Sampling and Analysis Plan

Carpenter Road Property
Tacoma Smelter Plume Sampling
Lacey, Washington

for
City of Olympia Public Works

October 27, 2022

GeoEngineers

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Project No. 0415-068-07

October 27, 2022

Prepared for:

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared in accordance with the Tacoma Smelter Plume Model Remedies Guidance (TSPMRG) to support redevelopment of the City of Olympia's (City) Carpenter Road Property (property) located at 6530 Martin Way East in Lacey, Washington. The property totaling approximately 8.45 acres is shown on the Vicinity Map, Figure 1.

The property is located within Washington State Department of Ecology's (Ecology's) mapped Tacoma Smelter Plume (TSP) (area-wide contamination) where arsenic concentrations in surface/near surface soil are predicted to exceed the Model Toxics Control Act (MTCA) Method A cleanup level for unrestricted land use (ULU). The subject property falls within the area where surface soil concentrations of arsenic are expected to be in the range of 20 to 40 milligrams per kilogram (mg/kg). The MTCA Method A cleanup level for arsenic and lead for ULU are 20 mg/kg and 250 mg/kg, respectively. The Ecology TSPMRG document (July 2019) requires remedial action for soil if the average arsenic concentration is greater than 20 mg/kg and the maximum concentration is greater than 40 mg/kg or if the average lead concentration is greater than 250 mg/kg and the maximum concentration is greater than 500 mg/kg. Ecology's TSP Model Remedy Guidance also provides guidance on the number of samples to be collected for various acreage.

The property is undergoing redevelopment by the City including demolition and remediation of the former indoor gun range and clearing, grading, and construction of a new solid waste operations facility that includes offices, maintenance shops, and parking areas. The cleanup of the gun range is being performed under the Expedited Voluntary Cleanup Program (VCP) to address lead contaminated soil associated with the activities of the gun range. The planned gun range remediation area totals approximately 20,800 square feet, leaving approximately 8 acres of the property to be included in the TSP evaluation. The existing property conditions are shown on the Soil Sampling Plan, Figure 2.

The known chemical of concern at the site is lead associated with the indoor gun range and the potential chemicals of concern are arsenic and lead related to air fallout from Asarco's smelter operations. Soil investigation was performed to evaluate soil conditions at the site related to gun range operations in April 2017. The details of the soil sampling and the analytical results are provided in the Environmental Investigation Report prepared by GeoEngineers Inc. dated November 6, 2017.

Lead was detected at concentrations greater than 500 mg/kg at six locations on the property with four of them located within the gun range building itself and two located just outside the building near where the ventilation system exhaust exits the building. The areas with elevated lead concentrations are located within the gun range remediation area and will be addressed through the VCP.

Arsenic was not detected at concentrations greater than the MTCA Method A cleanup level for ULU of 20 mg/kg in the samples that were collected as part of the investigation. The highest concentration (10 mg/kg) was detected in a sample collected inside the gun range building.

This SAP serves as the primary guide and standard operating procedures (SOPs) for soil sample collection for the project.

2.0 GENERAL SCOPE

The objectives of the investigation activities presented in this SAP are to evaluate the presence of arsenic and lead associated with the TSP in accordance with the TSPMRG. The general scope of services for this work will consist of completing soil borings that are generally, evenly spaced around the property from the remaining areas that do not already have arsenic and lead data associated with the previous site investigation. Ten soil samples were collected and analyzed for arsenic and lead during the previous site investigation that can be used for evaluating the TSP including eight samples representing the 0- to 6-inch below ground surface (bgs) sample interval and two samples representing the 6- to 12-inch sample interval. The proposed soil borings will be completed within one decision unit DU-1 to collect samples to support the TSP evaluation and include the following:

- Thirty-four (34) soil samples are to be collected from the 0- to 6-inch bgs depth interval.
- Nine (9) soil samples are to be collected from the 6- to 12-inch bgs depth interval (25 percent of the total soil boring locations).
- Five (5) 6-point composite duff samples are to be collected from the forested portions of the property.
- Soil and duff samples will be submitted to the laboratory for chemical analysis of total arsenic and lead.

A total of 58 samples consisting of the 43 soil samples and 5 duff samples to be collected in accordance with this SAP, and 10 previous soil samples will represent the recommended number of samples for a property of this size based on the guidelines outlined in the TSPMRG. The proposed and previous sampling locations are presented on Figure 2.

2.1. Project Organization, Roles and Responsibilities

This section outlines the individuals directly involved with the project and their specific responsibilities. Services completed under this SAP will be in cooperation with the following key personnel.

Affiliation	Contact Information
City of Olympia Public Works Project Manager	Jim Rioux jrioux@ci.olympia.wa.us (360) 753-8484 Olympia, Washington
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Consultant Project Manager (GeoEngineers, Inc.)	Abhijit R. Joshi ajoshi@geoengineers.com (206) 239-3256 Seattle, Washington

Affiliation	Contact Information
Consultant Field Coordinator (GeoEngineers, Inc.)	Aaron M. Waggoner awaggoner@geoengineers.com (253) 579-2176 Tacoma, Washington
Consultant Field Staff (GeoEngineers, Inc.)	Akanksha Garg agarg@geoengineers.com (201) 744-0304 Redmond, Washington Nathan Solomon nsolomon@geoengineers.com (206) 437-6819 Tacoma, Washington

2.2. Health and Safety

A site-specific Health and Safety Plan (HASP) will be developed for use during the investigation field activities. The Field Coordinator will be responsible for implementing the HASP during the field activities. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during the completion of field activities.

The Field Coordinator will conduct a tailgate safety meeting each morning prior to beginning daily field activities. The Field Coordinator will terminate any work activities that do not comply with the HASP. The HASP will include protocols to protect workers from exposure.

Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP for use by their employees.

3.0 SAMPLING PLAN

3.1. Soil Sampling

Field activities will include collecting up to 43 soil samples using hand tools from 34 soil sampling locations spaced around the property with 34 samples representing the 0- to 6-inch bgs sample interval and nine samples representing the 6- to 12- inch sample interval (25% of the soil boring locations). Sampling equipment will be decontaminated as described in Section 4.5. Proposed soil sampling locations are shown on Figure 2. Actual sample locations may be relocated in the field if the proposed sampling locations are not accessible. Relocated sampling locations will be positioned as close as possible to the proposed sampling locations and will be identified in the site plan. Sampling locations that are located in the forested area or areas that are not subject to disturbances from human activities will be marked in the field using a stake. Sample identification will be labeled on the stake. For sampling locations in areas that are subject to disturbances from human activities, field measurements will be obtained from identifiable site features (e.g., corner of the existing building). Two measurements will be obtained to ensure that the sampling location can be located in the field in the future, if necessary. Photographs will be obtained for each sampling location.

Each soil sample will be placed in a 1-gallon plastic bag and thoroughly homogenized. The soil from the bag will then be placed into a laboratory supplied 4- to 8-oz glass sample jar, labeled, and then placed in a sample cooler with ice for preservation and transport to the laboratory. The 43 soil samples obtained from

decision unit DU-1 will be analyzed for arsenic and lead by United States Environmental Protection Agency (EPA) method 6010.

3.2. Duff Sampling

Field activities will include collecting up to five (5), six-point composite samples of duff material present on site using hand tools. Each duff sample from decision unit DU-1 will be a composite comprised of duff collected from six individual locations around the sample locations shown on Figure 2 and consolidated in a 1-gallon plastic bag and thoroughly homogenized. The 5 sampling locations where duff samples will be collected are identified on Figure 2. The duff material from the bag will be packed into the laboratory supplied 4- to 8-oz glass sample jar, labeled, and then placed in a sample cooler with ice for preservation and transport to the laboratory. The 5 duff samples obtained from decision unit DU-1 will be analyzed for arsenic and lead by EPA method 6010.

4.0 GENERAL FIELD PROTOCOLS AND PROCEDURES

4.1. Soil Containers and Labeling

The Field Coordinator will manage field protocols related to sample collection, handling and documentation. Soil samples will be placed in appropriate laboratory-provided containers.

Sample containers will be labeled with the following information at the time of sample collection:

- Project number.
- Sample name, which will include a reference to the decision unit, sample location number and sampling depth.
- Date and time of collection.
- Sampler's initials.
- Preservative type (i.e., ice).

The Field Coordinator will monitor consistency between sample containers/labels, field logs, and chain of custody forms. Sample numbering conventions are described below and the sample numbers for the samples to be collected are shown on Figure 2.

Soil Samples – Each sample will be labeled with the decision unit number followed by the sequential boring location number and depth range in inches bgs. For example, the sample ID for the soil sample collected from decision unit DU-1, sample location number 1 from 0 to 6 inches bgs would be DU1-1-0-6. At locations where a sample is collected from 0 to 6 inches and 6 to 12 inches from the same boring location, the sample number will have the same boring number such as DU1-1-0-6 and DU1-1-6-12.

Duff Samples – Each duff sample will be labeled with the decision unit number followed by the sequential boring location number and the word DUFF. For example, the sample number for the duff sample collected from decision unit DU-1 at sample location three (3) would be DU1-3-DUFF.

4.2. Sample Handling and Custody

4.2.1. Sample Storage

Samples will be placed in a cooler following collection. The samples will be kept cool and dry until delivery to the analytical laboratory. The holding time for soil samples is 6 months when kept at less than or equal to 4 degrees Celsius.

4.2.2. Accredited Laboratory

The selected analytical laboratory for this project is OnSite Environmental, Inc. of Redmond, Washington. Their Washington State Department of Ecology Accreditation ID is C591 that is current through July 26, 2023.

4.2.3. Sample Shipment

Samples will be transported and delivered to the analytical laboratory in the laboratory supplied sample coolers. The samples will either be transported by field personnel, laboratory personnel, or by laboratory-supplied courier service. The cooler will be properly secured using clear plastic tape and custody seals prior to delivery to the analytical laboratory.

4.2.4. Chain-of-Custody Records

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A chain of custody (COC) form will be completed for the samples being delivered to the laboratory. Information to be included on the COC form includes the following:

- Project name and number.
- Sample identifications.
- Date and time of sampling.
- Sample matrix (soil), preservative, and number of containers for each sample.
- Analyses to be performed.
- Names of sampling personnel.
- Project manager name and contact information including phone number.
- Special instructions noted (e.g., laboratory sample detection limits).
- Shipping information including shipping container number, if applicable.

The original COC form will be signed by the field personnel responsible for sample collection. Field personnel will retain a signed carbon copy of the COC form and provide the original and remaining carbon copies of the COC form to the laboratory or courier.

4.2.5. Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include, at a minimum, the analyst's name or initials, time, date and condition of samples upon receipt.

4.3. Field Observations Documentation and Records

Field documentation provides important information about sample characteristics and special circumstances surrounding sample collection. Field personnel will record information for each soil sampling location and sample collected in a daily field report. Entries in the field report will be made in pencil or water-resistant ink on water-resistant paper, and corrections will consist of line-out deletions. Individual reports will become part of the project files at the conclusion of the field work.

At a minimum, the following information will be recorded during the collection of each sample.

- Sample location and description.
- Site or sampling area sketch showing sample location and measured distances.
- Sampler's name(s).
- Date and time of sample collection.
- Designation of sample as composite or discrete.
- Type of sample (soil or duff).
- Type of sampling equipment used.
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, etc.).
- Preliminary sample descriptions (e.g., lithologies, noticeable odors, colors, field-screening results).
- Sample preservation.
- Shipping or courier arrangements.
- Name of recipient laboratory.

The following specific information will also be recorded in the field report for each day of sampling in addition to the sampling information.

- Team members and their responsibilities.
- Time of arrival/entry on site and time of site departure.
- Other personnel present at the site.
- Summary of pertinent meetings or discussions with regulatory agency or other personnel on site.
- Deviations from sampling plans, site safety plans, and SOPs.
- Changes in personnel and responsibilities with reasons for the changes.
- Levels of safety protection.

The handling, use, and maintenance of field reports are the Field Coordinator's responsibilities.

4.4. Data Management

The laboratory will report the sample data in formatted hard copy and digital formats. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample

identification, the laboratory identification, reporting units, data qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and quantitation limits. The sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverable (EDD) requirements will be established by GeoEngineers, Inc. with the contract laboratory. The laboratory will send final analytical testing results to the Project Manager.

The EDD will be uploaded to Ecology's Environmental Information Management (EIM) database.

4.5. Decontamination

The objective of the decontamination procedures described herein is to prevent the potential for cross-contamination between sample locations. Sampling equipment will be decontaminated in accordance with the following procedures before each sampling attempt or measurement.

- Brush equipment with a nylon brush to remove large particulate matter.
- Rinse with potable tap water.
- Wash with non-phosphate detergent solution (Alconox® and potable tap water).
- Rinse with potable tap water.

Equipment will either be decontaminated immediately prior to use or wrapped in aluminum foil between decontamination and use.

5.0 REFERENCES

Washington State Department of Ecology, 2019. "Tacoma Smelter Plume Model Remedies Guidance, Sampling and Cleanup of Arsenic and Lead Contaminated Soils for: Formal Cleanup Sites, Voluntary Cleanup Program, Properties Under Development, Projects Involving Soil Movement." Ecology Toxics Cleanup Program. Publication number 19-09-101. July 2019.

Washington State Department of Ecology, 2013. "Model Toxics Control Act Statute and Regulation - Model Toxics Control Act Chapter 70.105D RCW, Uniform Environmental Covenants Act Chapter 64.70 RCW, MTCA Cleanup Regulation Chapter 173-340 WAC," January 1996, revised November 2013.

GeoEngineers, Inc., 2017. "Environmental Investigation Report, Carpenter Road Site, Lacey, Washington" November 6, 2017.

Table 1

Soil Sampling Schedule of Chemical Analysis

TSP Soil and Duff Samples

Carpenter Road Property

Lacey, Washington

Location Identification	Soil Boring Depth (Inches bgs)	0 to 6 Inch Depth Interval	6 to 12 Inch Depth Interval	Duff Sample	Total Arsenic	Total Lead
DU1-1	6	X		X	X	X
DU1-2	12	X	X		X	X
DU1-3	6	X		X	X	X
DU1-4	6	X			X	X
DU1-5	12	X	X		X	X
DU1-6	6	X			X	X
DU1-7	6	X			X	X
DU1-8	6	X			X	X
DU1-9	12	X	X		X	X
DU1-10	6	X			X	X
DU1-11	6	X			X	X
DU1-12	12	X	X		X	X
DU1-13	12	X	X		X	X
DU1-14	12	X	X		X	X
DU1-15	6	X		X	X	X
DU1-16	6	X			X	X
DU1-17	6	X			X	X
DU1-18	6	X			X	X
DU1-19	6	X		X	X	X
DU1-20	6	X			X	X
DU1-21	6	X		X	X	X
DU1-22	6	X			X	X
DU1-23	6	X			X	X
DU1-24	6	X			X	X
DU1-25	6	X			X	X
DU1-26	6	X			X	X
DU1-27	12	X	X		X	X
DU1-28	12	X	X		X	X
DU1-29	6	X			X	X
DU1-30	6	X			X	X
DU1-31	6	X			X	X
DU1-32	12	X	X		X	X
DU1-33	6	X			X	X
DU1-34	6	X			X	X

Notes:

X = Depth interval selected and sample to be analyzed at the laboratory following receipt

bgs = below ground surface

Table 2

Test Methods, Sample Containers, Preservation and Hold Times

Carpenter Road Property

Lacey, Washington

Analysis	Test Method	Soil/Duff			
		Minimum Sample Size	Bottle Size	Preservation	Holding Times
Total Metals (Arsenic and Lead)	EPA Method 6010 (soil)	4 oz	4- to 8-oz glass with Teflon-lined lid	Cool 4°C	180 days

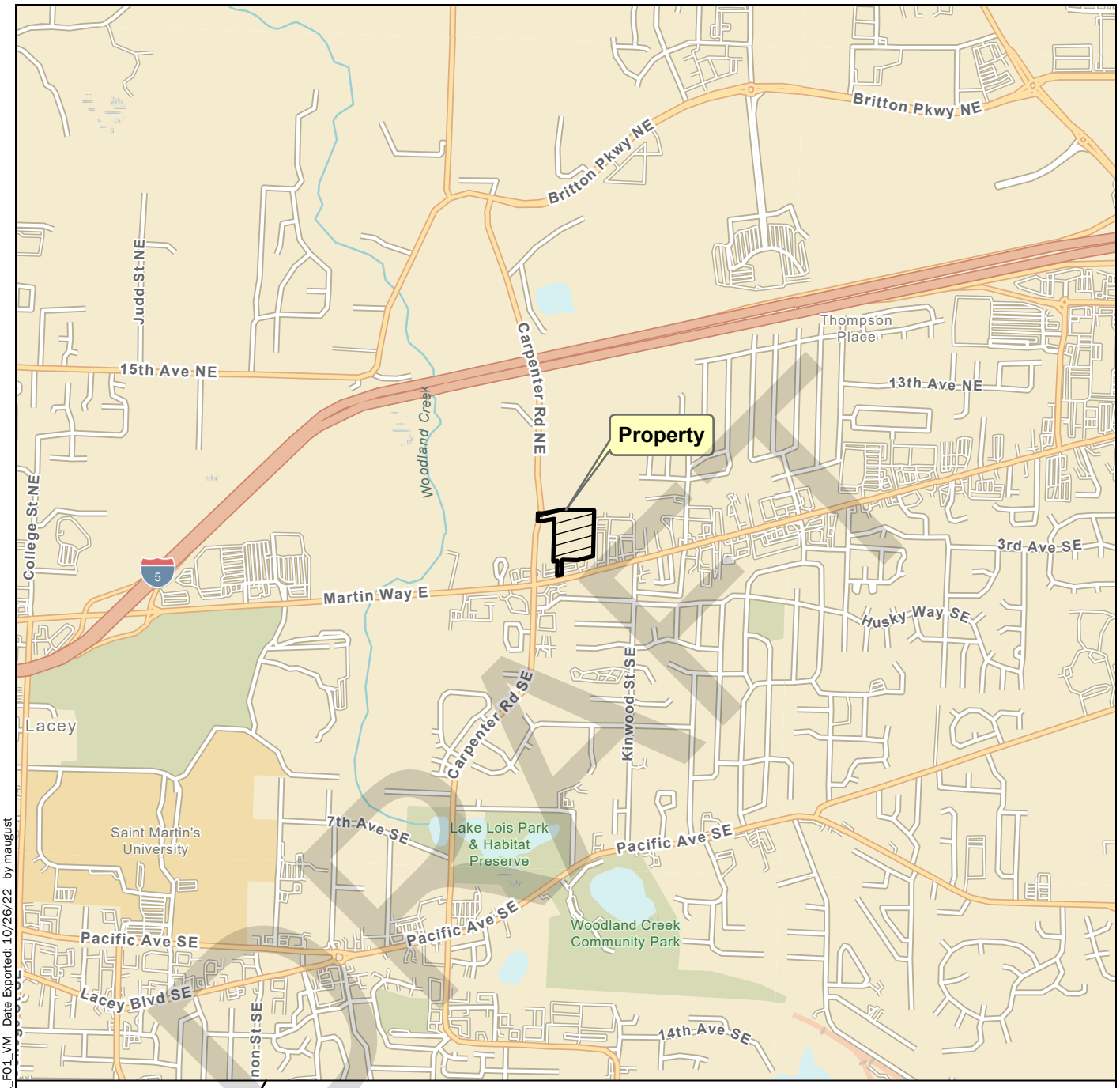
Notes:

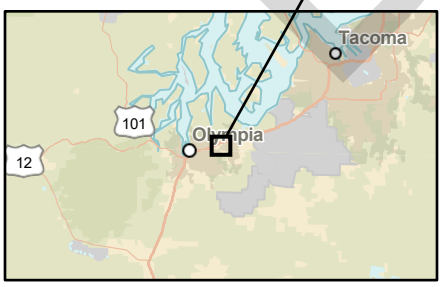
Extraction holding time is based on elapsed time from date of sample collection.

EPA = United States Environmental Protection Agency

˚C = degree Celsius

oz = ounce





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Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI

Projection: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Vicinity Map

Carpenter Road Property
Lacey, Washington

GeoEngineers

Figure 1

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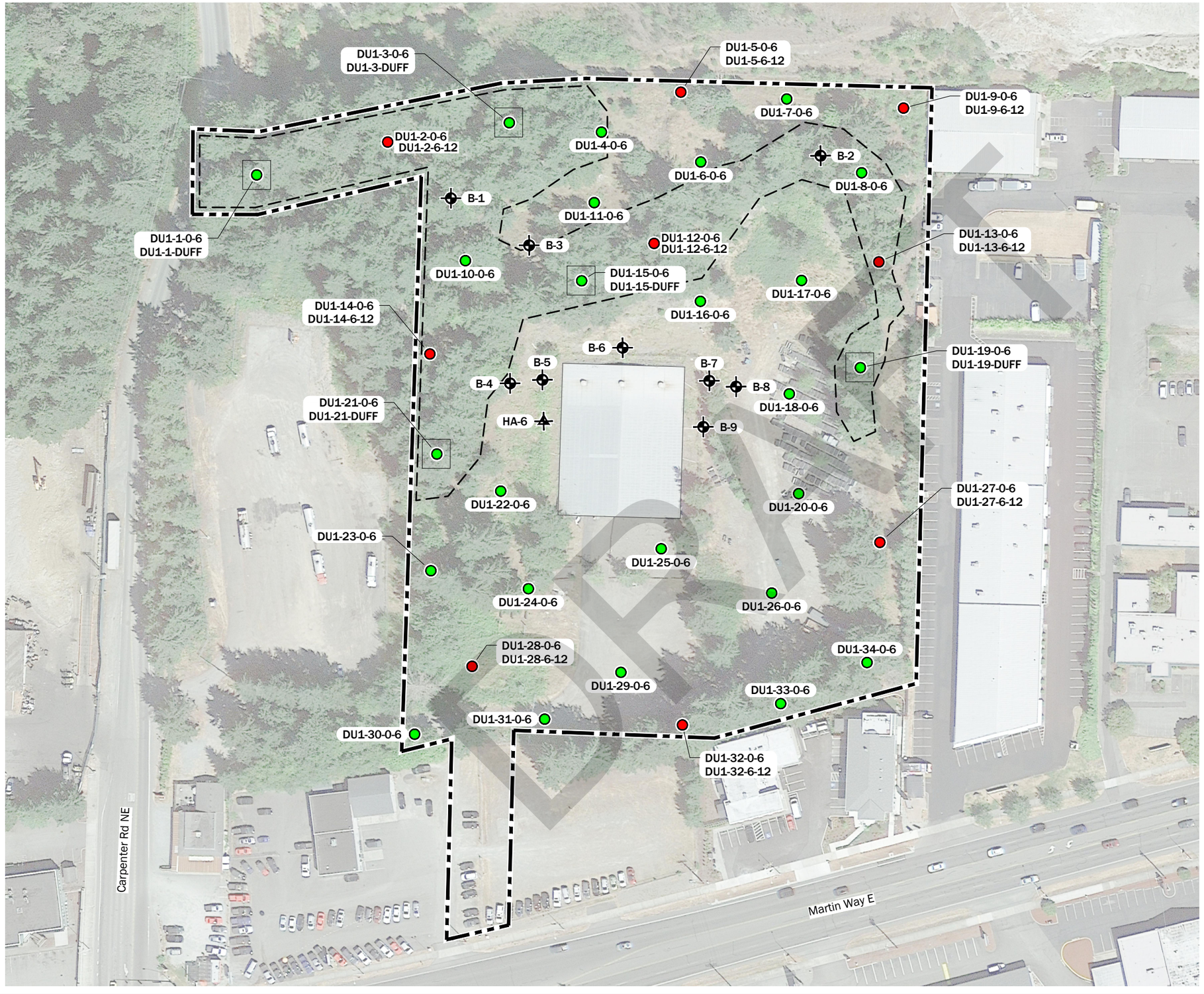

Legend

Site Property

Area of Anticipated Duff Accumulation

Previous Sample Location

B-1 — Boring by GeoEngineers, Inc.

HA-6 — Hand Auger by GeoEngineers, Inc.

Proposed Sample Location

0-inch to 6-inch Soil Sample Location

0-inch to 6-inch and 12-inch Soil Samples Location

6-point Composite Duff Sample Area

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from Google Earth Pro dated 08/06/2022.

Projection: WA State Plane, South Zone, NAD83, US Foot

N W E S

100 0 100
Feet

Soil Sampling Plan

Carpenter Road Property
Lacey, Washington

GeoEngineers

Figure 2