Target Removal Area Characterization Work Plan

Mobile Sediments and Surface Deposits Work

Penobscot River Estuary, Maine

Prepared for

Greenfield Penobscot Estuary Remediation Trust LLC
Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by:

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GLOSSARY

Beneficial Reuse	Shall mean "beneficial use" as defined in Code of Maine Rules 06-096 Chapter 418 of Maine's Solid Waste Regulations or other state and federal agencies as applicable.
Beneficiary, Beneficiaries	Shall mean, with respect to the Remediation Trust, Mallinckrodt US LLC, the Natural Resources Defense Council, Maine People's Alliance, and their successors.
Committed Funding	Shall mean those portions of funding for the remedial activities set forth in Paragraphs 10 through 15 (Paragraph 11 of the Consent Decree [Mobile Sediments and Surface Deposits]) that are required to be paid by Mallinckrodt.[1]
design	Removal action design for the Mobile Sediments and Surface Deposits Work.
East Channel	Shall mean "the portion of the Penobscot River along the entire eastern side of Verona Island from the northernmost tip of Verona Island to the southernmost tip of Verona Island."
Estuary	The uppercase term refers specifically to the Penobscot River Estuary system.
Feasible	Shall mean "capable of being accomplished with reasonable professional efforts, taking into account scientific, technical, legal, practicability, and other relevant constraints… cost; time to implement; potential benefits and risks; engineering, legal, and permitting considerations and processes; and input from stakeholders."
horizon	A distinct sediment layer parallel to the sediment surface that has different physical, chemical, and biological properties from the layers above and below it. Field identification based on visual observations of cores.

[1] The Consent Decree provides Committed Funding of $70 million for the Mobile Sediments and Surface Deposits remedy, and up to $50 million in Contingent Funding if the removal action design requires landfill disposal. Unless the contingency is triggered, the Consent Decree requires that the Work be designed to remain within the limits of the Committed Funding.

intertidal	The zone between mean low water and mean high water (i.e., under water at high tide but above water at low tide). In Maine, the intertidal zone is typically privately owned; however, the public has rights for fishing, fowling, and navigation as established by the Colonial Ordinance of 1647. Related terms include intertidal marsh (a zone characterized by vegetation such as grasses) and intertidal flats (a zone characterized by sediment without vegetation, also known as mud flats).
Mobile Sediment	Shall mean "any mineral or organic sediment, including wood waste, that may be mobilized and homogenized by natural processes in the Penobscot River over timescales relevant to affect the fate and transport of mercury within the Site" per the Consent Decree.
Orland River	Shall mean "the tidal portion of the Orland River, and adjacent intertidal areas, from the head of tide at the Orland Dam to the junction of the Orland River and the East Channel at Gross Point."
processing	Includes physical, chemical, or thermal manipulation or treatment.
Reach	Shall mean a defined portion or component of the Site subject to the remediation activities set forth in the Consent Decree. Defined geographically or based on hydrodynamic, geophysical, or other scientific bases.
Remediation Trust	Greenfield Penobscot Estuary Remediation Trust LLC, Trustee of the Penobscot Estuary Mercury Remediation Trust
Site	Shall mean "the Penobscot River Estuary, which generally includes the tidal portions of the Penobscot River from the location of the former Veazie Dam to upper Penobscot Bay. Specifically, the Site includes each of the Study Reaches shown in Appendix E of the Consent Decree, including any intertidal areas that fringe the Study Reaches."
Surface Deposit	Shall mean "any subtidal or intertidal region of Mobile Sediment accumulation, including any commingled materials or debris, that can be identified by physical, chemical, geophysical, or other scientific methods" per the Consent Decree.
suspended sediment	Sediment suspended in the water column that can be transported by water flow.
unconsolidated sediment	Non-cohesive sediment layers or deposits that may be mobilized or resuspended in the water column through hydrodynamic processes.
water column	The vertical interval between the surface of a water body and the upper extent of unconsolidated sediment (i.e., the air-water interface to the water-sediment interface).

wood waste	Organic sediment or debris originating primarily from historical sawmill operations along the Penobscot River.
Work Category, Work Categories	Shall mean, individually or collectively, the remedial activities described in Consent Decree Paragraphs 10 through 14, to which funding is specifically allocated.

ACRONYMS AND ABBREVIATIONS

¶	Paragraph
DO	data objective
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RTK	real-time kinematic
SOP	Standard Operating Procedure
Stantec	Stantec Consulting Services Inc.
TRA	target removal area
USACE	U.S. Army Corps of Engineers
Work Plan	Target Removal Area Characterization Work Plan

1 INTRODUCTION

This Target Removal Area Characterization Work Plan (TRA Characterization Work Plan) for the Mobile Sediments and Surface Deposits Work Category was prepared by Stantec Consulting Services Inc. (Stantec) on behalf of Greenfield Penobscot Estuary Remediation Trust LLC, Trustee of the Penobscot Estuary Mercury Remediation Trust (collectively, the Remediation Trust) for Work[2] on the Penobscot River Estuary (the Site, as shown on Figure 1). This Work Plan was prepared in accordance with the Consent Decree[3] and its appendices including applicable requirements of the Statement of Work (Appendix A of the Consent Decree).

As outlined in Paragraph (¶) 11 of the Consent Decree, the Mobile Sediments and Surface Deposits Work Category is one of three remediation Work Categories intended to work together to reduce mercury exposure and enhance recovery of the Penobscot River Estuary, including:

1. Orrington Reach – Orrington Reach extends from Orrington, just south (downstream) of the former HoltraChem facility, to North Bucksport. The remedy for this Work Category is capping of 130 acres of intertidal flats.

2. Mobile Sediments and Surface Deposits (the subject of this Work Plan) – The remedy for this Work Category is removal of a portion of these materials from the Site. There are no geographic limits within the Site specified for this Work Category.

3. Orland River and East Channel around Verona Island – The remedy for this Work Category will be determined by the Remediation Trust and may include capping, removal, or other remediation actions within the East Channel and/or Orland River.

This Work Plan builds on the results of the Phase III Engineering Study (AFW 2018a, 2018b), the conclusions of the Preliminary Removal Action Design Work Plan (Jacobs 2026), and the 2026 Geophysical and Preliminary Sediment Investigation (Stantec 2026a). Data gaps identified for this Work will be investigated to confirm potential TRA characteristics, further evaluate the feasibility of the removal action, inform Beneficial Reuse and/or other disposal alternatives, and be used for removal action design and permitting. The resulting information will also inform the estimated extent of Work that can be completed within the Committed Funding provided in the Consent Decree. The field investigations described in this Work Plan represent the second of three investigations proposed for 2026 as outlined below.

1. Geophysical and Preliminary Sediment Investigation Work Plan (Stantec 2026b) – This field investigation included bathymetric and sub-bottom surveys to confirm the

[2] The term "Work" is defined in the Consent Decree as all activities and obligations, the performance of which the Remediation Trust or the Project Trust, and their respective Trustees, is required to cause under the Consent Decree, including all remediation activities.

[3] The Consent Decree was approved and entered by the U.S. District Court for the District of Maine in the case *Maine People's Alliance and NRDC v. HoltraChem Manufacturing Company LLC, et al.,* No. 1:00-cv-00069-JAW (D. Me.) (ECF No.1187, October 11, 2022).

presence and location of Surface Deposits identified during the Phase III Engineering Study and selected as potential TRAs in the Preliminary Removal Action Design Work Plan (Jacobs 2026). Investigation results are currently being evaluated to determine if these Surface Deposits have moved or changed in size since the Phase III Engineering Study work in 2016-2017. This initial investigation also included the collection of sediment vibracores to confirm sediment horizon boundaries identified from the sub-bottom survey. Samples from these cores were analyzed to document physical parameters, characterize wood waste fraction, and determine the vertical extent of mercury concentrations within the Surface Deposits. This initial screening of sediments from the Surface Deposits informs this TRA Characterization Work Plan and ongoing evaluations of Beneficial Reuse and disposal alternatives. Results of the geophysical survey will be used to map and quantify the horizontal and vertical extents of the Surface Deposits in the potential TRAs and inform the next phase of field investigations. The field investigations were completed in August 2026.

2. TRA Characterization Work Plan (this Work Plan) – This field investigation will further characterize Surface Deposits confirmed as TRAs based on results of the geophysical survey and initial sediment sampling. Vibracores will be collected at sufficient locations in each potential TRA to further define the horizonal and vertical extents of the Surface Deposits. Composite samples taken across the length of these cores will be analyzed for a broad suite of chemicals to refine evaluations of Beneficial Reuse and other disposal alternatives. Characterization of the wood waste fraction from these cores will be used to further evaluate dewatering and disposal alternatives. This second investigation will include the collection of bulk sediment samples from the Surface Deposits for the treatability studies outlined below. Background turbidity levels in the Estuary will also be investigated to inform design and permitting. This field investigation is targeted for implementation in late October and November 2026.

3. Treatability Study Work Plan – This work plan will document the treatability studies necessary to identify the dewatering, treatment and potential stabilization methods necessary to support Beneficial Reuse and/or other disposal alternatives. Bulk sediment collection for the treatability studies will occur under the TRA Characterization Work (see above). These treatability studies are targeted to begin in late 2026.

As summarized in Table 1, this Work Plan meets the applicable requirements under ¶6(a) of the Statement of Work and includes i) a summary of existing data and description of data gaps; ii) a description of data quality objectives (referred to herein as the data objectives [DOs]); iii) a detailed sampling plan; iv) a sampling schedule; and v) a description of the quality assurance (QA) and quality control (QC) measures to be undertaken. The Quality Assurance Project Plan (QAPP) Addendum, which is an addendum to the March 2023 QAPP (WSP 2023a), is included as Appendix A.

This Work Plan is based on preliminary results from the Geophysical and Preliminary Sediment Investigation available in September 2026. Sediment sample locations and target sampling depths shown in Tables 5 and Figures 2 through 5 may be adjusted immediately prior to or during implementation based on the final geophysical survey results and/or conditions

observed in the field. Deviations from this Work Plan that may result from these adjustments will be documented in the TRA Characterization Investigation Report.

2 SUMMARY OF DATA OBJECTIVES, EXISTING DATA AND DATA NEEDS

This section summarizes DOs for this Work Plan, existing data in the potential TRAs, and data gaps to be addressed during the second of three investigations planned for 2026.

2.1 DATA OBJECTIVES

The DOs of this Work Plan include:

- Characterize contaminant concentrations to inform evaluation of processing requirements and final disposition of material removed from the potential TRAs.
- Update understanding of natural turbidity ranges in the Estuary during the start of the typical November to April in-water work window.
- Evaluate the mobility of Surface Deposit materials located in potential TRAs.
- Collect bulk sediment from the Surface Deposits for the treatability studies.

Table 2 summarizes the questions to be answered and decisions to be made based on investigation results, and Table 3 presents an overview of the investigation activities designed to meet each objective.

2.2 EXISTING DATA

The Phase I (PRMSP 2008, 2009) and Phase II (PRMSP 2013) Studies, and the Phase III Engineering Study (AFW 2018a, 2018b) generally characterized the distribution of mercury in the Penobscot River Estuary and identified wood waste as a significant sediment component, often associated with elevated mercury concentrations. These studies also documented variability in both physical and chemical characteristics of sediment across the Site.

Investigations completed by the Remediation Trust expanded this dataset through additional bathymetric surveys, including a comprehensive 2023 multibeam survey (Integral 2024) and a hydrodynamic model supported by historical and updated flow measurements. A comparison of the 2023 bathymetric survey data with the August 2026 bathymetric survey has been done to compare the variations in surface elevations between these two time periods. The results of these evaluations will be documented in the Geophysical and Preliminary Sediment Investigation Report.

Initial field observations from August 2026 vibracore sampling performed as part of the Geophysical and Preliminary Sediment Investigation indicated the following:

- Surface Deposits dominated by wood waste are still present at most of the potential TRAs in the Preliminary Removal Action Design Work Plan (Jacobs 2026). The exception

to this is at VE-2 where both core locations contained mineral sediments only, suggesting the Surface Deposit location has shifted.

- Based on field sieve analysis, the wood waste fraction from these Surface Deposits (excluding VE-2) ranges from approximately 52% to 100%, with an average of 77%. Other sediments in the cores consist primarily of fine sand and silts.

- Surface Deposits are underlain by consolidated mineral sediments consisting primarily of fine sand and silt.

- Surface Deposits observed in the field all had some fraction of wood waste compared to the mineral sediment horizon below the Surface Deposit. This observation was confirmed by the initial analytical chemistry data in which the Surface Deposit had elevated mercury concentrations compared to the mineral horizon below.

Based on the existing data, as briefly summarized in Table 2 and the recent August 2026 field observations, the following six potential TRAs identified in the Geophysical and Preliminary Sediment Investigation Work Plan (Stantec 2026b), were retained for additional investigation: Frankfort Flats (FF-1), Bucksport (BU-1), Verona East (VE-1, VE-2, and VE-3), and Orland River (OR-1). These areas were originally identified during the Phase III Engineering Study (AFW 2018a, 2018b) and characterized as Surface Deposits consisting of sediment with a significant fraction of wood waste that is readily remobilized, occurs in sufficient thickness to support efficient removal, and is present under conditions conducive to implementation of removal actions.

The retention of these areas will be reevaluated after sub-bottom data has been processed to confirm presence and depth of the Surface Deposits in these areas. However, if the geophysical sub-bottom data does not document a Surface Deposit in the vicinity of VE-2, it will be removed from further investigation.

2.3 APPROACH TO ADDRESS DATA GAPS

Although a significant body of existing data on the Penobscot River Estuary was obtained during the Phase I (PRMSP 2008, 2009) and Phase II Studies (PRMSP 2013) and the Phase III Engineering Study (AFW 2018a, 2018b), the information was collected to meet the specific objectives of each Court-ordered study and is not suitable or sufficient to inform removal design, permitting, and feasibility evaluations. In addition, data collected between 2006 and 2017 are nearly 10 to 20 years old and may no longer be representative of current conditions. Therefore, the additional focused investigations described in the Geophysical and Preliminary Sediment Investigation Work Plan and this TRA Characterization Work Plan are designed to confirm selection of the six Surface Deposits as potential TRAs and better inform future permitting, design, and material processing and disposition Work.

The location and horizontal and vertical extents of potential TRAs were characterized in the Geophysical and Preliminary Sediment Investigation. This second field investigation, TRA Characterization Investigation includes: i) additional sediment sampling and analyses to provide

a more comprehensive understanding of the physical and chemical nature of the Surface Deposits; ii) turbidity data collection; and iii) a fall/winter bathymetry survey to determine if the location and vertical extent of potential TRAs have changed when compared to the August 2026 surveys. Additional details about DOs, investigation rationale, and the specific questions that will be addressed through data collection are presented in Table 2.

The data collected from the investigation described herein will be evaluated using the same ranking and selection framework described in Section 3.4 (Table 3-9) of the Preliminary Removal Action Design Work Plan (Jacobs 2026). The results will be used to further evaluate the feasibility of the removal action specified in the Consent Decree answering the following questions:

- What contaminants of concern are detected, and at what concentrations are they present, in the potential TRAs? How do these concentrations compare to Beneficial Reuse and other disposal criteria?
- What is the material type (e.g., organic, wood waste, mineral, etc.) and does the sediment composition vary significantly over the area of the potential TRA?
- What are the natural turbidity ranges within the Estuary during the standard time-of-year work window (November to April) for dredging?
- Are Surface Deposits located in the potential TRAs shifting?

3 INVESTIGATION SCOPE AND METHODOLOGIES

This investigation will follow a structured sequence of sampling activities and surveys designed to further characterize the nature and extent of Surface Deposits within the potential TRAs. This investigation relies on the presence and dimensions of Surface Deposits within the potential TRAs identified during the Geophysical and Preliminary Sediment Investigation.

The field investigation will include:

- Sediment sample collection from 32 vibracores collected from the potential TRAs for laboratory analysis and sieve analysis in the field.
- Installation and periodic maintenance of a turbidity meter off the pier at the Stantec Winterport office and collection of turbidity data for up to three months.
- Bathymetric surveys of the potential TRAs, which will be repeated in November or December 2026 to determine if there are changes in the location or extent of Surface Deposits since the August 2026 bathymetric survey.

Together, these multiple lines of evidence will provide sufficient information regarding the Surface Deposits associated with the potential TRAs to refine evaluations of feasibility, Beneficial Reuse, and/or other disposal alternatives. These data will inform the need for and scope of pre-design investigations, dredge design, permitting, and constructability.

3.1 SEDIMENT SAMPLING

Sediment sampling proposed in this TRA Characterization Investigation will further characterize the nature and extent of contamination in Surface Deposits identified in the potential TRAs. Sediment core sampling in this investigation will provide a more comprehensive understanding of the chemical and wood waste composition of Surface Deposits identified in the potential TRAs. More specifically, the purpose of collecting sediment cores is to:

- Describe the physical characteristics of the Surface Deposits to inform dredge design, materials handling, dewatering, permitting, and the evaluation of potential Beneficial Reuse and other disposal alternatives;
- Characterize mercury concentrations across the vertical extent of the Surface Deposits;
- Review the concentrations of other chemical constituents relevant to the processing and final disposition of material to be removed; and
- Collect bulk sediment from the potential TRAs for treatability studies. Treatability studies will be detailed in a separate Treatability Study Work Plan.

Data collected from this sediment sampling will support DO C-6 (Table 2).

3.1.1 Sediment Core Collection

Sediment vibracores will be collected at 32 target locations identified following the Geophysical and Preliminary Sediment Investigation to complete a screening level assessment of the Surface Deposits for Beneficial Reuse and other disposal alternatives. Using a pneumatic vibracoring system, cores up to 10 feet deep will be collected from a 26-foot aluminum pontoon sampling vessel. Vessel positioning and heading will be established using a Hemisphere VS333 real-time kinematic (RTK) receiver and heading sensor and Hypack. SmartNet or Maine Department of Transportation RTK corrections will be used for these surveys. Sample time, location coordinates, water depth, core penetration, and sample recovery will be documented for each core location.

The physical and chemical sediment data from the Surface Deposits will be used to inform waste characterization of the material to be removed and screened against the Maine Department of Protection Maine Solid Waste Management Rules: Chapter 418 Beneficial Use of Solid Waste (MDEP 2018) and disposal requirements from anticipated licensed landfills. Sediment core logs will be prepared with corresponding photographs of each core collected.

3.1.2 Core Sample Processing

Sediment core samples will be logged for lithology, grain size, and stratigraphy in the field in accordance with Standard Operating Procedure (SOP) S-07a (Stantec 2026b). Photographs of each core will be collected. Table 5 documents core numbers from each potential TRA and the corresponding number of samples for analysis. Samples will be analyzed for potential contaminants of concern from one composite sample per core from each potential TRA from the field identified Surface Deposits, consisting of sediment collected from the mudline to the bottom of the Surface Deposit.

Sieve analysis of collected sediments from the Surface Deposit in each potential TRA will be completed in the field to document physical characteristics of the wood waste (particle size) and estimate wood waste and mineral fractions.

3.1.3 Chemical and Physical Characterization

The sediment core samples will be collected as summarized in Table 5 and submitted for laboratory analysis of selected parameters as detailed in Table 6, which includes laboratory methods, sample numbers, and QC samples. One composite sample will be collected across the depth of the Surface Deposit from each core for contaminant analysis.

Toxicity characteristic leaching procedure analysis will be performed on samples when an analyte concentration exceeds 20 times the applicable Resource Conservation and Recovery Act standard for a specific compound.

The samples will be collected and processed in accordance with the QAPP (WSP 2023a), the Field Sampling Plan (WSP 2023b), and the QAPP Addendum (Appendix A). A summary of the analytical methods and QA/QC sample counts is provided in Table 6.

3.2 TURBIDITY DATA COLLECTION

A turbidity meter will be installed and periodically maintained to collect turbidity data from late October to mid-December. Turbidity data will be collected using a YSI EXO2 or similar deployed on a piling at the Stantec Winterport Project Office and will be downloaded monthly. Data collected from these surveys will provide information on natural turbidity fluctuations in the estuary and support DO C-5 (Table 2).

Data collected from the turbidity meter will be processed following field collection and a turbidity data summary memo will be included as an appendix to the Target Removal Area Sediment Sampling and Analysis Report.

3.3 FALL BATHYMETRIC SURVEYS

A second bathymetric survey of the potential TRAs will be conducted in November or December 2026 to document changes in location and extent of the Surface Deposits in the TRAs since the August 2026 bathymetric survey. Unless otherwise noted in this Work Plan, survey methods, acquisition parameters, and data processing procedures will be consistent with those previously applied during the Phase III Engineering Study (AFW 2018a, 2018b), the 2023 bathymetric survey (Integral and WSP 2023), and the August 2026 survey for comparability with historical and future datasets.

The work shall follow established hydrographic surveying best practices, including a formal QA/QC program and defined DOs, and be conducted in accordance with the U.S. Army Corps of Engineers (USACE) Hydrographic Surveying Manual (EM 1110-2-1003), along with standard geodetic datums and RTK positioning practices.

Bathymetric surveys will be conducted within and adjacent to each potential TRA to characterize existing sediment surface elevations. The multibeam bathymetry survey will be performed using a Norbit iWBMS multibeam echosounder with a beam width of 1°x 1° at the frequency of 400 kilohertz. This frequency was selected for accurate detection of the sediment-water interface. An Applanix POS/MV Wavemaster II RTK receiver and inertial measurement unit will provide position, heading, altitude, and water level corrections. SmartNet or Maine Department of Transportation RTK corrections will be used for these surveys. An AML probe and AML Base X2 profiler will provide corrections for speed of sound in the water column. Data will be acquired using Hypack and Hysweep survey software packages. Processing and generation of data products will be performed using Hypack, Hysweep, and AutoCAD. Single beam survey equipment will also be mobilized to the field in case there are any multibeam collection issues in shallow water.

Multibeam surveys will be conducted to achieve full bottom coverage where feasible. Survey methodology selection will be based on field conditions and the professional judgment of the hydrographer. Shoreward and shallow-water survey coverage shall extend as safe navigation allows and will be determined by the captain and surveyor in the field. Survey activities will be scheduled in coordination with tidal cycles to optimize multibeam data acquisition. Continuous bathymetric coverage will be obtained to the extent practicable; however, actual survey

coverage will be determined based on conditions encountered in the field. The resulting sediment surface data will be used to generate updated bathymetric maps and compare them to maps from previous and future surveys.[4]

Bathymetric survey deliverables will include:

1. Multibeam bathymetric point data as ASCII text XYZ point files, with deliverables generated using 3-foot by 3-foot binned data, average depth per cell;
2. Multibeam bathymetric contours and soundings as AutoCAD DXF files; and
3. Multibeam bathymetric contours and soundings as PDF plots for each potential TRA.

Bathymetric data is being collected in support of DO C-7 (Table 2). Based on this evaluation, dredge polygons will be further refined from the field data to support state and federal permitting.

[4] The 2023 project bathymetric survey completed by Integral Consulting Inc. and the Phase III survey data are available.

4 QUALITY ASSURANCE AND QUALITY CONTROL

Field QC samples are collected to assess variability within samples (e.g., duplicates), to evaluate whether potential sources of sample contamination are present (e.g., equipment rinsate and trip blanks), and to confirm proper storage conditions of samples (e.g., temperature blanks). QA/QC procedures are presented in the QAPP (WSP 2023a), the Field Sampling Plan (WSP 2023b), the Geophysical and Preliminary Sediment Investigation Work Plan QAPP Addendum (Stantec 2026b), and the QAPP Addendum (Appendix A).

Requirements for field QC samples, including a summary of field QC sample numbers, are provided in Table 6. Field duplicates and other field QC samples, such as trip blanks, temperature blanks, and rinsate blanks, will be collected as outlined in the QAPP.

5 PERMITS AND ACCESS REQUIREMENTS

Permits and access agreements are not required to implement this Work Plan. Vibracore sampling is covered under USACE Nationwide Permit for Survey Activities (NWP-6). NWP-6 is a non-notifying USACE permit that does not require any submissions to USACE for activities covered under NWP-6. For the Maine Department of Protection, scientific explorations (e.g., geotech borings, vibracore) are exempt from Natural Resources Protection Act permitting by 38 M.R.S.A. Sections 480-Q.11. No vibracore sampling activities are planned within the intertidal flats area that would require access from private landowners.

6 ROLES AND RESPONSIBILITIES

The roles, responsibilities, and authorities of the Remediation Trust, Stantec, and Stantec's subcontractors for implementation of this Work Plan are presented below.

Task	Remediation Trust Role	Stantec/Stantec Subcontractor Role
Beneficiary communications, community involvement, state and federal agency communications	Lead	Technical support
Sediment Sampling	Oversight and project management	Stantec is responsible for implementation of Work Plan. CR Environmental, Inc, is the subcontractor responsible for collecting vibracores.
Sediment Chemistry Analyses	Oversight and project management	Eurofins Environmental Testing is the subcontractor for sediment analyses.
Sediment Chemistry Data Validation	Oversight and project management	Stantec is responsible for laboratory data validation.
Turbidity Data Collection	Oversight and project management	Stantec is responsible for collection of turbidity data.
Bathymetric Survey	Oversight and project management	Stantec is responsible for implementation of Work Plan. Steele Associates Marine Consultants, LLC, is the subcontractor responsible for completing the bathymetric survey.
TRA Figure Development	Oversight and project management	Stantec is responsible for TRA figure development based on data collected by Steele Associates Marine Consultants, LLC, during the bathymetric surveys.
TRA Sediment Sampling and Analysis Report	Oversight, deliverable review, and project management	Prepared by Stantec on behalf of the Remediation Trust.

7 SCHEDULE

The following schedule milestones have been established for the geophysical and preliminary sediment investigation:

- Implement TRA sediment sampling investigation, late October 2026
- Fall bathymetric survey, November/December 2026
- Turbidity meter deployment, late October through December 2026
- Complete laboratory analyses, November 2026
- Treatability sediment collection, October/November 2026
- Complete analytical results data validation, December 2026
- Draft Target Removal Area Sediment Sampling and Analysis Report, January 2027

The exact field investigation schedule is contingent on subcontractor availability and weather conditions. The TRA field investigation and fall bathymetric survey are both expected to require approximately 2 weeks, and the treatability sediment collection approximately 1 week. The turbidity meter is expected to be deployed for up to 3 months.

Samples will be submitted for laboratory analysis under standard turnaround times. Following receipt, analytical data will undergo data validation in accordance with the QAPP Worksheets #35, #36, and #37 (WSP, 2023a) before incorporation into the project database. Validated data and associated findings will be summarized and presented in the TRA Sediment Sampling and Analysis Report.

8 SUPPORTING DELIVERABLES

As described in Sections 1 and 3, this Work Plan references and augments existing Site-wide Supporting Deliverables and provides the necessary addenda to those plans for the proposed field events which include the QAPP Addendum in Appendix A.

9 REPORTING

All reporting will comply with the requirements identified in ¶6(b) of the Statement of Work (Appendix A to the Consent Decree) as applicable to the Work. Reporting will include the following:

- Target Removal Area Sediment Sampling and Analysis Report to include:
    - Description of and rationale for deviations from this Work Plan.
    - Summary of the field investigations performed and key observations.
    - Results of physical characterization of sediment samples.
    - Estimates of the wood waste content within the sampled Surface Deposits.
    - Summary tables to present validated results of laboratory analysis and preliminary screening analyses used to assess feasibility, potential Beneficial Reuse alternatives, and disposal alternatives.
    - Narrative interpretation of data and results, including how the DOs were satisfied.
    - Core logs/photographs and field sampling photographs.
    - Conclusions and recommendations to inform the Treatability Study Work Plan.
    - Conclusions and recommendations for the Work Design, including any resulting modifications to design parameters and criteria provided for in the basis of design or other deliverables (e.g., selection of potential TRAs for further investigation, Beneficial Reuse Feasibility, refinement of cost estimates).
- Turbidity Data Appendix to include:
    - Summary of collection methods, turbidity data tables, and summary statistics.
- Bathymetric Survey Memo and Data Deliverable Appendix:
    - Multibeam bathymetric point data.
    - Multibeam bathymetric contours and soundings as AutoCAD DXF files; and
    - Multibeam bathymetric contours and soundings as PDF plots for each potential TRA.

10 REFERENCES

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Tables

Table 1. Statement of Work[a] Compliance
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

Statement of Work Requirement	Work Plan Section
¶ 6(a)(i) An evaluation and summary of existing data and a description of the data gaps that require further investigation in order to complete the Work Design	Section 2
¶ 6(a)(ii) A description of the required technical and/or regulatory decisions to be made or questions to be answered with the investigation results, along with a summary of the type, quantity, and quality of data needed to reach those decisions	Section 3
¶ 6(a)(iii) A sampling plan including media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), and number of samples	Section 3
¶ 6(a)(iv) A schedule for the Investigation	Section 8
¶ 6(a)(v) Cross references to quality assurance/quality control requirements set forth in the QAPP as described in Paragraph 31(d)	Section 5

[a] Appendix A of the Consent Decree

QAPP = Quality Assurance Project Plan

Table 2. Data Objectives
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

Data Type	Data Objective		Why	How	Currently Available Information and Data	Additional Information and Data Needed	Scope and Approach to Information and Data Collection
Characterization	C-5	**Update understanding of natural turbidity ranges in the Estuary during the start of the typical November to April in-water work window.**	Measure turbidity ranges under natural background conditions to demonstrate potential adverse impacts from sediment removal will not cause a significant increase in turbidity, and build support from permitting authorities and community members.	Measure background turbidity in the Estuary during the start of the typical November to April in-water work window.	In 2023, real-time water quality data were collected in Orrington Reach over a 3-month period to capture the high flow period from late March through June. The instrumentation included a multiparameter water quality sonde to measure turbidity conductivity, and temperature.	The 2023 water quality data were collected upstream of the potential target removal areas and in late spring / early summer. Turbidity data are needed for the Estuary under conditions representative of the typical work window (November-April).	Deploy a multiparameter water quality sonde with a turbidity sensor in the Estuary to capture background turbidity conditions representative of the typical window window (November-April).
	C-6	**Characterize contaminant concentrations to inform evaluation of processing requirements and final disposition of material removed from the potential TRAs.**	Beneficial Reuse options and landfills will have acceptance criteria that need to be met, and chemical characteristics of material to be removed will determine potential treatment methods and cost. A better understanding of the concentrations of these analytes in the Surface Deposits identified during the 2026 geophysical surveys will inform permit and disposal planning.	Analyze materials collected from the potential target removal areas identified during the 2026 geophysical surveys for comparison against MDEP Chapter 418, Beneficial Use of Solid Waste Screening Levels, and anticipated landfill acceptance criteria.	Phase III Engineering Study, 2016/2017: Analyzed three samples for TCLP metals, total metals, total petroleum hydrocarbons, PCBs, dioxins and furans, PAHs, and pesticides, and compared the results against MDEP Chapter 418, Beneficial Use of Solid Waste Screening Levels (PFOS, PFOA, and PFBS were not analyzed), and anticipated landfill acceptance criteria. These Phase III samples were not located within the potential target removal areas. The results of samples collected in 2026 in accordance with the Geophysical and Preliminary Sediment Investigation Work Plan (DO C-4) are being evaluated as of the date of this Work Plan.	Sediment contaminant data are needed to characterize current conditions in confirmed Surface Deposits within confirmed target removal areas to determine if Beneficial Reuse is feasible and/or characterize for disposal.	Analyze contaminant concentrations in core samples collected for the full suite of analytes in MDEP Chapter 418, Beneficial Use of Solid Waste, and anticipated landfill acceptance criteria, including PFOS, PFOA, and PFBS. Samples will be composited across the vertical extent of the Surface Deposited identified during the 2026 geophysical surveys.
	C-7	**Evaluate the mobility of Surface Deposit materials located in potential TRAs.**	A better understanding of temporal variability of Surface Deposits will support selection of final target removal area(s) to achieve RAOs. Understanding area, depth, volume, and physical characteristics of the surface deposits will support additional targeted sampling, design, materials handling, dewatering, permitting, and the evaluation of potential Beneficial Reuse and other disposal options.	Assess the spatial and temporal physical characteristics of materials collected from the potential target removal areas.	The Phase III Engineering Study generated a digital elevation model from multiple bathymetric surveys conducted prior to and during 2016. These data are not representative of current or contiguous bathymetric conditions. A comprehensive, high-resolution multibeam echosounder bathymetric survey from Bangor to Fort Point was conducted in June, August, and October 2023. No comparison of the Phase III and 2023 bathymetric survey data has been completed to date. August 2026 bathymetric surveys documented baseline bathymetric conditions during the late summer, but are outside of the typical seasonal dredge window.	Fall/winter bathymtric surveys within the typcial seasonal dredge window are needed to confirm whether seasonal shifts are occuring for the Surface Deposits.	Conduct an updated bathymetric survey of potential target removal areas and generate bathymetric isopach figures (cut/fill) by comparing the two data surfaces to assess elevation changes since the August 2026 survey.

MDEP = Maine Department of Environmental Protection
ng/g = nanogram(s) per gram
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
RAO = remedial action objective
TCLP = toxicity characteristic leaching procedure

Table 3. Overview of Investigation Activities
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

	Data Objectives		
	Characterization		
	C-5	C-6	C-7
Investigation Activities	**Update understanding of natural turbidity ranges in the Estuary during the start of the typical November to April in-water work window.**	**Characterize contaminant concentrations to inform evaluation of processing requirements and final disposition of material removed from the potential TRAs.**	**Document whether Surface Deposits located in potential target removal areas are shifting seasonally and collect bathymetric data during the typical seasonal dredge window (November-April).**
Turbidity Meter Deployment	x		
Core Samples: Target Removal Area Field Investigation		x	
Fall/Winter Bathymetric Survey			x

Table 4. Preliminary Target Removal Area Summary
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

	Chemical Characteristics[a]			Physical Characteristics			Removal Implementability	
River Reach	**Average Mercury Concentration[a] (ng/g)**	**Minimum Mercury Concentration[a] (ng/g)**	**Maximum Mercury Concentration[a] (ng/g)**	**Thickness of Deposit[b] (feet)**	**Volume of Deposit[b] (yd^3)**	**Wood Waste Fraction[a]**	**Water Depth at MLLW[c] (feet, min-max)**	**Current[d] (non-freshet) (m/s)**
Frankfort Flats (FF-1)	916	620	1,700	4.0	647,000	78%	10-25	1.0
Bucksport Reach (BU-1)	1,260	620	2,700	3.5	165,000	88%	6-11	1.5
Orland River (OR-1)	2,025	1,200	2,800	3.0	32,000	32%	0-1	0.3
Verona (VE-1)	TBD	TBD	TBD	6.0	202,000	64%	14-24	0.5
Verona (VE-2)	NA	NA	NA	3.0	21,000	0%	6-12	0.5
Verona (VE-3)	1,300	1,100	1,500	5.0	49,000	68%	18-30	0.5

[a] 2026 Geophysical and Preliminary Sediment Investigation (Stantec 2026a)

[b] Table 4-3, Intertidal and Subtidal Sediment Characterization Report (AFW 2018b). Preliminary estimates of thickness and volumes that need to be confirmed by the current field investigation.

[c] Estimated from NOAA Charts.

[d] Section 5.2.1 Near Bottom Velocities, Phase II Study, Chapter 7 (Geyer and Ralston 2018).

MLLW = Mean Lower Low Water

m/s = meter(s) per second

ng/g = nanogram(s) per gram

NS = not sampled

yd^3 = cubic yard(s)

Table 5. Sample Collection Summary
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

Target Removal Area	Area[a] (Acres)	Estimated Number of Cores[b]	Estimated Depth of Cores (feet)[c]	Estimated No. of Composite Samples for Chemical and Physical Analyses from Cores[d]
FF-1	76	10	10	10
BU-1	26	4	10	4
OR-1	7	6	10	6
VE-1	29	5	10	5
VE-2	4	3	10	3
VE-3	6	4	10	4

[a]Phase III Engineering Study Report (AFW 2018a). Update areas measurements from the August 2026 geophysical survey will be reported in the Geophysical Survey Report.

[b] Cores will be advanced at a subset of locations as shown on Figures 2 through 5

[c] Estimated core depth is conservatively estimated at 10 feet to document conditions across and below the Surface Deposit. The depth of the cores for the field investigation may be adjusted based on the results of the 2026 Geophysical and Preliminary Sediment Investigation.

[d] Samples will be analyzed at a frequency of 1 composite sample per core.

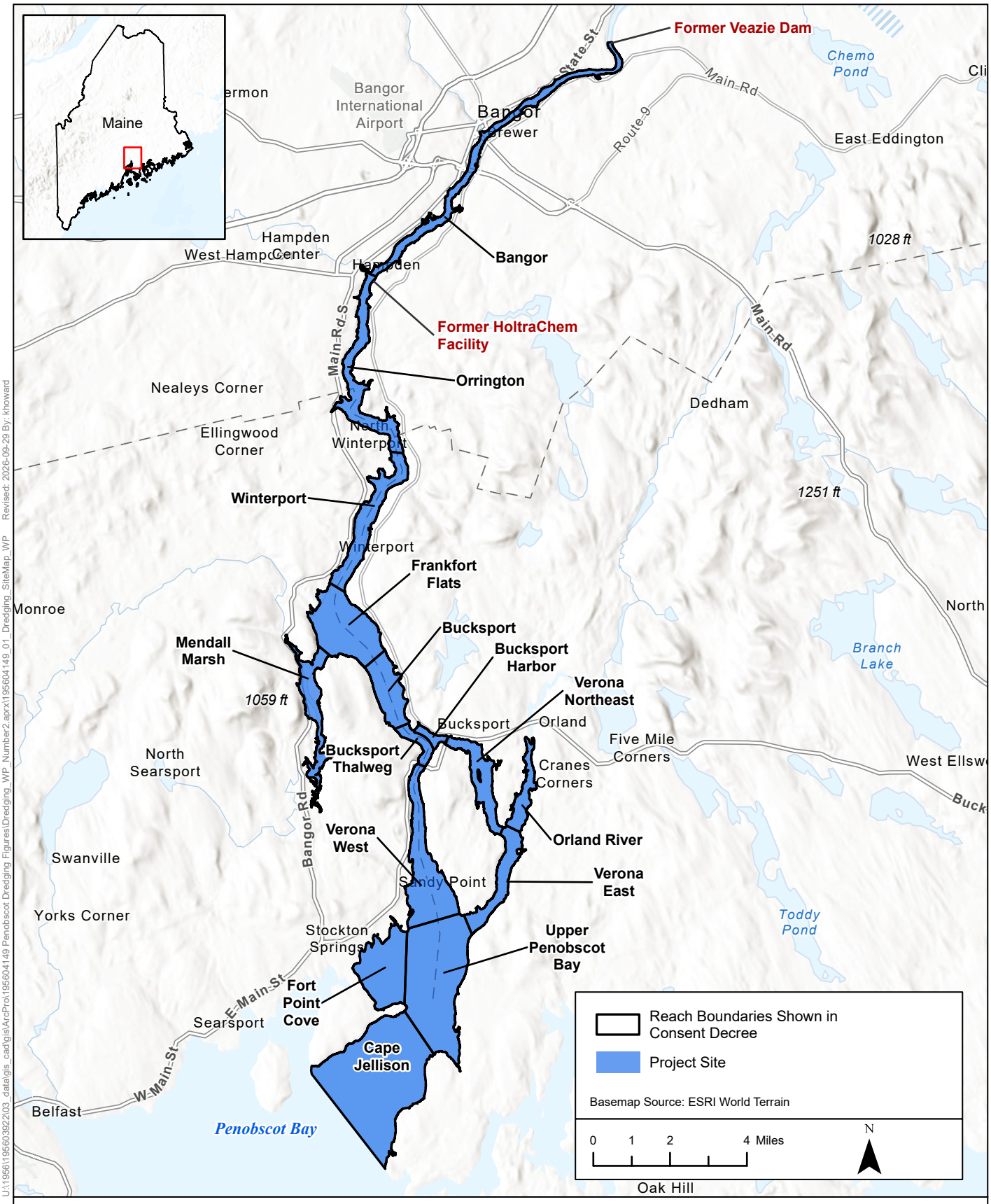
No. = number

Table 6. Summary of Sediment Investigation Samples
Target Removal Area Characterization Work Plan
Mobile Sediments and Surface Deposits
Penobscot River Estuary, Maine

Analytical Parameter	Analytical Method	Estimated Original Sample Count	Duplicates	MS/MSD	Equipment Blanks[a]	Estimated Sample Total
Mercury	EPA 1631B	32	4	2	6	44
Mercury Speciation (Mercury F1 - F5)	EPA 1631B SEP	32	4	2	6	44
Elemental Mercury	EPA 1631B SEP	32	4	2	6	44
Metals including cyanide[b]	EPA 6020B/9012A/B/9013	32	4	2	6	44
Chromium , Required for Chromium 3+	EPA 1638/3051A	32	4	2	6	44
Chromium, Trivalent (Colorimetric)	EPA 7196A	32	4	2	6	44
VOCs	EPA 8260D	32	4	2	6	44
SVOCs	EPA 8270E	32	4	2	6	44
Polychlorinated biphenyls (Aroclors)	EPA 8082A	32	4	2	6	44
Pesticides/Herbicides	EPA 8081B/8330/9321/8321B	32	4	2	6	44
Alachlor, Atrazine, Malathion, Phorate	EPA8270E_QQQ_Agchm	32	4	2	6	44
Dioxins/Furans	EPA 1613B	32	4	2	6	44
PFAS	EPA 1633	32	4	2	6	44
Hexavalent Chromium	EPA 7196A	32	4	2	6	44
EPH Reported without VPH - C8-C 10 reported	NWTPH/EPH	32	4	2	6	44
VPH Reported without EPH - C10-C12 reported	NWTPH/VPH	32	4	2	6	44
Total Organic Carbon	Lloyd Khan	32	4	0	6	42
Total Organic Matter	ASTM D2974 @ 87 C	32	4	0	6	42
Grain Size	ASTM D6913/D7928/D422	32	4	0	0	36
Flashpoint	D93-07/1010B	32	4	0	0	36
Ignitability	D93-07/1010B	32	4	0	0	36
Corrosivity/pH	EPA 9045	32	4	0	0	36
Reactive Sulfide	EPA 9012/9034	32	4	0	0	36
Reactive Cyanide	EPA 9012/9034	32	4	2	0	38
Perchlorate	EPA 6850	32	4	2	6	44
Bulk density	ASTM E868-82 Section 9.9 modified	32	4	0	0	36
Percent Moisture	Moisture - 2540	32	4	0	0	36
SPLP Extraction	EPA 1312	32	4	2	6	44
TCLP[c] Extraction	EPA 1311	32	4	2	6	44

[a] Equipment blanks will be collected from nondisposable sampling equipment at a rate of one sample per day.
[u] Metals will include laboratory target analyte list metals.
[c] Toxicity characteristic leaching procedure (TCLP) analysis will be performed on samples when the analyte concentration exceeds 20 times the applicable Resource Conservation and Recovery Act standard for a specific
ASTM = ASTM International
EPA = US Environmental Protection Agency
MS/MSD = matrix spike/matrix spike duplicate
NA = not applicable
VOC = volatile organic compound
PFAS = per and polyfluoroalkyl substances
SVOC = semi-volatile organic compound
EPH = Extractable Petroleum Hydrocarbons
VPH = Volatile Petroleum Hydrocarbons
TCLP = Toxicity Characteristic Leaching Procedure
SPLP Extraction = Synthetic Precipitation Leaching Procedure

Figures

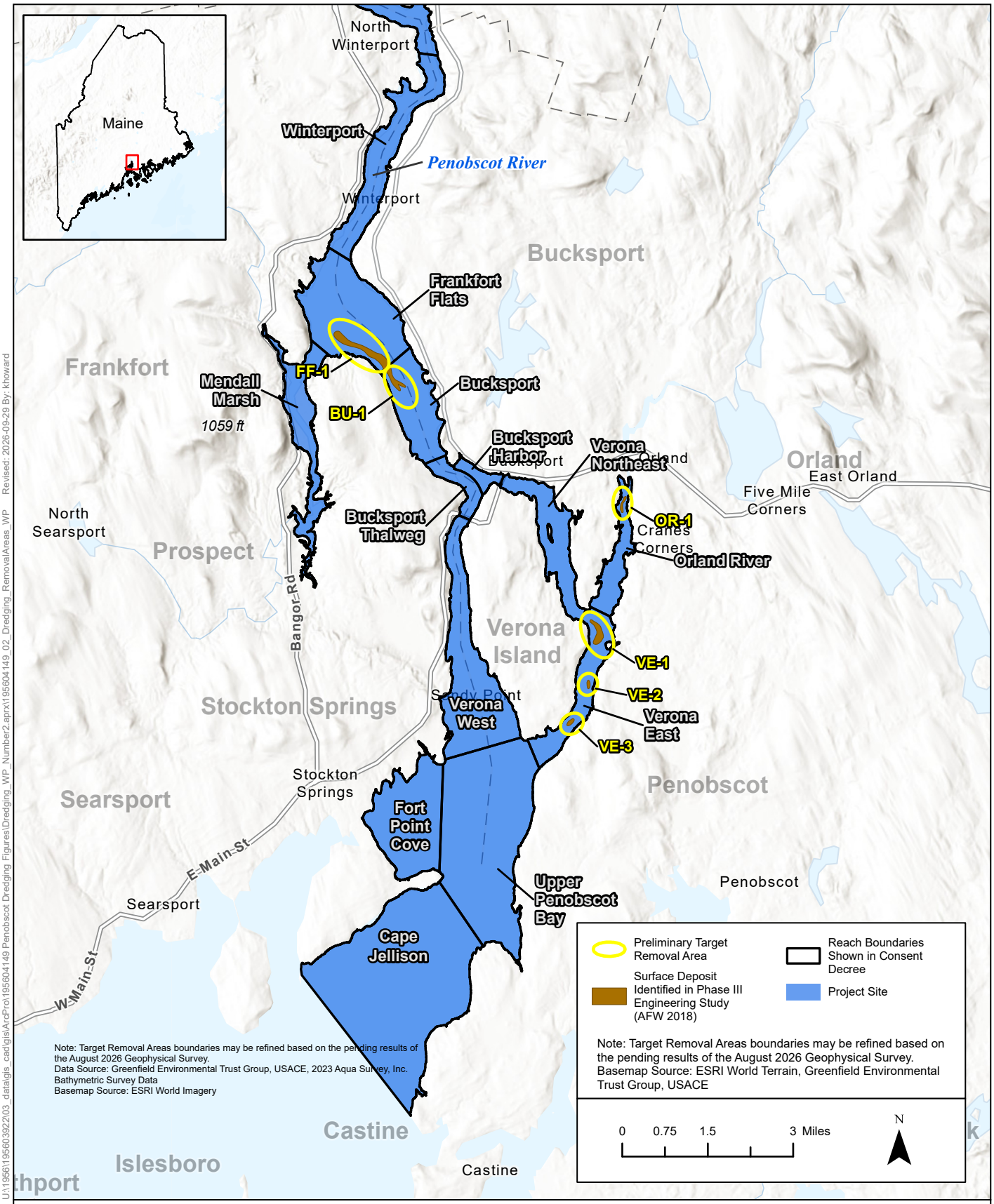


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Prepared for: Greenfield Penobscot Estuary Remediation Trust LLC
Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 1
Penobscot River Estuary Site Map
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

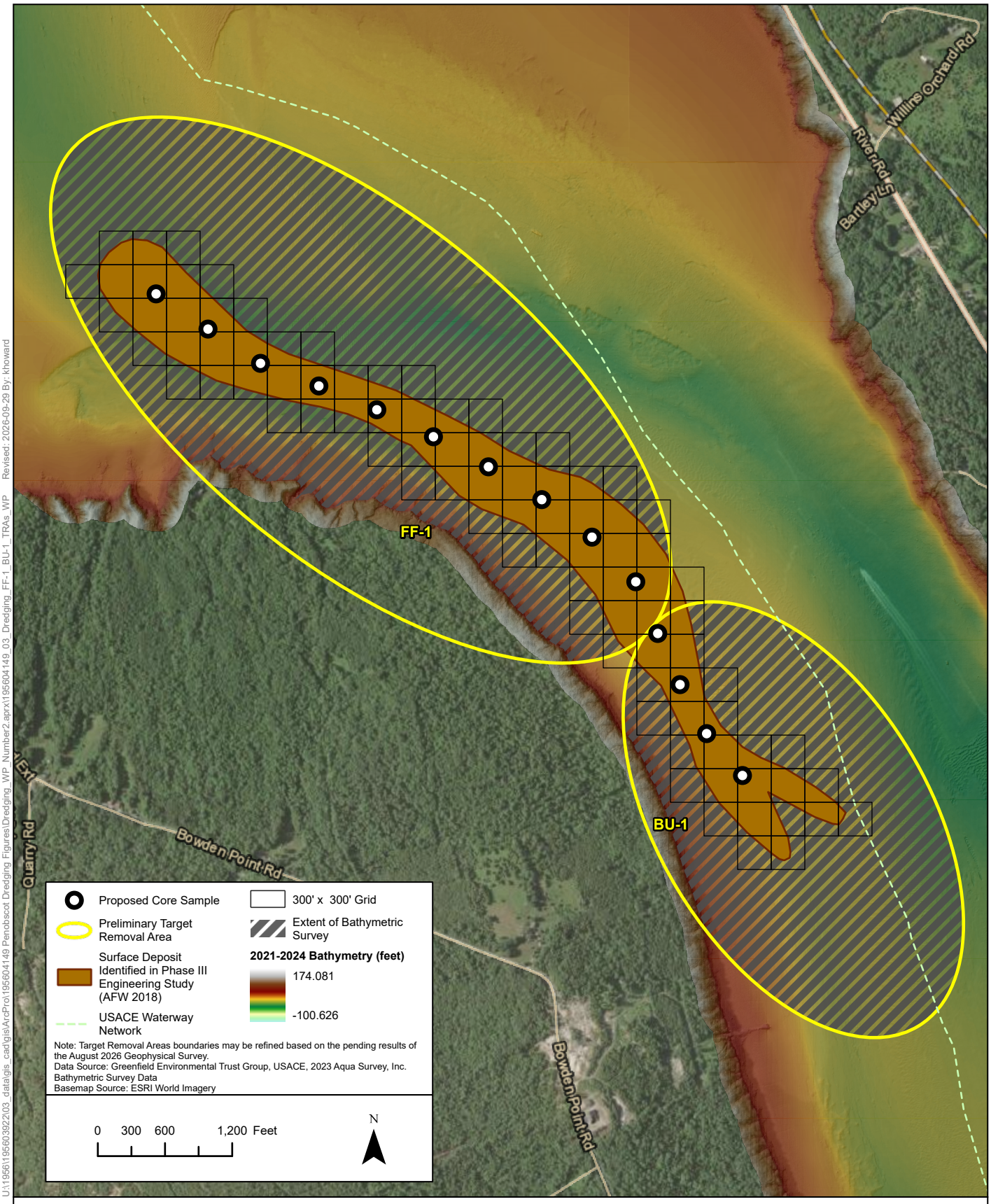


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Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 2
Preliminary Target Removal Areas
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

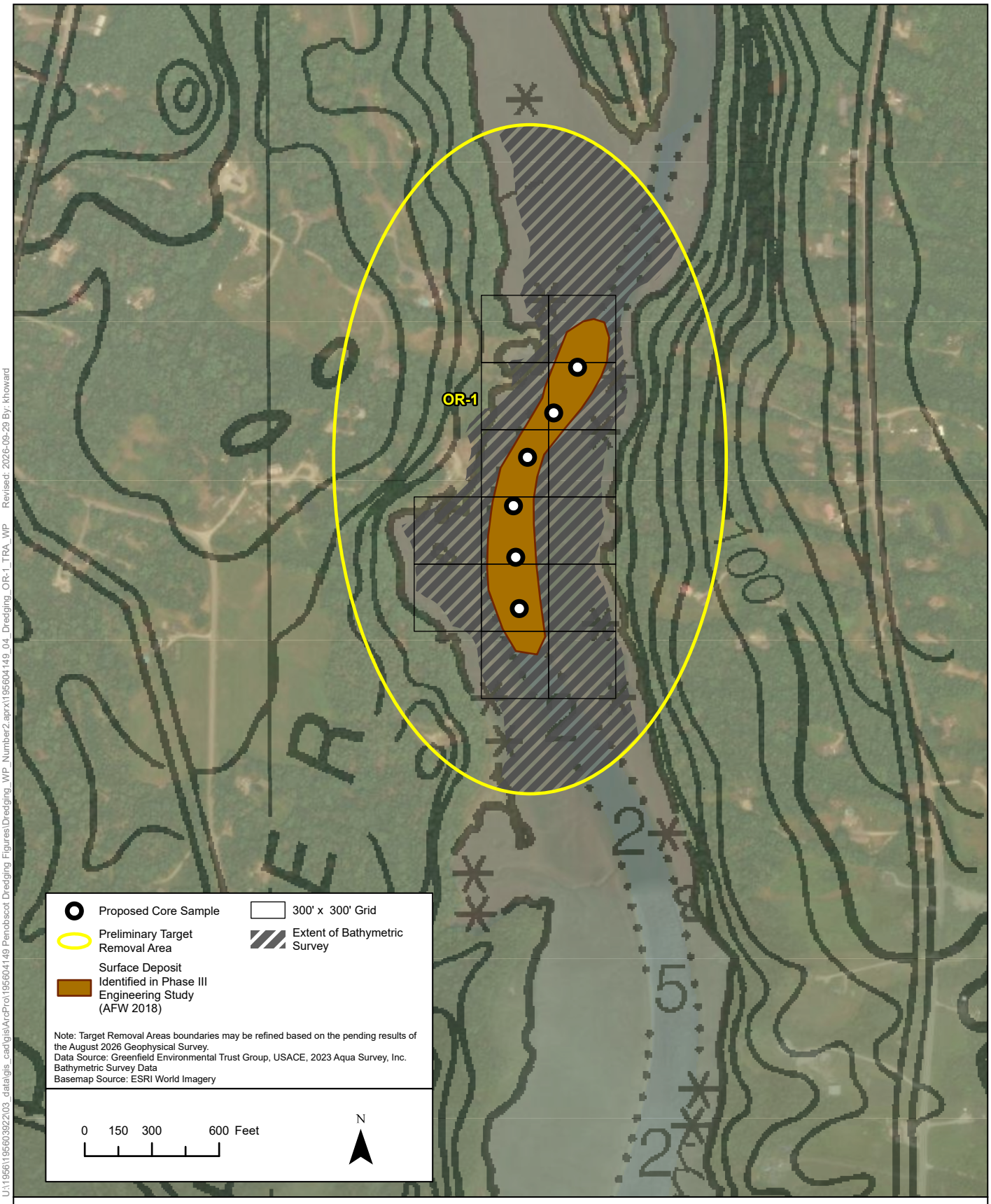


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Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 3
FF-1 and BU-1 Target Removal Areas
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

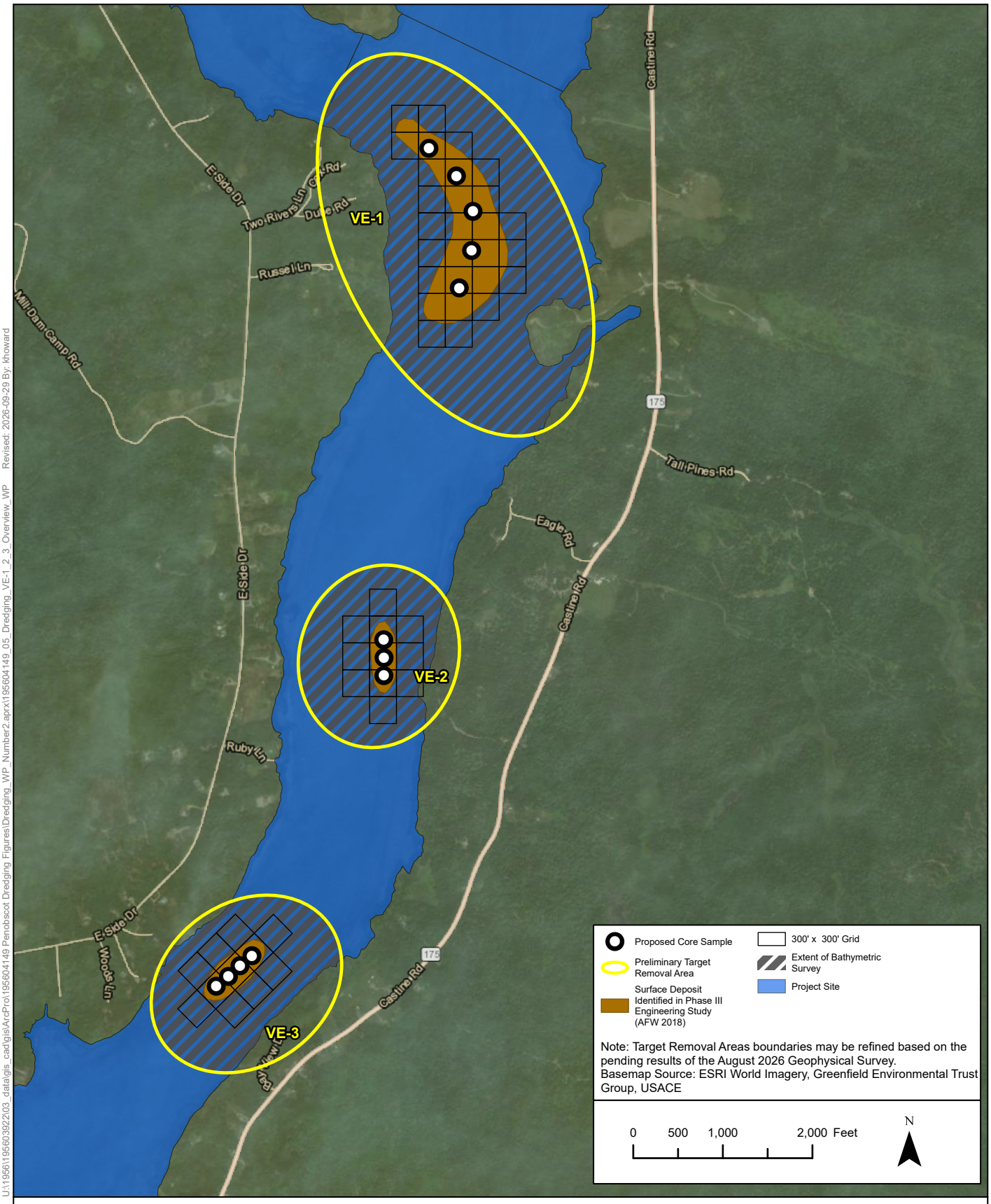


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Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 4
OR-1 Target Removal Area
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

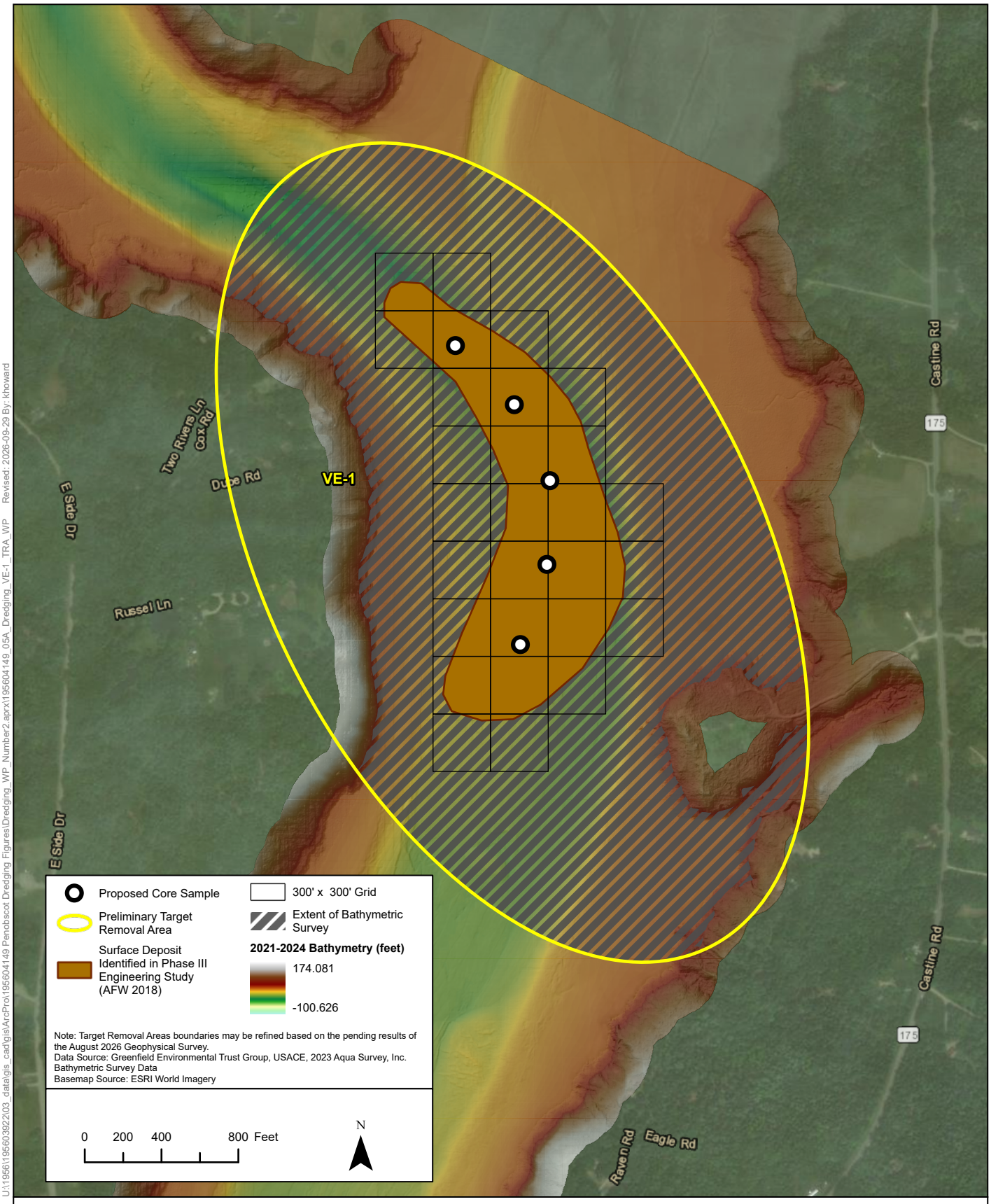


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Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 5
Overview of VE Target Removal Areas
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

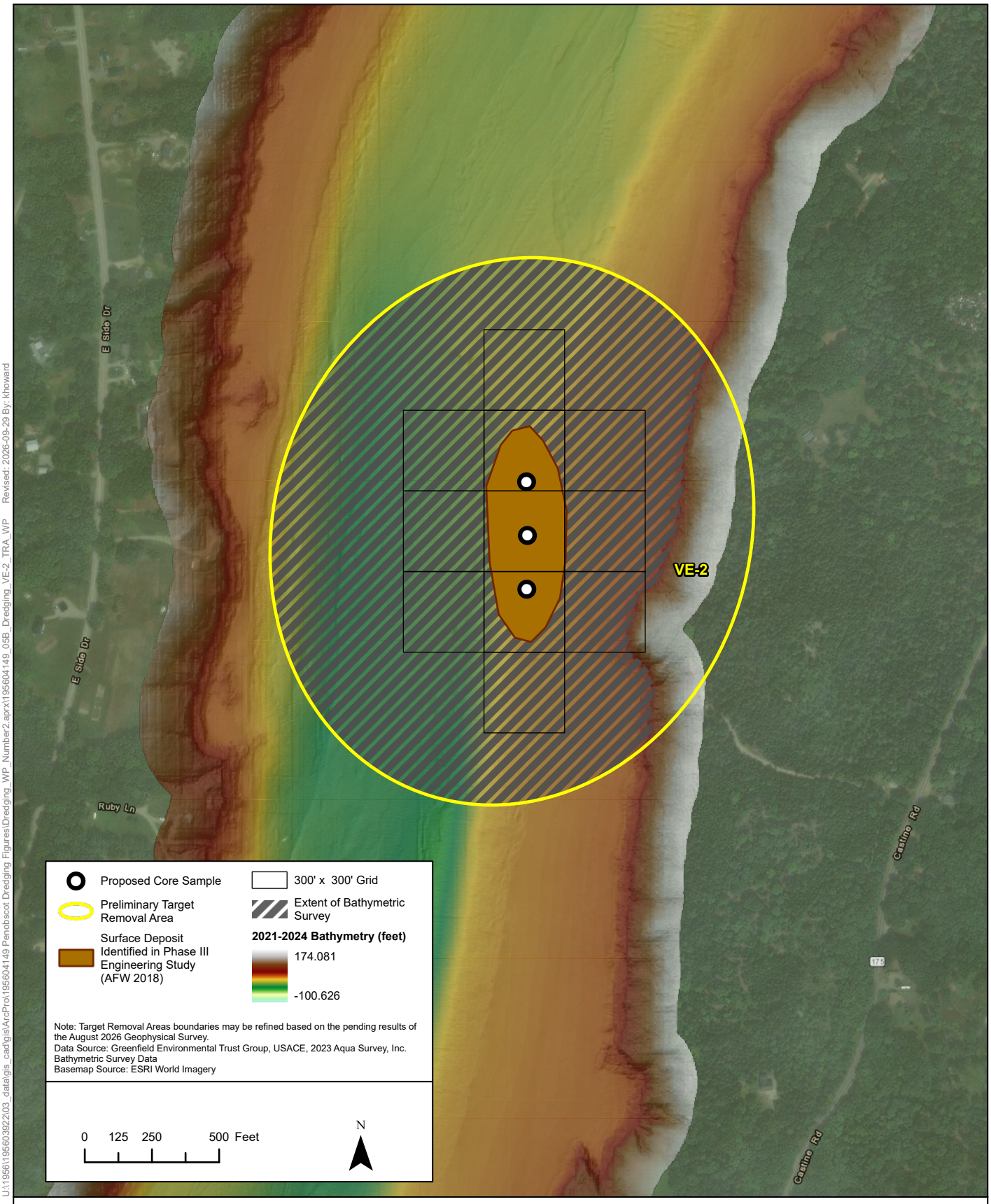


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Trustee of the Penobscot Estuary Mercury Remediation Trust

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Figure 5A
VE-1 Target Removal Area
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

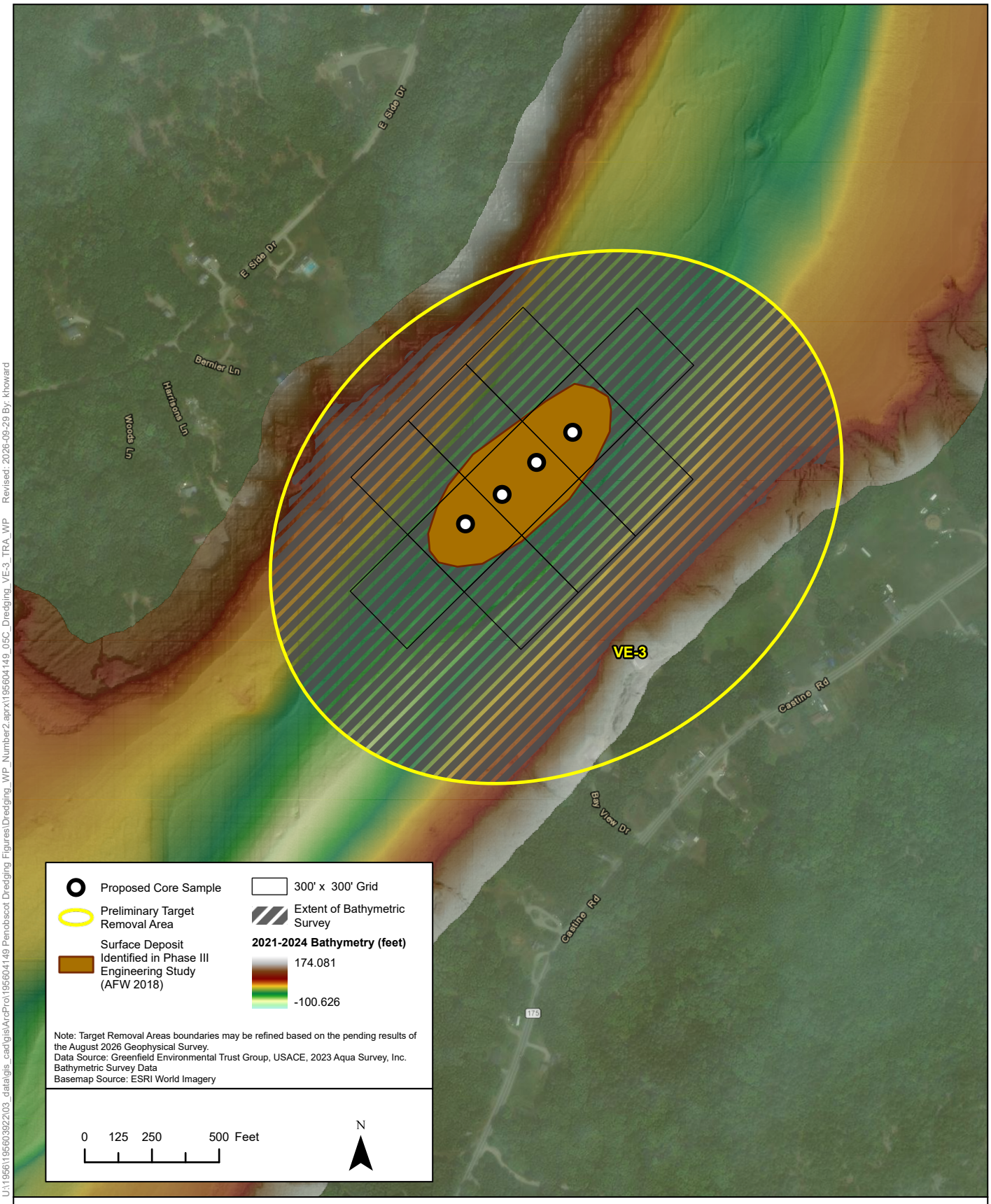


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Prepared for: Greenfield Penobscot Estuary Remediation Trust LLC
Trustee of the Penobscot Estuary Mercury Remediation Trust

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Figure 5B
VE-2 Target Removal Area
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026



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Prepared for: Greenfield Penobscot Estuary Remediation Trust LLC
Trustee of the Penobscot Estuary Mercury Remediation Trust

Prepared by: Stantec

Figure 5C
VE-3 Target Removal Area
Target Removal Area Characterization Work Plan
Penobscot River Estuary, Maine
September 2026

Appendix A
Quality Assurance Project Plan Addendum
(Laboratory SOPs included in a separate ZIP file)