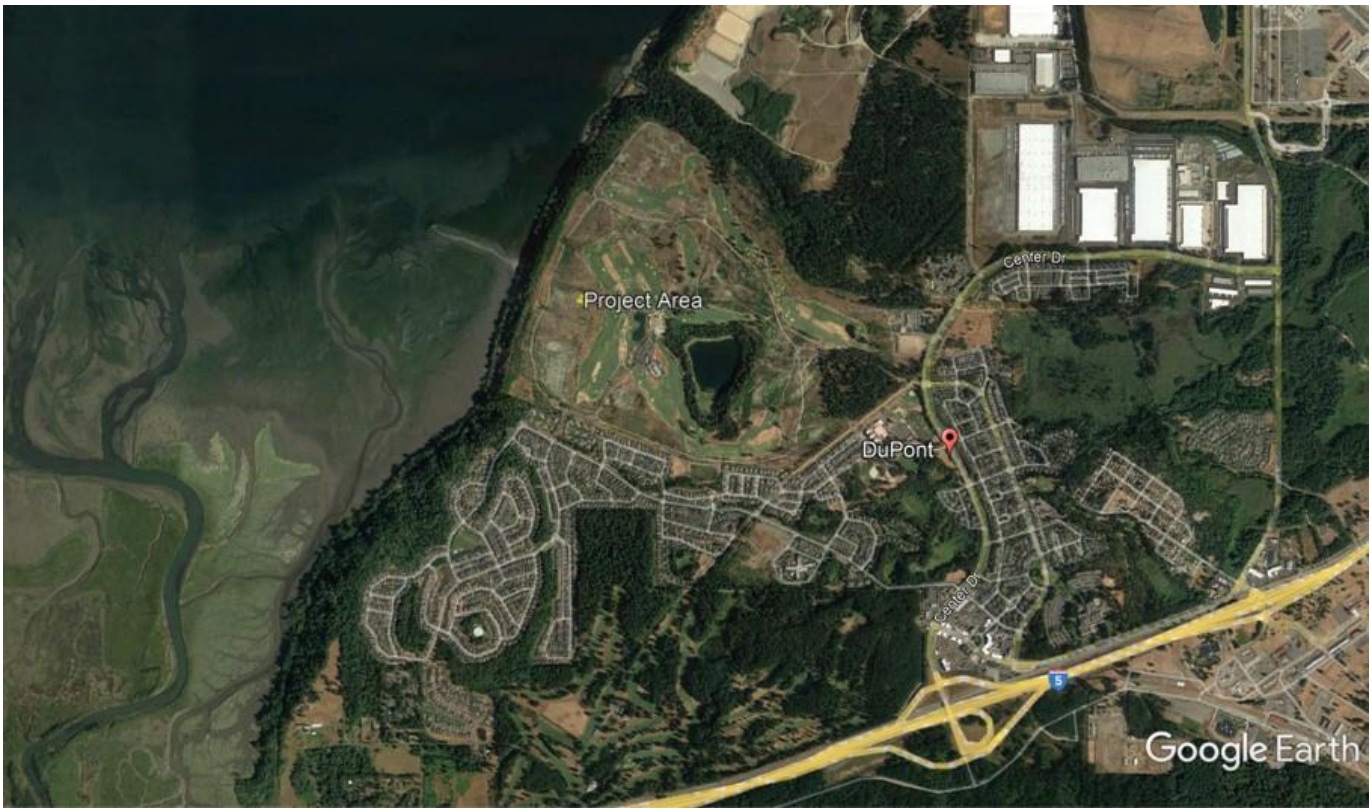
TREATABILITY STUDY WORK PLAN



REMEDIAL ACTION AREA OF THE FORMER DUPONT WORKS SITE, DUPONT, WASHINGTON

For

ALBATROSS ESTATES, LLC

By

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1 INTRODUCTION

Pacific Environmental and Redevelopment Corporation (PERC) and Pioneer Technologies Corporation (PIONEER), on behalf of Albatross Estates LLC. (Albatross), submits to the Washington State Department of Ecology (Ecology) this Draft Treatability Study Work Plan (Work Plan) for the Remedial Action Area (RAA) of the former DuPont Works Site (Site) located in DuPont, Washington. The location of the RAA within the Site is shown on the Site Vicinity Map (Figure 1) and the areas of the RAA where the work described below will be done are shown in the Site Plan (Figure 2). This Work Plan was prepared in accordance with requirements of the Agreed Order DE 21135 between Albatross and Ecology.

2 PURPOSE OF THE PROPOSED TREATABILITY STUDY

The purpose of the Treatability Study (TS) is to determine the effectiveness of two remediation methods being considered in the Feasibility Study (FS). These remedial methods are believed, at the pre-assessment phase, to be likely candidates for the remediation of the Site. Their effectiveness requires assessment to include them in the evaluation of cleanup alternatives in the FS.

3 DISCUSSION OF MODEL REMEDIES

Ecology has developed Model Remedies for the Tacoma Smelter Plume Project. As the majority of the remaining soils containing arsenic above unrestricted cleanup levels within the RAA are a result of the Tacoma Smelter Plume, it is appropriate to evaluate these Model Remedies during the evaluation of cleanup alternatives for the RAA in the FS.

The following table lists these Model Remedies:

TABLE 1: Model Remedies for the Tacoma Smelter Plume

REMEDY	ACTION	CONSIDERATIONS
Excavate & Remove Soil	Excavate contaminated soils and properly dispose of them.	The top 6" of soil must have <20 ppm average arsenic after excavation. Take samples at depth to remove all contamination. Performance monitoring required
Soil Mixing	Mix the top 6 or 12" of contaminated soils with imported or deeper, clean soil.	Not for soils >40 ppm average arsenic. Performance monitoring required
Non-Permanent Cap in Place	Cover contaminated soils with a geotextile barrier and soil cap, or a hard cap.	Hard caps include asphalt or concrete. Thicker cap is required when sampling results are high. Performance monitoring required. Institutional controls required.
Consolidate and Cap	Excavate and consolidate contaminated soils into an area of the property and place under a cap	Thicker cap is required when sampling results are high. Not for average arsenic >200 ppm or lead >1000 ppm. Performance monitoring required. Confirmational monitoring required. Institutional controls required.

Additional discussion is provided below for the Soil Mixing and Consolidate and Cap Model Remedies. The Excavate and Remove Soil and Non-Permanent Cap in Place Model Remedies are not being assessed in this TS.

4 TREATABILITY STUDY DESIGN

4.1 PLANNED IMPLEMENTATION

Possible remedial methods to be evaluated in the FS include two Ecology Model Remedies. This TS is designed to develop the information needed to evaluate the effectiveness of Soil Mixing Model Remedy and the practicability of the Consolidate and Cap Model Remedy.

4.2 SELECT CONSOLIDATION AND CAPPING

The objective of this study is not to determine the effectiveness of the process, as it has been proven during past work, but to determine production rates that can be expected during RAA remediation. These production rates will be used during the development of costs for the ranking of alternatives in the FS.

The process used will involve the excavation of soils to depths where soil concentrations greater than the screening level (SL) for arsenic and the site specific ecological cleanup level for lead of 20 mg/kg and 118 mg/kg, respectively and occur at a depth of greater than one-foot below ground surface (bgs). Only four samples with arsenic SL exceedances are located at depths greater than one-foot bgs, with the deepest exceedance between three and six feet bgs. No lead SL exceedances are at depths greater than one-foot bgs. A description of the equipment and process to be used to determine the effectiveness of this method is described in section 5.1.

4.3 SOIL MIXING

Soil mixing has been used on multiple projects throughout the state including the Tacoma Smelter Plume project. According to Ecology's guidance, mixing is only suggested as a model remedy when arsenic contamination is limited to surficial soils (less than 12 inches bgs). Ecology also suggests that the remedy is effective when the average soil arsenic does not exceed 40 mg/kg or 500 mg/kg for lead. This TS will test those limits.

For this TS, soil mixing will involve the blending of the top 12 inches of soil with the goal that the resulting blended soil will contain concentrations of arsenic and lead below the SLs of 20 mg/kg and 118 mg/kg, respectively. A description of the equipment and process to be used to determine the effectiveness of this method is described in section 5.2.

Based on the confirmation and RI data collected, a total of 262 of the 271 samples with arsenic detections greater than SLs are located in the uppermost six inches of soil. Five additional samples with arsenic exceedances are located between six and 12 inches bgs. These 267 locations are candidates for soil mixing. Only four arsenic SL exceedance locations occur at depths greater than 12 inches bgs and therefore are not candidates for this remedial method.

Each of seven lead SL exceedance locations, all of which are located in the uppermost six inches of soil, are collocated with arsenic SL exceedance locations. There are no lead SL exceedances occurring with lead concentrations greater than 500 mg/kg or at depths greater than one feet bgs within the RAA.

This permanent remedy involves mixing with either clean imported soils, or clean soils underneath the contaminated surface soils to reduce soil arsenic and lead concentrations to below cleanup levels. Soil can be

mixed in place, or piled in rows, mixed, and re-spread. Ecology recognizes that there are three main methods for mixing, this treatability study will focus on the first method:

1. **Mixing with deeper soils** - Soils may be mixed or tilled in place with deeper, cleaner soils. This method may require several passes of the mixing equipment and is more effective when there are few roots, rocks, or other objects in the soil.
2. Mixing with imported soils - Soils may be mixed or tilled in place with imported, clean soils. Imported soil sampling should be used to ensure that imported soils are not contaminated.
3. Stockpile mixing - Contaminated surface soils may be excavated, stockpiled, and mixed with clean imported or native soils. The mixed soils can then be spread out and reused on the property when they meet cleanup levels. Imported soil sampling should be used to ensure that imported soils are not contaminated.

According to Ecology's guidance, mixing also requires performance monitoring (i.e. soil sampling) and that sampling be repeated throughout the mixing process, until cleanup levels are met. Compliance sampling of soils mixed in place must be done throughout the total mixed depth. As an alternative to the consolidation and capping remedy, soil mixing will be evaluated for both the effectiveness in reaching remediation goals and the production rates that can be expected during RAA remediation. These production rates will be used during the development of costs for the ranking of alternatives in the FS.

5 Treatment Technology Descriptions

The following sections describe the technologies that will be tested in the treatability study.

5.1 Select Consolidation and Capping

This remedial option will involve the excavation and transportation of soils to a location within the RAA which may be used as a cap/containment area (shown on Figure 2).

This test will occur at location MSU-24-N located on the western section of the Site (Figure 2), and involve the excavation of a 75-foot by 75-foot section of the soil to a total depth of 6 feet (in one-foot increments). Soils in this area contain the arsenic concentrations listed on Table 2 below:

TABLE 2: Study Area Data – Selected Excavation, Consolidation and Capping

Sample Location	Constituent	Result (in mg/kg)	Corrected Sample Initial Depth (in feet bgs)	Corrected Sample Final Depth (in feet bgs)	Historical Remediation Unit
MSU-24-N	Arsenic	30	3.0	6.0	CM02B

5.1.1 Process

The following method will be used to determine the production rates expected during remediation if this alternative is recommended.

- Location of sampling area: Prior to implementing this portion of the TS, licensed surveyors with ESM will determine and stake the horizontal location of the sample location noted above using a Trimble GeoXH global positioning system unit (or similar unit). The horizontal accuracy will be approximately

one foot. Once the sample location is staked, a work area of approximately 75 by 75 feet, centered around the sample location, will be established using flagging and wooden stakes.

- Ground Preparation: The work area and approximately 50 feet in each direction will be cleared and grubbed of existing vegetation. This will involve reaching and pulling out the vegetation using an excavator with thumb attachment. This method will cause the least disturbance of the existing soils as practical.
- The soils within the sampling location will be excavated in one-foot increments and direct loaded into an off-road truck and hauled to the staging location shown on Figure 2. The soil will be stockpiled in this location until the future remediation of the RAA. The time of excavation for each depth increment and the time of transport will be recorded. This process will determine the production rates for each one-foot increment of excavation.
- A five-point composite soil sample will be taken at the base of the excavation using the process described in Section 6 below.
- This test will require 1 day to complete.

5.2 Soil Mixing

As an alternative to the consolidation and capping remedy, soil mixing will be evaluated for effectiveness.

A test area will be completed during the TS to determine the effectiveness of soil mixing with soil containing concentrations between 43 mg/kg and 55 mg/kg. This is the upper range that represents the majority of the soils requiring remediation using this method.[1] This test will occur at and between locations 01-SS-[T-066,067]-C1_04/21/03_0 and 1-R31C26_03/10/04_1, which are located on the western section of the RAA (Figure 2). The study area represented by sample locations 01-SS-[T-066,067]-C1_04/21/03_0 and 1-R31C26_03/10/04_1 is concurrent, includes sample locations 01-SS-[T068]-C1_04/21/03_0 and 01-SS-[T069]-C1_04/21/03_0, and is 75 feet wide and 300 feet long. Soils in this area contain the arsenic concentrations listed on Table 3 below:

TABLE 3: Study Area One Data – Soil Mixing

Sample Location	Constituent	Result (in mg/kg)	Corrected Sample Initial Depth (in feet bgs)	Corrected Sample Final Depth (in feet bgs)	Historical Remediation Unit
01-SS-[T-066,067]-C1_04/21/03_0	Arsenic	43	0.0	0.50	CM1B
01-SS-[T068]-C1_04/21/03_0	Arsenic	55	0.0	0.50	CM1B
01-SS-[T069]-C1_04/21/03_0	Arsenic	46	0.0	0.50	CM1B
1-R31C26_03/10/04_1	Arsenic	50	0.0	0.50	CM1B

[1] Although concentrations as high as 110 mg/kg are present in the RAA, they are mostly focused in remediation unit CM-08, which was historically remediated using statistical compliance. Due to the potential presence of human and cultural remains in this area and extensive trees/root systems, soil mixing is not likely to be implemented in this portion of the RAA.

5.2.1 Process

The following method will be used to mix the soil and collect the soil samples needed to assess the effectiveness of the mixing alternative.

- Location of sampling area: Prior to implementing this portion of the TS, licensed surveyors with ESM will determine and stake the horizontal location of each historical sample location noted above using a Trimble GeoXH global positioning system unit (or similar unit). The horizontal accuracy will be approximately one foot. Once the sample locations are staked, the work area, centered around the sample locations, will be established using flagging and wooden stakes.
- Ground Preparation: The work area and approximately 50 feet in each direction will be cleared and grubbed of existing vegetation. Roots, rocks, or other objects in the soil will be removed to the degree practicable. Soil disturbances will be minimized during this process to ensure the competency of the existing samples to the highest degree practicable. This will involve reaching and pulling out the vegetation using an excavator with a thumb attachment. This method will cause the least disturbance of the existing soils as practical.
- A Terex Model RS600C Road Reclaimer (https://www.environmental-expert.com/products/model-rs600c-reclaimers-stabilizers-173304) will be used to mix the top 12 inches of soil within the test area.
- Confirmation samples will be collected following the mixing process. This collection process is described in the following section.
- This test will require 1 to 2 days to complete.

6 Treatability Study Sample Collection

Soil samples will be collected as follows:

6.1 Selective excavation of hot spots (Consolidate and Cap Test Area)

As the objective of the method is to determine production rates only, soil samples are not required for this portion of the TS. However, one five-point composite soil sample will be taken to replace the existing base sample in the area to eliminate a data gap in the Project database. The sample will be collected using the methodology described in the *Remedial Investigation Work Plan* (PIONEER, 2023). The proposed confirmation sample location is shown on Figure 3. The sample will be submitted to the project laboratory, Libby Environmental of Olympia.

6.2 Soil Mixing

Confirmation soil samples will be collected following the mixing of soils from the test area (see Figure 3). One five-point composite sample will be taken from the 0 to 1-foot bgs sample interval for each 75-foot x 75-foot area (consistent with previous arsenic sampling intervals for this area). The samples will be collected using the methodology described in the *Remedial Investigation Work Plan* (PIONEER, 2023). The samples will be initially analyzed for arsenic via XRF (using an Ecology approved methodology) so that the analysis can be received in a timely basis. The XRF results will be confirmed by submitting one sample from the test area to the project laboratory, Libby Environmental of Olympia.

6.3 Sampling Equipment Decontamination Procedures

Non-dedicated sampling equipment (e.g., excavator bucket, trowels, and stainless-steel bowls) will be decontaminated in accordance with the following procedures:

- All non-dedicated equipment will be cleaned before use.
- The excavator bucket will be dry-brushed with a stiff-bristled broom to remove caked and loose soil after the collection of each soil sample.
- Following use at each sampling location, the affected portions of non-dedicated sampling equipment (e.g., stainless-steel bowls and trowels) will be sprayed with water containing diluted detergent (e.g., Liquinox) and dried with paper towels.
- All water generated during decontamination will be absorbed via paper towels.

6.4 Field Recordkeeping

PIONEER will complete the following forms to document each sampling event:

- **Field Checklist**: used to assist with planning and coordination prior to a field event, and to document completion of field activities.
- **Daily Field Report**: used to document miscellaneous field activities on a daily basis (e.g., miscellaneous field notes, miscellaneous sampling notes, etc.).
- **Subsurface Sampling Field Log**: used to record drilling, lithologic (e.g., color, grain size, moisture, detail), and associated sampling details.

In addition, representative photographs should be taken as necessary to support documentation of the field investigation procedures and each confirmation sample location will be GPS surveyed using a handheld GPS unit with post-processing accuracy of approximately one foot.

6.5 Laboratory Analyses and Sample Containers

Samples will be analyzed via an XRF at the On-site laboratory at the Superlon Plastics Site. Analysis will be done for arsenic only since none of the TS areas have lead concentrations greater than the SL prior to soil mixing or cap and consolidation. The XRF results will be confirmed by submitting one sample from each test area to the project laboratory, Libby Environmental of Olympia, Washington. The samples will be analyzed for arsenic via EPA Method 6010.

Laboratory analyses will be performed for soil samples collected pursuant to this Work Plan. The analytical methods, sample container expectations, preservation requirements, and holding times relevant to the constituents being analyzed are consistent with those presented in the *Remedial Investigation Work Plan* (PIONEER 2023).

Requirements associated with filling soil sample containers include:

- Sample containers will be provided by the laboratories.
- Unless otherwise noted below, sample containers will be filled until almost full in order to provide the laboratory with sufficient sample volume.
- Particles larger than approximately 1/4-inch should not be included in soil sample containers.

6.6 Sample Management

6.6.1 Sample Labeling

Sample labels will clearly indicate the Site location, sample number identification, date, time, sampler's initials, parameters to be analyzed, and added preservative (if any). Each sample will be individually labeled. Each sample number identification will be unique and will adhere to the PIONEER sample number schema.

6.6.2 Chain-of-Custody Documentation

Chain-of-custody procedures will be followed to maintain and document sample possession. A sample is considered under a person's custody if it is in that person's physical possession, within visual sight of that person after taking physical possession, secured by that person so that the sample cannot be tampered with, or secured by that person in an area that is restricted to unauthorized personnel.

The originator (the sampler) will complete requested information on the custody record, including signature and date. Original signed custody records listing the samples in the cooler will accompany sample shipments. The originator of the custody record will retain a copy of the custody record.

6.6.3 Sample Shipment

Sample packaging and shipping procedures are based on USEPA specifications and United States Department of Transportation regulations as specified in 49 Code of Federal Regulations (CFR) 173.6 and 49 CFR 173.24. Samples will be delivered on ice to Libby Environmental by the field team. Libby will ensure any subcontracted analysis samples will be packed in coolers with bubble wrap, bags, and ice in a manner to achieve preservation requirements while also preventing breakage of sample containers and leakage of melting ice during transport to the subcontracted lab.

7 Inadvertent Discovery Plan

An Inadvertent Discovery Plan detailing plans and procedures for the discovery of cultural resources and human skeletal remains was developed for the *Remedial Investigation Work Plan* (PIONEER, 2023). This plan will be followed during this work. Prior to the start of the field investigation, the Nisqually Tribe will be consulted to develop clear line of communication related to any inadvertent discoveries.

8 Health and Safety

The Health and Safety Plan (HASP) satisfies health and safety requirements in accordance with standards of the Occupational Safety and Health Administration (OSHA) Section 190.120. Each contractor completing work within the RAA will be responsible for development of a Site-specific HASP to protect the safety of their employees following procedures consistent with the RAA safety requirements. The HASP for the TS will be developed and submitted to Ecology prior to the start of work and is not included herein. At the beginning of each day of fieldwork, a brief joint safety meeting will be held. During this meeting, the field team will describe the activities to be implemented that day, identify the safety hazards, remind employees of important safety procedures, and comment on safety issues identified the previous day.

9 REPORTING

Upon completion of the TS tasks, the data will be compiled and analyzed. A Treatability Study Evaluation Report will be prepared describing the tests conducted, results obtained, conclusions, and recommendations. The results will be used in the FS during the evaluation of alternatives.

10 SCHEDULE

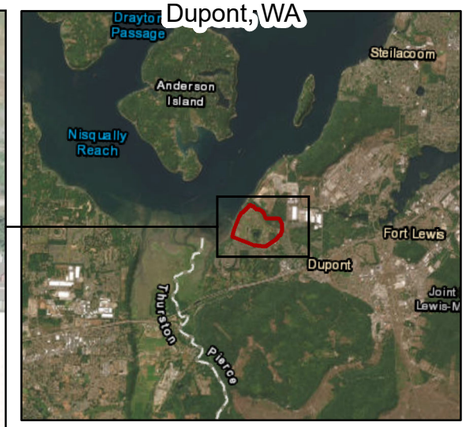
The anticipated schedule for the completion of the TS is listed below:

Task Name	Duration	Start	Finish
DuPont Works Treatability Study	**60 days**	**2/5/2024**	**5/1/2024**
Submittal of work plan to Ecology	1 day	2/5/2024	2/5/2024
Discussions with Ecology and authorization to proceed	15 days	2/6/2024	2/26/2024
Finalizing contracts with Equipment Suppliers	3 days	2/27/2024	2/29/2024
Surveying and staking of test areas	1 day	3/11/2024	3/11/2024
Mobilization of clearing and grubbing equipment	1 day	3/11/2024	3/11/2024
Clearing and grubbing of work areas	4 days	3/11/2024	3/14/2024
Mobilization of test equipment	1 day	3/18/2024	3/18/2024
Treatability study	3 days	3/18/2024	3/20/2024
DeMobilization of Equipment	1 day	3/21/2024	3/21/2024
Laboratory analysis & Data evaluation	15 days	3/21/2024	4/10/2024
Reporting	15 days	4/11/2024	5/1/2024

11 REFERENCES

PIONEER. 2023. Remedial Investigation Work Plan, June 2023

Figures



Legend

- Sequalitchew Creek
- Burlington Northern Railroad
- RAA (Albatross-owned Property)
- Property Owned by Others
- Historical Dupont Village
- Former DuPont Works Consent Decree Boundary
- Old Fort Lake

0 400 800 1,200 1,600 2,000 Feet

PIONEER TECHNOLOGIES CORPORATION

Site Vicinity Map
Treatability Study Work Plan
Albatross Remedial Action Area
DuPont, Washington

Figure 1

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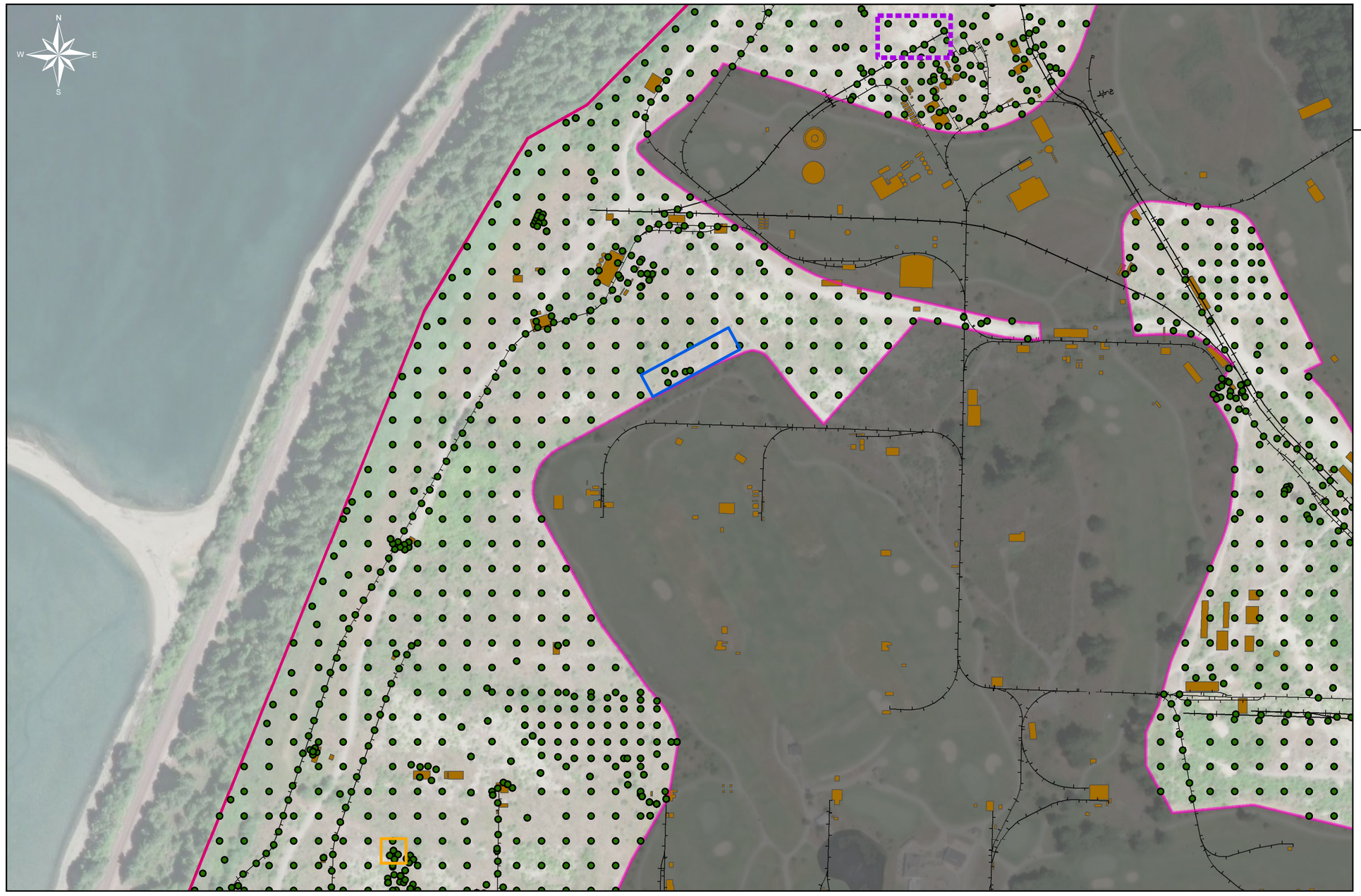

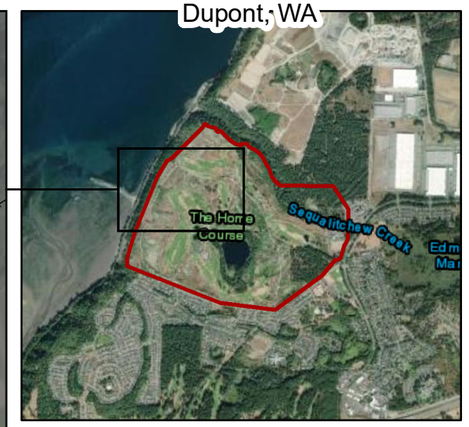

Legend

- Soil Sample

Other Site Features

- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Old Fort Lake
- RAA (Albatross-owned Property)
- Property Owned by Others
- Former DuPont Works Consent Decree Boundary
- Historical Buildings

Treatability Study Areas

- Consolidation and Cap Test Area
- Soil Mixing Test Area
- Staging Area

Notes:
-All soil samples collected within the RAA to date are shown. Soil was collected from multiple depth intervals at many locations.

0 400 800 Feet

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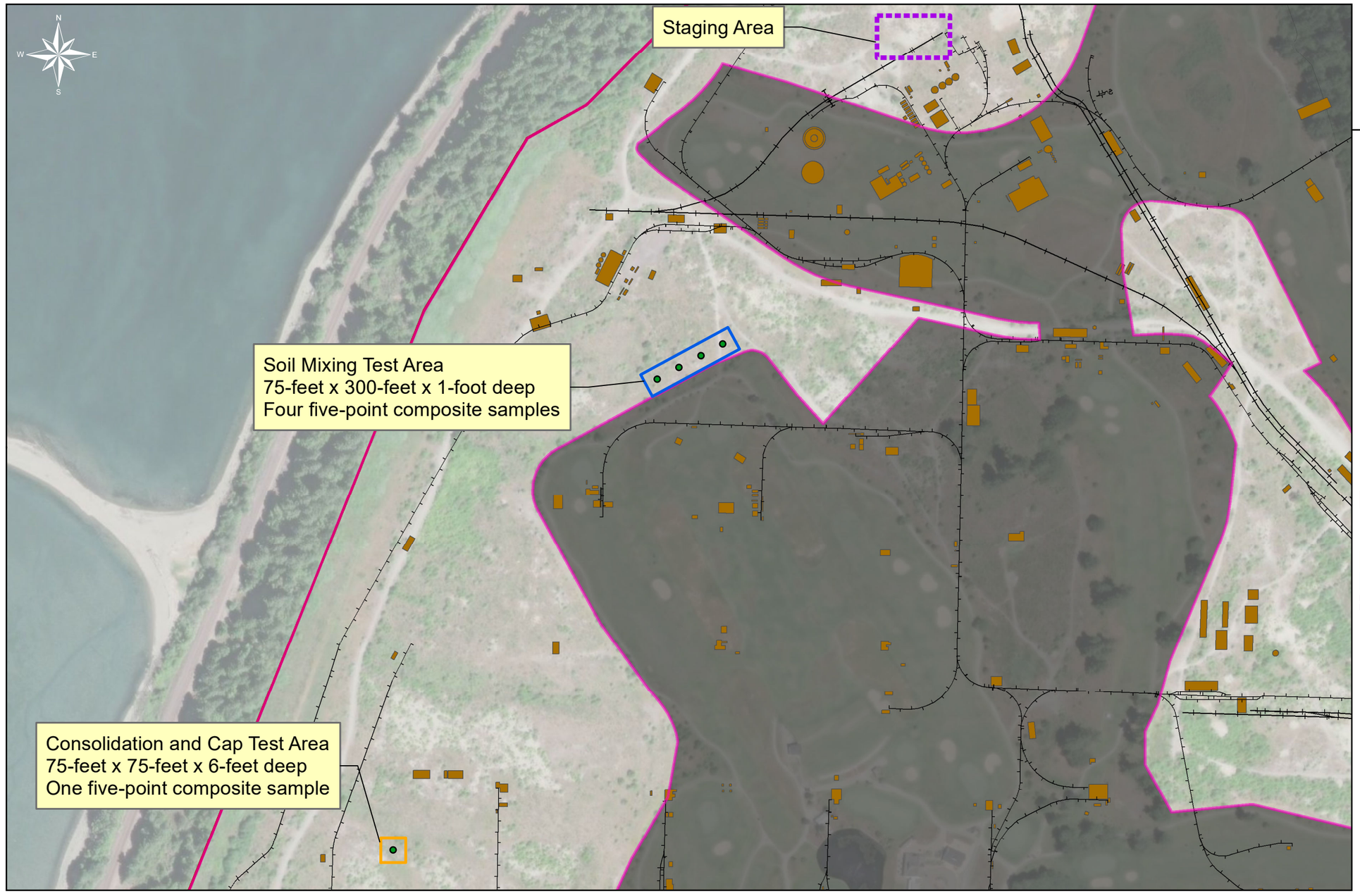
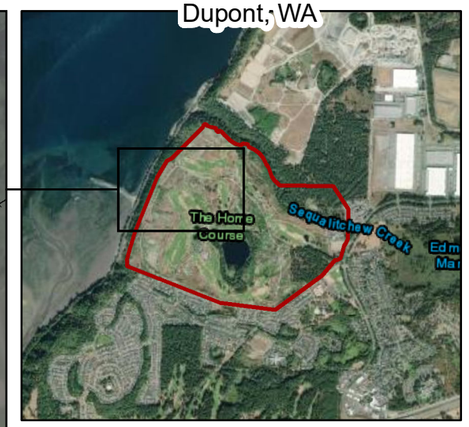
Site Plan
Treatability Study Work Plan
Albatross Remedial Action Area
DuPont, Washington

Figure 2





Legend

- Proposed Confirmation Soil Sample

Other Site Features

- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Old Fort Lake
- RAA (Albatross-owned Property)
- Property Owned by Others
- Former DuPont Works Consent Decree Boundary
- Historical Buildings

Treatability Study Areas

- Consolidation and Cap Test Area
- Soil Mixing Test Area
- Staging Area

Notes:
- Proposed five-point confirmation samples in the Consolidation and Cap Area and Soil Mixing Test Area are 75 feet on center.

0 400 800 Feet

PIONEER TECHNOLOGIES CORPORATION

Proposed Confirmation Sampling Locations
Treatability Study Work Plan
Albatross Remedial Action Area
DuPont, Washington

Figure 3