, Risk Questions, Assessment/Measurement Endpoints, and Proposed Data Collections
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Dyno Nobel Port Ewen Site
Port Ewen, NY

Ecological Receptor Category	Focal Species / Level of Organization	Assessment Endpoints	Risk Questions	Candidate Measurement Endpoints	Proposed Data Collection(s) to Evaluate Measurement Endpoints
Mammals					
Semi-aquatic omnivorous mammal	Raccoon (<i>Procyon lotor</i>)	Survival Growth Reproduction	Do daily doses of target metals received by semi-aquatic omnivorous mammals through the direct ingestion of dietary items and indirect ingestion of sediment from Plantasie Creek exceed TRVs for survival, growth, and/or reproduction of mammals?	Comparison of TRVs to dietary doses modeled using site-specific concentrations of target metals measured in surface sediments, benthic invertebrate tissue, and fish tissue.	Apportionment of dietary items in dose model based on benthic invertebrate and fish tissue samples collected, as described above, and analyzed for target metals.
Aerial insectivorous mammals	Little brown bat (<i>Myotis lucifugus</i>)	Survival Growth Reproduction	Do daily doses of target metals received by aerial insectivorous mammals through the direct ingestion of dietary items from Plantasie Creek exceed TRVs for survival, growth, and/or reproduction of mammals?	Comparison of TRVs to dietary doses modeled using concentrations of target metals estimated in emergent aquatic insect tissues based on site-specific measurements in benthic invertebrates in the bioaccumulation study.	Apportionment of dietary items in dose model based on data collected as described above and estimated for target metals.

Notes:

ANCOVA - Analysis of covariance

ANOVA - Analysis of variance

AVS/SEM - Acid volatile sulfides / simultaneously extracted metals

CBRs - Critical body residues

DOC - dissolved organic carbon

MeHg - Methylmercury

THg - Total mercury

TOC - Total organic carbon

TRV - toxicity reference value

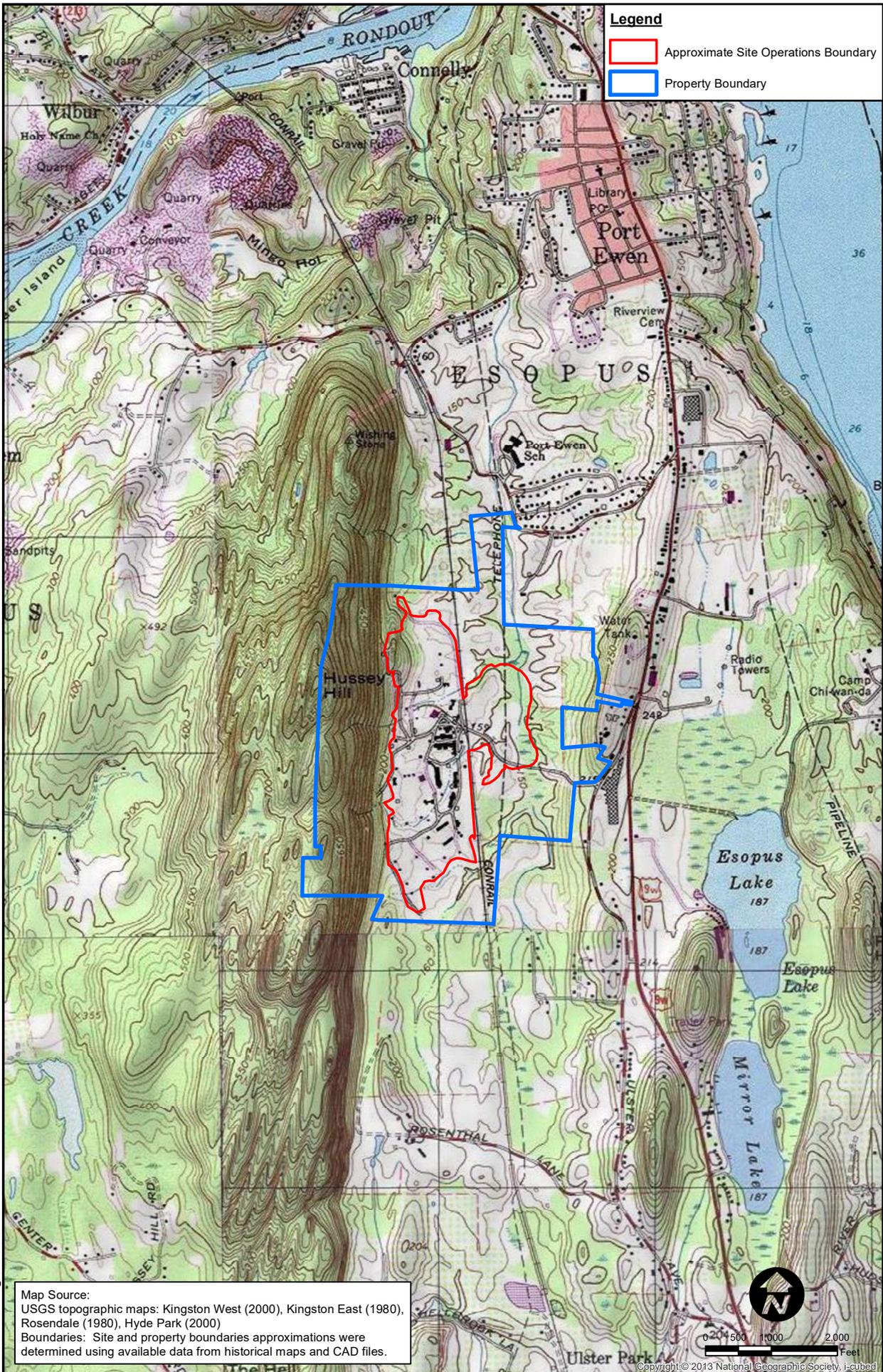
TSS - Total suspended solids

UCL - upper confidence limit

Mr. Mark Domaracki, P.G.
Plantasie Creek Phase 2 Comprehensive Ecological Impact Assessment Sampling Scope
Hercules, Inc. Site #356001; Port Ewen, New York
August 26, 2025



Figures



Reviewed By: K. VanLandingham

EHS Support

Downstream Sediment Investigation
 Dyno Nobel Port Ewen Site
 Port Ewen, New York

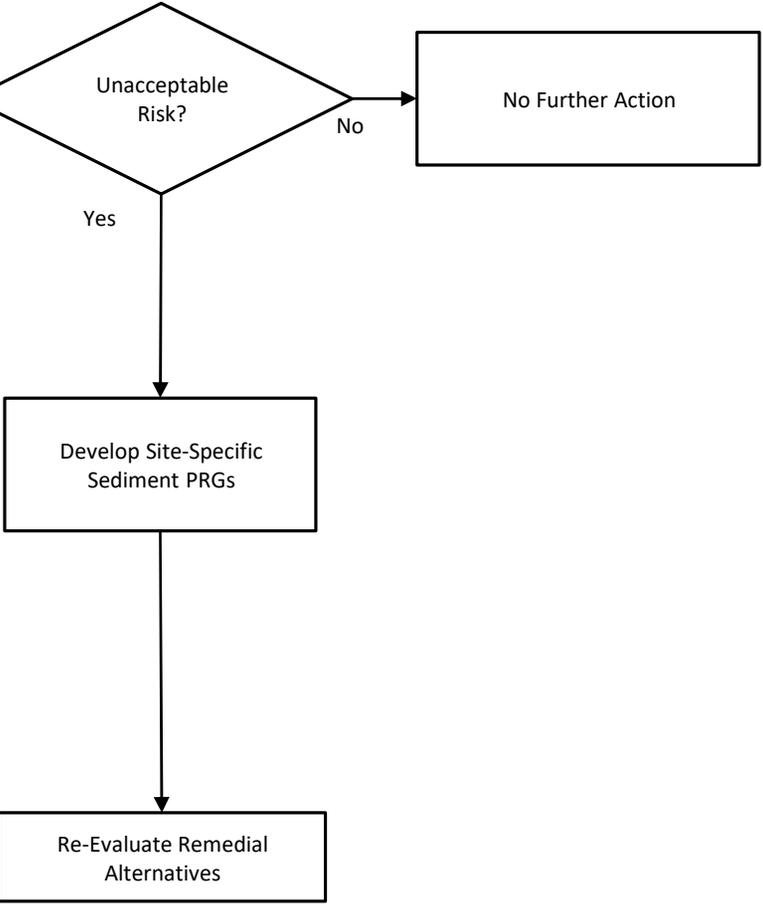
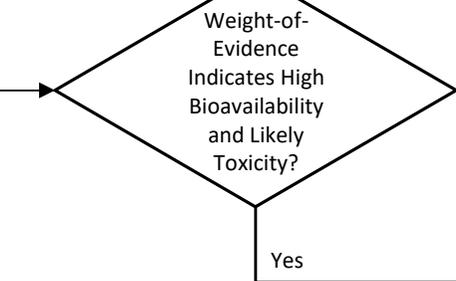
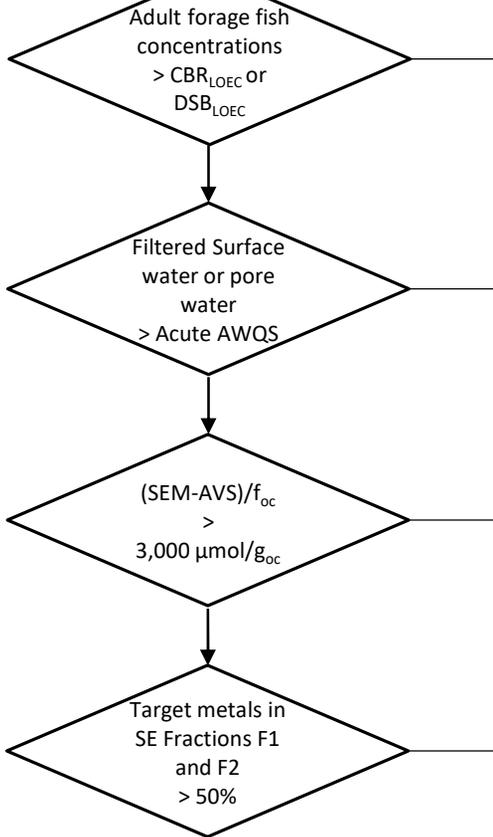
SITE LOCATION MAP

FIGURE 1

J:\EHS GIS\030308_Ashland\PortEwen\01_AVAL\Sites\010906_Plan\Coordinate\PortEwen\117_Figure\Figure 1 - Site Location Map.mxd
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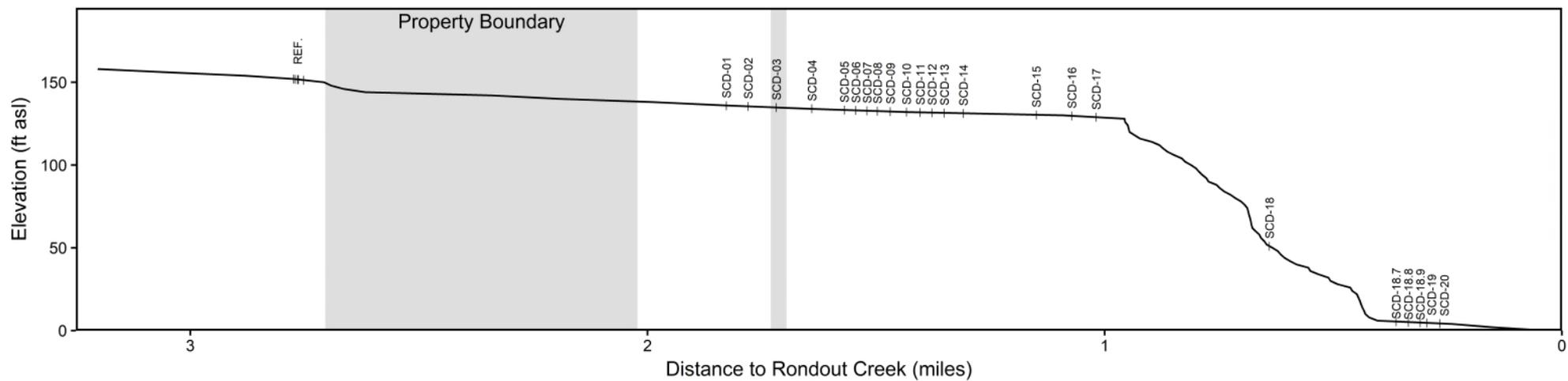
- Phase 1: Preliminary Bioavailability Assessment**
- 1) Adult forage fish tissue
 - 2) Surface water chemistry (Cu, THg, MeHg, Se, Zn)
 - 3) Bulk sediment:
 - a) Chemistry (Cu, THg, Se, Zn, TOC)
 - b) AVS-SEM analyses
 - c) Sequential extraction (SE)
 - 4) Pore water chemistry (Cu, THg, MeHg, Se, Zn)

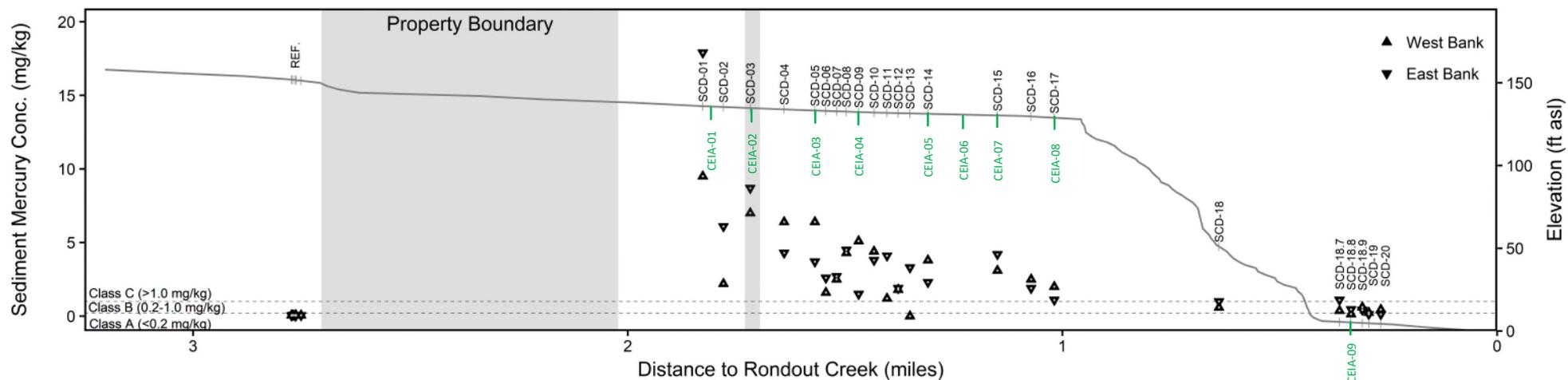
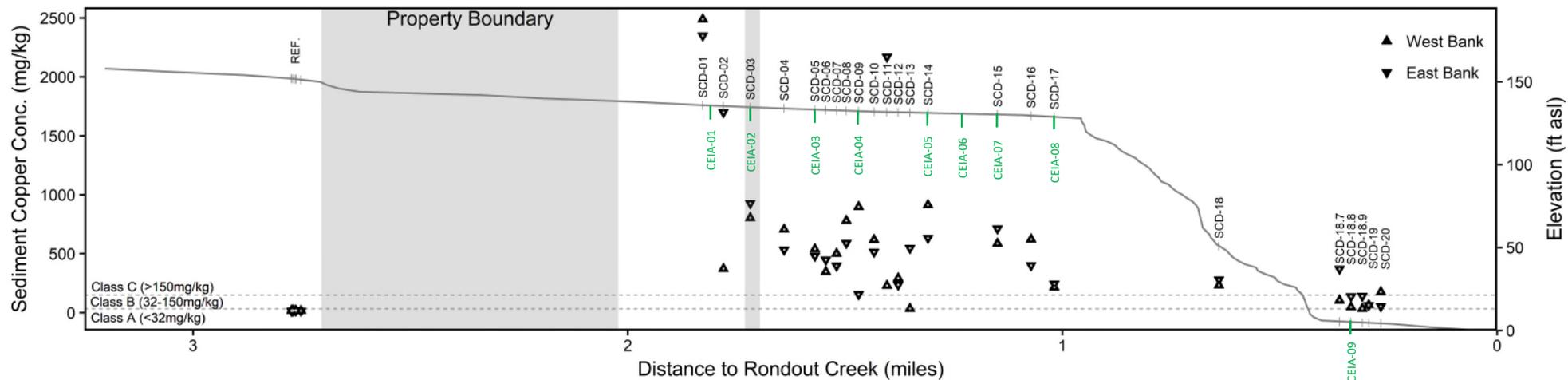
- Phase 2: Comprehensive Impact Assessment**
- 1) Surface water chemistry
 - 2) Bioavailability assessment:
 - a) AVS-SEM analyses
 - b) Sequential extraction
 - 3) Sediment Quality Triad (SQT):
 - a) Sediment chemistry
 - b) Pore water chemistry
 - c) Sediment toxicity testing
 - d) Benthic community analysis
 - 4) Wildlife exposure modeling:
 - a) Tissue analyses

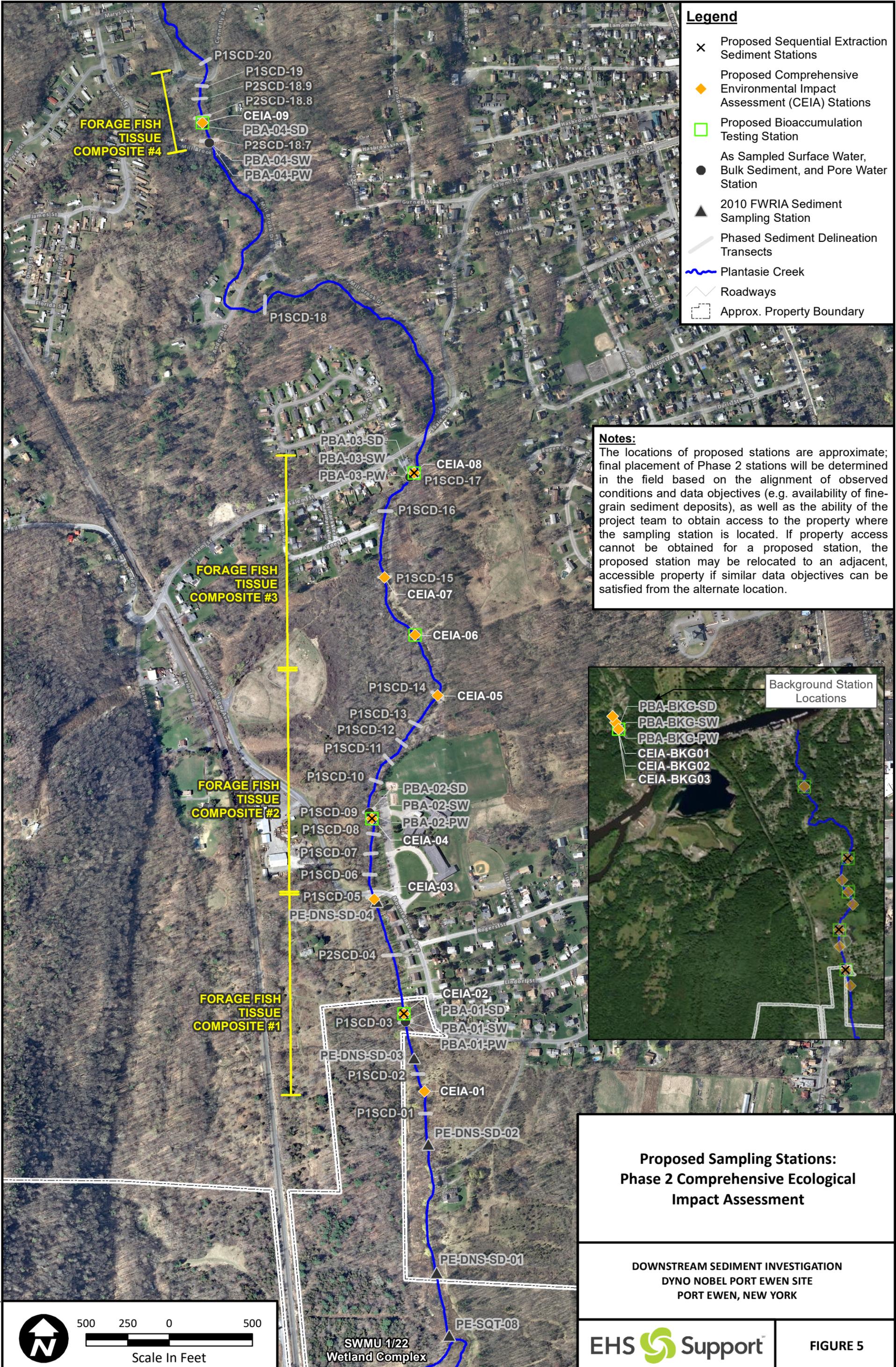


Notes:

Cu, copper	TOC, total organic carbon	DSB _{LOEC} , dietary screening benchmark
THg, total mercury	AVS, acid volatile sulfides	AWQS, ambient water quality standard
MeHg, methylmercury	SEM, simultaneously extracted metals	PRG, preliminary remediation goal
Se, selenium	SE, sequential extraction	<i>f</i> _{OC} , fraction organic carbon
Zn, zinc	SQT, sediment quality triad	
	CBR _{LOEC} , lowest effect critical body residue	







Legend

- ✕ Proposed Sequential Extraction Sediment Stations
- ◆ Proposed Comprehensive Environmental Impact Assessment (CEIA) Stations
- Proposed Bioaccumulation Testing Station
- As Sampled Surface Water, Bulk Sediment, and Pore Water Station
- ▲ 2010 FWRIA Sediment Sampling Station
- Phased Sediment Delineation Transects
- ~ Plantasie Creek
- Roadways
- Approx. Property Boundary

Notes:
 The locations of proposed stations are approximate; final placement of Phase 2 stations will be determined in the field based on the alignment of observed conditions and data objectives (e.g. availability of fine-grain sediment deposits), as well as the ability of the project team to obtain access to the property where the sampling station is located. If property access cannot be obtained for a proposed station, the proposed station may be relocated to an adjacent, accessible property if similar data objectives can be satisfied from the alternate location.

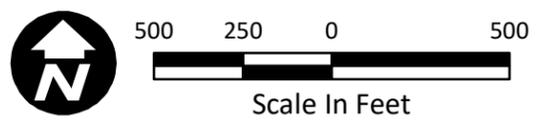
Background Station Locations

- ◆ PBA-BKG-SD
- ◆ PBA-BKG-SW
- ◆ PBA-BKG-PW
- ◆ CEIA-BKG01
- ◆ CEIA-BKG02
- ◆ CEIA-BKG03

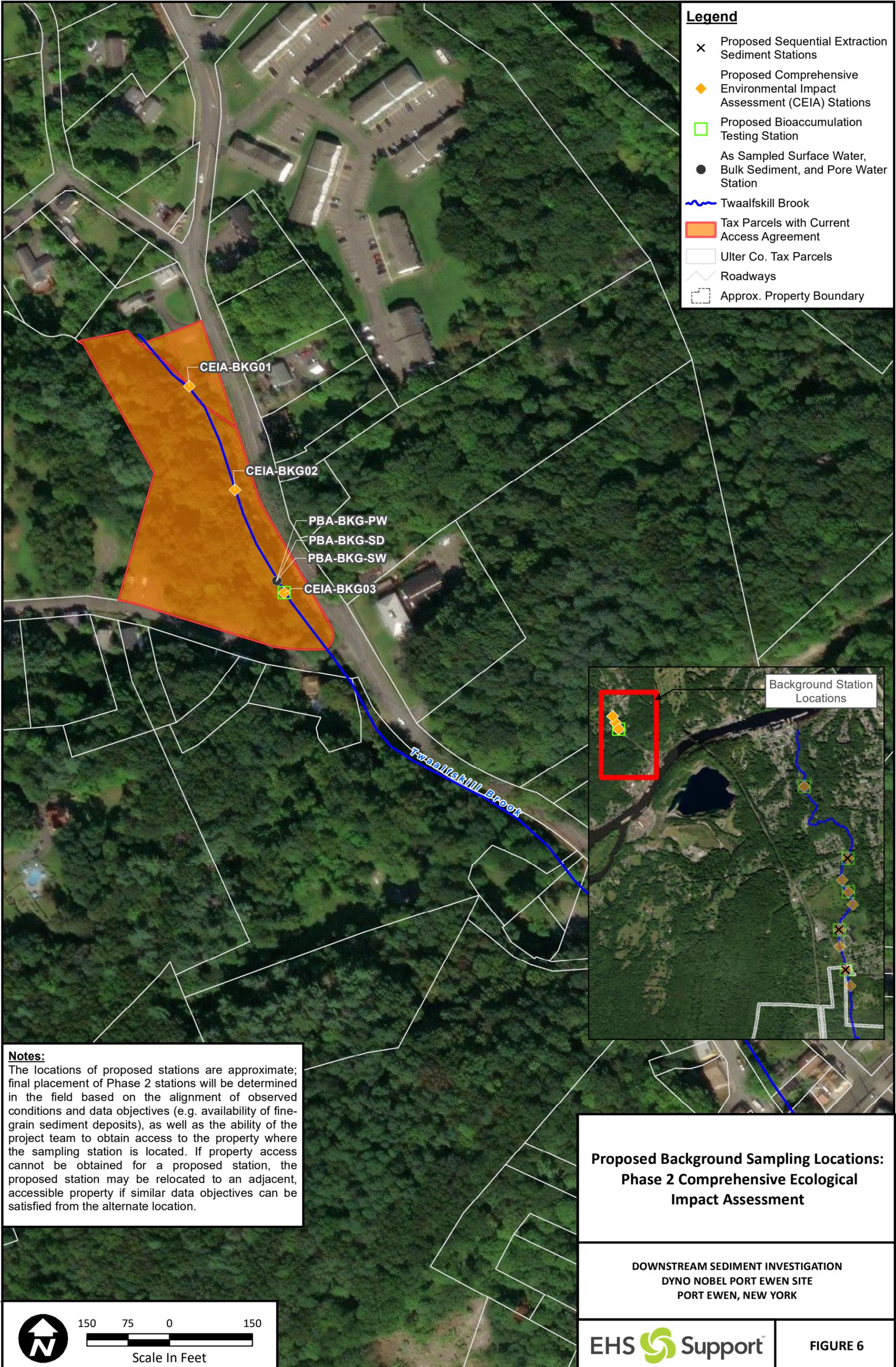
**Proposed Sampling Stations:
 Phase 2 Comprehensive Ecological
 Impact Assessment**

DOWNSTREAM SEDIMENT INVESTIGATION
 DYNNOBEL PORT EWEN SITE
 PORT EWEN, NEW YORK

Reviewed By:



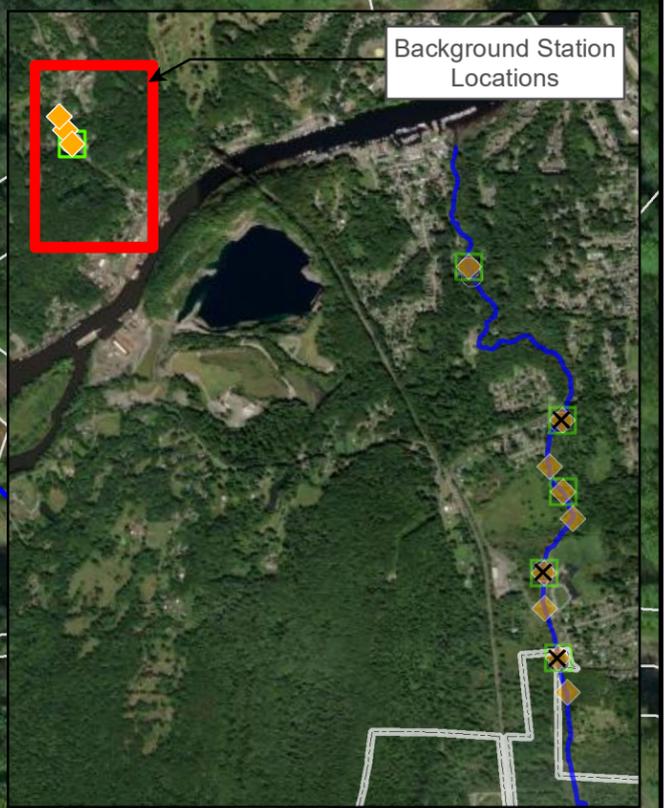
SWMU 1/22
Wetland Complex



Legend

- × Proposed Sequential Extraction Sediment Stations
- ◆ Proposed Comprehensive Environmental Impact Assessment (CEIA) Stations
- Proposed Bioaccumulation Testing Station
- As Sampled Surface Water, Bulk Sediment, and Pore Water Station
- ~ Twaalfskill Brook
- Tax Parcels with Current Access Agreement
- Ulster Co. Tax Parcels
- ~ Roadways
- Approx. Property Boundary

Notes:
 The locations of proposed stations are approximate; final placement of Phase 2 stations will be determined in the field based on the alignment of observed conditions and data objectives (e.g. availability of fine-grain sediment deposits), as well as the ability of the project team to obtain access to the property where the sampling station is located. If property access cannot be obtained for a proposed station, the proposed station may be relocated to an adjacent, accessible property if similar data objectives can be satisfied from the alternate location.



**Proposed Background Sampling Locations:
 Phase 2 Comprehensive Ecological
 Impact Assessment**

DOWNSTREAM SEDIMENT INVESTIGATION
 DYNO NOBEL PORT EWEN SITE
 PORT EWEN, NEW YORK



FIGURE 6

Reviewed By:  150 75 0 150
 Scale In Feet