Sampling and Testing Plan
Energy Northwest Firing Range
Industrial Development Complex
Benton County, Washington

March 7, 2019

Prepared for

Energy Northwest
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Industrial Development Complex
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FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

bgs ..... below ground surface
CFR ..... Code of Federal Regulations
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
EN ..... Energy Northwest
ft ..... foot/feet
GPS ..... global positioning system
IDC ..... Industrial Development Complex
LAI ..... Landau Associates, Inc.
mg/kg ..... milligrams per kilogram
MTCA ..... Model Toxics Control Act
plan ..... sampling and testing plan
range ..... firing range
TCLP ..... toxicity characteristic leaching procedure
WAC ..... Washington Administrative Code
XRF ..... x-ray fluorescence

1.0 INTRODUCTION

Energy Northwest (EN) contracted with Landau Associates, Inc. (LAI) to prepare this sampling and testing plan (plan) to provide EN with a detailed scope of work and procedures for characterizing the extent of lead and other metal contamination in and around EN's former Industrial Development Complex (IDC) Firing Range (range) located north of Richland, in Benton County, Washington (Figure 1). While the site has not yet been formally entered into the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP), EN expects to enter the VCP and seek Ecology input prior to enacting the pending Site Demolition and Restoration Plan.

1.1 Project Background

The IDC firing range was constructed to train EN security personnel. In preparation for development of this plan, LAI toured the site with EN personnel to gain a working knowledge of the site history and current conditions. As shown on Figure 2, the range is approximately 30 yards wide and 115 yards long with an approximately 15-foot-tall wooden timber wall that encloses the range on three sides. The range has target lines at 25, 50, and 100 yards. A sand bullet-entrapment berm is located just beyond the 100-yard target line.

Shooting at the range primarily occurred from the firing line to the targets positioned at the 100-yard line, which is evident by the large quantity of bullets observed in the berm soil. While targets were primarily paper and other easily penetrated materials, some steel targets were also used. While shooting at steel targets (which results in significant bullet fragmentation) did occur at the range, non-lead, frangible bullets were used on the range for at least the last decade of range operation. The wooden timber range walls were observed to be in good condition, with the exception of the portion of the wall at the north end of the range above the top of the sand berm where numerous bullet impacts were observed, some of which appeared to have penetrated through the wall. Bullet fragments were found on the ground surface north of the wall out to approximately 50 yards during a visual survey. North of the enclosure wall, two approximately 4-foot-diameter shallow pits were observed that contained numerous bullets, bullet fragments, and timber debris, indicating that material from inside the range may have been placed in those areas at one time. The approximate locations of the small pits are shown on Figure 2.

After LAI's tour of the site, the EN project manager stated that additional timbers, with damage consistent with bullet impacts, were found to the immediate northwest of the former shooting range (Figure 2). EN observed that some of the timbers had weathered to the point of disintegration and bullets were visible in the resulting debris. EN has no record of range modifications or removal of impacted timbers from the range, so the date and circumstances of placement of the timber debris in this area are unknown. The timbers will be moved from their current location to allow for investigation of the underlying ground surface. This area is shown on Figure 2 as the Timber Debris Area.

EN has range as-built plans that show that four stormwater drywells were part of the original design and are located along the midline of the range. LAI observed only one of these drywells during our site reconnaissance. EN subsequently uncovered one additional drywell; the approximate locations of the drywells are shown on Figure 2.

According to EN, no lead reclamation (harvesting) activities have occurred at the range since its construction. During early project discussions, EN agreed with LAI's recommendation that, prior to site characterization activities, recoverable lead should be reclaimed from the area within the enclosure wall, from the small pits north of the wall, and, if necessary, from the Timber Debris Area. Soil processed during reclamation activities will be stockpiled on site for disposal characterization (Section 2.2.4). Reclamation activities will occur prior to conducting the soil investigations discussed in this plan.

1.2 Site Investigation Objectives

The site investigation objectives are as follows:

- Determine the horizontal and vertical extent of potential lead (and other metals) contamination in soil associated with the operation of the firing range at concentrations exceeding the Washington State Model Toxics Control Act (MTCA; Ecology 2013)[1] Method A Soil Cleanup Levels for Unrestricted Land Use (WAC 173-340-740)[2].
- Characterize wooden timbers for disposal.
- Develop preliminary remediation alternatives and procedures based on the results of the sampling activities covered in this plan to be presented in a separate Site Demolition and Restoration Plan.

The ordering of the various tasks discussed in this plan, as well as the expected subsequent tasks, are discussed in Section 4.0.

[1] Ecology. 2013. Model Toxics Control Act Regulation and Statute. Publication No. 94-06. Toxics Cleanup Program, Washington State Department of Ecology. http://www.ecy.wa.gov/biblio/9406.html.

[2] Washington Administrative Code (WAC) 173-340-740 is promulgated under https://apps.leg.wa.gov/wac/default.aspx?cite=173-340-740.

2.0 SITE INVESTIGATION FIELD ACTIVITIES

The site investigation approach will be conducted in two phases: X-ray fluorescence (XRF) field screening and focused analytical soil sampling based on the XRF results. The following sections describe sampling activities and procedures.

2.1 Investigation Phase 1 – X-Ray Fluorescence

Following lead reclamation activities and moving of the timbers in the Timber Debris Area discussed in Section 1.1, Investigation Phase 1 will consist of a screening-level evaluation of lead impacts in soil using a portable XRF analyzer to help in delineating the vertical and lateral extent of metals contamination. This screening will help focus any laboratory analytical efforts conducted during Investigation Phase 2.

XRF screening was considered for evaluation of potential lead impacts to the range walls, but further evaluation determined that XRF results are inconsistent on wood surfaces and can provide high-biased results. The range walls will be evaluated during Investigation Phase 2.

2.1.1 X-Ray Fluorescence Field Screening

Based on the range history, XRF soil screening will occur within and immediately outside the range walls, in the Timber Debris Area, and in the Bullet Pass-through Area, which includes the shallow debris pits north of the range wall observed during the site reconnaissance. Based on the visual survey of the ground surface north of the wall discussed in Section 1.1, the XRF screening density will be increased in the area where occasional visible lead fragments were observed to confirm that the entire Bullet Pass-through Area to the north of the range, where bullets exited the back wall, is investigated (Figure 3).

A background sample, collected from an area to the west of the range, in presumably unimpacted soil, will also be screened with the XRF analyzer and a soil sample will be submitted for laboratory analysis.

The approximate XRF sampling locations shown on Figure 3 were selected based on site history and field observations. XRF screening and associated verification samples will be collected and analyzed as described below.

- **Sampling Locations:** A survey stake with white flagging/ribbon will be hammered into the ground at each sampling location and labeled per the location name provided on Figure 3. The sampling locations shown on Figure 3 are approximate and the final locations will be confirmed using a mapping-grade, differentially-correctable GPS (Trimble GeoXH or similar) device. The spatial coverage should be maintained if site features allow.
- **Sampling Depth Intervals:** At each proposed XRF sampling location there will be up to three sampling intervals. The rationale for the additional sampling depths within the walls of the range, discussed below, is due to the long history and high accumulation of lead bullets and bullet fragments observed.

a. Inside the range walls, three soil samples will be collected and analyzed at each location from 0 to 0.5 feet (ft), 0.5 to 1.0 ft, and 1.0 to 1.5 ft below the ground surface (bgs).

b. Outside the range walls, where vertical contamination migration is expect to be low, one soil sample will be collected and analyzed at each location from 0 to 0.5 ft bgs.

- **Sample Volume Collection:** A minimum of 1 liter of soil should be collected from each sampling interval using a single-use, disposable scoop or stainless steel implements decontaminated between sample intervals. Samples will be collected from each depth interval in such a way that cross-contamination between intervals is avoided. Sample collection methods to avoid cross-contamination include, but are not limited to, using a graduated 5-gallon bucket to case the hole as samples are collected, as described below, or using one of several soil coring devices capable of retrieving sample cores (i.e., a hand- or foot-driven soil probe or a portable, hammer-driven, standard penetration test kit equipped with a split-spoon sampler and sample catcher). As most hand-operated coring devices are capable of collecting only 1.0-ft-long samples, they could not be used alone to collect the soil samples within the range walls that will extend to 1.5 ft bgs, but could be used in combination with the Bucket Cased Hole method starting at Step 6. In addition, most hand-driven coring devices are narrow (~1.0 inch in diameter) and multiple driven samples will be necessary to collect enough sample volume.

  Bucket Cased Hole Soil Sampling

  1. Cut off the bottom of the bucket leaving at least 18 inches remaining
  2. Mark sides of bucket at 6-inch intervals starting from the bottom
  3. Collect the 0- to 0.5-ft interval sample
  4. Place bucket over sampled area and push, twist, or drive the bucket to the first 0.5-ft line
  5. Remove all soil within the bucket down to the bottom (i.e., to 0.5 ft bgs)
  6. Collect sample from 0.5- to 1.0-ft interval (or drive multiple 1.0-ft-long cores, as discussed above)
  7. Push, twist, or drive the bucket so that the bottom is 1.0 ft bgs
  8. Remove soil from within the bucket down to the bottom (i.e., 1.0 ft) and sample 1.0 to 1.5 ft
  9. Remove and decontaminate the bucket before moving to the next sampling location

  A minimum of 1 liter of sample volume will be collected into 1-gallon Ziploc® bags, sealed tight, labeled with the location and sampling depth (see below), collection date, collection time, collector's initials, and stored on ice. This collected sample volume will be used to screen via XRF and will be submitted to the laboratory for analysis (discussed below). For efficiency, XRF screening can be conducted following the collection of all samples. Samples will be labeled according to their collection location (Figure 3) with the following format:

  - XRF at Bullet Pass-Through location 1 from 0 to 0.5 ft bgs = XRF-BP1(0-0.5')
  - XRF within the Range at location 1 from 0 to 0.5 ft bgs = XRF-R1(0-0.5')
  - XRF in the Range Perimeter at location 1 from 0 to 0.5 ft bgs = XRF-RP1(0-0.5').

- **Equipment Decontamination:** Between the collection of each soil sample, follow the equipment decontamination steps discussed in Section 2.3.
- **XRF Analyzer:** The Olympus Handheld XRF analyzer manufactured by DELTA has been selected for use on this site, which can be rented and shipped from Field Environmental Equipment in Everett, Washington. Field Environmental Equipment can also provide in-person or web-conferencing instruction on using the XRF analyzer.
- **XRF Standardization:** The XRF analyzer will be standardized using the reference materials provided at the beginning of each day prior to soil analysis and after every 20 XRF sample runs. XRF standardization results will be recorded in a dedicated field log.
- **XRF Sample Preparation:** All large rocks or organic material will be removed from the collected sample volume in the Ziploc bag using clean nitrile gloves. At least 4 ounces of soil material will be sieved through a 2 millimeter sieve, homogenized, and dried if necessary, as soil moisture greater than 20 percent (by weight) can interfere with the XRF analysis. To evaluate if any of the soil samples need to be dried, a soil moisture test should be conducted to determine the range of soil moistures present in the samples. Prior to conducting the soil moisture test, the selected samples should be tested with XRF to help determine if drying of the soil resulted in any change in the metals concentrations. To conduct a soil moisture test:
    1. Visually select the two wettest looking samples and the two driest looking samples.
    2. Place a minimum of 20 grams of soil from each of the four selected samples into separate metal tins and record the pre-dried sample weight.
    3. Place the filled tin in a dedicated conventional toaster oven and dry at 250 degrees for 6 hours (or until no weight change is observed). Note: Microwave ovens should not be used to dry the soil as mineralogical changes will occur that can compromise the accuracy of the XRF results.
    4. Remove the samples from the oven and allow to cool before reweighing the samples and recording the results.
- **Sample Analysis:** The prepared sample will be placed in a Ziploc bag and then analyzed by placing the XRF probe window directly against the bag and follow the directions for the Olympus Handheld XRF device. Record the results in a field notebook and download the data from the XRF device at least once daily. Place the Ziploc bag of sieved soil into the main (unsieved) bag of soil and seal tightly.
- **Sample Retention:** All unused, bagged soil sample volume will be saved for verification sample selection (Section 2.1.2) and additional metals sampling in Phase 2 (Section 2.2).

2.1.2 XRF Verification Sampling, Laboratory Analysis, and Review of Results

To verify the XRF results, soil samples will be collected for laboratory analysis from approximately 20 percent of the XRF sampling locations. LAI will review the XRF results and work with EN to select the most appropriate samples to submit for laboratory analysis. It is expected that, while low-level and high-level metals detections will be included in the selected set of verification samples, XRF results closest to the MTCA Method A Soil Cleanup Level for Unrestricted Land Use (250 mg/kg) will be selected for laboratory analysis disproportionately to the low and high XRF detections. If XRF results do not fall close to the MTCA Method A Soil Cleanup Level, then a statistical methodology would likely

be employed that adequately captures the range of XRF results (which cannot be determined until results are available).

Soil from the separate, sieved soil Ziploc bag used for XRF screening will be placed into the appropriate laboratory-supplied sample containers and properly labeled. Sample labels will match those of their corresponding XRF location (with a "V" added to the name signifying that it is a verification sample:

- XRF-R1(0-0.5') Verification Sample = XRF-R1V(0-0.5').

Samples will be submitted to an Ecology-accredited laboratory, on ice, using proper chain-of-custody procedures. All samples will be analyzed for lead using US Environmental Protection Agency (EPA) Method 6020. Upon receipt of laboratory results, LAI will conduct a review of the analytical data for quality control/quality assurance purposes. LAI will compare the results to the MTCA Method A Soil Cleanup Level for Unrestricted Land Use for lead (250 mg/kg), provide the data to EN, and work with EN to determine where to focus Investigation Phase 2 sampling efforts.

2.2 Investigation Phase 2 – Metals Analytical Sampling

Investigation Phase 2 includes focused analytical soil sampling based on the results of Investigation Phase 1, evaluation and characterization sampling of the timber range walls, evaluation and sampling of the drywells within the range, and disposal characterization sampling of the stockpile of soil processed during lead reclamation activities. Each of these investigation actions is discussed below. Specific soil sampling locations cannot be determined until Investigation Phase 1 sampling results are available, at which time Figures 5 and 6 will be updated for use in the field. Soil sampling locations will be selected to delineate ground surface areas that XRF screening results indicate the presence of lead at concentrations near or above the MTCA Method A Soil Cleanup Level for Unrestricted Land Use of 250 mg/kg.

The Phase 2 sampling results will be used to determine the appropriate cleanup alternatives to be evaluated for the Demolition and Restoration Plan.

2.2.1 Soil Confirmation Analytical Sampling and Analysis

After evaluation of Investigation Phase 1 XRF data, LAI will delineate specific areas of the site that require additional investigation and sampling for the presence of metals. Each soil sample from each interval will be placed in a stainless steel bowl, homogenized with a stainless steel spoon, and placed into the appropriate laboratory-supplied sample container and properly labeled. Samples will be submitted to the analytical laboratory, on ice, using proper chain-of-custody procedures. All samples will be analyzed for lead, antimony, arsenic, copper, nickel, and zinc by EPA Method 6020. Upon receipt of sampling results, LAI will conduct a review of the analytical data for quality control/quality assurance purposes.

2.2.2 Timber Wall Visual Assessment, Sampling, and Analysis

While many of the timbers that make up the range walls do not show any impact from firearms, some timbers were regularly in the line of fire and are visibly impacted. The initial visual assessment and subsequent analytical sampling process discussed below will help minimize the amount of hazardous waste generated at the site.

2.2.2.1 Visual Assessment

The timbers of the range wall and Timber Debris Area will be separated into two categories through visual assessment: timbers without bullet impacts and timbers with bullet impacts. Areas of impacted and unimpacted timbers should be marked in the field using two different colors of spray paint (i.e., white for not impacted and red for impacted), as detailed below.

- **Timbers Without Bullet Impacts**: Timbers without bullet impacts may be disposed of as solid waste under Ecology's treated timbers exclusion [Washington Administrative Code (WAC) 173-303-071(3-g-i) and WAC 173-303-071(3-g-ii)]. This exclusion covers timbers that are used for the "material's intended use" that would be considered characteristic hazardous wastes due to their exceeding the characteristic criteria set forth in 40 CFR Part 261 Subpart C using the toxicity characteristic leaching procedure (TCLP) test. Thus the exclusion covers materials failing the TCLP test for arsenic and lead. These timbers have been used for their intended purpose (i.e., building range walls) and do not require testing.
- **Timbers With Bullet Impacts**: Samples will be collected for laboratory analysis from timbers with bullet impacts as described below, based on how many bullet impacts are observed in each timber. The more bullets that have impacted a timber, the more lead will be exposed through fragmentation and erosion of the bullet along the path of penetration into the timber through friction.

2.2.2.2 Sampling and Analysis

The following timber sampling approach will provide samples representative of the waste stream (i.e., bullet-impacted timbers) and allow evaluation of the range of TCLP values associated with a density of bullet impacts per six inches of timber. The data will be used to segregate the bullet-impacted timbers (or sections of a timber) into solid waste and hazardous waste categories based on the density of bullet impacts, thus reducing the volume of material being disposed of as hazardous waste. Timbers will be sampled as follows:

1. Collect 12 samples of bullet-impacted timbers. The 12 samples would be divided into three groups to evaluate the various levels of bullet impacts:
    a. 4 samples with 1 bullet impact
    b. 4 samples with 2 to 5 bullet impacts
    c. 4 samples with 5 or more bullet impacts
        – It is recommend that timber sections with as many bullets as possible be selected as a worst-case scenario.

2. Each sample would be an approximately 6-inch horizontal section cut from the selected portion of the timber using the following process, modified as necessary in the field:
    a. Using a heavy-duty electric drill and a 1-inch-diameter, hardened steel, wood auger bit suitable for drilling through nails (i.e., a "ship auger bit"), drill two, 1-inch-diameter holes, 6 inches apart just above the top of the selected timber or along the joint between two timbers.
    b. Using an electric, reciprocating saw and at least a 9 inch, carbide toothed, demolition-rated blade, cut down from the two drilled holes all the way through the timber to create an approximately 6 inch x 6 inch block of wood.
    c. Using a small sledgehammer, knock the block of wood out of the wall.
3. The timber block will then be further reduced to approximately 1-cubic-inch pieces using an axe or saw (using an axe is preferable to reduce generation of saw dust). This step should be carried out over plastic sheeting to catch all pieces of wood and/or bullets that get separated from the block during size reduction. A chopping block should be used to improve splitting energy transfer and minimize the axe impacting the ground.
4. The wood pieces and any stray bullets/bullet fragments will be placed in a 1-gallon Ziploc bag and submitted to the analytical laboratory (one with a large TCLP tumbling chamber such as OnSite Laboratories of Redmond, Washington) for waste characterization analysis using the TCLP test for lead by EPA Method 1311/6020. Other analytes may be added if the Phase 1 sampling indicates the likelihood that other metals are present at concentrations that could affect disposal characterization. The laboratory should be instructed to analyze the samples sequentially starting with the 1-bullet impact samples. If those samples are not found to exceed the toxicity characteristic criteria for lead, then the 2-5 bullet samples would be analyzed, and if no exceedances are reported then testing would proceed to the next category. Upon receipt of each set of sampling results, LAI will conduct a review of the analytical data for quality control/quality assurance purposes.

2.2.3 Drywell Evaluation and Sampling

According to the as-built drawings provided by EN, four drywells, located along the midline of the range, were included in the original design of the range, as shown on Figure 5. Only Drywells #3 and #4 have been located in the field. If Drywells #1 and #2 still exist, they have been buried by the imported crushed rock and sand that covers the range surface. Immediately following the lead reclamation activities discussed in Section 1.1, an additional attempt will be made to find Drywells #1 and #2 using hand tools, metal detectors, and other devices, as appropriate. Design drawings of the drywells are not available and EN thinks that the drywells have open bottoms (i.e., no concrete).

Soil observed within each drywell will be excavated by hand, vacuum truck, or other appropriate equipment until native soil has been exposed or at least 1.0 ft of material has been removed, whichever is greater. The removed soil will be stockpiled and characterized with the soil processed during reclamation activities.

Two soil samples will be collected with hand equipment (i.e., shovels or a hand auger) at each drywell location from 0 to 0.5 ft and 0.5 to 1.0 ft below the bottom of the drywell following soil removal. The

0 to 0.5 ft interval sample will be analyzed and the 0.5 to 1.0 ft sample will be placed on hold pending the results of the shallow sample. Soil samples will be homogenized with a stainless steel spoon, placed into the appropriate laboratory-supplied sample containers, properly labeled, and submitted to the analytical laboratory, on ice, using proper chain-of-custody procedures. All samples will be analyzed for lead, antimony, arsenic, copper, nickel, and zinc by EPA Method 6020. Samples will be labeled according to their collection location with the following format:

- DryWell #1 from 0 to 0.5 ft = DW1(0-0.5').

2.2.4 Stockpiled Soil Disposal Characterization

Soil processed during lead reclamation activities and soil excavated from drywells will require characterization for disposal. Two stockpiles of excavated/processed soil will be generated: one consisting of soil from the bullet-entrapment berm, which has the potential to have high concentrations of lead even after recovery operations; and one from soil excavated from all other areas of the site. The stockpile locations and sampling locations will be recorded in the field and on Figure 5. The number of samples to be collected for waste characterization analysis from each stockpile will be determined in the field from the following table provided in an Ecology guidance document (Ecology 2016)[3] for sampling stockpiled material for disposal.

Cubic Yards	No. of Samples
0–100	3
101–500	5
501–1,000	7
1,001–2,000	10
>2,000	10, plus 1 for each additional 500 cubic yards

Each stockpile sample will be a composite soil sample consisting of five subsamples of approximately equal volume collected from different portions of the stockpile that are thoroughly homogenized with a stainless steel spoon, placed into the appropriate laboratory-supplied sample containers, and properly labeled. Samples will be submitted to the analytical laboratory, on ice, using proper chain-of-custody procedures. All samples will be analyzed for total RCRA[4] metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA Method 6020/7471. If any of the RCRA metals are detected at a concentration that exceeds the threshold value (20 times the applicable RCRA toxicity characteristic criteria) listed below, then the sample found to exceed the criteria will be

[3] Ecology. 2016. Guidance for Remediation of Petroleum Contaminated Sites. Publication No. 10-09-057. Washington State Department of Ecology. Revised June.

[4] Resource Conservation and Recovery Act.

further analyzed for leachability of the particular metal(s) exceeding the threshold using TCLP by EPA Method 1311/6020/7471.

Metal	RCRA Toxicity Characteristic Criteria (mg/L)	Threshold Value (mg/kg)
Arsenic	5	100
Barium	100	2,000
Cadmium	1	20
Chromium	5	100
Lead	5	100
Mercury	0.2	4
Selenium	1	20
Silver	5	100

mg/L = milligrams per liter
mg/kg = milligrams per kilogram

Samples will be labeled with the following format:

- Stockpile Sample #1 = SS-1.

2.3 Decontamination and Investigation-Derived Waste

Reusable equipment for collecting the soil samples will be decontaminated to minimize the possibility of cross-contaminating samples. Decontamination will consist of the following steps:

- Remove gross contamination from the equipment by brushing and then rinsing with tap water
- Wash with 1 percent Alconox® solution (1.25 ounces of Alconox dissolved in 1 gallon of tap water)
- Rinse with tap water
- Rinse with de-ionized water
- Repeat all steps as necessary.

Investigation-derived waste generated during the execution of this plan is expected to be minimal and limited to unused soil sample volume (in Ziploc bags), decontamination water, and safety gloves (and other protective gear). Immediately following generation, the decontamination water should be placed in a drum, labeled, and tested by EN for disposal determination.

As discussed in Section 2.1.1, the unused soil samples from Investigation Phase 1 will be held until receipt and consideration of the analytical results during Investigation Phase 2 in case additional soil analysis is necessary on these samples. If necessary, the Phase 2 analytical results will be used to characterize and dispose of the unused soil samples.

2.4 Personal Protective Equipment

EN will prepare a health and safety plan specific to conducting the work discussed in this plan. It is expected that the Personal Protective Equipment (PPE) that will be used to complete the work discussed in this plan will include standard Level D safety equipment, such as safety glasses, hearing protection, hard hat, steel-toed boots, work gloves, long-sleeve shirts, and long pants. It is expected that a half-face respirator with a high-efficiency particulate air (HEPA) filter will be necessary during Timber Wall sampling (Section 2.2.2) when sawdust is being generated. Additionally, a respirator might also be necessary while working with dry soil during any sampling activities covered in this plan.

3.0 REPORTING

After Investigation Phase 2 is complete, LAI will prepare and submit the tabulated data and associated figures to EN. The results will be used to determine the appropriate cleanup and demolition alternatives and develop the Demolition and Restoration Plan.

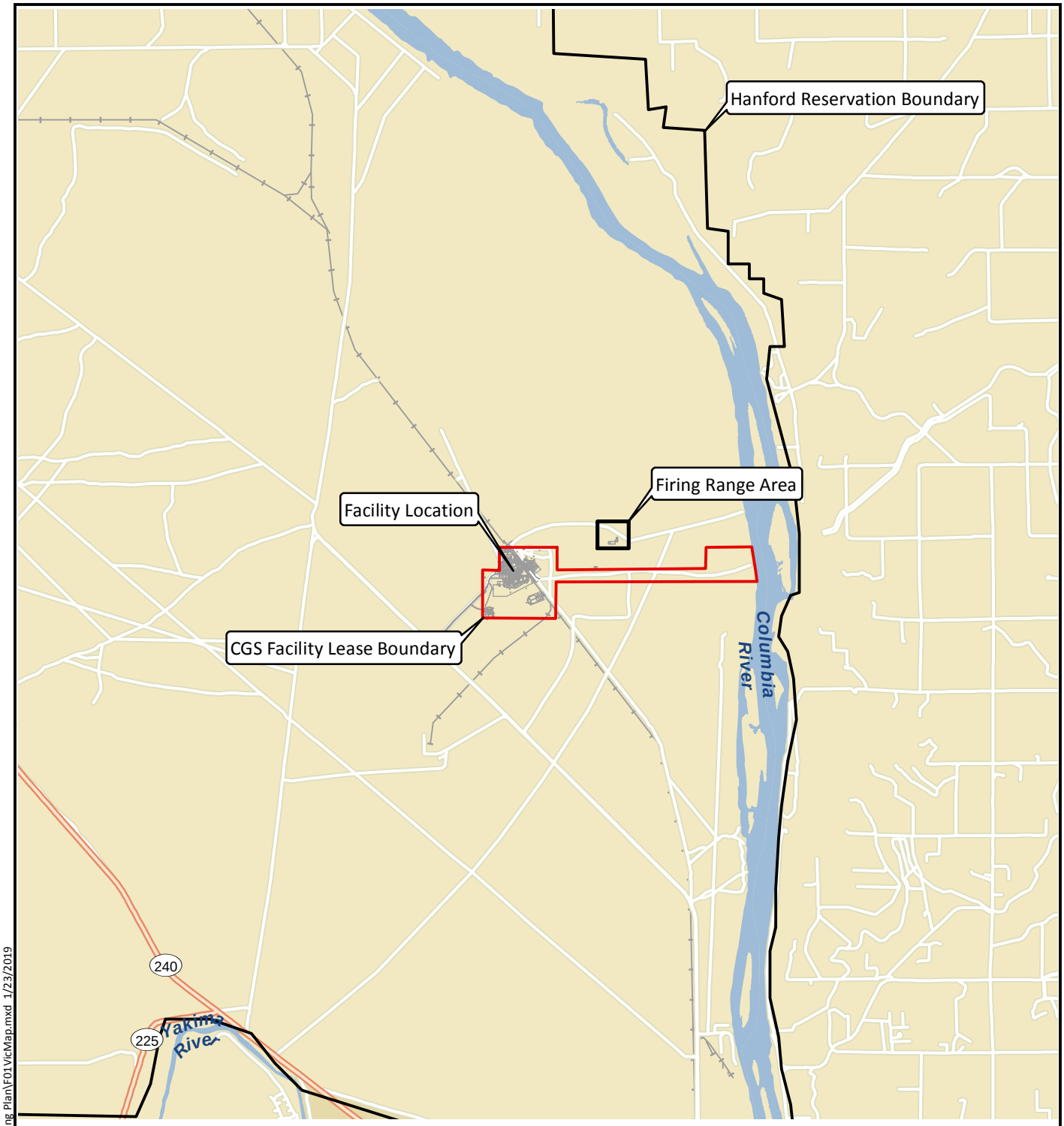
4.0 ORDER OF OPERATIONS

The ordering of the various tasks discussed in this plan, as well as the expected subsequent tasks, are as follows:

1. **Remove and Sort Timbers from Timber Debris Area**
    - Remove timbers for evaluation of underlying soil. EN to visually sort timbers based on the presence of bullet impacts.
    - If bullets are seen on the ground surface under the timbers, remove by hand, or if large enough of an area, add to reclamation contract.
2. **Lead Reclamation**
    - Reclaim all recoverable lead within range wall, small debris pits north of wall, and Timber Debris Area (if necessary).
    - Stockpile reclaimed soil outside of range area for EN testing and disposal.
3. **Implement Sampling and Testing Plan**
    - Phase 1: XRF Screening (all areas)
        - 20 percent of XRF locations will have samples analyzed by laboratory for verification of XRF results. Extra soil retained for future analysis.
    - Phase 2: Metals Analytical Sampling
        - Focused soil sampling per XRF results (if necessary).
        - Timber visual evaluation and sampling.
        - Drywell sampling.
        - Stockpile sampling.
4. **Develop Preliminary Range Cleanup Alternatives**
    - Using the Sampling and Testing Plan laboratory analytical results, provide preliminary alternatives to EN and select the appropriate alternatives to include in the Restoration Plan.
5. **Write Demolition and Restoration Plan**
    - Sort and dispose of range walls
    - Per the selected range cleanup alternatives, prepare a plan to remove or mitigate the presence of any remaining soil with contaminant concentrations greater than MTCA Method A Soil Cleanup Levels for Unrestricted Land Use.
    - Collect confirmation soil samples (if necessary).
6. **Summary Report**
    - Write a report to document the demolition, reclamation, and waste characterization and disposal activities described in the Demolition and Restoration Plan.

5.0 USE OF THIS DOCUMENT

This sampling and testing plan has been prepared for the exclusive use of Energy Northwest for specific application to the EN Industrial Development Center Firing Range. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.



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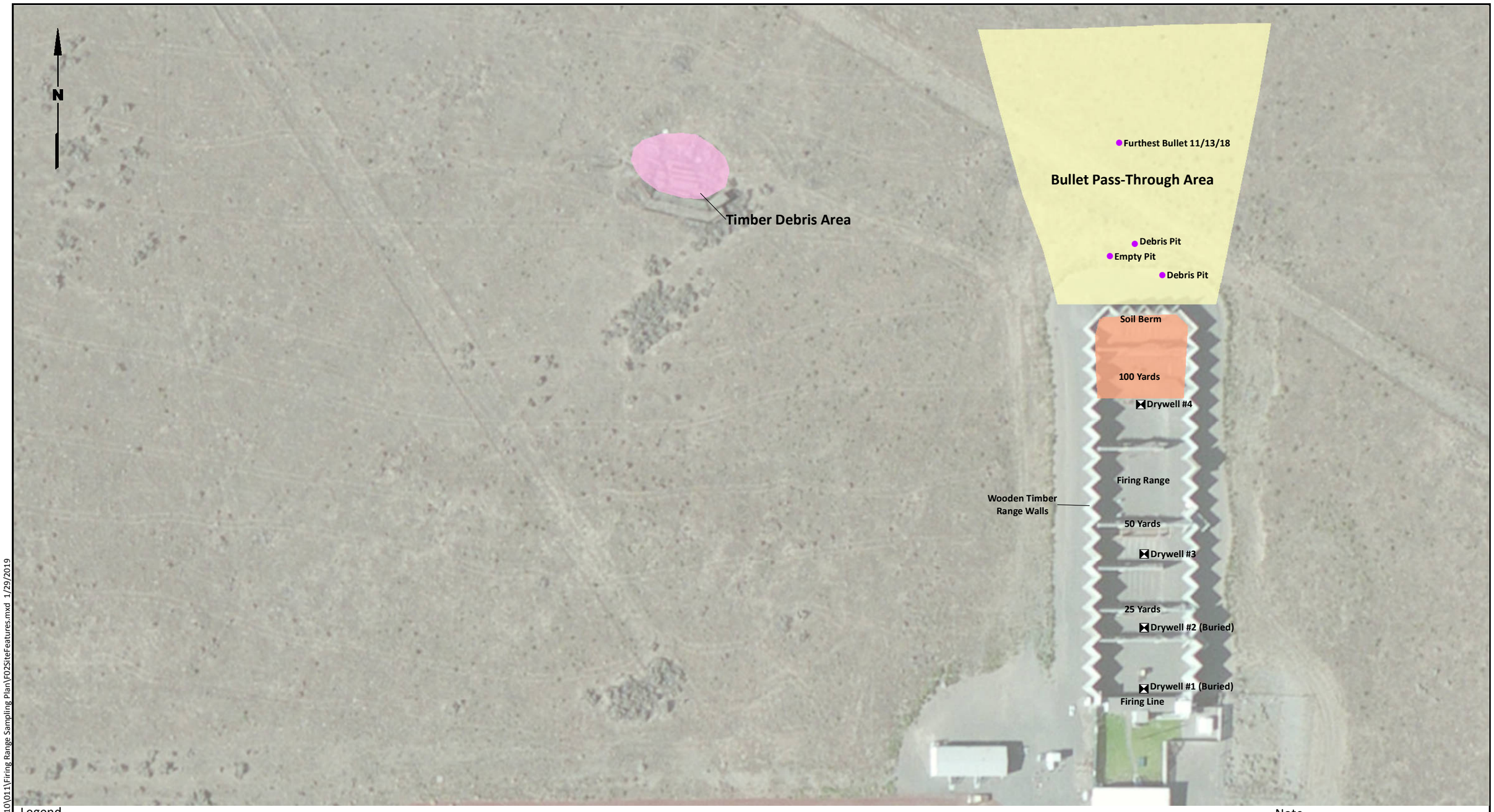
Energy Northwest Firing Range Sampling and Testing Plan Benton County, Washington	**Vicinity Map**	Figure 1



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Legend

- Bullet Pass-Through Area
- Likely Area of Highest Lead Contamination
- Timber Debris Area
- Site Walk Observation
- Drywell

0 80 160

Scale in Feet

Data Source: Esri World Imagery.

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Energy Northwest
Firing Range Sampling and Testing Plan
Benton County, Washington

General Site Features

Figure 2

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Legend

- Site Walk Observation
- Drywell
- Range XRF Survey
- Range Interior XRF Survey
- Range Perimeter XRF Survey
- Bullet Pass-Through Area
- Likely Area of Highest Lead Contamination

0 60 120

Scale in Feet

Data Source: Esri World Imagery.

Notes

1. XRF = X-Ray Fluorescence
2. Laboratory analytical samples should be collected at approximately 20% of the XRF survey locations to confirm XRF survey results.
3. Sampling locations are approximate and will be adjusted per XRF survey results.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Energy Northwest
Firing Range Sampling and Testing Plan
Benton County, Washington

Investigation Phase 1
X-Ray Fluorescence Screening
Firing and Bullet Pass-Through Area

Figure
3

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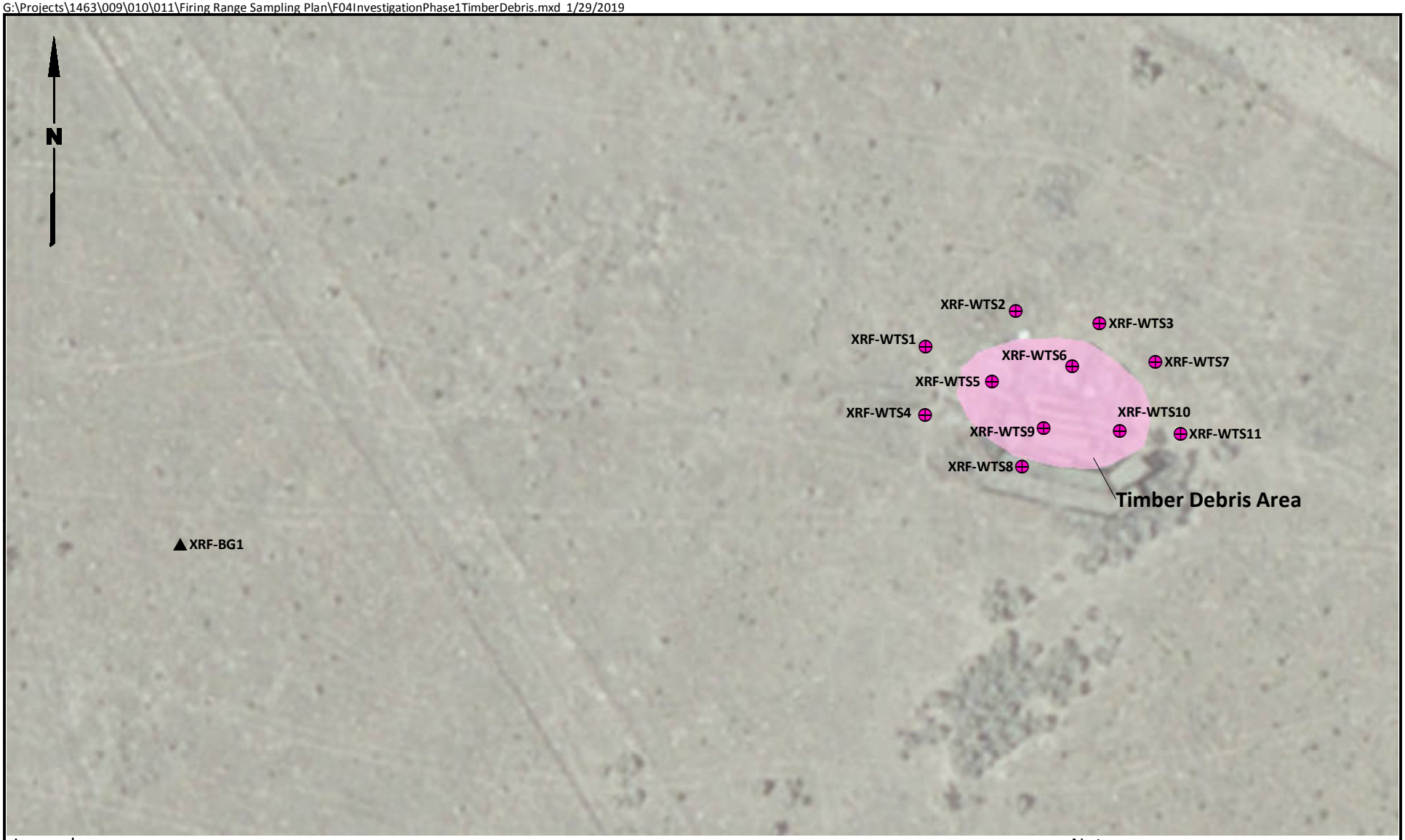

Legend

- Background Sampling Location
- Timber Debris XRF Screening Location
- Timber Debris Area

0 60 120

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

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Energy Northwest
Firing Range Sampling and Testing Plan
Benton County, Washington

Investigation Phase 1
X-Ray Fluorescence Screening
Timber Debris Area

Figure
4

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Legend

- Site Walk Observation
- Drywell
- Bullet Pass-Through Area
- Likely Area of Highest Lead Contamination

0 60 120

Scale in Feet

Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

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Energy Northwest Firing Range Sampling and Testing Plan Benton County, Washington	**Investigation Phase 2 Sampling Firing Range and Bullet Pass-Through Area**	Figure 5

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Legend

Timber Debris Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

0 60 120

Scale in Feet

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Energy Northwest
Firing Range Sampling and Testing Plan
Benton County, Washington

Investigation Phase 2 Sampling
Timber Debris Area

Figure
6