CHEHALIS POWER PLANT TRANSFORMER SPILLS
ADDITIONAL SITE CHARACTERIZATION WORK PLAN

1813 BISHOP ROAD
CHEHALIS, WASHINGTON

FACILITY SITE ID NO. 3336951
CLEANUP SITE ID NO. 11776
VCP NO. SW1246

Prepared for:

PACIFICORP

Rocky Mountain Power
Chehalis Power Plant
1813 Bishop Road
Chehalis, Washington 98532

March 8, 2023

Hill West Environmental

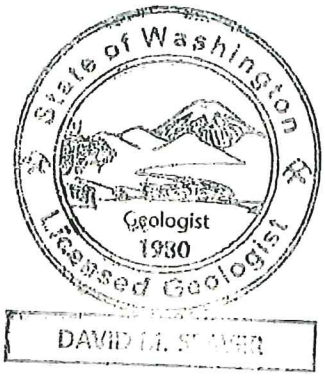
Prepared by:
Hill West Environmental, LLC Team
A & M Engineering and Environmental Services, Inc.
1176 West 7th Avenue
Eugene, Oregon 97402
Project 2064-0021

Chehalis Power Plant Transformer Spills
Additional Site Characterization Work Plan
1813 Bishop Road, Chehalis, Washington
Facility Site ID No. 3336951, Cleanup Site ID No. 11776, VCP No. SW1246

The material and data in this work plan were prepared under the supervision and direction of the undersigned.

Hill West Environmental, LLC Team

A&M Engineering and Environmental Services, Inc.



David M. Seaver
Senior Geologist, LPG

Daniel J. Landry
Senior Project Manager

CONTENTS

FIGURES

Figures **Following Text**

1 INTRODUCTION

PacifiCorp/Rocky Mountain Power (RMP) retained A&M Engineering and Environmental Services, Inc. (A&M) a member of the Hill West Environmental, LLC (Hill West) Team to prepare this Additional Site Characterization Work Plan (Work Plan) for completion of additional characterization of soil and groundwater related to mineral oil releases at the RMP Chehalis Power Plant (the Site) located at 1813 Bishop Road in Chehalis, Lewis County, Washington (Figures 1).

The project is being completed under the oversight of the State of Washington Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). The Site has been assigned by Ecology VCP Identification No. SW1246.

Prior Site investigations and remedial actions have been completed for soil and groundwater at the Site for the 2011 and 2013 Non-Polychlorinated Biphenyl (PCB) mineral oil spills related to two electrical transformers. Those investigation and remedial actions have included: excavation and disposal of contaminated soil, soil borings to collect soil samples and construct groundwater monitoring wells, quarterly groundwater monitoring, and water sampling from electrical vaults located near the release areas.

In July 2016, RMP submitted a cleanup action completion report (RMP, 2016) to Ecology requesting a No Further Action (NFA) determination for the mineral oil releases. On June 26, 2017, Ecology issued an Opinion Letter (Ecology, 2017) to RMP declining an NFA determination due to data gaps in the assessment data. This Work Plan has been prepared to present the proposed additional assessment to be conducted to address the data gaps identified by Ecology in the Opinion Letter (Appendix A), as well as the follow-up letter from Ecology dated December 5, 2022 (Ecology, 2022) and the conversation with Ecology on December 27, 2022.

1.1 Work Plan Organization

This Work Plan is organized into the following sections:

- Section 1 (Introduction) presents the purpose of the Work Plan;
- Section 2 (Background) presents a description of the Site and background information regarding the Site, and summarizes the results of previous Site investigations and remedial actions;

- Section 3 (Sampling and Analysis Plan) presents the sampling locations, proposed methodologies for soil and groundwater sampling, equipment decontamination, sample analyses, and investigation derived waste (IDW) management; and

- Section 4 (Reporting) presents the proposed reporting for the additional Site characterization.

2 BACKGROUND

This section describes background information regarding the RMP Chehalis Power Plant and the 2011 and 2013 mineral oil spills at the facility. Descriptions of the Site, background information regarding the Site, and summaries of the results of Site investigations and remedial action are presented below.

2.1 Site Description

The Site is located at 1813 Bishop Road in Chehalis, Washington in the southeast quarter of the southwest quarter of Section 10, Township 13 North, Range 2 West of the Willamette Meridian (Figure 1) at an elevation of approximately 240 feet above mean sea level. The Site is approximately 20-acres in area and is currently a power plant facility including two combustion turbines, electrical transformers, heat recovery steam generators, air emissions control equipment, exhaust gas stacks, air-cooled steam condenser, water treatment equipment, and operations and maintenance building (Figure 2). The facility also includes two (2) inactive 1.7-million-gallon fuel oil storage tanks located in lined earthen containment which were closed in May 2013. The eastern storage tank was recommissioned as a raw water storage tank in June 2018.

The generator step-up (GSU) transformers located on the northwest portion of the property (Figure 3) convert the generated electrical power to high voltage for transmission at the Bonneville Power Authority (BPA) substation located adjacent to the Site. The electrical transformers at the power plant use mineral oil as a dielectric fluid. The transformers are certified as *Non-PCB*, as is standard for transformers manufactured after the 1970s. The mineral oil in GSU#1 was tested after the failure in 2011 to confirm no PCBs were present.

Storm water collected from the Site is directed by storm water ditches and underground pipes to a retention pond located southwest of the GSU transformers (Figure 2). Storm water is discharged from the retention pond to a waterway to a nearby drainage under an Ecology Industrial Storm Water General NPDES Permit.

2.2 Surrounding Properties

The Site is located 3-miles south of Chehalis, Washington and the area consists mostly of farms, small pockets of light industrial areas, rural homes, and a few housing subdivisions. There are several roadways near the Site, the closest being Bishop Road. Interstate

Highway 5 is ¼-mile southwest of the Site and Jackson Highway is ½-mile northeast of the Site.

The electrical substation property adjoining the power plant on the west side is owned by BPA and was constructed for the Site to transport power generated by the power plant to the BPA high voltage electrical transmission line less than 1-mile west of the Site. The fenced substation is surrounded by Site property on three sides (Figure 2).

Other properties adjoining the Site include:

- East of the Site is an open agricultural field;
- South of the Site is a transportation terminal operated by Armellini Logistics, a vacant commercial property, and a farm, incorporating a residence, garage, shop, barns and several acres of open pasture;
- West of the Site is the headquarters for Zelus Shoe Insoles, a mobile structures manufacturing facility operated by Pacific Mobile Structures, and a natural waterway and wetland adjoining the power plant storm water waterway; and
- North of the Site is a Fred Meyer retail distribution transportation warehouse and paved parking lot.

2.3 Land Use History

According to KTA Associates, Inc.'s (KTA) *Cleanup Action Report* (KTA, 2016), the Chehalis Power Plant was originally developed by independent power companies who purchased the property in the mid-1990s and began permitting for a power plant. Construction was delayed several years for siting and environmental permitting. Construction began in May 2001, was commissioned in August 2003, and the power plant began operation in October 2003. Tractebel, a Belgium consultancy and engineering services in the energy, water, nuclear, and infrastructure sectors company, which in 2003 merged with Société Générale de Belgique (SUEZ), developed and operated the power plant. PacifiCorp purchased the power plant in 2008. Prior to construction, the power plant property was an agricultural field.

2.4 Geology and Hydrogeology

Site geology and hydrogeology are presented in the following section. The information was provided in KTA's *Cleanup Action Report* (KTA, 2016) dated June 2016.

2.4.1 Site Geology

A geotechnical subsurface investigation was conducted by URS Corporation (URS) in 2000 for the construction of the power plant. The URS *Geotechnical Data Report*

Subsurface Investigation (URS, 2000) indicates the surficial geology beneath the Site consists of late glacial sand and gravel deposits from the Hayden Creek Drift. Silt and clay deposits underlie the surface soil to a depth of 100 to 200 feet in the area of the Site.

The overall soil-type distribution at the Site consists of a low permeability silt and clay layer underlain by 45 to 50 feet of water-bearing sand and gravel, underlain by a silt and clay aquitard. These soil types are consistent with regional geologic mapping (Weigle and Foxworthy, 1962) and a regional study for the Chehalis Generation Facility (Dames and Moore, 1994). These regional studies classify the upper 50 feet of soil in the area of the site as recent alluvium and glaciofluvial sediments. The aquitard found at approximately 50 feet below grade surface (bgs) is widespread and is often described as blue-gray, clayey silt, reported to be more than 100 feet thick (Dames and Moore, 1994).

2.4.2 Site Hydrogeology

The Site is located in the Chehalis River Valley, in the northwest-southeast Newaukum River drainage that flows northwest to the Chehalis River. The area around the Site is a relatively flat bench of level soils used for agriculture. In general, the surface, and likely groundwater flow, is southwest from the foothills in the northeast to the river at the bottom of the drainage valley to the southwest.

The power plant yard areas are graded level with a layer of gravel in the transformer area. Surface water at the Site flows to storm water ditches along the roadway encircling the Site which collects and directs storm water to a retention pond. The pond outfall flows west in a gravel waterway (under an Industrial Storm Water permit) to Berwick Creek. Berwick Creek flows from east to west, under Bishop Road and Interstate Highway 5, to Dillenbaugh Creek, which then flows into the Newaukum River.

Regional investigations conducted by others (Dames and Moore, 1994) have categorized the shallow aquifer in the area as unconfined or semi-confined. However, the shallow aquifer appears to exhibit the characteristics of a confined or semi-confined aquifer, primarily due to the low permeably silt cap immediately above the aquifer (KTA, 2016).

The field exploration for the URS *Geotechnical Data Report Subsurface Investigation* (URS, 2000) was conducted in August 2000. At that time, the groundwater elevation was found to be 15 to 20 feet bgs. During the groundwater investigation in May 2011, the groundwater elevation was found to be 5 to 14 feet bgs. Groundwater measurements collected during groundwater monitoring events conducted from April 2015 to March 2016 indicated the groundwater level varied between 3.5 and 7.4 feet bgs with a consistent southwest groundwater flow direction.

2.5 Site Investigation and Remedial Actions

Site investigation related to the mineral oil spills and the subsequent remedial actions are presented in the following section. The information was summarized in KTA's *Cleanup Action Report* (KTA, 2016) dated June 2016.

2.5.1 2011 GSU#1 Transformer Failure and Oil Release

On January 20, 2011, transformer GSU#1 failed with an explosion and fire. *Non-PCB* mineral oil in the transformer sprayed onto the transformer containment structure and to the soil outside the containment. Fire suppression fluids overflowed the containment and flowed into adjacent storm water ditches resulting in some oily water reaching the storm water pond (Figure 3).

Cowlitz Clean Sweep (CCS) of Longview, Washington was retained for emergency spill response and completed spill cleanup, followed by sampling of the soil and water from the storm water ditches, storm water pond, and the area around transformer GSU#1. The contaminated soil and gravel in the ditches and pond were removed by CCS and replaced with clean material. At the same time, the west side of the transformer containment was excavated for a larger foundation and containment structure for the replacement transformer. The storm water ditch west of transformer GSU#1 was replaced with a culvert, and the new concrete containment structure was constructed. The area around transformer GSU#1 affected by the mineral oil sprayed during the transformer explosion release was remediated by excavating contaminated soil and gravel. Clean fill was deposited in the excavated area and compacted (RMP, 2012).

Laboratory analytical results for confirmation soil samples indicated three (3) locations with reported concentrations exceeding the Ecology Model Toxics Cleanup Act (MTCA) Method A cleanup level (CUL) for mineral oil (4,000 milligrams per kilogram [mg/kg]). Two (2) of the locations, the ditch and pond bank, were further excavated to meet the CUL. The third location (Sample #D8, 28,100 mg/kg) was collected at 20-inches bgs within the storm water ditch west of transformer GSU#1, which was not accessible for excavation and re-sampling due to the new transformer foundation containment extension (KTA, 2016).

2.5.2 2011 Site Investigation

In May 2011, KTA's subcontractor TEC, Inc. completed a site investigation that included groundwater assessment to determine whether impacts from the transformer GSU#1 mineral oil release were present (TEC, 2011). Six (6) direct-push soil borings were advanced to collect soil samples and groundwater samples from temporary monitoring wells. Four (4) temporary monitoring wells were placed downgradient of the transformer, one (1) up gradient of the transformer, and one (1) directly west of the transformer (Figure 3).

Soil boring field screening observed a limited oil sheen only in borehole GW-4. Subsurface soil samples were collected from the gravel/clay soil interface at three locations (SG-1, SG-2, and SG-3). Mineral oil was reported in only one soil sample, SG-1, at a concentration of 160 mg/kg, the location nearest to transformer GSU#1. Mineral oil was only reported in the groundwater sample collected from temporary groundwater well GW-4, located within the transformer explosion spray area and nearest to transformer GSU#1, at a concentration of 1,100 microgram per liter (µg/L), above the Ecology MTCA Method A CUL of 500 µg/L.

2.5.3 2013 GSU#3 Transformer Failure and Oil Release

On November 22, 2013, transformer GSU#3 experienced an explosive failure and subsequent fire similar to transformer GSU#1, which resulted in a release of *non-PCB* mineral oil around the transformer and into the storm water system. Fire suppression water filled the concrete transformer containment and overflowed to the surrounding soil and gravel across the gravel road to nearby storm water ditches impacting the storm water pond, but not the outfall, as storm water was not being discharged due to the dry weather.

Oil and water from the transformer containment flowed south and north to the storm water ditch, east towards the turbine building, and west across the road to storm water ditches. The ditches to the south and west flow into the pond through underground culverts (Figure 3). Due to cold dry weather, the extent of the contamination was simple to observe and contain (CCS, 2013).

CCS of Longview, Washington provided spill response and cleanup. Mineral oil and contaminated water were removed from the pond, ditches, and transformer containment and stored in tanks on-Site, treated, and then discharged to the sanitary sewer. After the transformer was replaced, CCS excavated oil-contaminated gravel and soil around the transformer containment, storm water ditches, and pond banks. The soils were removed to a depth below the contamination level or to the compacted clay soil layer approximately 4 to 5 feet bgs. The excavations were backfilled, and the excavated gravel and soil were stored on-Site pending off-Site disposal.

CCS conducted confirmation soil sampling of the underlying soil before replacement of the excavated gravel and soil. Samples were collected throughout the extent of excavation. Mineral oil was only reported in two (2) soil samples at concentrations of 128 mg/kg and 76.9 mg/kg, below the Ecology MTCA Method A CUL of 4,000 mg/kg (RMP, 2016).

At the conclusion of soil excavation during cleanup activities in January 2014, an oil sheen was observed on the perched groundwater layer approximately 5-feet bgs. CCS installed an open, vertical, slotted culvert on the south side of the containment for the transformer, near the location where most of the oil/water flowed over the containment wall (Figure 3). The culvert was installed to a depth just below the bottom of the perched groundwater layer. Power plant staff inspected the groundwater informally in the following months of 2014. Minimal oil droplets were observed as the groundwater level declined in the spring

until groundwater was no longer present at the bottom of the culvert (5-feet bgs). When the groundwater level rose in the fall of 2014, initially a few droplets of oil were observed, but were not observed following that time (RMP, 2016).

2.5.4 2013 Site Investigation

In October 2013, KTA's subcontractor Cardno (formerly TEC, Inc) advanced three (3) direct-push soil borings up to 30 feet bgs to collect soil samples and to construct, develop, and sample three (3) groundwater monitoring wells at the Site. Groundwater monitoring wells were installed in the shallow water bearing zone at two of the three locations. Monitoring well MW-1 was located adjacent to soil sample D8 which was collected under the transformer containment structure, the soil boring for proposed monitoring well MW-2 was located near soil boring GW-4, and monitoring well MW-3 was located downgradient from the transformer in a location outside the spill contamination area to triangulate groundwater level and flow direction (Figure 3). Only two of the groundwater monitoring wells were installed. This was due to encountering utilities during the construction of MW-2 (Cardno, 2014).

Mineral oil was not reported at, or above the laboratory reporting limit (RL) in the three (3) soil samples collected from the soil/groundwater interface. Mineral oil was reported in the groundwater sample collected from the soil boring for MW-2 at a concentration of 380 µg/L, below the Ecology MTCA Method A cleanup level of 500 µg/L (Cardno, 2016).

2.5.5 Groundwater Investigation 2015/2016

From March 2015 through March 2016, KTA along with their subcontractors Cardno and Clear Water Services (CWS) conducted groundwater investigation that included an assessment of potential impacts to subsurface soil and shallow groundwater within certain Site areas previously exposed to mineral oil releases in 2013 at the power plant. The assessment consisted of advancing three (3) hollow-stem soil borings from 26.5 to 31.5 feet bgs to collected soil samples and to construct and develop three (3) groundwater monitoring wells at the Site, and completion of four (4) consecutive groundwater monitoring events.

2.5.5.1 Monitoring Well Installation

In April 2015, groundwater monitoring wells MW-4, MW-5, and MW-6 were installed in the shallow water bearing zone at three (3) locations (Cardno, 2015a). Monitoring well MW-4 was located south-southeast of the extent of soil contamination from the transformer GSU#3 release, monitoring well MW-5 was located at the northeast corner of the storm water pond, and monitoring well MW-6 was located west of the extent of soil contamination from the transformer GSU#3 release (Figure 3). Soil samples were collected at a depth of 4 to 6 feet bgs from each soil boring.

Diesel range organics (DRO), mineral oil, and residual range organics (RRO) were not reported above Ecology MTCA Method A CULs in the three (3) soil samples.

2.5.5.2 Groundwater Monitoring

Groundwater monitoring was conducted on a quarterly basis in April, July, and December 2015 and March 2016 to assess groundwater quality and determine groundwater flow direction and gradient (Cardno, 2015b and 2015c, and CWS, 2016a and CWS, 2016b).

During each monitoring event, prior to sample collection, each monitoring well was opened allowed to equilibrate to the current ambient air pressure and an electronic interface probe was used to check for the presence/thickness of any accumulated free-phase hydrocarbons (FPH) and to measure depth to groundwater. Groundwater samples were collected from each monitoring well using low-flow sampling techniques. Groundwater samples were analyzed for DRO, mineral oil, and RRO.

DRO, mineral oil, and RRO were not reported at, or above their respective laboratory RLs in all groundwater samples collected during the four (4) quarterly groundwater monitoring events.

Groundwater elevations and flow direction data collected during the quarterly groundwater monitoring events indicated a general flow direction to the southwest with a groundwater gradient of approximately 0.01 feet/foot.

2.5.6 2015 Electrical Vault Water Sampling

During a Site visit in March 2015, it was noted that the electrical utility vaults in the areas adjacent to transformers GSU#1 and GSU#3, and areas in between, were at least partially filled with inflowing storm water infiltration and groundwater that filled the utility trenches leading to these vaults. The system of electrical vaults are equipped with submersible pumps to remove the in-flow water and are connected to piping that discharges to the main storm water drainage ditches running along the western boundary of the GSUs. Though plant operators had not observed oil discharged into the ditches or storm water pond, it was concluded that the pumping from the vaults could be a potential mechanism for removal of any residual groundwater oil contamination since the oil spill cleanup. A decision was made to collect and analyze water samples from select vaults (Cardno, 2015a).

On April 7, 2015, electrical utility vaults EMHC-001, EMHM-002, EMHC-002, EMHM-003, and EMHC-003 (Figure 5) were inspected to assess for the presence of an oil sheen and the collection of water samples. A possible oil sheen was noted in vaults EMHC-001, EMHM-003, and EMHC-003 (Figure 5). Water samples were collected from vaults EMHC-001, EMHC-002, EMHM-003, and EMHC-003 and analyzed for DRO, mineral oil, and RRO.

DRO and mineral oil were reported above their Ecology MTCA Method A CULs (500 µg/L) in the sample collected from electrical vault EMHC-001 located southeast of transformer GSU#1. RRO was not reported above the Ecology MTCA Method A CUL in the sample. In the remaining samples, DRO, mineral oil, and RRO were either not reported at, or above their respective laboratory RLs or reported below their Ecology MTCA Method A CULs.

3 SCOPE OF WORK

Prior Site investigations and remedial actions have been completed for soil and groundwater at the Site for the *Non-PCB* mineral oil spills related to transformers GSU#1 and GSU#3. In July 2016, RMP submitted a cleanup action completion report (RMP, 2016) to Ecology requesting a NFA determination for the mineral oil releases. On June 26, 2017, Ecology issued an Opinion Letter (Ecology, 2017) to RMP declining an NFA determination due to data gaps in the assessment data. This Work Plan has been prepared to present the proposed additional assessment to be conducted to address the data gaps identified by Ecology in the Opinion Letter.

The Ecology Opinion Letter requested the following data gaps be addressed:

(1) Additional depth-discrete soil and groundwater sampling in the immediate vicinity of former soil borings GW-4 and SB-2 to evaluate the current concentration of mineral oil in soil and groundwater;

(2) Depth-discrete soil sampling in the immediate vicinity of former soil boring D8 to evaluate the current concentration of mineral oil in soil and the extent of vertical contamination;

(3) Groundwater data for the vertical *groundwater monitoring culvert* installed south of GSU #3 to evaluate the current concentration of mineral oil in groundwater; and

(4) Resampling of the electrical utility vaults sampled in 2015 to assess the current water quality conditions and their potential risk to on-Site workers.

The following sections detail the additional characterization proposed to address the data gaps.

3.1 Pre-Field Activities

Site characterization activities will be completed under a Site-specific health and safety plan (HASP) prepared in accordance with Occupational Safety & Health Administration (OSHA) CFR 1910.120. The HASP will include a chemical and physical hazard evaluation, an operations plan, safety equipment and procedures, and emergency procedures.

Prior to initiating the soil and groundwater sampling activities, all appropriate notifications will be made for the subsurface investigation activities. Underground utilities in the planned sampling area will be located through Washington Utility Location Center and the

locations approved by RMP. Each soil boring location will also be cleared using a third-party private utility locator for the proposed subsurface investigation locations.

3.2 Soil and Groundwater Sampling – Former GW-4 and SB-2 Soil Borings

Ecology requested in the June 2017 Opinion Letter (Ecology, 2017) that depth-discrete soil and groundwater sampling be completed in the immediate vicinity of former soil borings GW-4 and SB-2 to evaluate the current concentration of mineral oil in soil and groundwater. The requested sampling location is located beneath 500-kilovolt amp (KVA) electrical transmission lines between the GSUs and the BPA switch yard (see photo below). For safety reasons drilling in the area beneath the transmission lines will need to occur during the annual maintenance period in April when the lines are deactivated.

Transformer GSU #1 with 500-KVA overhead transmission lines – looking south.

The proposed scope of work is provided in the following sections.

3.2.1 Discrete-depth Soil Sampling

One (1) direct-push soil borings will be advanced up to 30-feet bgs near historical soil borings GW-4 and SB-2 (Figure 4). During direct-push drilling activities soil samples will be collected continuously in new plastic liners provided by the direct-push drilling contractor. Each liner will be opened, and the soil field screened for visible contamination

and odors. Soil samples will be collected from the boring at the groundwater/soil interface, where screening indicates potential soil contamination, and at minimum of 10-foot intervals. All soil samples will be collected in laboratory-supplied jars, labeled with a unique identification, and delivered in an iced cooler using standard A&M chain-of-custody (COC) procedure to an Ecology accredited laboratory for analyses.

A field log will be prepared for the direct-push boring. The field log will include the project name and location, soil sample depths, drilling characteristics, and descriptions of the soils encountered. Subsurface lithology will be described consistent with ASTM D2488-84, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. A copy of a blank field log is provided in Appendix B.

The direct-push sampling barrel will be decontaminated in accordance with the drilling contactor's standard procedures. All fluids generated during decontamination procedures will be containerized in United States Department of Transportation (USDOT)-approved 55-gallon drums pending characterization and appropriate disposal.

3.2.1.1 Laboratory Analyses

All soil samples will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analyses. All soil samples will be analyzed consistent with WAC-173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for Extractable Petroleum Hydrocarbons (EPH) by Ecology Method WA-EPH.

3.2.2 Depth-discrete Groundwater Sampling

To obtain depth-discrete groundwater samples, a groundwater monitoring well will be installed in the soil boring. Discrete groundwater samples will be collected at 10-feet and 20-feet bgs utilizing low-flow groundwater sampling procedures, which result in groundwater samples being collected from discrete intervals by pumping that creates laminar flow of groundwater from the surrounding formation.

3.2.2.1 Well Construction

A monitoring well will be constructed in the direct-push boring using 2-inch diameter flush-threaded, Schedule 40, polyvinyl chloride (PVC) blank casing from the ground surface to top of the screened interval with up to 25-feet of 2-inch diameter pre-packed 0.020-inch slotted PVC casing. The well will be completed with a flush-mount, traffic-rated well box monument.

3.2.2.2 Well Development

No sooner than 24-hours following well construction, the groundwater monitoring well will be developed by surging and then pumping. The well will be considered developed when at least three (3) borehole volumes of water has been removed and field parameters (pH, electrical conductivity, and temperature) stabilize within 10 percent (%) of the

previous reading and the turbidity decreases noticeably. Water generated during development will be stored at the Site in USDOT-approved 55-gallon drums pending laboratory results. After the final laboratory report is received, the water will be disposed of appropriately. Well development data will be recorded on a well development data sheet (WDDS). A copy of a blank WDDS is provided in Appendix B.

3.2.2.3 Surveying

Following well construction, the top of casing and top of box elevation, as well as the State Plane northerly and easterly location for each shallow groundwater monitoring well will be surveyed by a licensed Washington Land Surveyor.

3.2.2.4 Groundwater Sampling

Groundwater samples will be collected at 10-feet and 20-feet bgs from the new well utilizing the United States Environmental Protection Agency's (USEPA) *Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection* (USEPA, 2021). Prior to sampling, depth to water measurements will be used to determine the static water level in each well. A submersible or peristaltic pump with new, disposable tubing will be placed in the well so that the pump or tubing intake is located at 10-feet and 20-feet bgs. The well will be purged at a flow rate of approximately 0.5 liters per minute, or slower if drawdown in the well is observed to exceed 0.3 feet from the static level. During purging, field parameters including: pH, conductivity, temperature, oxidation reduction potential (ORP), turbidity, and dissolved oxygen (DO) will be measured. Groundwater samples will be collected after at least three sequential field parameter readings have stabilized to within the limits specified in the USEPA procedure. Field sampling data will be recorded on an field sampling data sheet (FSDS). A copy of a blank FSDS is provided in Appendix B.

The groundwater samples will be placed directly into laboratory-supplied glassware with as little disturbance as possible, labeled with a unique identification, and delivered in an iced cooler using chain-of-custody procedure to an Ecology accredited laboratory for analyses.

3.2.2.5 Laboratory Analyses

All groundwater samples will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analysis. All groundwater samples will be analyzed consistent with WAC 173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for EPH by Ecology Method WA-EPH.

3.3 Soil Sampling – Former Soil Boring D8

Ecology requested in the June 2017 opinion letter (Ecology, 2017) that depth-discrete soil sampling be completed in the immediate vicinity of former soil boring D8 to evaluate the current concentration of mineral oil in soil and the extent of vertical contamination. The requested sampling location is located within the secondary containment for transformer GSU #1 where a storm water culvert is now located below grade (Figure 4). The location is also beneath the 500-KVA electrical transmission lines between the GSUs and the BPA switch yard. It is not feasible to drill within the secondary containment for GSU #1 due to the culvert. The nearest feasible location is near the location of MW-1, within 3 to 4-feet of the secondary containment area and with 8 feet of soil boring D8 (see photos below). Also, as previously discussed, for safety reasons drilling in the area beneath the transmission lines will need to occur during the annual maintenance period in April when the lines are deactivated.

MW-1 and transformer GSU#1 spill containment berm – looking south.

MW-1 and transformer GSU#1 spill containment berm – looking east.

The proposed scope of work is provided in the following section.

3.3.1 Direct-Push Soil Sampling

One (1) direct-push soil boring will be advanced up to 15-feet bgs near historical soil boring D8 (Figure 4). During direct-push drilling activities soil samples will be collected continuously in new plastic liners provided by the direct-push drilling contractor. Each liner will be opened, and the soil field screened for visible contamination and odors. Soil samples will be collected from 20-inches bgs and at the groundwater/soil interface. Soil samples will be collected in laboratory-supplied jars, labeled with a unique identification, and delivered in an iced cooler using standard A&M COC procedure to an Ecology accredited laboratory for analyses.

A field log will be prepared for the direct-push boring. The field log will include the project name and location, soil sample depths, drilling characteristics, and descriptions of the soils encountered. Subsurface lithology will be described consistent with ASTM D2488-84, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. A copy of a blank field log is provided in Appendix B.

The direct-push sampling barrel will be decontaminated in accordance with the drilling contactor's standard procedures. All fluids generated during decontamination procedures will be containerized in USDOT-approved 55-gallon drums pending characterization and appropriate disposal.

3.3.1.1 Laboratory Analyses

All soil samples will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analysis. All soil samples will be analyzed consistent with WAC 173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for EPH by Ecology Method WA-EPH.

3.4 Groundwater Monitoring Culvert Sampling

Ecology requested in the June 2017 opinion letter (Ecology, 2017) that a sample be collected from the vertical *groundwater monitoring culvert* installed south of GSU #3 to evaluate the current concentration of mineral oil in groundwater. Ecology also requested additional information regarding the construction and placement of the culvert and the proposed actions to mitigate the culvert as a preferential pathway for contaminant migration.

The groundwater monitoring culvert is constructed as follows:

Construction Details	
Material	Corrugated Steel
Diameter	3.5-feet
Total Length	7.5-feet
Top-of-Casing (TOC) to Grade	2-feet, 5-inches
Screen Interval	4-feet, 3-inches below TOC to Bottom of Casing
Depth to Water (2-16-2023)	7-feet below TOC

Photographs of the culvert are provided as Appendix C.

Following completion of Site assessment, the culvert will be decommissioned by a Washington licensed well installer in accordance with Washington Administrative Code (WAC) 173-160-460.

The proposed scope of work for sampling the culvert is provided in the following section.

3.4.1 Groundwater Sampling

A groundwater sample will be collected utilizing the USEPA's *Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection* (USEPA, 2021). Prior to sampling, a depth to water measurement will be used to determine the static water level in the culvert. A peristaltic pump with new, disposable tubing will be placed in the culvert so that the tubing intake is located at approximately the mid-point of the saturated screened interval. The culvert will be purged at a flow rate of approximately 0.5 liters per minute, or slower if drawdown in the well is observed to exceed 0.3 feet from the static level. During purging, field parameters including: pH, conductivity, temperature, ORP, turbidity, and DO will be measured. Groundwater samples will be collected after at least three sequential field parameter readings have stabilized to within the limits specified in the USEPA procedure. Field sampling data will be recorded on an FSDS (Appendix B).

The groundwater sample will be placed directly into laboratory-supplied glassware with as little disturbance as possible, labeled with a unique identification, and delivered in an iced cooler using chain-of-custody procedure to an Ecology accredited laboratory for analysis.

All purge water will be stored on-Site in USDOT-approved 55-gallon drum pending proper off-Site disposal.

3.4.1.1 Laboratory Analyses

The groundwater sample will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analysis. All groundwater samples will be analyzed consistent with WAC 173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for EPH by Ecology Method WA-EPH.

3.5 Utility Vault Risk Assessment Sampling

Ecology requested in the June 2017 opinion letter (Ecology, 2017) that the electrical utility vaults sampled in 2015 be resampled to assess the current water quality conditions and their potential risk to on-Site workers. The four (4) electrical utility vaults EMHC-001, EMHC-002, EMHM-003, and EMHC-003 (Figure 5) will be sampled as requested. The proposed scope of work is provided in the following sections.

3.5.1 Water Sampling

Water samples will be collected utilizing the USEPA's *Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection* (USEPA, 2021). Prior to sampling, depth to water measurements will be used to determine the static

water level in each vault. A peristaltic pump with new, disposable tubing will be placed in the vault so that the tubing intake is located within the first 3-feet of water. The vault will be purged at a flow rate of approximately 0.5 liters per minute, or slower if drawdown in the well is observed to exceed 0.3 feet from the static level. During purging, field parameters including: pH, conductivity, temperature, ORP, turbidity, and DO will be measured. Water samples will be collected after at least three sequential field parameter readings have stabilized to within the limits specified in the USEPA procedure. Field sampling data will be recorded on an FSDS (Appendix B).

The water samples will be placed directly into laboratory supplied glassware with as little disturbance as possible, labeled with a unique identification, and delivered in an iced cooler using standard A&M COC procedure to an Ecology accredited laboratory for analyses.

All purge water will be stored on-Site in USDOT-approved 55-gallon drum pending proper off-Site disposal.

3.5.1.1 Laboratory Analyses

All water samples will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analysis. All water samples will be analyzed consistent with WAC 173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for EPH by Ecology Method WA-EPH.

3.6 Groundwater Monitoring

The last groundwater monitoring event was completed for the release in March 2016. To establish current groundwater quality, a groundwater monitoring event will be completed. Groundwater monitoring wells MW-1, MW-3, MW-4, MW-5, and MW-6 will be included in the monitoring event. The following section provides the proposed scope of work.

3.6.1 Groundwater Sampling

Depth-to-water readings will be taken using a decontaminated electronic water probe. Depth readings will be measured to the nearest 0.01-foot from the north side of the top of each well casing. Measurements will be recorded immediately on a groundwater monitoring FSDS. A copy of a blank FSDS is provided in Appendix B.

Groundwater samples will be collected utilizing the USEPA's *Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection* (USEPA, 2021). Prior to sampling, depth to water measurements will be used to determine the static water level in each well. A submersible or peristaltic pump with new, disposable tubing will be placed in the well so that the pump or tubing intake is located at approximately the mid-point of the screened interval. The well will be purged at a flow rate of approximately 0.5 liters per minute, or slower if drawdown in the well is observed to exceed 0.3 feet from the static level. During purging, field parameters including: pH,

conductivity, temperature, ORP, turbidity, and DO will be measured. Groundwater samples will be collected after at least three sequential field parameter readings have stabilized to within the limits specified in the USEPA procedure. Field sampling data will be recorded on an FSDS (Appendix B).

The groundwater samples will be placed directly into laboratory supplied glassware with as little disturbance as possible, labeled with a unique identification, and delivered in an iced cooler using standard A&M COC procedure to an Ecology accredited laboratory for analyses.

All purge water will be stored on-Site in USDOT-approved 55-gallon drum pending proper off-Site disposal.

3.6.1.1 Laboratory Analyses

All groundwater samples will be submitted under standard A&M COC procedure to an Ecology accredited laboratory for analysis. All groundwater samples will be analyzed consistent with WAC 173-340-900 Table 830-1 for DRO by Ecology Method NWTPH-Dx and for EPH by Ecology Method WA-EPH.

3.7 Investigation Derived Waste

During soil and groundwater assessment activities, IDW will be generated by the decontamination of the sampling equipment and the exterior of all downhole equipment between borings, groundwater sampling purge water, and excess soil cuttings from each direct-push boring. All liquid and solid IDW will be placed in USDOT-approved 55-gallon steel drums. Both the water and the soil cuttings will be sampled to characterize the waste for disposal purposes.

Following receipt of laboratory analyses, the water will either be discharged under a general disposal permit to the sanitary sewer system or will be transported off-Site to an appropriate Washington licensed facility for proper treatment and/or disposal. The soil cuttings will either be placed on-Site as clean fill or transported off-Site to an appropriate Washington licensed facility for proper treatment and/or disposal.

4 REPORTING

The following section presents the proposed reporting for implementing the Work Plan.

4.1 Reporting

A&M will prepare a report summarizing the additional Site characterization. Reporting will include a discussion of field operations, deviations from the Work Plan, data inconsistencies, other significant operational details, and an interpretation of the soil and groundwater sample results. The report will also include figures indicating the sample locations, analytical summary tables comparing laboratory analytical results to Ecology MTCA Method A CULs, copies of the laboratory analytical reports, field boring logs, and available field notes. Assessment data will be uploaded to Ecology's Environmental Information Management (EIM) database.

REFERENCES

CCS, 2011. *Mineral Oil Spill Cleanup Report*, Chehalis, Washington. Cowlitz Clean Sweep (CCS). May.

CCS, 2013. *Spill Cleanup Report Mineral Oil Release, Chehalis, Washington*. CCS. November 22.

Cardno, 2014. *PacifiCorp Groundwater Investigation* (Report), *PacifiCorp Chehalis Plant*. Cardno TEC (Cardno). January.

Cardno, 2015a. *Monitoring Well Installation and Support Tasks Final Report, PacifiCorp Chehalis Plant*. Cardno. May.

Cardno, 2015b. *Groundwater Quarterly Monitoring Report; 1st Quarterly Event – April 2015, PacifiCorp Chehalis, WA Plant.* Cardno. June.

Cardno, 2015c. *Groundwater Quarterly Monitoring Report; 2nd Quarterly Event – July 2015, PacifiCorp Chehalis, WA Plant.* Cardno. July.

Clear Water Services, 2016a. *Groundwater Quarterly Monitoring Report; 4th Quarterly Event – March 2016, Rocky Mountain Power Chehalis, WA Plant.* Clear Water Services. January.

Clear Water Services, 2016b. *Groundwater Quarterly Monitoring Report; 3rd Quarterly Event – December 2015, PacifiCorp Chehalis, WA Plant.* Clear Water Services. April.

Dames and Moore, Inc. 1994. *Groundwater Resources Investigation for Ecology Groundwater Right Application No. G2-29004.* Prepared for Chehalis Power, Inc. Chehalis, Washington.

Ecology, 2017. *Review of Cleanup Action Completion Report and Response to No Further Action Request (VCP SW1246; FSID 3336951; CSID 11776)*, State of Washington Department of Ecology (Ecology). June 26.

Ecology, 2022. *VCP Project Status Request for the Following Contaminated Site,* Chehalis Power LP Generation Facility, FSID 3336951, CSID 11776, VCP SW1246), Ecology. December 5.

KTA Associates, Inc., 2016. *Cleanup Action Report for: Chehalis Power Plant, Transformers GSU#1 and GSU#3 Oil Spills.* KTA Associates, Inc (KTA). June.

RMP, 2012. *Cleanup Action Report – Chehalis Power Plant – Transformer GSU#1 Oil Spill*. PacifiCorp – Rocky Mountain Power (RMP). August.

RMP, 2016. *Cleanup Action Report for Chehalis Power Plant Transformers GSU#1 and GSU#3 Oil Spills*. RMP. July 6.

TEC, Inc., 2011. *Site Investigation Report, PacifiCorp Chehalis Plant, Chehalis, Washington.*

USEPA, 2021. *Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection*, United States Environmental Protection Agency. November.

URS, 2000, *Geotechnical Data Report Subsurface Investigation, Proposed Chehalis Generation Facility*, Lewis County Washington. URS Corporation (URS). September.

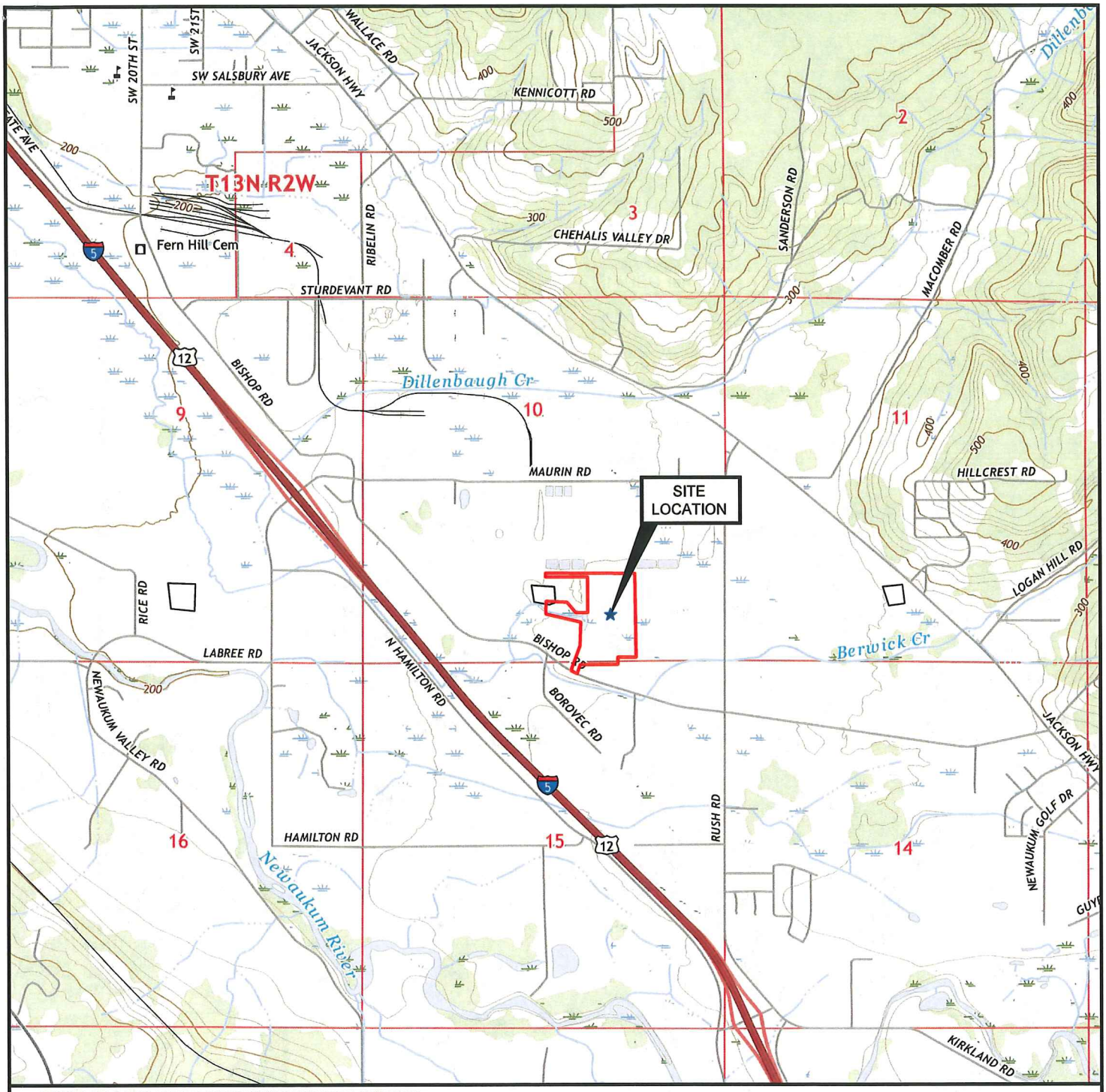
Weigle, J.M. and B.L. Foxworthy 1962. *Geology and Groundwater Resources of Western Central Lewis County, Washington.* Water Supply Bulletin No. 17. State of Washington Department of Conservation, District of Water Resources.

LIMITATIONS

The scope of work described in this work plan was developed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. This work plan was developed consistent with our agreement with our client. This work plan is solely for the use and information of our client unless otherwise noted. Any reliance on this work plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this work plan apply to conditions existing when the scope of work was developed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to completion of this work plan. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this work plan.

FIGURES



SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, CENTRALIA, WASHINGTON AND NAPAVINE, WASHINGTON (2020)

Scale: 1"=2,000

N

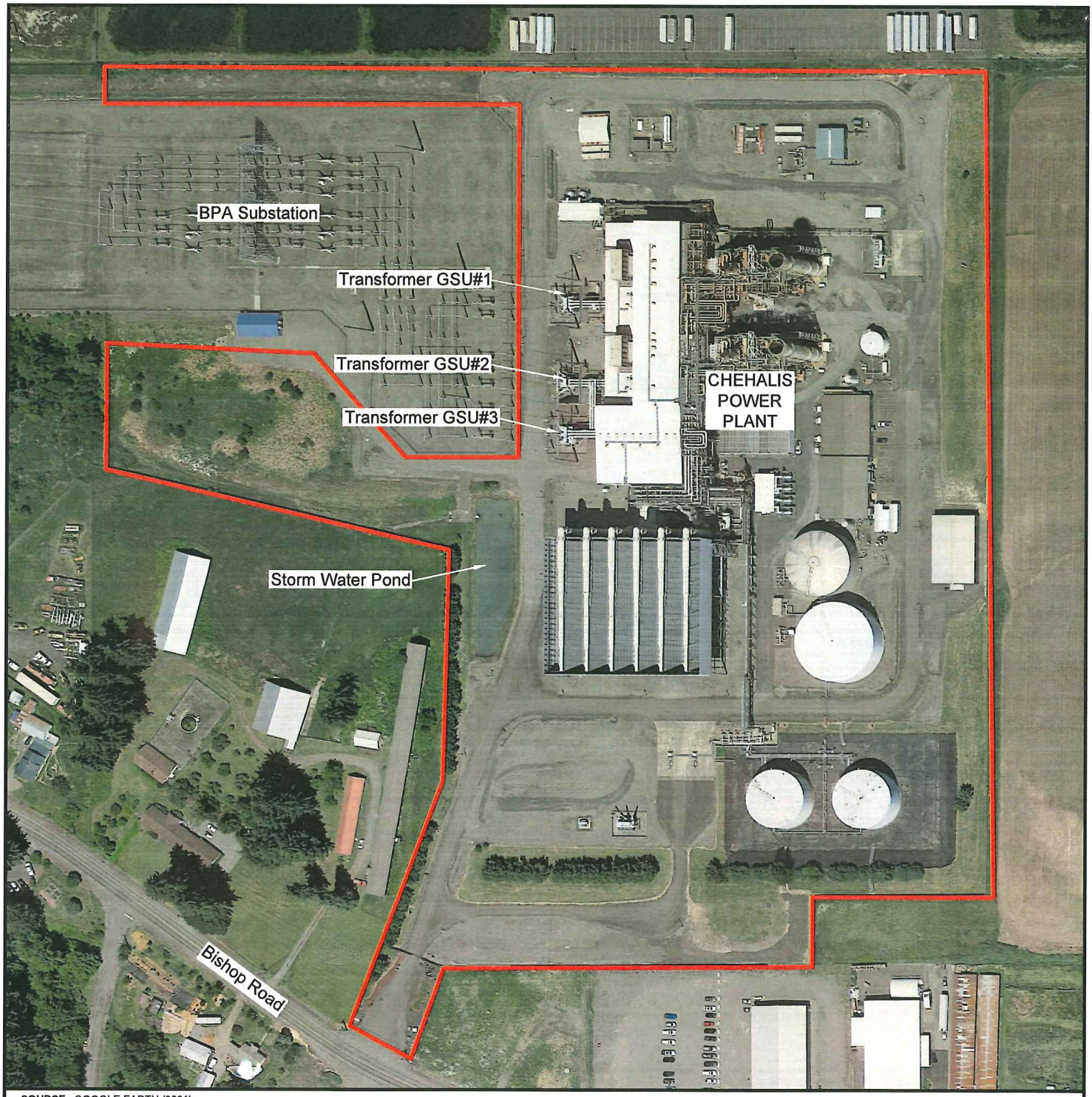
0 1,000 2,000 4,000

A & M Engineering and Environmental Services, Inc.
Consulting - Design - Construction - Remediation

SITE LOCATION MAP
CHEHALIS POWER PLANT

PACIFICORP ROCKY MOUNTAIN POWER
1813 BISHOP ROAD, CHEHALIS, WASHINGTON

SCALE:	DATE:	FIGURE NO.
AS SHOWN	2/22/23	1
APPROVED BY:	DRAWN BY:	PROJECT NO.
DJL	SRM	2064-0021



SOURCE: GOOGLE EARTH (2021)

LEGEND

Approximate Site Boundary

N

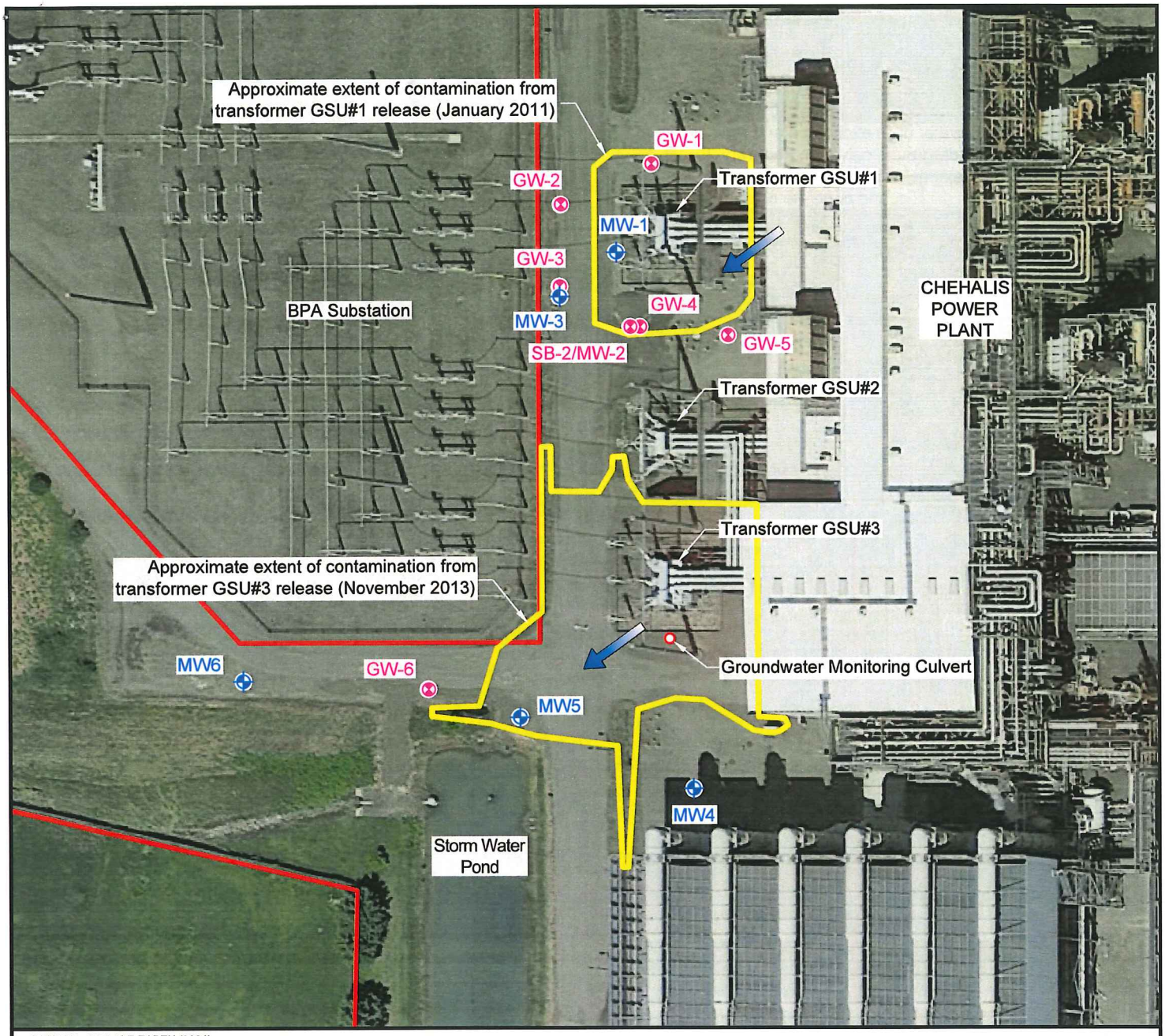
Scale: 1"=200'

0 100 200 400

A & M Engineering and Environmental Services, Inc.
Consulting - Design - Construction - Remediation

FACILITY MAP
CHEHALIS POWER PLANT
PACIFICORP ROCKY MOUNTAIN POWER
1813 BISHOP ROAD, CHEHALIS, WASHINGTON

SCALE:	DATE:	FIGURE NO.
AS SHOWN	2/22/23	2
APPROVED BY:	DRAWN BY:	PROJECT NO.
DJL	SRM	2064-0021



SOURCE: GOOGLE EARTH (2021)

LEGEND

- MW-1 — Monitoring Well
- GW-1 — Temporary Well (2011/2013)
- Approximate Property Boundary
- Approximate Shallow Groundwater Flow Direction

All Locations are Approximate

N

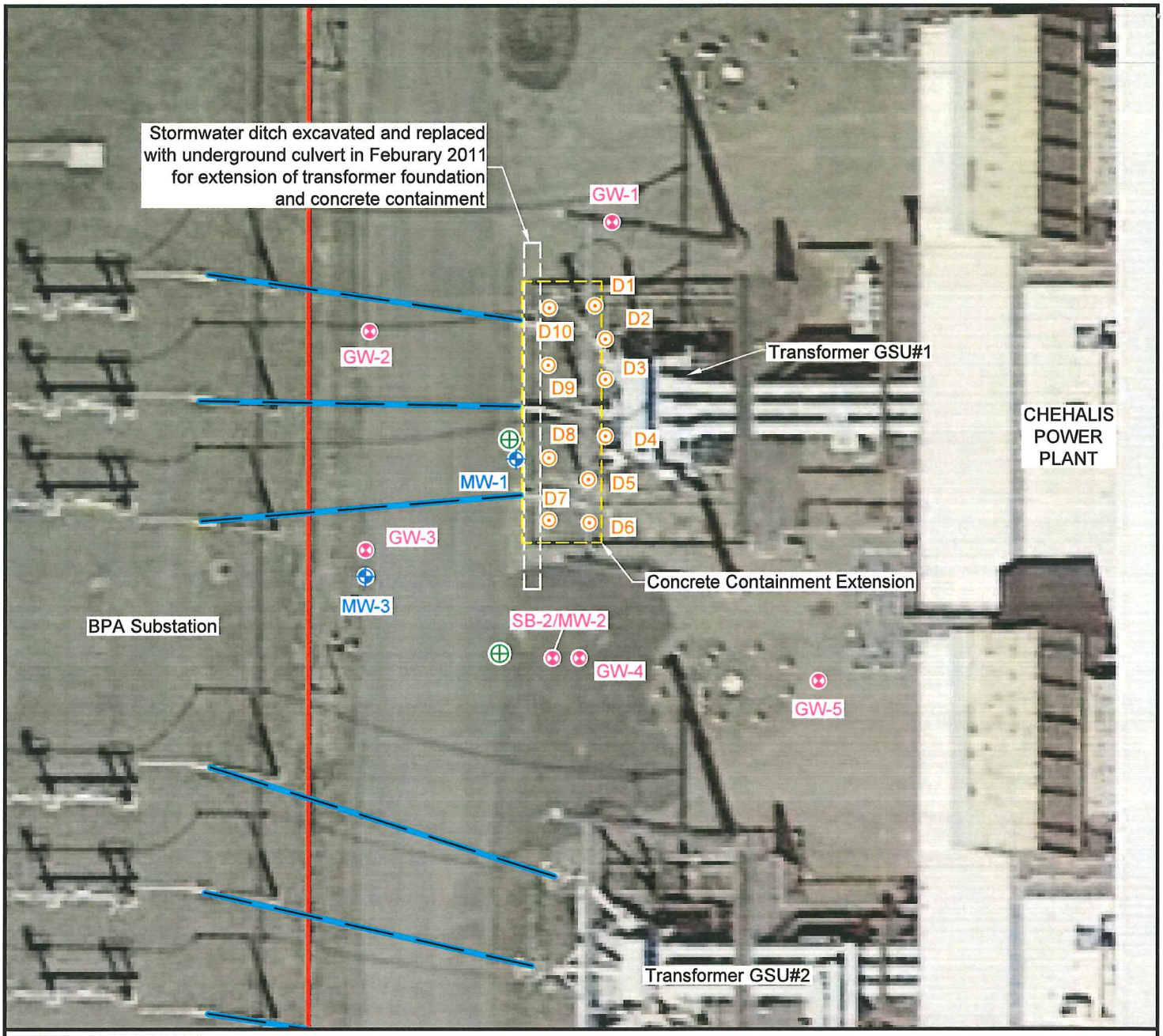
Scale: 1"=80'

0 40 80 160

A & M Engineering and Environmental Services, Inc.
Consulting - Design - Construction - Remediation

SPILL AREAS MAP
CHEHALIS POWER PLANT
PACIFICORP ROCKY MOUNTAIN POWER
1813 BISHOP ROAD, CHEHALIS, WASHINGTON

SCALE:	DATE:	FIGURE NO.
AS SHOWN	2/23/23	3
APPROVED BY:	DRAWN BY:	PROJECT NO.
DJL	SRM	2064-0021



SOURCE: GOOGLE EARTH (2021)

LEGEND

- ⊕ Proposed Soil Boring
- MW-1 ⊕ Monitoring Well
- GW-1 ⊗ Temporary Well (2011/2013)
- D1 ⊙ Soil Sample (2011)
- Overhead Power Line
- Approximate Property Boundary

All Locations are Approximate

N

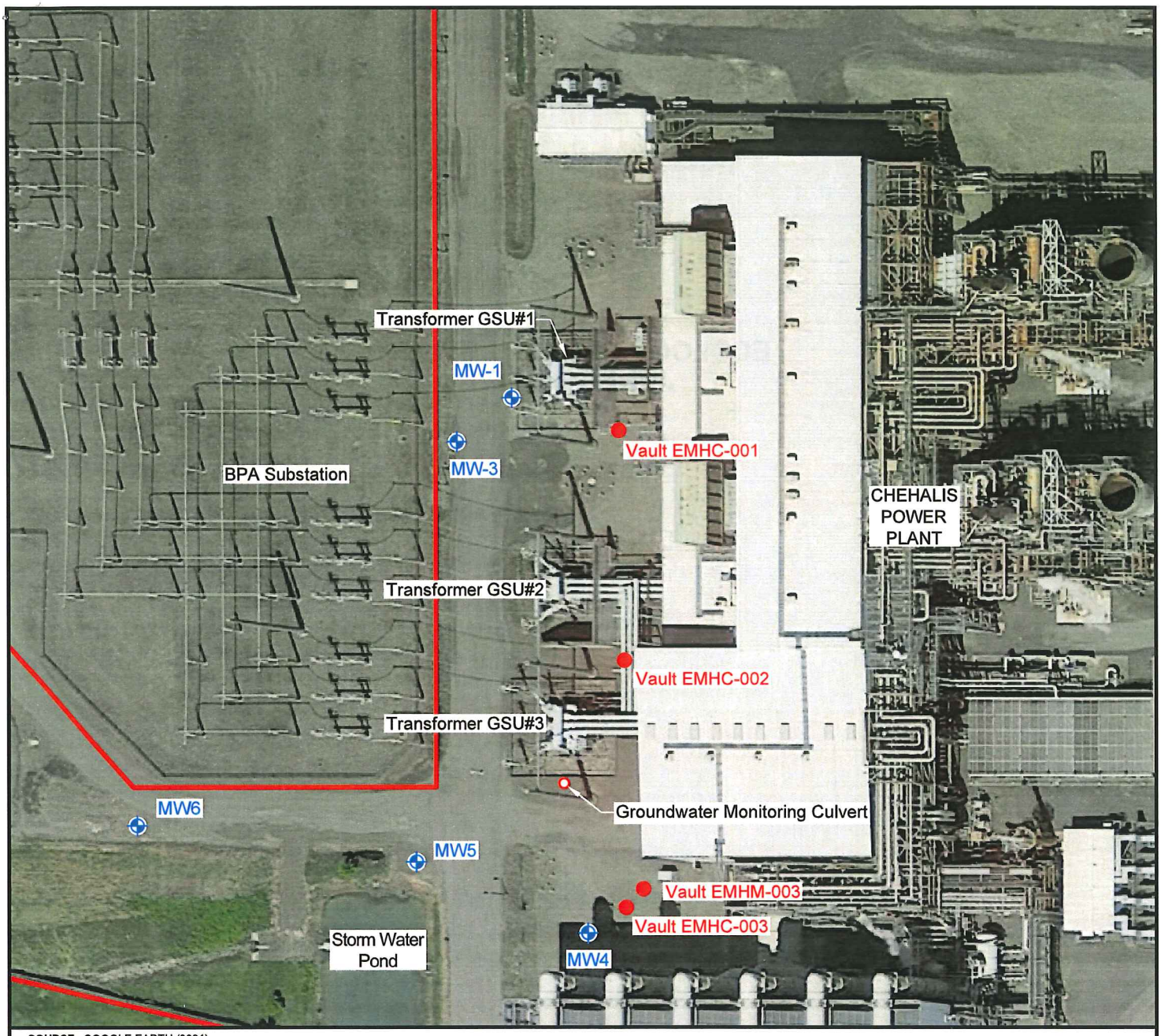
Scale: 1"=30'

0 15 30 60

A & M Engineering and Environmental Services, Inc.
Consulting - Design - Construction - Remediation

PROPOSED SOIL BORING LOCATIONS
CHEHALIS POWER PLANT
PACIFICORP ROCKY MOUNTAIN POWER
1813 BISHOP ROAD, CHEHALIS, WASHINGTON

SCALE:	DATE:	FIGURE NO.
AS SHOWN	2/22/23	4
APPROVED BY:	DRAWN BY:	PROJECT NO.
DJL	SRM	2064-0021



SOURCE: GOOGLE EARTH (2021)

LEGEND

MW-1 — Monitoring Well

Vault EMHM-003 — Electrical Vault

Approximate Property Boundary

All Locations are Approximate

N

Scale: 1"=80'

0 40 80 160

A & M Engineering and Environmental Services, Inc.

Consulting - Design - Construction - Remediation

ELECTRICAL VAULT SAMPLING LOCATIONS
CHEHALIS POWER PLANT

PACIFICORP ROCKY MOUNTAIN POWER

1813 BISHOP ROAD, CHEHALIS, WASHINGTON

SCALE:	DATE:	FIGURE NO.
AS SHOWN	2/22/23	5
APPROVED BY:	DRAWN BY:	PROJECT NO.
DJL	SRM	2064-0021

APPENDIX A
ECOLOGY OPINION LETTER
JUNE 26, 2017

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 26, 2017

Mark Miller
PacifiCorp Rocky Mountain Power
Chehalis Power Plant
1813 Bishop Road
Chehalis, WA 98532

Re: Review of Cleanup Action Completion Report and Response to No Further Action Request (VCP SW1246; FSID 3336951; CSID 11776)

Dear Mr. Miller:

The Washington State Department of Ecology (Ecology) has reviewed the July 6, 2016 *Cleanup Action Report for Chehalis Power Plant Transformers GSU #1 and GSU #3 Oil Spills* for the Chehalis Power Plant, located at 1813 Bishop Road in Chehalis, Washington (Site). This document was prepared for PacifiCorp Rocky Mountain Power (PacifiCorp) by KTA Associates, Inc. (KTA) and summarizes spill response and subsequent cleanup and monitoring activities performed at the Site in association with two distinct releases of non-PCB transformer fluids (mineral oil) in 2011, and again in 2013. PacifiCorp requested Ecology's opinion of the cleanup activities performed at the Site and recommended that a No Further Action determination be granted based on those activities. This letter provides Ecology's response to those requests under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Basis for the Evaluation

The evaluations and opinions presented herein were based on the information contained in the following documents:

1. KTA Associates, Inc., *Cleanup Action Report for Chehalis Power Plant Transformers GSU #1 and GSU 3# Oil Spills*, dated June 2016 (2016 CAR);
2. Clear Water Services, *Groundwater Monitoring Report*, 4th Quarterly Event - March 2016, dated April 2016;
3. Clear Water Services, *Groundwater Monitoring Report*, 3rd Quarterly Event - December 2015, dated January 2016;
4. Cardno, *Groundwater Monitoring Report*, 2nd Quarterly Event – July 2015, dated July 2015;
5. Cardno, *Groundwater Monitoring Report*, 1st Quarterly Event - April 2015, dated June 2015 (1st Quarter 2015 Monitoring Report);

6. Cardno, *Monitoring Well Installation & Support Tasks Final Report*, dated May 2015 (2015 Well Installation Report); and

7. KTA Associates, Inc., *Cleanup Action Report for Chehalis Power Plant Generator Step-up Transformer No.1 (GSU #1) Oil Spill,* August 2012 (2012 CAR).

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

The evaluations and opinions presented herein are considered void if any of the information contained in the above documents is materially false or misleading.

Site Description and Release Summary

As noted above, the Site is located at 1813 Bishop Road in Chehalis, Washington (Lewis County) and within the Chehalis River Valley. The Site is a 20-acre, level-grade property occupied by a power generation facility. The facility also includes two 1.7 million gallon fuel oil aboveground storage tanks (ASTs) in a lined earthen containment. A stormwater collection ditch surrounds the facility to collect stormwater from the facility's graveled lot, and conveys the water to a stormwater pond located at the west side of the facility. Key events in the development of this project are summarized below.

2011 GSU #1 Mineral Oil Release

On January 20, 2011, a Generation Step Up transformer (GSU #1), containing non-polychlorinated biphenyl (PCB) mineral oil, experienced an explosive failure and subsequent fire. An estimated 2,000 gallons of the 11,000 gallons of mineral oil in the transformer sprayed onto the transformer containment structure and surrounding soil outside the containment structure. During the subsequent firefighting operations, the containment around GSU #1 was filled beyond capacity, causing mineral oil and other fluids to flow onto the surrounding gravel and soil and into the adjacent stormwater pond. On-duty personnel closed the discharge outfall from the stormwater pond and none of the released material was allowed to discharge from the pond.

Due to the emergency nature of the spill and contamination, cleanup activities were immediately initiated and soil samples were collected to guide remedial excavation activities and for confirmation purposes. Residual mineral oil was documented in soil at three sampling locations and additional excavation of the affected material occurred at two of the locations (a drainage ditch and stormwater pond-bank). The third location (designated as **D8), where mineral oil was detected at 28,100 milligrams per kilogram (mg/kg) in a soil sample collected from 20-inches below grade**, was subsequently covered as a result of expanding the adjacent GSU #1 containment structure before this soil could be further excavated.

During expansion of the GSU #1 containment structure, excavation proceeded to the water table where light, non-aqueous-phase liquid (LNAPL) was observed, confirming that the release of mineral oil had likely migrated to groundwater (no groundwater samples or depth-to water measurements were collected at that time). Sorbent materials were deployed to address the LNAPL and an unknown amount of contaminated groundwater was pumped into an empty, on-property above-ground storage tank (AST) prior to disposal. Laboratory analysis of the water contained within the AST revealed the presence of mineral-oil in the associated samples.

In May of 2011, six temporary wells (GW-1 through GW-6) were installed to evaluate groundwater conditions in the vicinity of GSU #1. Each of the temporary wells were screened from 5 to 15 feet below ground surface (bgs) and sampled using low-flow purging methods. **Only one location (GW-4) detected mineral oil (as diesel-range total petroleum hydrocarbons [TPH-Dx] at 1,100 microgram per liter [µg/l])** above the MTCA Method A cleanup level of 500 µg/l. Groundwater samples collected from the remaining locations did not contain TPH-Dx above laboratory reporting limits.

2013 Site Investigation Summary

As a result of an Ecology letter, dated November 20, 2012, suggesting that further action was needed to evaluate deeper soil and groundwater in the vicinity of GSU #1, KTA retained Cardno, of Seattle, Washington, to install three monitoring wells (MW-1 through MW-3) at the Site. Locations of these monitoring wells were selected based on the documented presence of elevated concentrations of mineral oil in soil and groundwater in the vicinity of GSU #1 as follows:

- MW-1 - screened from 4.5 to 17 feet bgs and installed near the former location of soil sample D8, where mineral oil was detected at a concentration of 28,100 mg/kg;

- MW-2 – proposed for installation near the former site of groundwater sample GW-4, where mineral oil was detected in groundwater at 1,100 µg/l. **This location was abandoned** following discovery of a "fire water supply line" while advancing the associated boring (SB-2). To Ecology's knowledge, **no relocation of this proposed monitoring location was attempted;** and

- MW-3 - screened from 4 to 19 feet bgs and installed downgradient from GSU #1 to evaluate groundwater gradients, flow directions, and potential impacts associated with the 2011 mineral oil release.

Soil samples collected during the 2013 well installation activities (SB-1 through SB-3) did not contain concentrations of TPH-Dx above laboratory reporting limits. The grab groundwater sample, however, collected from soil boring SB-2 (at the proposed location of MW-2), contained **380 µg/l of mineral oil** (as diesel-range organics [DRO]). The 2016 CAR concluded that reductions in the concentration of dissolved-phase mineral oil observed through time at this location (from 1,100 µg/l in 2011 to 380 µg/l in 2013) were likely the result of "natural processes" occurring in groundwater beneath the Site.

Groundwater samples collected from monitoring locations MW-1 and MW-3 did not reveal the presence of dissolved-phase TPH-Dx above laboratory reporting limits at these locations.

2013 GSU #3 Mineral Oil Release

On November 22, 2013, a second transformer, GSU #3, experienced an explosive failure and subsequent fire, resulting in a release of non-PCB transformer fluids (mineral oil) in the vicinity of GSU #3 and stormwater conveyance system and pond. On-duty personnel closed the discharge outfall from the stormwater pond and none of the released material was allowed to discharge from the pond. Subsequent reports of this incident estimated the released volume of mineral oil at 4,337 gallons and suggested that the majority of these fluids were recovered during the initial spill response and associated remedial excavation activities. Following these initial activities, a series of 45 confirmation soil samples were collected prior to placement of clean fill and gravel. As presented in the 2016 CAR, only two of the 45 samples collected yielded detections of mineral oil above analytical reporting limits, however, those concentrations remained below the associated MTCA Method A cleanup level (CUL) of 4,000 mg/kg.

During the soil excavation activities conducted in response to the GSU #3 mineral oil release, an "oil sheen" was observed on groundwater encountered at approximately 5 feet bgs. According to the 2016 CAR, a "vertical slotted culvert was installed to visually monitor groundwater" during January of 2014, to a depth "just below" the water table, on the south side of the GSU #3 containment structure. Immiscible droplets of oil continued to be observed in the vertical culvert throughout 2014. Though groundwater in the culvert has reportedly been free of visible oil since 2014, it does not appear that samples have been obtained from this culvert.

2015 Monitoring Well Installations

During April of 2015, KTA and Cardno installed three additional monitoring wells (MW-4 through MW-6) downgradient of GSU #3 to evaluate potential mineral oil impacts to groundwater beneath this area of the Site. These monitoring locations were constructed with screened intervals from approximately 5 to 25 feet bgs. Soil samples collected during advancement of the monitoring wells (SB4 through SB6) did not exhibit detections of NWTPH-Dx or mineral oil above MTCA Method A CULs.

In addition to these installation activities, a series of underground electrical vaults, located in the vicinity of GSU #1 and GSU #3, were inspected and sampled to evaluate suspected impacts from mineral oil to storm- and groundwater that was observed flowing into these utilities. Water samples collected from the utility vaults revealed **concentrations of dissolved-phase DRO up to 1,900 µg/l.**

2015-2016 Groundwater Monitoring and Sampling

Four quarterly sampling events were conducted at the Site during April 2015 through March 2016. Laboratory analysis of groundwater samples collected from the Site monitoring well network (MW-1 and MW-3 through MW-6) did not detect NWTPH-Dx above laboratory reporting limits during this period.

Evaluation of Site Cleanup and Characterization

Based on the data gaps and deficiencies described below, Ecology is unable to grant a determination of No Further Action for the Site at this time. To generate a sufficient data set from which Ecology can fully evaluate the Site for closure, please submit a Work Plan that contains a proposal to sufficiently address the following items:

1. **Depth-discrete soil- and groundwater sampling in the immediate vicinity of former borings GW-4 and SB-2.** According to the 2016 CAR, SB-2 (proposed location of MW-2) was advanced to 30 feet bgs prior to collecting a groundwater sample, in which DRO (mineral oil) was detected at 380 µg/l. The 2016 CAR compared these concentrations to those reported from the groundwater sample collected from the co-located boring GW-4 during May of 2011 (1,100 µg/l). At the time the groundwater sample was obtained from GW-4, however, water levels at this location were approximately 13 feet bgs. To evaluate the current concentrations of mineral oil in the vicinity of the former location of borings GW-4/SB-2, Ecology is requesting that additional, depth-discrete soil- and groundwater sampling be performed in this area of the Site. These samples should be collected, at a minimum 10-foot interval-spacing, from first encountered water to the approximate total depth of SB-2 (30 feet bgs).

2. **Depth-discrete soil sampling in the immediate vicinity of former boring D8.** Though Ecology acknowledges that groundwater data obtained from monitoring location MW-1 does not indicate that groundwater has been impacted by the sorbed-phase mineral oil previously reported from beneath the GSU #1 containment structure (sample D8; 28,100 mg/kg at 20 inches bgs), additional information is needed to evaluate the current nature and extent of this compound immediately beneath this area of the Site. As a result, Ecology is requesting that additional, depth-discrete soil sampling, be performed in the immediate vicinity of former boring D8. These samples should be collected from 20 inches bgs and at the water-table interface.

3. **Grab-groundwater sample collection from the vertical "groundwater monitoring culvert".** Ecology is requesting that grab-groundwater samples be obtained from the vertical "groundwater monitoring culvert", installed adjacent to GSU #3, for subsequent analysis of NWTPH-Dx. Additionally, Ecology is requesting further details regarding the construction and placement of this culvert (i.e. total depth, slotted interval, and means of access).

Ecology is concerned that this culvert may present a preferential pathway to shallow groundwater for potential releases of mineral oil from the nearby GSU #3. Please provide information as to how PacifiCorp intends to address this concern.

4. **Updated evaluation of mineral oil impacts to on-Site utility vaults and assessment of risk to employees.** As described above, water samples collected from the utility vaults in the vicinity of GSU #1 and #3 during 2015 revealed concentrations of dissolved-phase DRO up to 1,900 µg/l. Ecology is requesting an updated evaluation of potential mineral oil impacts to these utility vaults and associated assessment of risk to on-Site employees that may access these structures.

Additional Comments

5. During a review of Site documentation, Ecology personnel noted erroneous values in Ecology's Environmental Information Management (EIM) system. Specifically, First Quarter 2015 groundwater monitoring results associated with monitoring location MW-1 indicate non-detectable concentrations of DRO for this location, inconsistent with analytical reports indicating DRO at 120 ug/l (Appendix E of the 2016 CAR; 1st Quarter 2015 Monitoring Report). Ecology is requesting confirmation of the correct laboratory analytical results associated with this monitoring location and event. Please make every effort to assure that data uploaded to EIM is done so in a timely and accurate manner.

6. Groundwater samples initially collected monitoring locations MW-1 and MW-3 during October and November of 2013 were analyzed for NWTPH-Dx using silica gel cleanup (SGC). Please assure that all future groundwater samples collected from the Site for NWTPH-Dx analysis report results for *both* pre-SGC and post-SGC sample treatment.

Limitations

1. **Opinion does not settle liability with the state.**

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the Voluntary Cleanup Program (VCP).

4. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-0276 or e-mail at Jeremy.Hughes@ecy.wa.gov.

Sincerely,

Jeremy Hughes, L.G.
VCP Site Manager
Toxics Cleanup Program, Southwest Regional Office
Washington State Department of Ecology

By certified mail: [91 7199 9991 7037 0291 6142]

cc: Nicholas M. Acklam, Ecology
Matthew Alexander, Ecology

APPENDIX B
FIELD FORMS

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME _____
PROJECT # _____
GEOLOGIST/ENGINEER _____
DRILLING CONTRACTOR _____
DRILLING METHOD _____
HOLE DIAMETER _____

BORING ID. _____
DATE BEGAN _____
DATE COMPLETED _____
TOTAL DEPTH _____
SHEET _____ OF _____

OTHER	WELL OR PIEZOMETER	DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE ID	BLOW COUNT	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION

WATER LEVEL DATA

DEPTH				
TIME				
DATE				
BORING DEPTH				

FIELD LOCATION OF BORING:

GROUND ELEVATION _____

DATUM _____

NOTES:

WELL DEVELOPMENT DATA SHEET

PROJECT NAME: _____ WELL ID:_____

SITE ADDRESS:_____

Wind From	N	NE	E	SE	S	SW	W	NW	Light	Medium	Heavy
Weather	Sunny		Cloudy		Rain		_____?		Temperature:	_____°F	_____°C

WELL DATA

Date	Casing Diam	DTB	DTW	DTB-DTW	Casing Vol (gal)
	Annulus Diam.	Annulus Length	Annulus vol. per foot (bh-c)	Annulus Volume (gal)	BOREHOLE VOL. [Annulus + Casing] (gal)
			0.23		

Gal/ft=(dia/2)^{2}x0.163	1" = 0.041	2" = 0.163	3" = 0.367	4" = 0.653	6" = 1.469	10" = 4.080	12" = 5.875

WATER QUALITY DATA

Volume (gal)	PH	Spec. Cond.	Temp	Dissolved Oxygen	Turbidity	Observations

Notes:_____

Developed By:_____ Signature:_____

FIELD SAMPLING DATA SHEET
LOW-FLOW GROUNDWATER SAMPLING

PROJECT NAME: _____ WELL ID:_____

SITE ADDRESS: _____ LABEL CODE:_____

DUPLICATE ID:_____

Wind From	N	NE	E	SE	S	SW	W	NW	Light	Medium	Heavy
Weather	Sunny		Cloudy		Rain		_____?		Temperature:	_____°F	_____°C

WELL DATA

Date	Time	Casing Diameter	DT-Product	DT-Water	Product Thickness

PUMP/INTAKE DEPTH (ft btoc):_____

WATER QUALITY DATA

Time	DTW	Liters	PH	Temp	DO	Spec. Cond.	Redox	Turb

GROUNDWATER SAMPLE DATA

Sample Date:_____

Sample Time:_____

Bottle Type	√	Amount & Volume		Preservative	Filter	
VOA Glass			40 ml	HCl	NA	
Amber Glass			1 liter	HCl/None	NA	
Poly				HNO3		
Total Bottles						

Notes:_____

_____

_____

_____

Sampled By:_____ Signature:_____

APPENDIX C
GROUNDWATER MONITORING CULVERT PHOTOGRAPHS

GSU#3 with Groundwater Monitoring Culvert in foreground – Looking northeast.

Groundwater Monitoring Culvert – Looking north.

Interior of Groundwater Monitoring Culvert.

Slotted perforations in the Groundwater Monitoring Culvert.