Pasco Sanitary Landfill NPL Site

# Zone A Removal Action
# Engineering Design Report

# Appendix F
# Zone A Cone Penetration Testing
# Investigation Plan

**FINAL**

# Zone A Cone Penetration Testing Investigation Plan

## Appendix F
## Zone A Removal Action EDR

Pasco Landfill NPL Site
Pasco, Washington

Submitted to:
Washington State Department of Ecology
Eastern Regional Office
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On Behalf of the:
Industrial Waste Area Generators Group III

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Figure 1 CPT Locations

# 1 INTRODUCTION

This *Zone A Cone Penetration Testing Investigation* Plan provides the basis for the cone penetration testing (CPT; a.k.a., cone penetrometer testing) employed for purposes of exploring the subsurface physical properties present at the Zone A Industrial Waste Area at the Pasco Landfill National Priorities Listed (NPL) Site (hereafter Site). Data generated from the CPT exploration will inform the design of the proposed shoring to be installed at the perimeter of Zone A, provide insight as to the drivability of the sheeting, and will assist in determining the required pile driving equipment for the installations along the barrier wall in the northern portion of Zone A and along the natural gas line easement in the southwestern corner of Zone A. The CPTs will be performed to collect geotechnical data. No environmental data will be collected. Geotechnical data collected will include information on the nature of the soil along the proposed shoring alignment, such as the depth, lithology, and physical properties of each soil strata encountered, as described below.

This *Zone A Cone Penetration Testing Investigation Plan* is part of the *Zone A Removal Action Engineering Design Report* (EDR). These plans have been prepared for the Washington State Department of Ecology (Ecology) on behalf of the Industrial Waste Area Generators Group III (IWAG) in fulfillment of the requirements of the *Cleanup Action Plan – Pasco Landfill NPL Site* (CAP), prepared by Ecology and dated August 2019 and Enforcement Order DE 16899, dated November 8, 2019.

# 2 CPT METHOD

The CPT investigation will involve advancing a probe into the subsurface at a standard rate while measuring tip and shaft resistance and temperature. The combination of measured tip and shaft resistance is used to classify soil types and consistency/relative density, which are used to develop a relatively continuous soil profile. CPT data will be correlated to soil properties, such as internal angle of friction, undrained shear strength, and modulus in order to develop geotechnical parameters for use in design of shoring.

No samples are collected from CPTs, as the probe displaces the soil as it is advanced. The resulting void created upon probe removal will be backfilled with grout or bentonite.

## 2.1 Field Procedures and Measurements

Before the start of testing, the CPT rig is leveled on four pads to provide a stable base for the cone thrust. During the test, the instrumented cone is hydraulically pushed into the ground at the rate of about 2 centimeters per second (cm/s), and readings of cone tip resistance, sleeve resistance, and pore pressure are digitally recorded every second. As the cone advances, additional rods are added such that the "string" of rods continuously advances through the soil. As the test progresses, the CPT operator monitors the cone resistance and vertical alignment.

CPT probes include a pressure transducer that can be used to collect pore water pressure data. Pore pressure dissipation testing can be used to estimate the depth of groundwater (when the probe is advanced below groundwater elevations) and estimate hydraulic conductivity of site soils. No soil or groundwater samples will be collected during CPT testing. Parameters collected via CPT are explained in further detail in Table 1.

**Table 1. CPT Parameters**

| Parameter | Purpose |
|---|---|
| Cone Tip Resistance | The sleeve resistance, cone tip resistance, and pore pressure are used in combination to estimate the friction angle, cohesion, and unit weight of soils; from which lateral earth pressures are derived. |
| Sleeve Resistance | |
| Pore Pressure | |
| Temperature | A temperature sensor is included in the CPT that can be used to collect subsurface temperature data at various depths. |

### 2.2 CPT Logs

In accordance with applicable standard test methods, the vertical axis on each CPT log will indicate the depth, while the horizontal axis will display the magnitude of the test values recorded. Recorded values include tip and shaft resistance and pore pressure. Final plotting scales are determined after all the tests are completed and take into consideration maximum test values and depths recorded for the project. This information is used to calculate the friction ratio and is correlated to material types, which are presented graphically.

## 3 CPT EXPLORATION LOCATIONS AND DEPTH

Selection of location and spacing of CPT explorations is based on experience in the region, expected subsurface conditions, and the preliminary shoring design. Current plans include advancing CPTs at a spacing of approximately 50 feet on center, along the proposed Zone A perimeter shoring alignment. Proposed CPT locations are shown in Figure 1. Site accessibility was considered in selection of exploration locations. No substantive earthwork including construction of roads or ramps, or removal of boulders, berms or other obstacles is to be performed. In the event that one or more exploration locations cannot be accessed, due to equipment, weather, or for any other reason, that corresponding CPT will not be performed.

Desired exploration depths are selected based on the estimated tip depth of the shoring system and the associated loading imparted on the soil. For shoring, CPTs are typically advanced to a depth of at least 10 feet below the base of the shoring system. The anticipated elevation of the bottom of sheet piling is 373.5 feet.

## 4 BACKFILL AND WASTE MANAGEMENT

ASTM standard CPT probes range from approximately 1.4 to 1.7 inches in diameter. Following completion of the test, the probe will be withdrawn while backfilling with grout. Since the CPT method involves pushing a probe into the ground, no soil cuttings will be generated. Any decontamination water produced will be containerized, held for characterization, and handled with wastewater from other early site preparation activity for the Zone A Removal Action.

## 5 REPORTING

The CPT report generated as part of the investigation will be provided to MRCE, the shoring design engineer that is subcontracted to the General Contractor to finalize shoring design.

The CPT work will be documented in a memorandum that will be submitted to Ecology shortly after the work is completed. The documentation will include logs for each CPT hole along with a narrative description of the

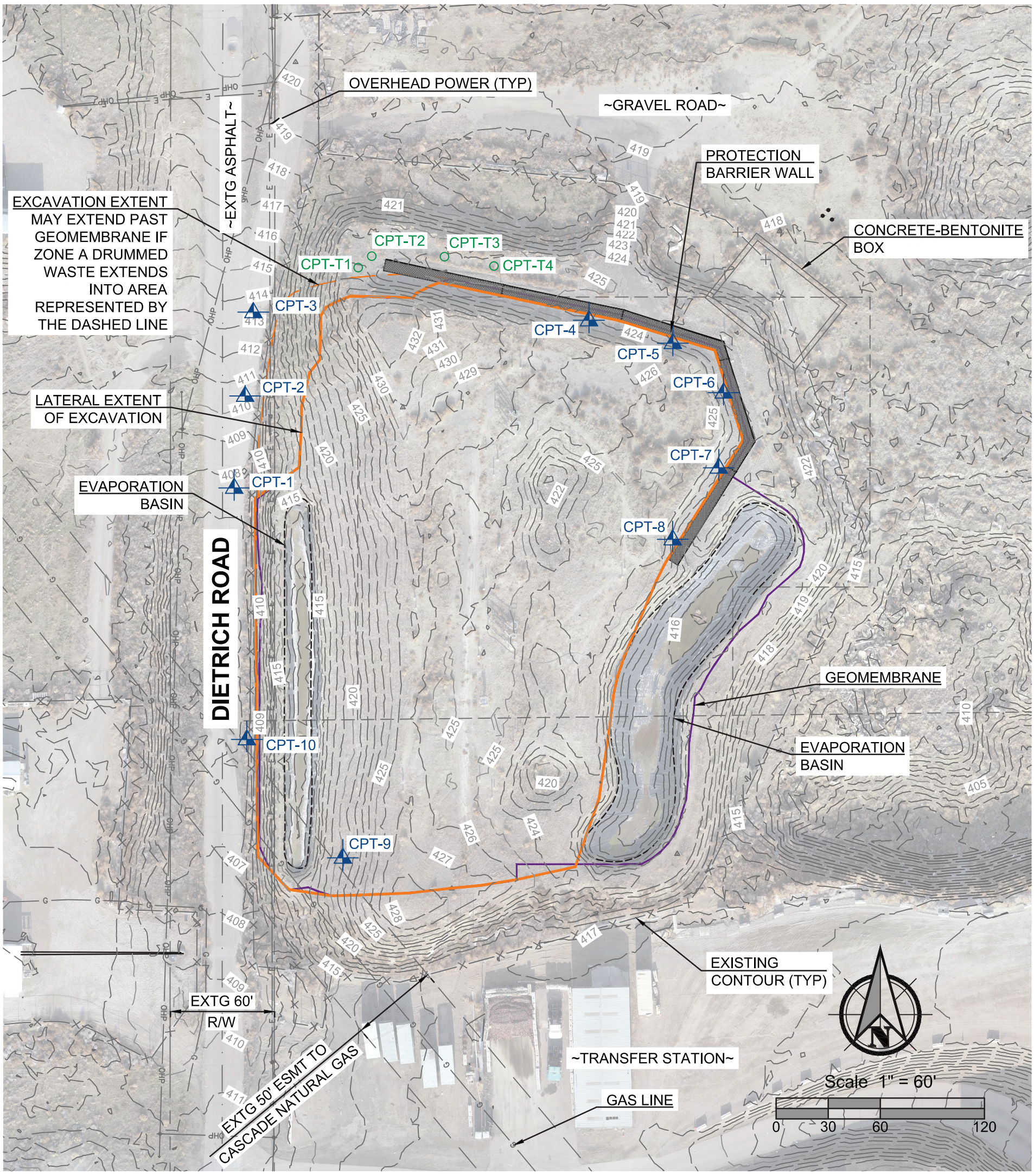
work performed. Tables, figures, and photographs will be included, as appropriate, to document this field investigation work, along with the various CPT-derived parameter estimations.

Geotechnical borings will comply with the requirements of WAC 173-160 and will include notification (start cards), and boring logs which will be provided to Ecology Water Resources at the end of the work.

## 6 HEALTH AND SAFETY

The existing Health and Safety Plan (HASP) for site operations will be used to ensure worker health and safety during the CPT investigation. As with previous work at the Site, a photoionization detector (PID) will be used to monitor air quality.

A utility location notification will be submitted in advance of the CPT investigation work.




**LEGEND**

- EXISTING FENCE
- EXISTING GAS LINE
- EXISTING GROUND CONTOUR
- EVAPORATION BASIN
- CPT-9 PROPOSED CPT LOCATION
- CPT-T1 PREVIOUSLY COMPLETED CPT LOCATION

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 / 1 | | SHEET ID | AUGUST 2020 64180.020 | CHECKED: PB | DESIGNED: SG | CPT LOCATIONS FOR: **ZONE A REMOVAL ACTION** PASCO LANDFILL NPL SITE |

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