ARCADIS

American Electric Power Service Corporation

Landfill - CCR Groundwater Monitoring Well Network Evaluation Update

H.W. Pirkey Power Plant

2400 FM 3251

Harrison County

Hallsville, Texas

January 20, 2022

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Appendix A. **Soil Boring Logs and Piezometers - 2018 Landfill Lateral Expansion Area**

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Acronyms and Abbreviations

AEP	American Electric Power Service Cooperation
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
BAP	bottom ash pond
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
EPRI	Electric Power Research Institute
FAP	fly ash pond
FGD	flue gas desulfurization
ft	feet
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
PTI	Permit to Install
TDS	total dissolved solids

1 Objective

This update report was prepared by ARCADIS U.S., Inc. (ARCADIS) for American Electric Power Service Corporation (AEP) to provide an updated assessment the adequacy of the groundwater monitoring well network included in the Coal Combustion Residual (CCR) requirements, as specified in Code of Federal Regulations (CFR) 40 CFR 257.91 and Texas Administrative Code (TAC) 30 TAC 352.911, for the Landfill CCR Unit at the AEP H.W. Pirkey Generating Plant (Plant) located at 2400 FM 3251 in Hallsville, Harrison County, Texas (**Figure 1**). The Landfill CCR Unit at the Plant was 130 acres and when fully expanded will cover approximately 145 acres in size. As shown on **Figure 2**, the Landfill was expanded laterally to the south beginning in 2018 (2018 Lateral Expansion). The 2018 Lateral Expansion will be approximately 15 acres in size. Currently approximately 3.5 acres of the 2018 landfill expansion has been constructed, in the northern portion of the expansion area, including the basal liners and leachate drainage system. The remaining area of the 2018 landfill expansion has not yet been fully constructed**.** During Lateral Expansion construction activities one of the existing downgradient monitoring wells (monitoring well AD-35) was plugged and replaced with new monitoring well AD-36. Monitoring well AD-35 was plugged because it was located within the footprint of the 2018 Lateral Expansion, and newly installed monitoring well AD-36 is located hydraulically downgradient of the 2018 Lateral Expansion.

Four regulated CCR units associated with the Plant were identified for review, which include the West BAP, East BAP, Stack Out Area, and Landfill (**Figure 2**). This report provides an updated evaluation of the groundwater monitoring well network in the uppermost aquifer at the Landfill, including the 2018 Lateral Expansion. The updated evaluation of the location restriction criteria for the Landfill 2018 Lateral Expansion is not included in this report and was completed previously under separate cover.

This evaluation included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the Landfill CCR unit, including the 2018 Lateral Expansion area, as well as publicly-available geologic and hydrogeologic data. The following report also presents the current Conceptual Site Model based on all documents reviewed and will further describe the uppermost aquifer, include an evaluation of the adequacy of the existing monitoring well network, and provide recommendations for monitoring well augmentation, as necessary.

2 Background Information

The following section provides background information for the AEP H.W. Pirkey Generating Plant Landfill.

2.1 Facility Location Description

The AEP H.W. Pirkey Plant is located in southern Harrison County, approximately 5 miles southeast of Hallsville, Texas, and approximately 8 miles southwest of Marshall, Texas. The existing Landfill CCR unit is located in the southern portion of the Plant. The existing Landfill CCR unit is currently approximately 133.5 acres in size, including 3.5 acres associated with the 2018 Landfill Lateral Expansion. When completed, the 2018 Landfill Lateral Expansion will cover in approximately 15 acres directly south of the existing Landfill (**Figures 2** and **3**).

2.2 Description of Landfill CCR Unit

The following section will discuss the embankment configuration, area, volume, construction and operational history, and surface water control associated with the Landfill.

2.2.1 Embankment Configuration

The Landfill was constructed in the southwestern portion of the Plant, and as shown on the U.S. Geological Survey 1983 topographic map (**Figure 1**), the southwestern portion of the Plant contained an unnamed intermittent tributary of Hatley Creek prior to Landfill construction in 1984. The Landfill was constructed within the unnamed tributary creek which had a bottom elevation ranging from approximately 290 feet amsl on the south side of the Landfill to 300 feet amsl on the north side of the Landfill. The native soil sidewalls of the tributary creek at the Landfill location have a maximum elevation of approximately 355 feet amsl. Therefore, as shown on Geologic Cross Section C-C' (**Figure 6**), the Landfill is partially incised within the tributary creek, and the tributary creek native soil sidewalls serve as a natural embankment for the lower portion of the Landfill.

The original Landfill design included emplacement of CCR materials in the Landfill with 3:1 slopes (3 feet horizontal, 1 foot vertical) with an approximate 10 foot wide bench for every 20 foot vertical rise of CCR material (VFL Technology Corporation, 1984). In addition to the Landfill CCR material embankments, earthen embankments are present around portions of the Landfill to control storm water flow.

The 2018 Landfill Lateral Expansion will cover approximately 15 acres directly south of the existing Landfill. Currently approximately 3.5 acres of the 2018 landfill expansion has been constructed, in the northern portion of the expansion area, including the basal liners and leachate drainage system. The remaining area of the 2018 landfill expansion has not yet been constructed**.** In 2016, Auckland Consulting conducted a stability assessment of the 2018 Lateral Expansion area and concluded the embankments would be stable on slopes no steeper than 3:1 (Auckland, November 2016). The 2016 Auckland Consulting report stated the northern and eastern extents of the 2018 Lateral Expansion will be constructed contiguous to the existing Landfill disposal area, and ash disposal will be completed in multiple lifts, each with an approximate height of 20 feet, integrated with safety benches, and maximum side slopes of 3:1 to a maximum waste height of 120 feet.

2.2.2 Area/Volume

Prior to expansion, the landfill was approximately 130 acres in size and was designed to receive 12,207,000 cubic yards (7,566 acre feet) of CCR materials including fly ash, bottom ash, economizer ash, and stabilized FGD sludge (VFL Technology Corporation, 1984). The design capacity of the CCR materials to be placed within the 2018 Lateral Expansion is approximately 2,200,000 cubic yards.

2.2.3 Construction and Operational History

The H.W. Pirkey Power Plant was constructed in 1983 and 1984, and began operation in 1985. Throughout the life of the Plant, CCR materials (fly ash, bottom ash, economizer ash, stabilized FGD sludge) have been generated. The CCR materials that are not taken offsite for beneficial reuse are disposed of in the Landfill. The Landfill was constructed in several phases beginning with the northeast portion (Phase 1) in 1984. The Landfill was expanded (east-central portion) in 1985 and 1987. The Landfill was subsequently expanded to the west and south during the 1990's, including construction of the Landfill Stormwater Runoff Pond (non-CCR unit) directly south of the Landfill in 1993 and 1994.

In 2005, ETTL conducted a geotechnical evaluation of the Landfill and Landfill Stormwater Runoff Pond, including installation 30 soil borings, ten cone penetration test (CPT) borings, and geotechnical testing of soil samples. The Landfill was further expanded to the west between 2005 and 2015 to its previous size of approximately 130 acres as shown on **Figure 3**.

The 2018 Landfill Lateral Expansion design included emplacement of up to 120 feet of CCR materials with maximum side slopes of 3:1 above the Landfill liner system which consisted of a 60-mil HDPE top liner underlain by a 2-foot-thick compacted clay bottom liner. Prior to installation of the liner system, approximately 10 to 15 feet of cut into the existing soils will occur along the topographically higher southern portion of the Lateral Expansion, and emplacement of these soils (clayey sands, silty clayey sand and/or lean clays) as fill materials below the liner system in the topographically lower central and northern portions of the Lateral Expansion. As detailed below in Section 3.3.2, during Lateral Expansion construction activities, existing downgradient monitoring well AD-35, located within the Lateral Expansion construction zone, was plugged and replaced with new monitoring well (AD-36) located directly downgradient to the west of the Lateral Expansion area.

2.2.4 Surface Water Control

Surface water in the area of the existing Landfill flows in a general southerly direction to the Landfill Stormwater Runoff Pond located directly southwest of the existing Landfill. Surface water in the area of the 2018 Landfill Lateral Expansion flows in a general westerly direction to the Landfill Stormwater Runoff Pond. The Landfill Stormwater Runoff Pond, which is approximately 16 acres in size, also receives (1) Landfill leachate that is gravity drained from the existing Landfill via underground lateral perforated pipes and permeable bottom ash materials that were installed above portions of the existing Landfill liner, (2) Landfill leachate that will gravity drain via underground lateral perforated pipes that were installed above the 2018 Landfill Lateral Expansion liner system, and (3) shallow groundwater that will gravity drain via underground lateral perforated HDPE underdrain pipes that were installed in permeable bottom ash materials approximately seven feet below the 60-mil HDPE liner of the 2018 Landfill Lateral Expansion.

2.3 Previous Investigations

The initial soils investigation and design of the Plant was provided in a January 31, 1983 report prepared by Sargent & Lundy entitled "*Henry W. Pirkey Power Plant, Design Summary for Lignite Storage Area and Wastewater Pond Facilities*". This investigation included advancement of soil borings throughout the Plant, including the Landfill Area.

A soils investigation of the Landfill was conducted by Southwestern Laboratories in 1984. The investigation included installation of 45 soil borings and geotechnical analyses of soil samples. The report recommended installation of three feet of compacted clay as the bottom liner for the Landfill (Southwestern Laboratories, July 1984).

An engineering design report for the Landfill was prepared by VFL Technology Corporation in 1984. The Landfill design included a bottom compacted clay liner three feet in thickness, and Landfill side slopes of 3:1 (VFL Technology Corporation, 1984).

In 1985, Southwestern Laboratories conducted a geotechnical evaluation of the clay liner that was installed at the base of the Landfill, including installation of four soil borings and permeability testing of soil samples. The report concluded the clay liner was three feet thick with a permeability less than 1×10^{-7} centimeters per second (cm/sec) (Southwestern Laboratories, 1985).

In 1993, Alliance Inc. conducted a geotechnical investigation of the clay liner installed at the base of the Landfill following a Landfill expansion phase in 1993. The report concluded the clay liner was three feet or more in thickness, and the clay liner met the permeability specifications of $<1 \times 10^{-7}$ cm/sec (Alliance Inc., 1993).

In 1995, Central and South West Services prepared design specifications for Landfill expansion to the west and south. The design specifications included a geosynthetic clay liner overlain by a 0.060-inch (60 mil) HDPE liner (Central and South West Services, 1995).

In 2005, ETTL conducted a geotechnical evaluation of the Landfill and Landfill Stormwater Runoff Pond, including installation 30 soil borings, ten CPT borings, and geotechnical testing of soil samples. The geotechnical data was obtained to design Landfill expansions in 2005 through 2007.

In 2010 and January 2011, Apex Geoscience expanded the groundwater monitoring well system at the Plant, including installation of monitoring wells AD-16 through AD-29. Apex Geoscience also conducted video surveillance of the existing monitoring wells and plugged monitoring wells MW-1, MW-5, MW-6, MW-9, MW-11, MW-14, MW-15, M-2, and M-3 (Apex Geoscience, March 2011).

In 2012, Apex Geoscience conducted a geotechnical investigation for Landfill expansion activities planned at the western portion of the Landfill where surface lignite mining operations had previously been conducted to a depth of 50 to 100 feet using a dragline, and the spoils (reclaimed soil) were returned to the excavation. The report concluded the Landfill embankments would be stable with side slopes of 3:1 (Apex Geoscience, 2013).

In December 2015, Auckland Consulting further expanded the groundwater monitoring well system at the Plant, including installation of six monitoring wells (AD-30 through AD-35) (Auckland Consulting, 2016).

In 2016, Auckland Consulting conducted a geotechnical evaluation of the 2018 Landfill Lateral Expansion area, including installation of eight soil borings (B1 through B8) with total depths ranging from 40 to 62 feet below ground surface (bgl). Soil boring locations are shown on **Figure 11**, and copies of the soil boring logs are provided in **Appendix A.** Based on the results of the 2016 geotechnical evaluation, including slope stability

modeling and settlement analysis, Auckland Consulting concluded the 2018 Landfill Lateral Expansion will be structurally stable with maximum side slopes of 3:1 to a maximum disposal height of 120 feet (Auckland, November 2016).

In 2018, Auckland Consulting installed seven piezometers (PZ-1 through PZ-7) within the 2018 Landfill Lateral Expansion area to obtain detailed depth to groundwater and groundwater flow direction data prior to construction of the Lateral Expansion. The piezometers were completed in the uppermost water-bearing unit with total depths ranging from 14 to 20 feet bgl. Piezometer locations are shown on **Figure 11**, and piezometer completion data is provided in **Appendix A.**

In November 2018, AD-35 was decommissioned due to landfill expansion activities. AD-36 was installed in April 2019 as replacement of AD-35 as a new downgradient monitoring well in the CCR well network. Eight background samples were collected from August 2019 to July 2020 to establish Appendix III background values at AD-36 to incorporate AD-36 into the CCR well network (AEP, 2021). AD-36 has been included in the subsequent semi-annual sampling events completed in November 2020, May 2021, and November 2021. The well construction log and well construction report for AD-36 are included in **Appendix B**.

2.4 Hydrogeologic Setting

2.4.1 General

The site area is located within the West Gulf Coastal Plain. Cretaceous formations crop out in belts that extend in a northeasterly direction parallel to the Gulf of Mexico, and dip gently southeast. The central and northern portions of the Plant are located on the outcrop of the Eocene-age Recklaw Formation. The Recklaw Formation consists predominantly of clay and fine grained sand, and attains a maximum thickness of approximately 100 feet (Broom, 1966).

The Recklaw Formation is underlain by the Eocene-age Carrizo Sand, which outcrops in the topographically low southern portion of the Site in the area of the Landfill Stormwater Runoff Pond. The Carrizo Sand consists of fine to medium grained sand interbedded with silt and clay, and attains a thickness of up to approximately 100 feet in Harrison county, Texas (Broom, 1966). As shown on Geologic Cross Sections C-C' (**Figure 6**) and D-D' (**Figure 7**), a thick sand stratum is located below and adjacent to the Landfill between an elevation of approximately 270 feet and 330 feet amsl. This sand stratum likely corresponds to the Carrizo Sand based on geologic maps of the Site area (Broom, 1966; Flawn, 1965).

The Carrizo Sand is underlain by the Eocene-age Wilcox Formation, which outcrops in topographically low areas near the Sabine River to the south and southeast of the Plant (Flawn, 1965). The Wilcox Formation consists of interbedded sand and clay with seams of lignite, and attains a thickness of approximately 700 feet (Broom, 1966). As shown on Geologic Cross Section D-D' (**Figure 7**), a lignite seam was encountered below an elevation of approximately 270 feet amsl during drilling of monitoring well AD-24 at the south end of the Site. This lignite seam likely corresponds to the top of the Wilcox Formation based on geologic maps of the Site area (Broom, 1966; Flawn, 1965).

These features are further illustrated on five lines of cross section that were prepared through the existing Landfill Area, with three lines trending from west to east (A-A'; B-B'; C-C'), and the other two lines trending from north to south (D-D'; E-E'). The cross section location map is included as **Figure 3** and the lines of cross section are included as **Figure 4** (A-A') through **Figure 8** (E-E').

2.4.2 2018 Landfill Lateral Expansion Area

Based on the hydrogeologic data obtained from soil borings, monitoring wells, and piezometers installed in the 2018 Landfill Lateral Expansion area, four lines of cross section were prepared through the 2018 Landfill Lateral Expansion area. The cross section location map is included as **Figure 11** and the lines of cross section are included as **Figure 12** (F-F'), **Figure 13** (G-G'), **Figure 14** (H-H'), and **Figure 15** (I-I').

As shown on **Figures 12** through **15**, a reddish-brown to gray clayey and silty sand stratum is located below the Lateral Expansion area between an elevation of approximately 280 feet and 330 feet amsl. This sand stratum likely corresponds to the Carrizo Sand based on geologic maps of the Site area (Broom, 1966; Flawn, 1965).

As shown on **Figures 12** through **15**, a clay stratum with an average thickness of approximately 10 feet is located below the sand stratum, and a lignite seam is present below the clay stratum at an elevation of approximately 270 feet amsl. As discussed above in Section 2.4.1, this lignite seam likely corresponds to the top of the Wilcox Formation based on geologic maps of the Site area (Broom, 1966; Flawn, 1965).

2.4.3 Climate and Water Budget

Average temperatures in Harrison County, Texas range from 47.1˚ Fahrenheit (F) in January to 83.8˚F in July, and the mean annual growing season is 238 days. Average annual precipitation (including liquid water equivalent from snowfall) is approximately 47 inches (Broom, 1966).

2.4.4 Regional and Local Geologic Setting

The central and northern portions of the Plant are located on the outcrop of the Eocene-age Recklaw Formation. The Recklaw Formation is underlain by the Eocene-age Carrizo Sand, which outcrops in the topographically low southern end of the Plant where the existing Landfill, 2018 Landfill Lateral Expansion, and Landfill Stormwater Runoff Pond are located (Broom, 1966; Flawn, 1965).

Detailed regional geologic characterization can be found in several published reports including Texas Water Development Report 27 "*Ground-Water Resources of Harrison County, Texas*" (Broom, 1966), The University of Texas at Austin Bureau of Economic Geology "*Geologic Atlas of Texas – Tyler Sheet*" (Flawn, 1965), and U.S. Geological Survey Open-File Report 88-450K "*Petroleum Geology and the Distribution of Conventional Crude Oil, Natural Gas, and Natural Gas Liquids, East Texas Basin*" (USGS, 1988).

Detailed regional and site geologic characterization can also be found in the 2010 ETTL report entitled "*Geotechnical Investigation, Pirkey Power Station, Existing Ash, Surge, Lignite and Limestone Runoff, and Landfill Stormwater Ponds Embankment Investigation, Hallsville, Texas*" (ETTL, 2010).

2.4.5 Surface Water and Surface Water Groundwater Interactions

Figures 9 and **10** are potentiometric surface maps based on January 2016 and August 2017 water level data, respectively, for the uppermost water bearing unit at the Site, and water level elevations in the Site monitoring wells are summarized on **Table 1** and has been updated to include data through 2021. As shown on **Figures 9** and **10**, shallow groundwater flow direction in the Landfill area is southwesterly at an average hydraulic gradient of approximately 0.01 foot per foot.

The Landfill is located approximately 400 feet west of Brandy Branch Reservoir, which was dammed during Plant construction in the 1980's. The normal pool level of Brandy Branch Reservoir is approximately 340 feet amsl. As shown on **Figures 9** and **10**, shallow groundwater flow direction at the Site generally follows surface topography to the west and southwest toward Hatley Creek, which is located in a topographically low area approximately one mile west of the Site. Therefore, shallow groundwater in the Landfill area does not discharge into Brandy Branch Reservoir. Brandy Branch Reservoir likely recharges the uppermost water bearing unit in the southern portion of the Site, where the pool level in the Reservoir (340 feet amsl) is higher than water level elevations in monitoring wells located southwest (downslope) of the Reservoir.

Figure 16 is a June 2018 potentiometric surface map for the uppermost water-bearing unit in the 2018 Landfill Lateral Expansion area, and water level elevations for the 2018 Landfill Lateral Expansion area piezometers are summarized on **Table 2**. As shown on **Figure 16** and potentiometric figures for the semi-annual sampling from 2019 to 2021 included in **Appendix C**, shallow groundwater flow direction in the 2018 Landfill Lateral Expansion area is westerly toward the Landfill Stormwater Runoff Pond at a hydraulic gradient of approximately 0.02 foot per foot. Water level elevations in the 2018 Landfill Lateral Expansion area piezometers were higher than the surface water elevation of the Landfill Stormwater Runoff Pond (approximately 298 feet amsl), which indicated shallow groundwater in the 2018 Landfill Lateral Expansion area discharges into the Landfill Stormwater Runoff Pond.

2.4.6 Water Users

A water well inventory conducted by Banks Information Solutions showed 12 water wells had been drilled within a ½-mile radius of the Site (Banks, 2015). The nearest water well was reportedly drilled directly east of the Landfill in 2004 by Bennett Drilling for use as a rig supply well. The water well was screened from 330 to 426 feet below ground surface, therefore this water well is completed in a deeper water bearing unit relative to the uppermost water-bearing unit at the Site.

The second closest water well was reportedly drilled directly south of the Landfill by Amoco Production Company in 1991 for use as an oil field rig supply well. The water well was screened from 163 to 243 feet below ground surface, therefore this water well is completed in a deeper water bearing unit relative to the uppermost water-bearing unit at the Site.

The third closest water well was reportedly drilled approximately 200 feet southwest of the Landfill by Matador Operating in 2000 for use as an industrial well. The water well was screened from 340 to 420 feet below ground surface, therefore this water well is completed in a deeper water bearing unit relative to the uppermost water-bearing unit at the Site.

All of the water wells identified within a ½-mile radius of the Site were drilled to total depths of 160 feet or deeper except one water well (Well ID: 35-37-4E) that was drilled to a total depth of 55 feet in 1982. This water well was completed with concrete tile from the surface to total depth and is located approximately ¼-mile east (upgradient) of the Pirkey Power Plant.

3 Groundwater Monitoring Well Network Evaluation

The existing monitoring well network present at the Site was evaluated to determine if any of the wells were viable for continued use as part of the groundwater monitoring well network or also retained as part of a larger groundwater hydraulic monitoring well network. The hydrogeologic conditions were also evaluated to determine if the uppermost aquifer unit has an effective well network. The evaluation was completed in accordance with 40 CFR 257.91 and 30 TAC 352.911 to have an established monitoring well network that effectively monitors the uppermost aquifer up gradient and down gradient of the Site. The up gradient wells represent background groundwater quality and the down gradient wells are to be placed down gradient of the CCR unit boundary to monitor water quality.

3.1 Hydrostratigraphic Units

3.1.1 Horizontal and Vertical Position Relative to CCR Unit

Geologic data from soil borings, piezometers, and monitoring wells installed at the Site show the uppermost aquifer in the existing Landfill Area is a very fine to fine grained clayey and silty sand stratum located below and adjacent to the existing Landfill between an elevation of approximately 270 feet and 330 feet amsl (**Appendix B**). The location of the uppermost water bearing unit relative to the existing Landfill is shown on cross section C-C' (**Figure 6)** and cross section D-D' (**Figure 7)**.

The location of the uppermost water bearing unit relative to the 2018 Landfill Lateral Expansion is shown on cross section F-F' (**Figure 12**), cross section G-G' (**Figure 13**), H-H' (**Figure 14**), and cross section I-I' (**Figure 15**). As shown on these geologic cross sections, the uppermost aquifer in the Landfill Lateral Expansion area is a clayey and silty sand stratum located between an elevation of approximately 280 feet and 330 feet amsl. Clay interbeds are present within the sand stratum, but the clay interbeds are discontinuous, indicating the entire saturated thickness of the sand stratum between approximately 280 feet and 330 feet amsl in the Lateral Expansion area is in hydraulic communication and represents the uppermost aquifer.

3.1.2 Overall Flow Conditions

Groundwater is recharged from regional precipitation infiltration. The uppermost aquifer (clayey and silty sand) is expected to have a hydraulic conductivity of approximately 10^{-4} centimeters per second (Fetter, 1980). Based on the hydraulic conductivity and saturated thickness in the Landfill area (up to 60 feet), the yield of the uppermost aquifer is anticipated to exceed the TCEQ non-useable (Class 3) limit of 150 gallons per day (TCEQ, 2010).

Groundwater elevations from the plant monitoring wells are summarized on **Table 1** and piezometer data is summarized on **Table 2**. The plant-wide comprehensive groundwater elevation data set from August 24, 2017 is depicted on **Figure 10**. Sitewide potentiometric surface maps from 2019 to 2021 are also included in **Appendix C**. The groundwater flow direction in the Landfill area is south to southwesterly towards Hatley Creek, which is located approximately one mile west of the Site.

Current groundwater elevations in the Landfill 2018 Lateral Expansion area are summarized on **Table 1-**, and a June 22, 2018 piezometric surface map is depicted on **Figure 16,** and potentiometric surface maps for sampling events completed from 2019 to 2021 are included in **Appendix C**. As shown on these figures, shallow

groundwater flow direction in the 2018 Landfill Lateral Expansion area is westerly toward the Landfill Stormwater Runoff Pond at a hydraulic gradient of approximately 0.02 foot per foot. Water level elevations in the 2018 Landfill Lateral Expansion area piezometers are higher than the surface water elevation of the Landfill Stormwater Runoff Pond (approximately 298 feet amsl), which indicates shallow groundwater in the 2018 Landfill Lateral Expansion area discharges into the Landfill Stormwater Runoff Pond.

3.2 Uppermost Aquifer

3.2.1 CCR Rule Definition

The CCR rule definitions for an aquifer and the uppermost aquifer as specified in 40 CFR 257.53 and 30 TAC 352.3 indicates an aquifer is a geologic formation capable of yielding usable quantities of groundwater to wells or springs while an uppermost aquifer is defined as the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers, that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural groundwater surface to which the aquifer rises during the wet season.

3.2.1.1 Common Definitions

An aquifer is commonly defined as a geologic unit that stores and transmits water (readily or at sufficient flow rates) to supply wells and springs (USGS, 2015; Fetter, 2001). The uppermost aquifer is considered the first encountered aquifer nearest to the CCR unit.

3.2.2 Identified Onsite Hydrostratigraphic Unit

The identified Site hydrostratigraphic unit in the Landfill area is the clayey and silty sand stratum that is located between an elevation of approximately 270 and 330 feet amsl.

3.3 Review of Existing Monitoring Well Network

3.3.1 Overview

A well construction table that summarizes the location, ground surface elevation, borehole depth, installation date, and associated well construction details of the monitoring well network is included as **Table 3**.

Monitoring wells AD-8, AD-12, AD-16, AD-23, AD-24, AD-25, AD-26, AD-27, AD-34, and AD-35 were previously installed at the Site to monitor the uppermost aquifer (clayey and silty sand stratum) associated with the Landfill. AD-35 was decommissioned in 2018 and AD-36 was installed as a replacement in 2019. As discussed above in Section 3.1.1, the uppermost aquifer below and adjacent to the existing Landfill is up to 60 feet thick and is located between an elevation of approximately 270 and 330 feet amsl. The uppermost aquifer below the Landfill Lateral Expansion area is located between an elevation of approximately 280 and 330 feet amsl.

3.3.2 Gaps in Monitoring Network

As shown on **Figure 10** and subsequent potentiometric maps in **Appendix C** shallow groundwater flow direction in the existing Landfill area is south to southwesterly. Four existing monitoring wells (AD-8, AD-12, AD-16, and AD-27) are located up gradient north and northeast of the Landfill and will be utilized as up gradient monitoring wells for the Landfill.

As shown on **Figure 10** and subsequent potentiometric maps in **Appendix C**, three existing monitoring wells (AD-23, AD-34, and AD-36) are located downgradient (south) of the Landfill and are currently utilized to monitor groundwater quality downgradient of the Landfill CCR unit. Monitoring well MW-35 was located within the footprint of the proposed 2018 Landfill Lateral Expansion and was plugged by a Texas Department of Licensing and Regulation (TDLR) licensed water well driller. This data gap was addressed by installation of new downgradient monitoring well AD-36. As shown on potentiometric surface maps included in **Appendix C**, monitoring well AD-36 is located on the west (downgradient) side of the 2018 Landfill Lateral Expansion. With the addition of monitoring well AD-36 as a replacement for monitoring well AD-35, there are no gaps in the groundwater monitoring network for the Landfill.

4 Monitoring Well Network and PE Certification

The groundwater monitoring well network is intended to meet specifications stated in 40 CFR 257.91 and 30 TAC 352.911. These wells are further discussed below with respect to location to the Landfill (up gradient or down gradient), well depth, and well construction. The monitoring well network provides an adequate understanding of groundwater quality, hydraulics, and groundwater flow at the Landfill.

4.1 Monitoring Well Network Distribution

Four up gradient well locations (existing monitoring wells AD-8, AD-12, AD-16, and AD-27) and three downgradient well locations (existing monitoring wells AD-23, AD-34, and AD-36) are currently utilized as the groundwater quality monitoring well network for the Landfill. During the 2018 Landfill Lateral Expansion construction activities, monitoring well AD-35 was plugged and replaced with a new monitoring well (AD-36) installed directly west (downgradient) of the Lateral Expansion. In addition, existing side gradient monitoring wells AD-25 and AD-26 may be utilized as piezometers to obtain additional groundwater flow direction and gradient data for the Landfill.

4.1.1 Location

The monitoring well network for groundwater quality of the uppermost aquifer at the Landfill is summarized on **Table 4** and illustrated on **Figure 17.**

4.1.2 Depth

The screen depths for the monitoring wells recommended for inclusion in the monitoring network are within the shallow saturated sand stratum (uppermost aquifer) that occurs between an elevation of approximately 270 and 330 feet amsl in the existing Landfill area, and between an elevation of approximately 280 and 330 feet amsl in the Landfill Lateral Expansion area, as shown on Geologic Cross Sections C-C' (**Figure 6**), D-D' (**Figure 7**), F-F' (**Figure 12**), G-G' (**Figure 13**), H-H' (**Figure 14**), and I-I' (**Figure 15**). The screen elevations are presented in **Table 4**.

4.1.3 Well Construction

As discussed above in Section 3.3.2, the gap in the monitoring well network for the uppermost aquifer at the Landfill due to the expansion activities has been previously addressed by plugging of monitoring well AD-35 in 2018 and installation of new monitoring well AD-36 in 2019. Well construction data for the monitoring well network are summarized on **Tables 3** and **4**, and the monitoring well completion diagrams for the existing monitoring wells are provided in **Appendix B**.

4.2 Professional Engineer's Certification

I, Kenneth J. Brandner, certify that this report was prepared under my direction and supervision, and that the information contained herein is true and accurate to the best of my knowledge. Based on my experience and knowledge of the site, the proposed groundwater monitoring system for the Landfill CCR unit is adequate to meet the requirements of 40 CFR Part 257.91 and 30 TAC 352.911.

Kenneth J. Brandner

Printed Name of Registered Professional Engineer

Kenneth J Brandner

Signature

69586	Texas	1-20-22
Registration No.	Registration State	Date

Arcadis U.S. Inc.
711 North Carancahua
Suite 904
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(361) 883-1353

Professional Geoscientist firm registration #50158
Texas Board of Professional Engineers firm registration #F-533

Firm Information

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Tables

Table 1
Water Level Data
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrison County, Texas

ARCADIS

Well ID	Latitude	Longitude	Ground Surface Elevation[a]	Top of Casing Elevation[a]	Borehole Depth ft. bls	Date Installed	Screen Material	Well Diameter inches	Top of Screen[b]		Bottom of Screen[b]		4/13/2011	12/15/2011	6/20/2012	1/23/2013	7/7/2013	1/22/2014	7/9/2014	1/28/2015	1/20/2016	1/12/2017	3/1/2017	4/11/2017
									Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl
Monitoring Wells																								
MW-2/AD-2	32° 27' 54.753"	94° 29' 25.282"	341.25	344.04	40	10/7/83	Sch. 40 PVC	4	20.0	321.3	40.0	301.3	326.90	327.12	327.17	327.26	326.62	327.70	327.19	328.62	328.55	327.65	327.96	329.09
MW-3/AD-3	32° 28' 6.829"	94° 29' 21.498"	372.76	375.30	57	11/4/83	Sch. 40 PVC	4	37.0	335.8	57.0	315.8	342.95	341.59	343.70	341.10	343.27	341.42	343.96	345.01	347.03	344.19	345.53	345.53
MW-4/AD-4	32° 27' 59.247"	94° 29' 4.692"	363.69	366.79	46	10/10/83	Sch. 40 PVC	4	26.0	337.7	46.0	317.7	351.45	351.24	352.44	354.42	349.22	355.58	353.33	359.00	359.16	353.27	355.38	356.62
MW-7/AD-7	32° 27' 43.611"	94° 29' 15.611"	359.61	362.79	40	10/3/83	Sch. 40 PVC	4	20.0	339.6	40.0	319.6	344.34	343.75	344.15	344.90	343.35	346.61	346.23	349.17	349.31	347.04	347.96	347.87
MW-8/AD-8	32° 27' 25.095"	94° 29' 14.925"	356.92	359.84	35	10/4/83	Sch. 40 PVC	4	20.0	336.9	35.0	321.9	341.65	340.29	341.65	340.72	341.25	341.67	343.36	344.03	347.21	345.74	346.00	345.81
MW-10/AD-10	32° 27' 52.446"	94° 29' 16.545"	359.48	362.21	40	10/10/83	Sch. 40 PVC	4	20.0	339.5	40.0	319.5	342.03	341.90	342.19	341.41	339.85	342.27	342.22	344.39	343.97	---	---	---
MW-12/AD-12	32° 27' 51.702"	94° 29' 3.238"	378.84	381.99	51	1/30/86	Sch. 40 PVC	4	31.0	347.8	51.0	327.8	358.95	357.99	359.33	368.07	357.41	369.97	367.04	372.75	371.05	365.11	368.79	372.97
MW-13/AD-13	32° 27' 46.002"	94° 29' 5.71"	361.98	364.76	40.5	2/23/88	Sch. 40 PVC	4	30.5	331.5	40.5	321.5	349.46	348.91	349.52	350.81	348.61	351.97	351.29	354.47	354.15	352.01	352.81	352.68
AD-16	32° 27' 40.871"	94° 29' 38.637"	356.81	360.05	35	12/30/10	Sch. 40 PVC	2	15.0	341.8	35.0	321.8	338.08	335.50	337.58	335.43	336.67	339.53	340.84	343.34	347.68	343.09	344.54	344.69
AD-17	32° 28' 2.315"	94° 29' 39.45"	342.65	346.09	30	12/30/10	Sch. 40 PVC	2	10.0	332.7	30.0	312.7	322.66	322.29	323.31	323.51	323.06	325.19	324.15	328.42	326.78	324.70	326.27	326.27
AD-18	32° 28' 9.245"	94° 29' 6.469"	360.48	363.42	25	1/3/11	Sch. 40 PVC	2	15.0	345.5	25.0	335.5	355.53	351.54	357.21	355.47	357.23	360.03	358.06	359.88	360.52	357.06	359.21	358.63
AD-19	32° 27' 50.512"	94° 29' 13.973"	359.50	362.82	30	12/30/10	Sch. 40 PVC	2	10.0	349.5	30.0	329.5	344.07	343.58	344.29	344.62	342.60	345.11	345.76	347.92	347.40	---	---	---
AD-20	32° 27' 51.346"	94° 29' 21.576"	352.30	355.79	35	12/28/10	Sch. 40 PVC	2	15.0	337.3	35.0	317.3	334.50	334.63	334.69	334.78	333.38	335.38	334.87	336.88	336.07	---	---	---
AD-21	32° 27' 45.403"	94° 29' 19.195"	347.23	350.72	30	12/27/10	Sch. 40 PVC	2	10.0	337.2	30.0	317.2	340.43	340.02	340.22	341.57	339.16	342.36	341.67	345.45	343.82	---	---	---
AD-22	32° 27' 41.349"	94° 29' 17.779"	355.57	358.51	30	12/16/10	Sch. 40 PVC	2	10.0	345.6	30.0	325.6	343.64	343.16	343.74	344.83	342.90	346.49	345.77	350.24	350.29	347.20	348.52	348.45
AD-23	32° 27' 3.384"	94° 29' 41.258"	346.72	350.10	35	12/15/10	Sch. 40 PVC	2	15.0	331.7	35.0	311.7	319.65	318.94	319.29	318.66	318.87	319.80	319.79	319.84	321.23	320.99	321.00	320.85
AD-24[e]	32° 27' 1.455"	94° 29' 56.388"	287.68	291.14	20	12/27/10	Sch. 40 PVC	2	5.0	282.7	20.0	267.7	282.92	284.29	285.10	285.63	285.06	288.30	287.10	288.56				
AD-25	32° 27' 17.187"	94° 29' 58.998"	334.15	337.09	30	12/14/10	Sch. 40 PVC	2	10.0	324.2	30.0	304.2	324.51	321.90	323.14	321.94	322.15	322.56	324.24	326.42	327.00	---	---	---
AD-26	32° 27' 25.426"	94° 29' 54.775"	342.41	345.25	40	12/14/10	Sch. 40 PVC	2	10.0	332.4	40.0	302.4	324.53	323.77	323.62	322.32	322.09	323.24	322.51	323.04	326.06	---	---	---
AD-27	32° 27' 36.66"	94° 29' 47.272"	349.83	352.62	37.5	12/15/10	Sch. 40 PVC	2	17.5	332.3	37.5	312.3	325.82	324.54	326.13	325.39	325.35	326.39	327.91	329.69	330.89	330.04	331.59	331.24
AD-28	32° 27' 55.439"	94° 29' 39.418"	335.92	339.40	40	12/28/10	Sch. 40 PVC	2	15.0	320.9	35.0	300.9	319.67	319.16	319.92	320.21	319.69	320.65	320.22	322.16	321.39	320.27	320.51	320.69
AD-29	32° 28' 8.271"	94° 29' 31.939"	350.21	353.37	30	1/3/11	Sch. 40 PVC	2	10.0	340.2	30.0	320.2	334.68	333.37	334.74	337.47	336.84	338.55	335.85	340.57	338.48	---	---	---
AD-30[d]	32° 27' 56.49"	94° 29' 32.53"	339.04	342.02	25	12/8/15	Sch. 40 PVC	2	10.0	329.0	25.0	314.0	---	---	---	---	---	---	---	---	323.70	322.23	322.85	322.88
AD-31[d]	32° 28' 02.48"	94° 29' 20.90"	357.75	360.75	35	12/8/15	Sch. 40 PVC	2	20.0	337.8	35.0	322.8	---	---	---	---	---	---	---	---	346.60	343.78	344.53	344.58
AD-32[d]	32° 27' 56.20"	94° 29' 11.86"	357.23	359.18	33	12/11/15	Sch. 40 PVC	2	13.0	344.2	33.0	324.2	---	---	---	---	---	---	---	---	352.32	347.44	348.44	349.09
AD-33[d]	32° 27' 38.70"	94° 29' 15.82"	359.30	362.37	30	12/11/15	Sch. 40 PVC	2	15.0	344.3	30.0	329.3	---	---	---	---	---	---	---	---	351.13	348.56	349.32	349.25
AD-34[d,f]	32° 27' 10.13"	94° 29' 57.93"	304.64	307.61	25	12/11/15	Sch. 40 PVC	2	10.0	294.6	25.0	279.6	---	---	---	---	---	---	---	---	307.61	307.61	307.61	307.61
AD-35[d,g]	32° 27' 09.64"	94° 29' 42.74"	316.01	318.95	20	12/11/15	Sch. 40 PVC	2	3.0	313.0	18.0	298.0	---	---	---	---	---	---	---	---	309.85	310.42	310.82	311.27
AD-36[d]	32° 27' 05.39"	94° 29' 50.99"	306.50	309.20	15	4/24/19	Sch. 40 PVC	2	5.0	301.5	15.0	291.5	---	---	---	---	---	---	---	---	---	---	---	---
Piezometers[c]																								
W-3 (PW-3)	32° 27' 57.6"	94° 29' 31.8"	356.30	356.30	38	10/20/09	Sch. 40 PVC	2	28.0	328.3	38.0	318.3	---	---	---	---	---	---	---	---	---	---	---	---

NOTES:

(a) Source: Apex Geoscience Inc. (March 23, 2011) and Akron Consulting, LLC (2019).

(b) Screen length and screened intervals for AD-2 through AD-12 estimated from video surveillance (Apex Geoscience Inc., March 23, 2011).

(c) Souce: EETL (October 2010).

(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-30 through AD-35 installed during December 2015. AD-36 installed April 2019.

(e) AD-24 was abandoned on January 26, 2016

(f) AD-34 water level observations are often flowing artesian (water upwelling out of the well casing with an entered 0.00 depth to water) and the actual water level is greater.

(g) AD-35 was abandoned on November 13, 2018

Groundwater Elevation Source: AEP, Pirkey Monitoring Well Groundwater Elevations through November 2021.

--- = Not Measured

ft = Feet

bls = Below land surface

msl = mean sea level

Elev. = Elevation in feet above mean sea level

Table 1
Water Level Data
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrison County, Texas

Well ID	Latitude	Longitude	Ground Surface Elevation[a]	Top of Casing Elevation[a]	Borehole Depth ft. bls	Date Installed	Screen Material	Well Diameter inches	Top of Screen[b] Depth ft. bls	Top of Screen[b] Elevation ft. msl	Bottom of Screen[b] Depth ft. bls	Bottom of Screen[b] Elevation ft. msl	8/24/2017 GW Elev. ft. msl	3/22/2018 GW Elev. ft. msl	8/21/2018 GW Elev. ft. msl	2/28/2019 GW Elev. ft. msl	5/23/2019 GW Elev. ft. msl	8/12/2019 GW Elev. ft. msl	1/27/2020 GW Elev. ft. msl	3/11/2020 GW Elev. ft. msl	4/15/2020 GW Elev. ft. msl	6/3/2020 GW Elev. ft. msl	6/16/2020 GW Elev. ft. msl
Monitoring Wells																							
MW-2/AD-2	32° 27' 54.753"	94° 29' 25.282"	341.25	344.04	40	10/7/83	Sch. 40 PVC	4	20.0	321.3	40.0	301.3	327.63	328.36	326.99	329.21	328.91	327.60	---	329.23	---	328.06	---
MW-3/AD-3	32° 28' 6.829"	94° 29' 21.498"	372.76	375.30	57	11/4/83	Sch. 40 PVC	4	37.0	335.8	57.0	315.8	343.49	344.56	343.28	348.36	349.37	346.08	---	347.22	---	347.76	---
MW-4/AD-4	32° 27' 59.247"	94° 29' 4.692"	363.69	366.79	46	10/10/83	Sch. 40 PVC	4	26.0	337.7	46.0	317.7	353.58	359.04	350.39	360.40	361.18	354.10	---	360.56	---	360.25	---
MW-7/AD-7	32° 27' 43.611"	94° 29' 15.611"	359.61	362.79	40	10/3/83	Sch. 40 PVC	4	20.0	339.6	40.0	319.6	347.40	348.46	344.57	350.21	350.82	346.85	---	350.64	---	350.25	---
MW-8/AD-8	32° 27' 25.095"	94° 29' 14.925"	356.92	359.84	35	10/4/83	Sch. 40 PVC	4	20.0	336.9	35.0	321.9	346.31	346.11	345.24	348.05	348.60	347.33	---	---	---	348.61	---
MW-10/AD-10	32° 27' 52.446"	94° 29' 16.545"	359.48	362.21	40	10/10/83	Sch. 40 PVC	4	20.0	339.5	40.0	319.5	---	---	---	---	---	343.07	---	---	---	---	---
MW-12/AD-12	32° 27' 51.702"	94° 29' 3.238"	378.84	381.99	51	1/30/86	Sch. 40 PVC	4	31.0	347.8	51.0	327.8	367.68	370.57	357.99	372.43	373.12	361.90	---	373.10	---	371.68	---
MW-13/AD-13	32° 27' 46.002"	94° 29' 5.71"	361.98	364.76	40.5	2/23/88	Sch. 40 PVC	4	30.5	331.5	40.5	321.5	352.62	353.25	349.14	355.63	355.87	350.87	---	355.71	---	355.17	---
AD-16	32° 27' 40.871"	94° 29' 38.637"	356.81	360.05	35	12/30/10	Sch. 40 PVC	2	15.0	341.8	35.0	321.8	342.71	344.63	340.03	351.21	351.92	343.92	---	---	---	349.39	---
AD-17	32° 28' 2.315"	94° 29' 39.45"	342.65	346.09	30	12/30/10	Sch. 40 PVC	2	10.0	332.7	30.0	312.7	324.18	327.13	324.12	331.11	331.66	326.45	---	330.07	---	328.04	---
AD-18	32° 28' 9.245"	94° 29' 6.469"	360.48	363.42	25	1/3/11	Sch. 40 PVC	2	15.0	345.5	25.0	335.5	358.23	360.00	361.99	354.61	360.74	357.09	---	360.58	---	359.98	---
AD-19	32° 27' 50.512"	94° 29' 13.973"	359.50	362.82	30	12/30/10	Sch. 40 PVC	2	10.0	349.5	30.0	329.5	---	---	---	---	---	345.31	---	---	---	---	---
AD-20	32° 27' 51.346"	94° 29' 21.576"	352.30	355.79	35	12/28/10	Sch. 40 PVC	2	15.0	337.3	35.0	317.3	---	---	---	---	---	335.36	---	---	---	---	---
AD-21	32° 27' 45.403"	94° 29' 19.195"	347.23	350.72	30	12/27/10	Sch. 40 PVC	2	10.0	337.2	30.0	317.2	---	---	---	---	---	341.78	---	---	---	---	---
AD-22	32° 27' 41.349"	94° 29' 17.779"	355.57	358.51	30	12/16/10	Sch. 40 PVC	2	10.0	345.6	30.0	325.6	347.37	349.62	344.11	350.90	351.99	346.70	---	351.80	---	350.95	---
AD-23	32° 27' 3.384"	94° 29' 41.258"	346.72	350.10	35	12/15/10	Sch. 40 PVC	2	15.0	331.7	35.0	311.7	320.77	320.17	320.31	320.88	320.99	321.29	320.46	---	---	320.79	---
AD-24[e]	32° 27' 1.455"	94° 29' 56.388"	287.68	291.14	20	12/27/10	Sch. 40 PVC	2	5.0	282.7	20.0	267.7											
AD-25	32° 27' 17.187"	94° 29' 58.998"	334.15	337.09	30	12/14/10	Sch. 40 PVC	2	10.0	324.2	30.0	304.2	---	---	---	329.55	330.57	327.80	---	---	---	---	---
AD-26	32° 27' 25.426"	94° 29' 54.775"	342.41	345.25	40	12/14/10	Sch. 40 PVC	2	10.0	332.4	40.0	302.4	---	---	---	329.50	331.10	331.03	---	---	---	---	---
AD-27	32° 27' 36.66"	94° 29' 47.272"	349.83	352.62	37.5	12/15/10	Sch. 40 PVC	2	17.5	332.3	37.5	312.3	330.05	332.49	328.61	335.04	336.53	330.71	---	---	---	335.75	---
AD-28	32° 27' 55.439"	94° 29' 39.418"	335.92	339.40	40	12/28/10	Sch. 40 PVC	2	15.0	320.9	35.0	300.9	320.07	321.73	319.93	321.86	322.61	320.40	---	321.98	---	321.28	---
AD-29	32° 28' 8.271"	94° 29' 31.939"	350.21	353.37	30	1/3/11	Sch. 40 PVC	2	10.0	340.2	30.0	320.2	---	---	---	---	---	337.47	---	---	---	---	---
AD-30[d]	32° 27' 56.49"	94° 29' 32.53"	339.04	342.02	25	12/8/15	Sch. 40 PVC	2	10.0	329.0	25.0	314.0	322.04	323.29	321.70	324.54	325.21	322.63	---	323.94	---	323.40	---
AD-31[d]	32° 28' 02.48"	94° 29' 20.90"	357.75	360.75	35	12/8/15	Sch. 40 PVC	2	20.0	337.8	35.0	322.8	343.57	344.10	342.73	348.31	349.68	346.63	---	346.95	---	347.95	---
AD-32[d]	32° 27' 56.20"	94° 29' 11.86"	357.23	359.18	33	12/11/15	Sch. 40 PVC	2	13.0	344.2	33.0	324.2	349.73	351.42	347.58	352.86	354.14	353.12	---	352.55	---	352.87	---
AD-33[d]	32° 27' 38.70"	94° 29' 15.82"	359.30	362.37	30	12/11/15	Sch. 40 PVC	2	15.0	344.3	30.0	329.3	349.31	350.10	347.23	351.99	352.95	349.96	---	352.68	---	352.54	---
AD-34[d,f]	32° 27' 10.13"	94° 29' 57.93"	304.64	307.61	25	12/11/15	Sch. 40 PVC	2	10.0	294.6	25.0	279.6	307.61	307.61	306.66	307.61	307.61	---	307.61	307.61	---	307.61	---
AD-35[d,g]	32° 27' 09.64"	94° 29' 42.74"	316.01	318.95	20	12/11/15	Sch. 40 PVC	2	3.0	313.0	18.0	298.0	310.28	311.17	297.95								
AD-36[d]	32° 27' 05.39"	94° 29' 50.99"	306.50	309.20	15	4/24/19	Sch. 40 PVC	2	5.0	301.5	15.0	291.5	---	---	---	---	---	302.94	302.63	303.21	302.74	303.78	303.74
Piezometers[c]																							
W-3 (PW-3)	32° 27' 57.6"	94° 29' 31.8"	356.30	356.30	38	10/20/09	Sch. 40 PVC	2	28.0	328.3	38.0	318.3	---	---	---	---	---	---	---	---	---	---	---

NOTES:

(a) Source: Apex Geoscience Inc. (March 23, 2011) and Akron Consulting, LLC (2019).

(b) Screen length and screened intervals for AD-2 through AD-12 estimated from video surveillance (Apex Geoscience Inc., March 23, 2011).

(c) Souce: EETL (October 2010).

(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-30 through AD-35 installed during December 2015. AD-36 installed April 2019.

(e) AD-24 was abandoned on January 26, 2016

(f) AD-34 water level observations are often flowing artesian (water upwelling out of the well casing with an entered 0.00 depth to water) and the actual water level is greater.

(g) AD-35 was abandoned on November 13, 2018

Groundwater Elevation Source: AEP, Pirkey Monitoring Well Groundwater Elevations through November 2021.

--- = Not Measured

ft = Feet

bls = Below land surface

msl = mean sea level

Elev. = Elevation in feet above mean sea level

Table 1
Water Level Data
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrison County, Texas

Well ID	Latitude	Longitude	Ground Surface Elevation[a]	Top of Casing Elevation[a]	Borehole Depth ft. bls	Date Installed	Screen Material	Well Diameter inches	Top of Screen[b] Depth ft. bls	Top of Screen[b] Elevation ft. msl	Bottom of Screen[b] Depth ft. bls	Bottom of Screen[b] Elevation ft. msl	7/1/2020 GW Elev. ft. msl	11/4/2020 GW Elev. ft. msl	3/8/2021 GW Elev. ft. msl	5/25/2021 GW Elev. ft. msl	7/27/2021 GW Elev. ft. msl	11/17/2021 GW Elev. ft. msl
Monitoring Wells																		
MW-2/AD-2	32° 27' 54.753"	94° 29' 25.282"	341.25	344.04	40	10/7/83	Sch. 40 PVC	4	20.0	321.3	40.0	301.3	---	327.57	329.00	329.57	---	327.36
MW-3/AD-3	32° 28' 6.829"	94° 29' 21.498"	372.76	375.30	57	11/4/83	Sch. 40 PVC	4	37.0	335.8	57.0	315.8	---	342.89	346.58	347.46	---	342.60
MW-4/AD-4	32° 27' 59.247"	94° 29' 4.692"	363.69	366.79	46	10/10/83	Sch. 40 PVC	4	26.0	337.7	46.0	317.7	---	349.70	359.14	360.45	---	351.40
MW-7/AD-7	32° 27' 43.611"	94° 29' 15.611"	359.61	362.79	40	10/3/83	Sch. 40 PVC	4	20.0	339.6	40.0	319.6	---	346.45	350.13	350.97	---	345.08
MW-8/AD-8	32° 27' 25.095"	94° 29' 14.925"	356.92	359.84	35	10/4/83	Sch. 40 PVC	4	20.0	336.9	35.0	321.9	---	346.63	---	348.58	---	346.48
MW-10/AD-10	32° 27' 52.446"	94° 29' 16.545"	359.48	362.21	40	10/10/83	Sch. 40 PVC	4	20.0	339.5	40.0	319.5	---	---	---	---	---	---
MW-12/AD-12	32° 27' 51.702"	94° 29' 3.238"	378.84	381.99	51	1/30/86	Sch. 40 PVC	4	31.0	347.8	51.0	327.8	---	361.86	373.52	375.56	---	358.32
MW-13/AD-13	32° 27' 46.002"	94° 29' 5.71"	361.98	364.76	40.5	2/23/88	Sch. 40 PVC	4	30.5	331.5	40.5	321.5	---	350.93	355.22	356.42	---	349.43
AD-16	32° 27' 40.871"	94° 29' 38.637"	356.81	360.05	35	12/30/10	Sch. 40 PVC	2	15.0	341.8	35.0	321.8	---	343.07	---	350.52	---	341.99
AD-17	32° 28' 2.315"	94° 29' 39.45"	342.65	346.09	30	12/30/10	Sch. 40 PVC	2	10.0	332.7	30.0	312.7	---	324.36	329.37	329.03	---	323.77
AD-18	32° 28' 9.245"	94° 29' 6.469"	360.48	363.42	25	1/3/11	Sch. 40 PVC	2	15.0	345.5	25.0	335.5	---	354.98	359.99	360.46	---	355.55
AD-19	32° 27' 50.512"	94° 29' 13.973"	359.50	362.82	30	12/30/10	Sch. 40 PVC	2	10.0	349.5	30.0	329.5	---	---	---	---	---	---
AD-20	32° 27' 51.346"	94° 29' 21.576"	352.30	355.79	35	12/28/10	Sch. 40 PVC	2	15.0	337.3	35.0	317.3	---	---	---	---	---	---
AD-21	32° 27' 45.403"	94° 29' 19.195"	347.23	350.72	30	12/27/10	Sch. 40 PVC	2	10.0	337.2	30.0	317.2	---	---	---	---	---	---
AD-22	32° 27' 41.349"	94° 29' 17.779"	355.57	358.51	30	12/16/10	Sch. 40 PVC	2	10.0	345.6	30.0	325.6	---	346.12	351.33	352.31	---	345.25
AD-23	32° 27' 3.384"	94° 29' 41.258"	346.72	350.10	35	12/15/10	Sch. 40 PVC	2	15.0	331.7	35.0	311.7	---	320.83	---	320.32	---	320.49
AD-24[e]	32° 27' 1.455"	94° 29' 56.388"	287.68	291.14	20	12/27/10	Sch. 40 PVC	2	5.0	282.7	20.0	267.7						
AD-25	32° 27' 17.187"	94° 29' 58.998"	334.15	337.09	30	12/14/10	Sch. 40 PVC	2	10.0	324.2	30.0	304.2	---	326.73	---	330.48	---	327.37
AD-26	32° 27' 25.426"	94° 29' 54.775"	342.41	345.25	40	12/14/10	Sch. 40 PVC	2	10.0	332.4	40.0	302.4	---	330.32	---	331.02	---	330.64
AD-27	32° 27' 36.66"	94° 29' 47.272"	349.83	352.62	37.5	12/15/10	Sch. 40 PVC	2	17.5	332.3	37.5	312.3	---	329.77	---	337.25	---	329.69
AD-28	32° 27' 55.439"	94° 29' 39.418"	335.92	339.40	40	12/28/10	Sch. 40 PVC	2	15.0	320.9	35.0	300.9	---	319.99	322.06	323.10	---	319.98
AD-29	32° 28' 8.271"	94° 29' 31.939"	350.21	353.37	30	1/3/11	Sch. 40 PVC	2	10.0	340.2	30.0	320.2	---	---	---	---	---	---
AD-30[d]	32° 27' 56.49"	94° 29' 32.53"	339.04	342.02	25	12/8/15	Sch. 40 PVC	2	10.0	329.0	25.0	314.0	---	321.90	324.19	324.94	---	321.80
AD-31[d]	32° 28' 02.48"	94° 29' 20.90"	357.75	360.75	35	12/8/15	Sch. 40 PVC	2	20.0	337.8	35.0	322.8	---	342.84	346.24	347.27	---	342.79
AD-32[d]	32° 27' 56.20"	94° 29' 11.86"	357.23	359.18	33	12/11/15	Sch. 40 PVC	2	13.0	344.2	33.0	324.2	---	346.13	350.30	351.28	---	348.72
AD-33[d]	32° 27' 38.70"	94° 29' 15.82"	359.30	362.37	30	12/11/15	Sch. 40 PVC	2	15.0	344.3	30.0	329.3	---	348.71	351.84	352.95	---	348.40
AD-34[d,f]	32° 27' 10.13"	94° 29' 57.93"	304.64	307.61	25	12/11/15	Sch. 40 PVC	2	10.0	294.6	25.0	279.6	---	307.00	---	307.61	307.61	307.20
AD-35[d,g]	32° 27' 09.64"	94° 29' 42.74"	316.01	318.95	20	12/11/15	Sch. 40 PVC	2	3.0	313.0	18.0	298.0						
AD-36[d]	32° 27' 05.39"	94° 29' 50.99"	306.50	309.20	15	4/24/19	Sch. 40 PVC	2	5.0	301.5	15.0	291.5	303.86	302.88	---	302.22	302.42	301.66
Piezometers[c]																		
W-3 (PW-3)	32° 27' 57.6"	94° 29' 31.8"	356.30	356.30	38	10/20/09	Sch. 40 PVC	2	28.0	328.3	38.0	318.3	---	---	---	---	---	---

NOTES:

(a) Source: Apex Geoscience Inc. (March 23, 2011) and Akron Consulting, LLC (2019).

(b) Screen length and screened intervals for AD-2 through AD-12 estimated from video surveillance (Apex Geoscience Inc., March 23, 2011).

(c) Souce: EETL (October 2010).

(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-30 through AD-35 installed during December 2015. AD-36 installed April 2019.

(e) AD-24 was abandoned on January 26, 2016

(f) AD-34 water level observations are often flowing artesian (water upwelling out of the well casing with an entered 0.00 depth to water) and the actual water level is greater.

(g) AD-35 was abandoned on November 13, 2018

Groundwater Elevation Source: AEP, Pirkey Monitoring Well Groundwater Elevations through November 2021.

--- = Not Measured

ft = Feet

bls = Below land surface

msl = mean sea level

Elev. = Elevation in feet above mean sea level

Table 2
Piezometer Water Level Data - 2018 Landfill Lateral Expansion Area
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrision County, Texas

Piezometer Completion Information									
Piezometer ID:	**PZ1**	**PZ2**	**PZ3**	**PZ4**	**PZ5**	**PZ6**	**PZ7**	**AD-23**	**AD-35**
Northing	6871372.73	6871442.96	6871218.9	6871018.52	6870962.73	6870939.86	6871250.41		
Easting	3203056.63	3203345.4	3203322.02	3203009.98	3203281.7	3203544.92	3202996.36		
Screen length	10	10	10	10	10	10	10	20	15
TD (from GS)	14	14	14	14	20	20	14	37.44	18
Sand pack, top (from GS)	3	3	3	3	8	8	3		
Elev, GS								346.72	334.15
Elev, TOC	308.85	312.74	307.35	311.53	328.3	328.78	303.73	350.1	318.95

Piezometer Depth to Water Measurements (feet) below TOC									
Date	**PZ1**	**PZ2**	**PZ3**	**PZ4**	**PZ5**	**PZ6**	**PZ7**	**AD-23**	**AD-35**
6/20/2018	9.98	9.99	4.29	8.66	20.47	13.23	2.84		
6/21/2018	9.99	9.95	4.07	8.37	20.47	13.24	2.75	29.4	7.95
6/22/2018	9.99	9.91	3.98	8.31	20.47	13.25	2.76	29.42	7.92
6/29/2018	10.01	10.1	4.34	8.85	20.63	13.4	2.98	29.39	8.14
7/6/2018	10.02	10.23	4.45	8.92	20.75	13.52	3.21	29.43	8.23

Piezometer Potentiometric Surface (Water Table) Elevations (feet AMSL)									
Date	**PZ1**	**PZ2**	**PZ3**	**PZ4**	**PZ5**	**PZ6**	**PZ7**	**AD-23**	**AD-35**
6/20/2018	298.87	302.75	303.06	302.87	307.83	315.55	300.89		
6/21/2018	298.86	302.79	303.28	303.16	307.83	315.54	300.98	320.70	311.00
6/22/2018	298.86	302.83	303.37	303.22	307.83	315.53	300.97	320.68	311.03
6/29/2018	298.84	302.64	303.01	302.68	307.67	315.38	300.75	320.71	310.81
7/6/2018	298.83	302.51	302.9	302.61	307.55	315.26	300.52	320.67	310.72

NOTES:

GS = Ground surface

TD = Total depth

TOC = Top of piezometer casing

AMSL = Above mean sea level

Table 3
Well Construction Details
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrison County, Texas

Well ID	Latitude	Longitude	Ground Surface Elevation[a]	Top of Casing Elevation[a]	Borehole depth ft. bls	Date Installed	Screen Material	Well diameter inches	Top of Filter Pack		Bottom of Filter Pack		Top of Screen[b]		Bottom of Screen[b]	
									Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl
Monitoring Wells																
MW-2/AD-2	32° 27' 54.753"	94° 29' 25.282"	341.25	344.04	40	10/7/83	Sch. 40 PVC	4	18	323	40	301	20	321.25	40	301.25
MW-3/AD-3	32° 28' 6.829"	94° 29' 21.498"	372.76	375.30	57	11/4/83	Sch. 40 PVC	4	35	338	57	316	37	335.76	57	315.76
MW-4/AD-4	32° 27' 59.247"	94° 29' 4.692"	363.69	366.79	46	10/10/83	Sch. 40 PVC	4	24	340	46	318	26	337.69	46	317.69
MW-7/AD-7	32° 27' 43.611"	94° 29' 15.611"	359.61	362.79	40	10/3/83	Sch. 40 PVC	4	18	342	40	320	20	339.61	40	319.61
MW-8/AD-8	32° 27' 25.095"	94° 29' 14.925"	356.92	359.84	35	10/4/83	Sch. 40 PVC	4	18	339	35	322	20	336.92	35	321.92
MW-10/AD-10	32° 27' 52.446"	94° 29' 16.545"	359.48	362.21	40	10/10/83	Sch. 40 PVC	4	18.0	341.5	40.0	319.5	20.0	339.5	40.0	319.5
MW-12/AD-12	32° 27' 51.702"	94° 29' 3.238"	378.84	381.99	51	1/30/86	Sch. 40 PVC	4	29.0	349.8	51.0	327.8	31.0	347.8	51.0	327.8
MW-13/AD-13	32° 27' 46.002"	94° 29' 5.71"	361.98	364.76	40.5	2/23/88	Sch. 40 PVC	4	17.5	344.5	40.5	321.5	30.5	331.5	40.5	321.5
AD-16	32° 27' 40.871"	94° 29' 38.637"	356.81	360.05	35	12/30/10	Sch. 40 PVC	2	13.0	343.8	35.0	321.8	15.0	341.8	35.0	321.8
AD-17	32° 28' 2.315"	94° 29' 39.45"	342.65	346.09	30	12/30/10	Sch. 40 PVC	2	8.0	334.7	30.0	312.7	10.0	332.7	30.0	312.7
AD-18	32° 28' 9.245"	94° 29' 6.469"	360.48	363.42	25	1/3/11	Sch. 40 PVC	2	13.0	347.5	25.0	335.5	15.0	345.5	25.0	335.5
AD-19	32° 27' 50.512"	94° 29' 13.973"	359.50	362.82	30	12/30/10	Sch. 40 PVC	2	8.0	351.5	30.0	329.5	10.0	349.5	30.0	329.5
AD-20	32° 27' 51.346"	94° 29' 21.576"	352.30	355.79	35	12/28/10	Sch. 40 PVC	2	13.0	339.3	35.0	317.3	15.0	337.3	35.0	317.3
AD-21	32° 27' 45.403"	94° 29' 19.195"	347.23	350.72	30	12/27/10	Sch. 40 PVC	2	8.0	339.2	30.0	317.2	10.0	337.2	30.0	317.2
AD-22	32° 27' 41.349"	94° 29' 17.779"	355.57	358.51	30	12/16/10	Sch. 40 PVC	2	8.0	347.6	30.0	325.6	10.0	345.6	30.0	325.6
AD-23	32° 27' 3.384"	94° 29' 41.258"	346.72	350.10	35	12/15/10	Sch. 40 PVC	2	13.0	333.7	35.0	311.7	15.0	331.7	35.0	311.7
AD-24[e]	32° 27' 1.455"	94° 29' 56.388"	287.68	291.14	20	12/27/10	Sch. 40 PVC	2	3.0	284.7	20.0	267.7	5.0	282.7	20.0	267.7
AD-25	32° 27' 17.187"	94° 29' 58.998"	334.15	337.09	30	12/14/10	Sch. 40 PVC	2	8.0	326.2	30.0	304.2	10.0	324.2	30.0	304.2
AD-26	32° 27' 25.426"	94° 29' 54.775"	342.41	345.25	40	12/14/10	Sch. 40 PVC	2	8.0	334.4	40.0	302.4	10.0	332.4	40.0	302.4
AD-27	32° 27' 36.66"	94° 29' 47.272"	349.83	352.62	37.5	12/15/10	Sch. 40 PVC	2	15.5	334.3	37.5	312.3	17.5	332.3	37.5	312.3
AD-28	32° 27' 55.439"	94° 29' 39.418"	335.92	339.40	40	12/28/10	Sch. 40 PVC	2	13.0	322.9	35.0	300.9	15.0	320.9	35.0	300.9
AD-29	32° 28' 8.271"	94° 29' 31.939"	350.21	353.37	30	1/3/11	Sch. 40 PVC	2	8.0	342.2	30.0	320.2	10.0	340.2	30.0	320.2
AD-30[d]	32° 27' 56.49"	94° 29' 32.53"	339.04	342.02	25	12/8/15	Sch. 40 PVC	2	8.0	331.0	25.0	314.0	10.0	329.0	25.0	314.0
AD-31[d]	32° 28' 02.48"	94° 29' 20.90"	357.75	360.75	35	12/8/15	Sch. 40 PVC	2	18.0	339.8	35.0	322.8	20.0	337.8	35.0	322.8
AD-32[d]	32° 27' 56.20"	94° 29' 11.86"	357.23	359.18	33	12/11/15	Sch. 40 PVC	2	11.0	346.2	33.0	324.2	13.0	344.2	33.0	324.2
AD-33[d]	32° 27' 38.70"	94° 29' 15.82"	359.30	362.37	30	12/11/15	Sch. 40 PVC	2	12.0	347.3	30.0	329.3	15.0	344.3	30.0	329.3
AD-34[d]	32° 27' 10.13"	94° 29' 57.93"	304.64	307.61	25	12/11/15	Sch. 40 PVC	2	8.0	296.6	25.0	279.6	10.0	294.6	25.0	279.6
AD-35[d,f]	32° 27' 09.64"	94° 29' 42.74"	316.01	318.95	20	12/11/15	Sch. 40 PVC	2	2.5	313.5	20.0	296.0	3.0	313.0	18.0	298.0
AD-36[d]	32° 27' 05.39"	94° 29' 50.99"	306.50	309.20	15	4/24/19	Sch. 40 PVC	2	4.0	302.5	15.0	291.5	5.0	301.5	15.0	291.5
Piezometers[c]																
W-3 (PW-3)	32° 27' 57.6"	94° 29' 31.8"	356.30	356.30	38	10/20/09	Sch. 40 PVC	2	26.0	330.3	38.0	318.3	28.0	328.3	38.0	318.3

NOTES:

Elevations in feet above mean sea level.

(a) Source: Apex Geoscience Inc. (March 23, 2011) and Akron Consulting, LLC (2019).

(b) Screen length and screened intervals for AD-2 through AD-12 estimated from video surveillance (Apex Geoscience Inc., March 23, 2011). Top of sand pack estimated 2 feet above top of screened interval.

(c) Souce: EETL (October 2010).

(d) Source: Aukland Consulting LLC (January 26, 2016 and April 2019).

(e) AD-24 was abandoned on January 26, 2016

(f) AD-35 was abandoned on November 13, 2018

NA = Data not available

ft = feet

bls = below land surface

msl = mean sea level

Table 4
Monitoring Well Network
AEP Pirkey Power Plant-Landfill CCR
Hallsville, Harrison County, Texas

ARCADIS

Well ID	Hydrostratigraphic Unit Target	Location Description		Screen Top Elevation (ft amsl)	Screen Bottom Elevation (ft amsl)	Screen Length (ft)	Comments
Upgradient							
AD-8	Uppermost Water-Bearing Unit	Northeast of Landfill	Upgradient	336.9	321.9	15	Existing well installed in 1983; well will be utilitzed to establish backgroud water quality
AD-12	Uppermost Water-Bearing Unit	Northeast of Stack Out Area	Upgradient	347.8	327.8	20	Existing well installed in 1986; well will be utilitzed to establish backgroud water quality
AD-16	Uppermost Water-Bearing Unit	North of Landfill	Upgradient	341.8	321.8	20	Existing well installed in 2010; well will be utilitzed to establish backgroud water quality
AD-27	Uppermost Water-Bearing Unit	Northwest of Landfill	Upgradient	332.3	312.3	20	Existing well installed in 2010; well will be utilitzed to establish backgroud water quality
Downgradient							
AD-23	Uppermost Water-Bearing Unit	South of Landfill	Down gradient	331.7	311.7	20	Existing well installed in 2010; uppermost shallow aquifer adjacent to Landfill - downgradient
AD-34	Uppermost Water-Bearing Unit	Southwest of Landfill	Down gradient	294.6	279.6	15	Existing monitoring well installed during December 2015 in uppermost shallow aquifer adjacent to Landfill - downgradient.
AD-35[(a)]	Uppermost Water-Bearing Unit	South of Landfill	Down gradient	313.0	298.0	15	Monitoring well installed during December 2015 in uppermost shallow aquifer adjacent to Landfill - downgradient. Was plugged during 2018 Landfill Cell construction on November 13, 2018 and replaced with AD-36.
AD-36	Uppermost Water-Bearing Unit	South of Landfill, West of 2018 Landfill Cell	Down gradient	301.5	291.5	10.0	New well installed on April 24, 2019 in uppermost shallow aquifer adjacent to Landfill - downgradient.
Piezometers							
AD-25	Uppermost Water-Bearing Unit	West of Landfill	Side gradient	324.2	304.2	20	Existing well installed in 2010; uppermost shallow aquifer adjacent to Landfill - side gradient
AD-26	Uppermost Water-Bearing Unit	West of Landfill	Side gradient	332.4	302.4	30	Existing well installed in 2010; uppermost shallow aquifer adjacent to Landfill - side gradient

NOTES:

(a) AD-35 was abandoned on November 13, 2018.

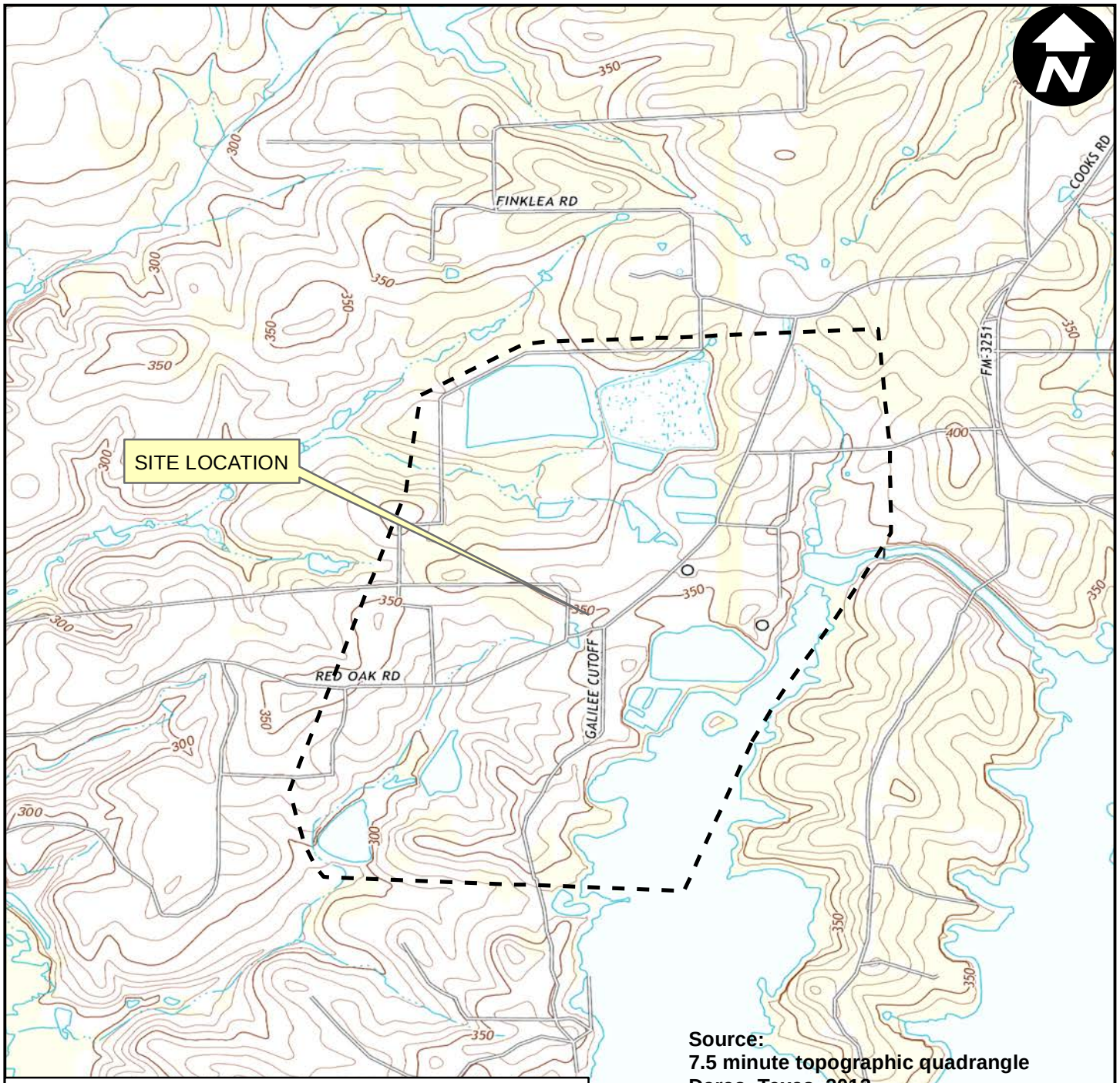
U = Upgradient

D = Downgradient

ft = feet

amsl = above mean sea level

Figures



Source:
7.5 minute topographic quadrangle
Darco, Texas, 2013
Easton, Texas, 2013

0 2,000 4,000

SCALE IN FEET

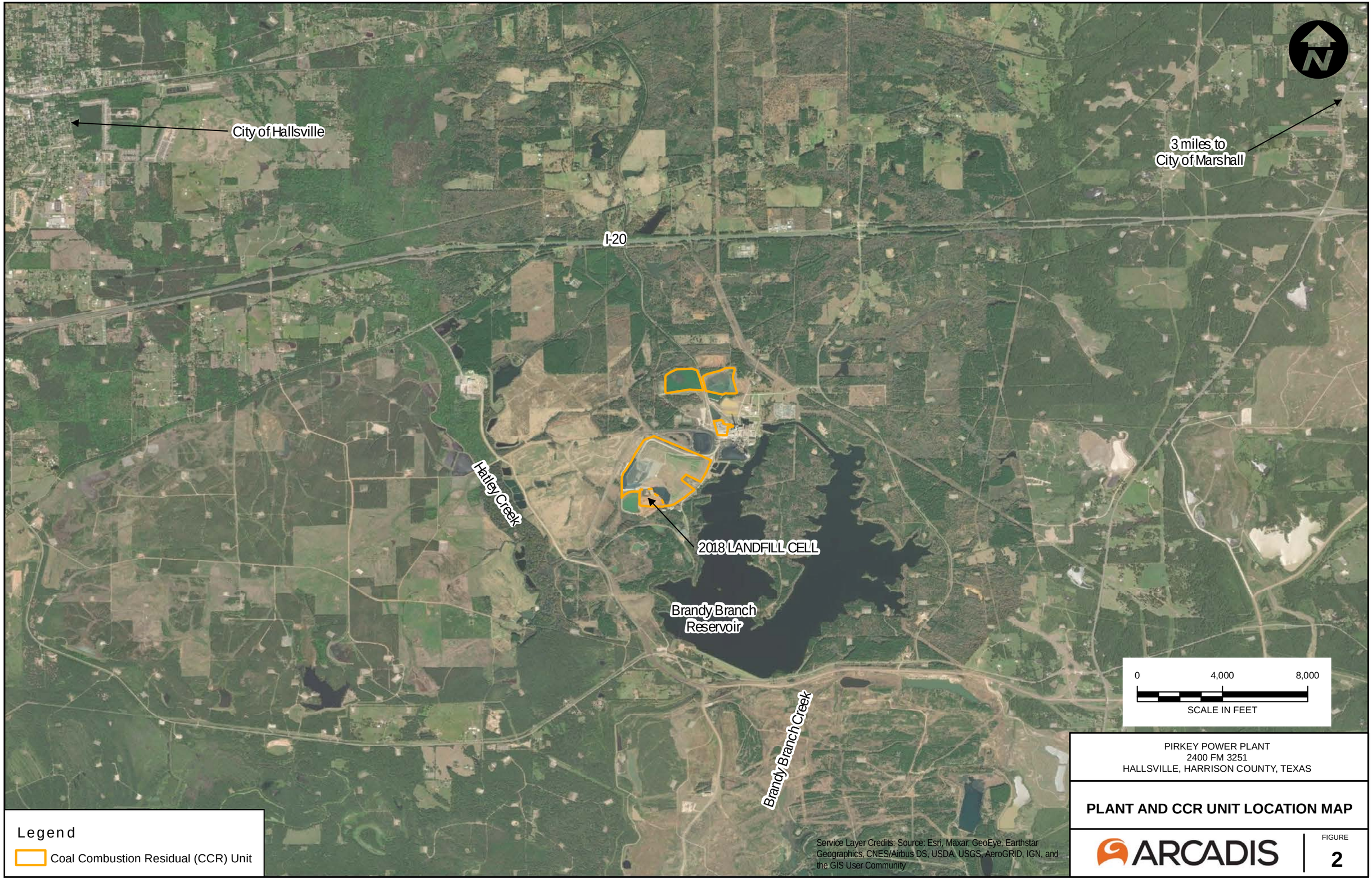
PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LOCATION MAP

ARCADIS

FIGURE
1

Document Path: T:_ENVAEP\Pirkey Plant\MXD\Updated\Figure 1 - Site Location Map.mxd



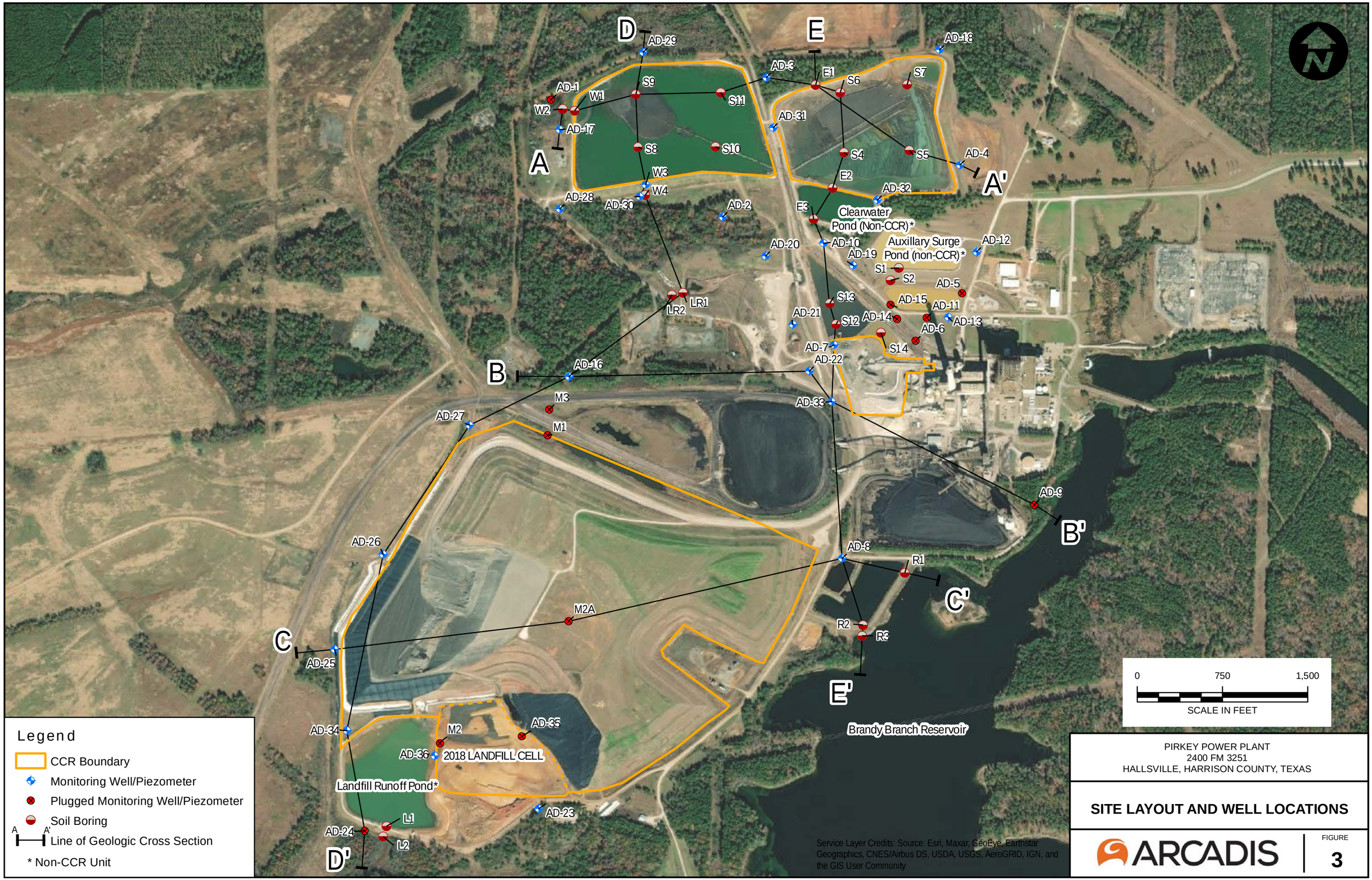
PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

PLANT AND CCR UNIT LOCATION MAP

ARCADIS

FIGURE
2

Document Path: T:_ENV\AEP\Pirkey Plant\MXD\Updated\Figure 2 - Plant and CCR Unit Location Map.mxd



PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

ARCADIS

FIGURE
3

Document Path: T:_ENV\AEP\Pirkey Plant\MXD\Updated\Figure 3 - Site Layout and Well Locations.mxd

WEST

A

A'

EAST

WEST BOTTOM ASH POND

EAST BOTTOM ASH POND

ELEVATION (FEET MSL)

380'
370'
360'
350'
340'
330'
320'
310'

AD-17
AD-3
AD-4
W1
W2
E1
PERIMETER BERM (EL. 357')
PERIMETER BERM (EL. 357')
S9(C)
S11(C)
S5(C)
WATER AND CCR FILL (A)
COMPACTED COHESIVE SOIL FILL (B)
SILTY CLAY
SILTY SANDY CLAY, TAN TO GRAY.
SANDY CLAY, TAN TO GRAY.
CLAYEY SILTY SAND, TAN TO GRAY.
SILTY SANDY CLAY, RED/BROWN/GRAY.
CLAYEY SILTY SAND, TAN TO GRAY.

STATE OF TEXAS
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LICENSED PROFESSIONAL GEOSCIENTIST
1-20-22

0 300'
HORIZONTAL SCALE

LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (MAY 2021)
- BASE OF CCR UNIT

NOTES:

A) TOP OF WEST BOTTOM ASH POND AND EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357', OPERATING ELEVATION IS 354'(JOHNSON & PACE, MAY 2011). BASE ELEVATION OF WEST BOTTOM ASH POND AND EAST BOTTOM ASH POND IS 347' (SARGENT & LUNDY, JANUARY 1983).
B) COMPACTED COHESIVE SOIL FROM ELEVATION 344' TO 347' (SARGENT & LUNDY, SEPTEMBER 1984;AMEC, AUGUST 2011).
C) SOIL BORING INSTALLED BY SOUTHWESTERN LABORATORIES DURING ASH POND CONSTRUCTION IN 1983.

PIRKEY POWER PLANT
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CROSS SECTION
A - A'

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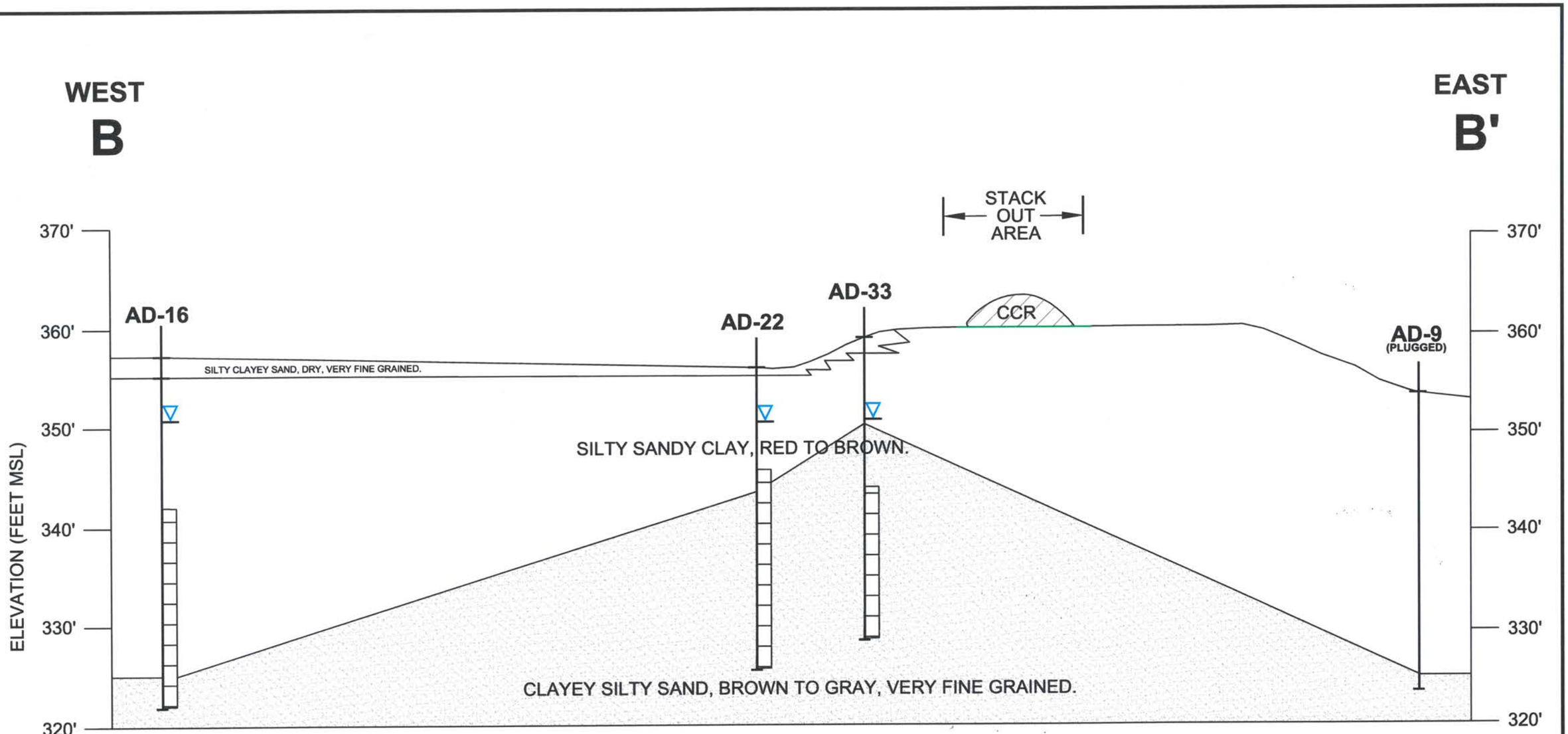
FIGURE
4

CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF* G:\Active Projects\AEP\30117944 - Pirkey 2022\Figures-Maps\Figure 4 Cross Section A-A'.dwg LAYOUT: MODEL SAVED: 2/22/2016 11:17 AM ACADVER: 24.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: --- PLOTTED: 1/13/2022 10:21 AM BY: LEASE, DANA



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LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (MAY 2021)
- BASE OF CCR UNIT

0 300'
HORIZONTAL SCALE

NOTES:
A) BASE OF STACK OUT AREA CCR UNIT LOCATED AT GRADE, ELEVATION TAKEN FROM MAY 2012 AND JUNE 23, 2015 TOPOGRAPHIC SURVEYS BY BEACON AVIATION.
B) ELEVATION OF CCR MATERIAL ABOVE STACK OUT AREA VARIES.

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CROSS SECTION
B - B'

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FIGURE
5

WEST

C

LANDFILL

EAST

C'

ELEVATION (FEET MSL)

370'
360'
350'
340'
330'
320'
310'
300'
290'

AD-25

CLAYEY SAND

SANDY CLAY

LANDFILL
LOW-PERMEABILITY LINER
(CLAY, PVC, OR HDPE)

CCR FILL
(HEIGHT VARIES)

AD-8

R1

SILTY SANDY CLAY.

CLAYEY SILTY SAND.

SILTY SANDY CLAY.

CLAYEY SILTY SAND, BROWN TO GRAY.

M2A
(PLUGGED)

0 500'
HORIZONTAL SCALE

LEGEND

MONITORING WELL SCREENED INTERVAL

WATER LEVEL IN MONITORING WELL (MAY 2021)

BASE OF CCR UNIT

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION
C - C'

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FIGURE
6

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CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*
G:\Active Projects\AEP\30117944 - Pirkey 2022\Figures-Maps\Figure 6 Cross Section C-C'.dwg LAYOUT: MODEL SAVED: 2/22/2016 11:19 AM ACADVER: 24.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: --- PLOTTED: 1/13/2022 11:01 AM BY: LEASE, DIANA

NORTH

D

SOUTH

D'

WEST BOTTOM ASH POND

PERIMETER BERM (EL. 357') [A]

W3 (PW-3)

AD-29

WATER AND CCR FILL [A]

S9

S8

COHESIVE FILL [B]

AD-30

SILTY SANDY CLAY, RED/BROWN/GRAY.

LR-1

AD-16

SILTY SANDY CLAY, TAN TO GRAY.

AD-27

SILTY CLAYEY SAND

LANDFILL

LANDFILL RUNOFF POND (NON-CCR UNIT) [C]

AD-26

CLAYEY SAND

LANDFILL LOW-PERMEABILITY LINER (CLAY, PVC, OR HDPE)

SANDY CLAY AND CLAYEY GRAVEL, GRAY.

SANDY CLAY, BROWN.

CLAY, GRAY

AD-34

CLAY W/CLAYEY SAND

STREAKS, ORANGE/BROWN.

AD-24

CLAY, GRAY

CLAYEY SILTY SAND, BROWN TO GRAY, VERY FINE GRAINED.

BLACK LIGNITE

ELEVATION (FEET MSL)

360' 350' 340' 330' 320' 310' 300' 290' 280' 270'

0 600'

HORIZONTAL SCALE

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LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (MAY 2021)
- BASE OF CCR UNIT

NOTES:

A) TOP OF WEST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357', OPERATING LEVEL IS 354' (JOHNSON & PACE, MAY 2011); BASE ELEVATION OF WEST BOTTOM ASH POND IS 347' (SARGENT & LUNDY, JANUARY 1983).
B) COMPACTED COHESIVE SOIL FROM ELEVATION 344' TO 347' (SARGENT &LUNDY SEPTEMBER 1984; AMEC, AUGUST 2011).
C) LANDFILL RUNOFF POND PERIMETER BERM APPROXIMATE ELEVATION 302' MSL, BASE OF LANDFILL RUNOFF POND APPROXIMATE ELEVATION 286' MSL. NORMAL OPERATING LEVEL 288' MSL (JOHNSON & PACE MAY 2011).

PIRKEY POWER PLANT
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HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION D - D'

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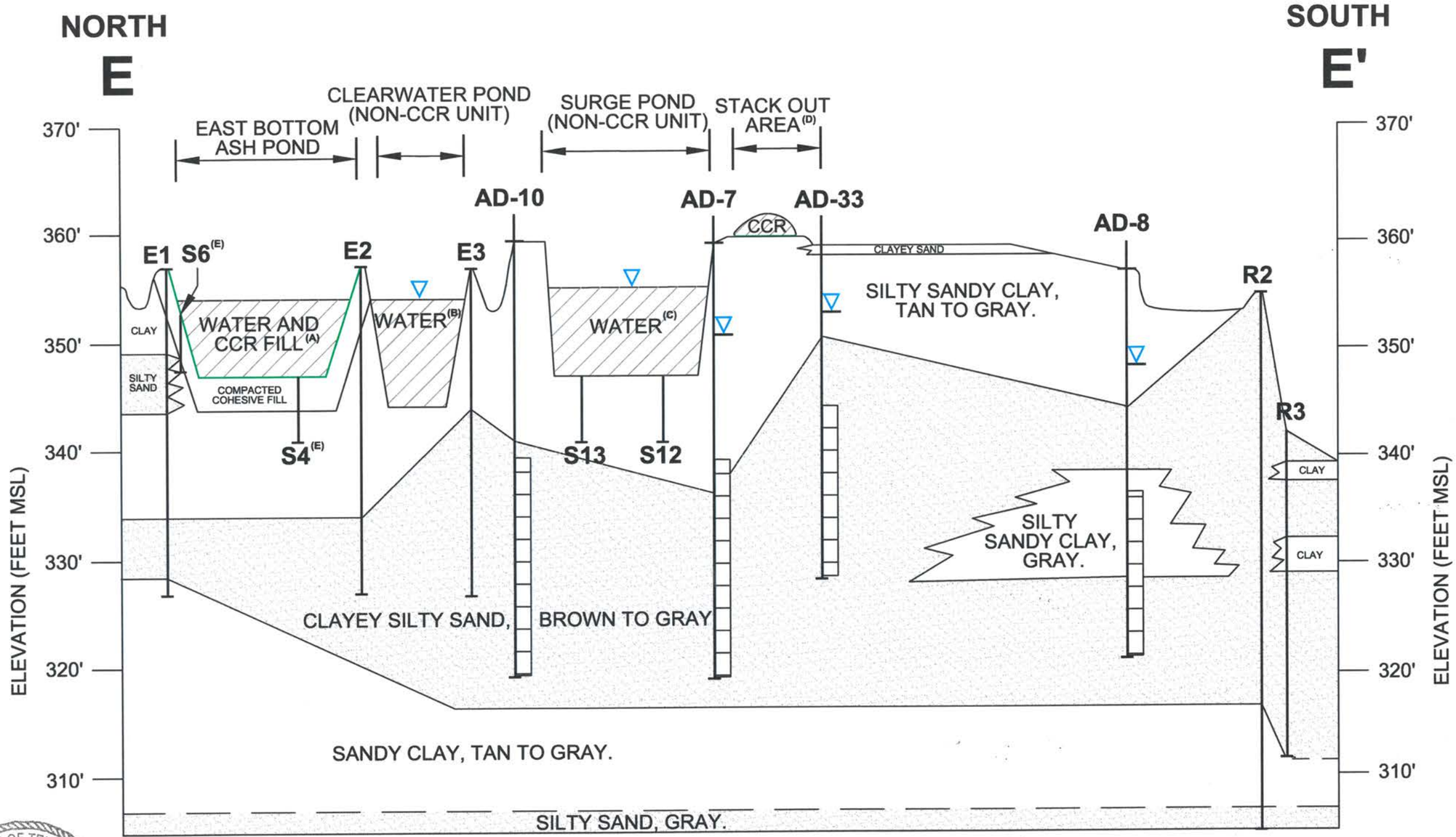
FIGURE 7

CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF* G:\Active Projects\AEP\30117944 - Pirkey 2022\Figures-Maps\Figure 7 Cross Section D-D'.dwg LAYOUT: MODEL SAVED: 2/22/2016 11:20 AM ACADVER: 24.0S (LMS TECH) PAGESETUP:— PLOTSTYLETABLE:— PLOTTED: 1/13/2022 11:07 AM BY: LEASE, DIANA



0 500'
HORIZONTAL SCALE

LEGEND

- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (MAY 2021)
- BASE OF CCR UNIT

NOTES:

A) TOP OF EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357', OPERATING LEVEL IS 354' (JOHNSON & PACE, MAY 2011); BASE ELEVATION OF EAST BOTTOM ASH POND IS 347' (SARGENT & LUNDY, JANUARY 1983).
B) TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357',OPERATING LEVEL IS 354' (JOHNSON & PACE, MAY 2011). BASE ELEVATION OF CLEARWATER POND IS 344' (SARGENT & LUNDY, JANUARY 1983).
C) BASE ELEVATION OF SURGE POND (347-352'MSL) AND POND DESIGN LEVEL (355'MSL) TAKEN FROM JANUARY 31, 1983 SARGENT & LUNDY REPORT "DESIGN SUMMARY FOR LIGNITE STORAGE AREA AND WASTEWATER POND FACILITIES".
D) BASE OF STACK OUT AREA CCR UNIT LOCATED AT GRADE. ELEVATION TAKEN FROM MAY 2012 AND JUNE 23, 2015 TOPOGRAPHIC SURVEYS BY BEACON AVIATION.
E) SOIL BORING INSTALLED BY SOUTHWESTERN LABORATORIES DURING ASH POND CONSTRUCTION IN 1983.

PIRKEY POWER PLANT
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CROSS SECTION E - E'

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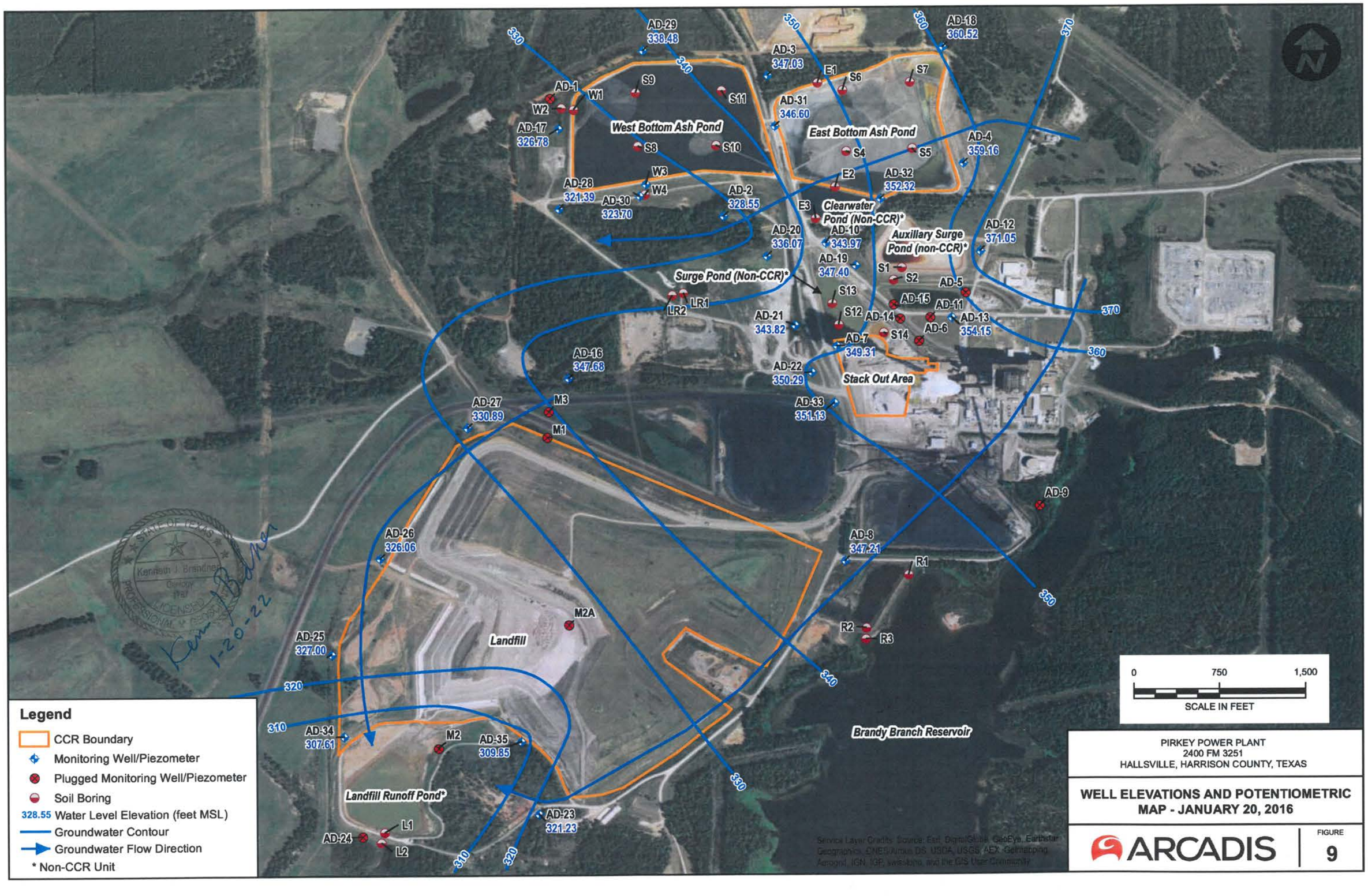
FIGURE 8

CITY: DIV/GROUP: DB: LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*
G:\Active Projects\AEP\30117944 - Pirkey 2022\Figures-Maps\Figure 8 Cross Section E-E'.dwg LAYOUT: MODEL SAVED: 2/22/2016 11:37 AM ACADVER: 24.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 1/13/2022 11:11 AM BY: LEASE, DIANA



Legend

- CCR Boundary
- Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- 328.55 Water Level Elevation (feet MSL)
- Groundwater Contour
- Groundwater Flow Direction
- * Non-CCR Unit

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

WELL ELEVATIONS AND POTENTIOMETRIC MAP - JANUARY 20, 2016

ARCADIS

FIGURE 9

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Document Path: Z:\GIS\PROJECTS_ENV\AEP\Pirkey Plant\MXD\Figure 9 - Well Elevations and Potentiometric Map - January 20, 2016.mxd

AD-29
NM
AD-18
358.23
AD-3
343.49
E1
S6
S7
S9
S11
AD-1
W1
W2
AD-31
343.57
AD-17
324.18
West Bottom Ash Pond
East Bottom Ash Pond
AD-4
353.58
S8
S10
S4
S5
W3
E2
AD-32
349.73
AD-28
320.07
W4
AD-30
322.04
AD-2
327.63
E3
Clearwater
Pond (Non-CCR)*
AD-20
NM
AD-10
NM
Auxillary Surge
Pond (non-CCR)*
AD-12
367.68
AD-19
NM
S1
S2
Surge Pond (Non-CCR)*
AD-5
S13
LR1
LR2
AD-15
AD-11
AD-21
NM
S12
AD-14
AD-13
352.62
AD-6
S14
AD-7
347.40
AD-16
342.71
AD-22
347.37
Stack Out Area
AD-27
330.05
M3
AD-33
349.31
M1
AD-9
AD-26
NM
AD-8
346.31
R1
M2A
R2
R3
AD-25
NM
Landfill
Brandy Branch Reservoir
AD-34
307.61
M2
AD-35
310.28
Landfill Runoff Pond*
AD-23
320.77
AD-24
L1
L2
330
340
350
360
370
320
310

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Legend

- CCR Boundary
- Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- 328.55 Water Level Elevation (feet MSL)
- Groundwater Contour
- Groundwater Flow Direction
- * Non-CCR Unit
- NM - Not Measured

0 750 1,500
SCALE IN FEET

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

WELL ELEVATIONS AND POTENTIOMETRIC MAP - AUGUST 24, 2017

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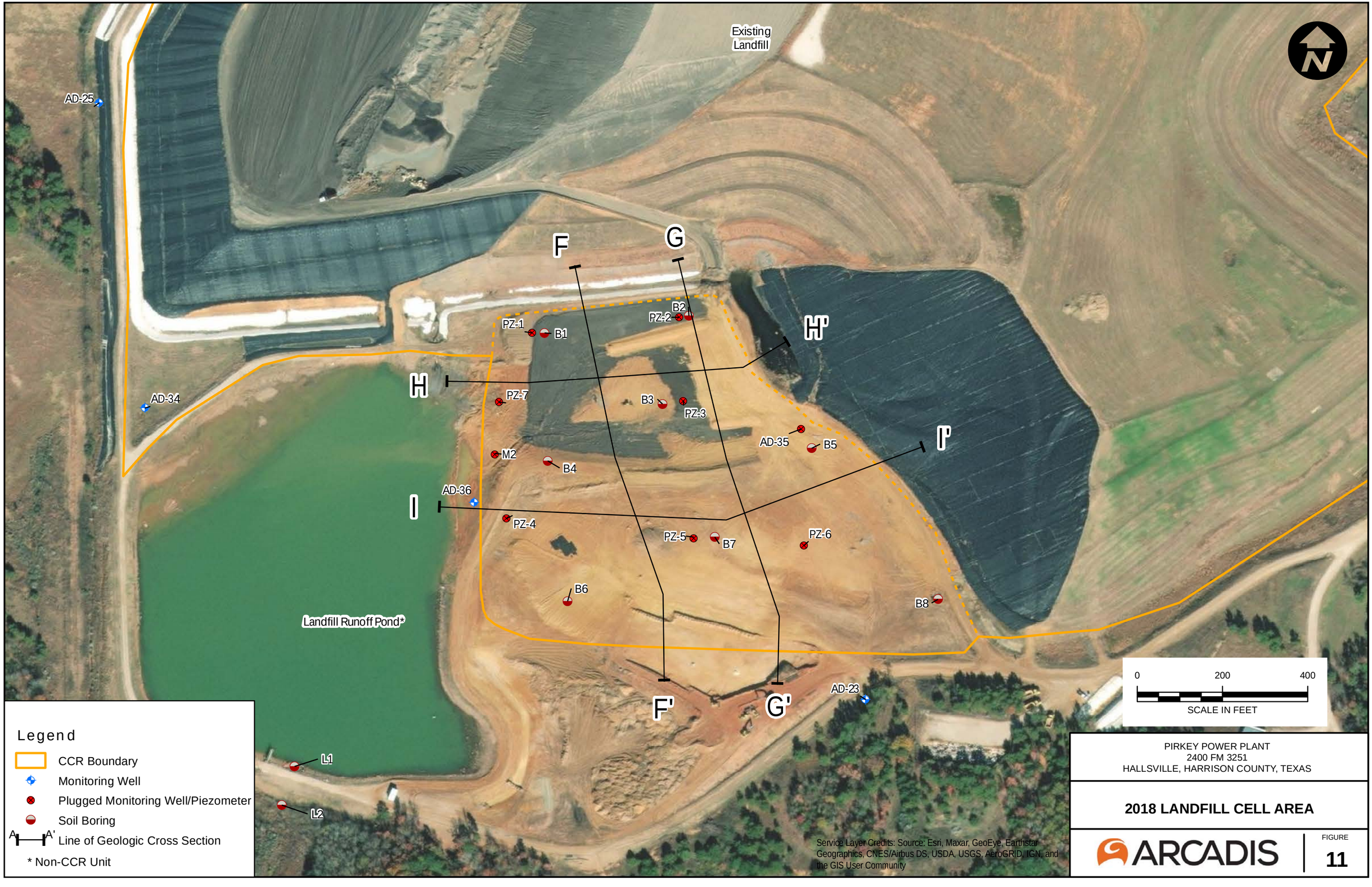
FIGURE 10

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Document Path: Z:\GISProjects_ENV\AEP\Pirkey Plant\MXD\Figure 10 - Well Elevations and Potentiometric Map - August 24, 2017.mxd



PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

2018 LANDFILL CELL AREA

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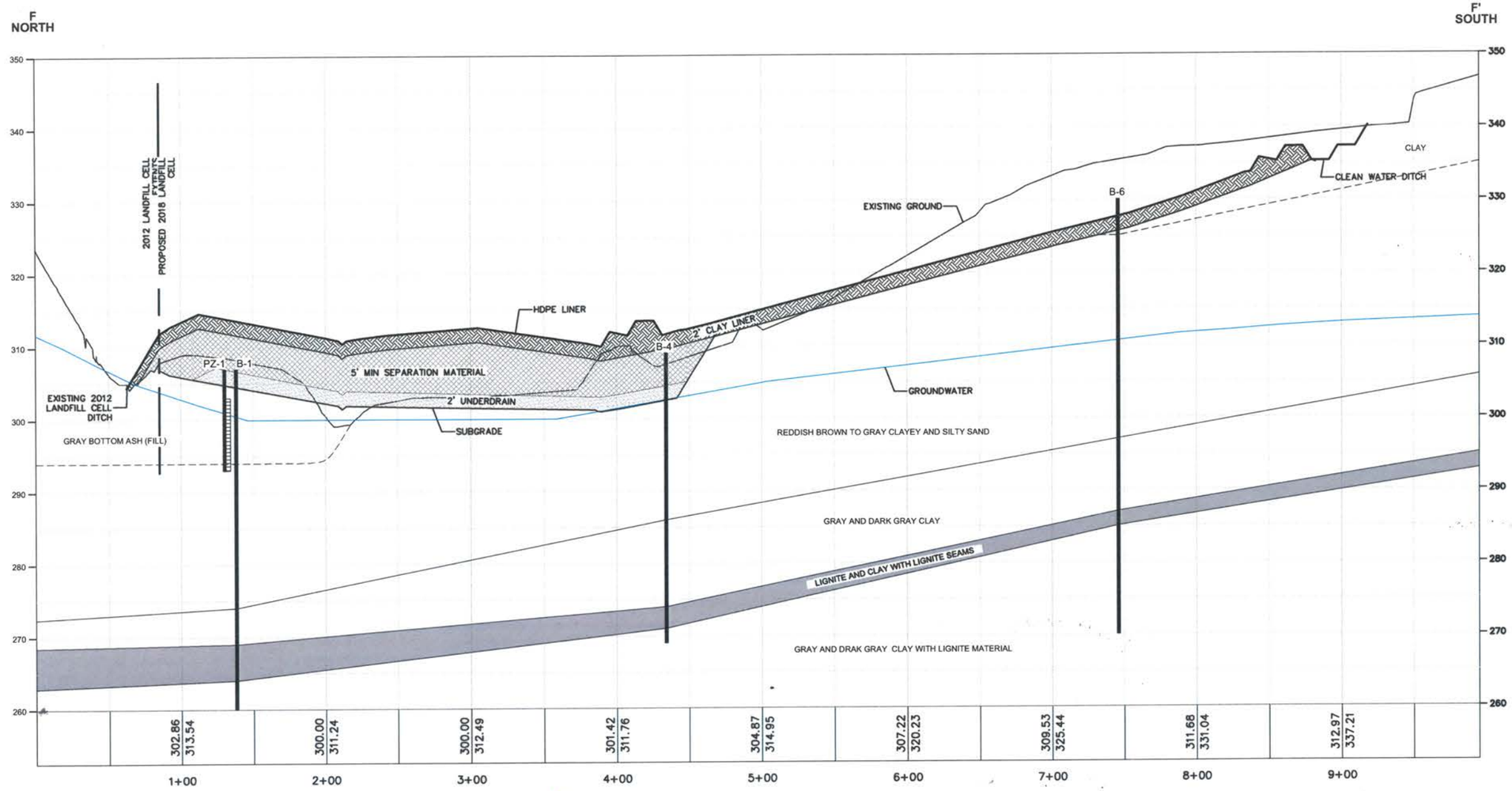
FIGURE
11



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1-20-22

HORIZONTAL SCALE 1" = 80'
VERTICAL SCALE 1" = 8'

0 80' 80'
GRAPHIC SCALE

NOTES:
1. MODIFIED FROM AKRON CONSULTING, LLC FIGURE TITLED "2018 LF EXPANSION CROSS SECTIONS A & B, DRAWING NO. 1-3494".
2. MONITORING WELLS, SOIL BORINGS, AND GEOLOGIC DESCRIPTIONS WERE ADDED BY ARCADIS TO ORIGINAL SOURCE FILE. THEY ARE PROJECTED ONTO THE SECTION LINE. THEREFORE, STRATIGRAPHIC INTERPRETATIONS ARE CONSIDERED APPROXIMATE.
3. THE GROUNDWATER ELEVATION PROFILE IS CONSISTENT WITH GROUNDWATER MEASUREMENTS COLLECTED BETWEEN 6/20/2018 AND 7/6/2018.

LEGEND
PZ-1 — SAMPLE IDENTIFICATION
BORING/WELL
WELL SCREEN

MATERIAL LEGEND
BOTTOM ASH
CLAY LINER
FGD SLUDGE PROTECTIVE CAP
SEPARATION MATERIAL

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION F-F'

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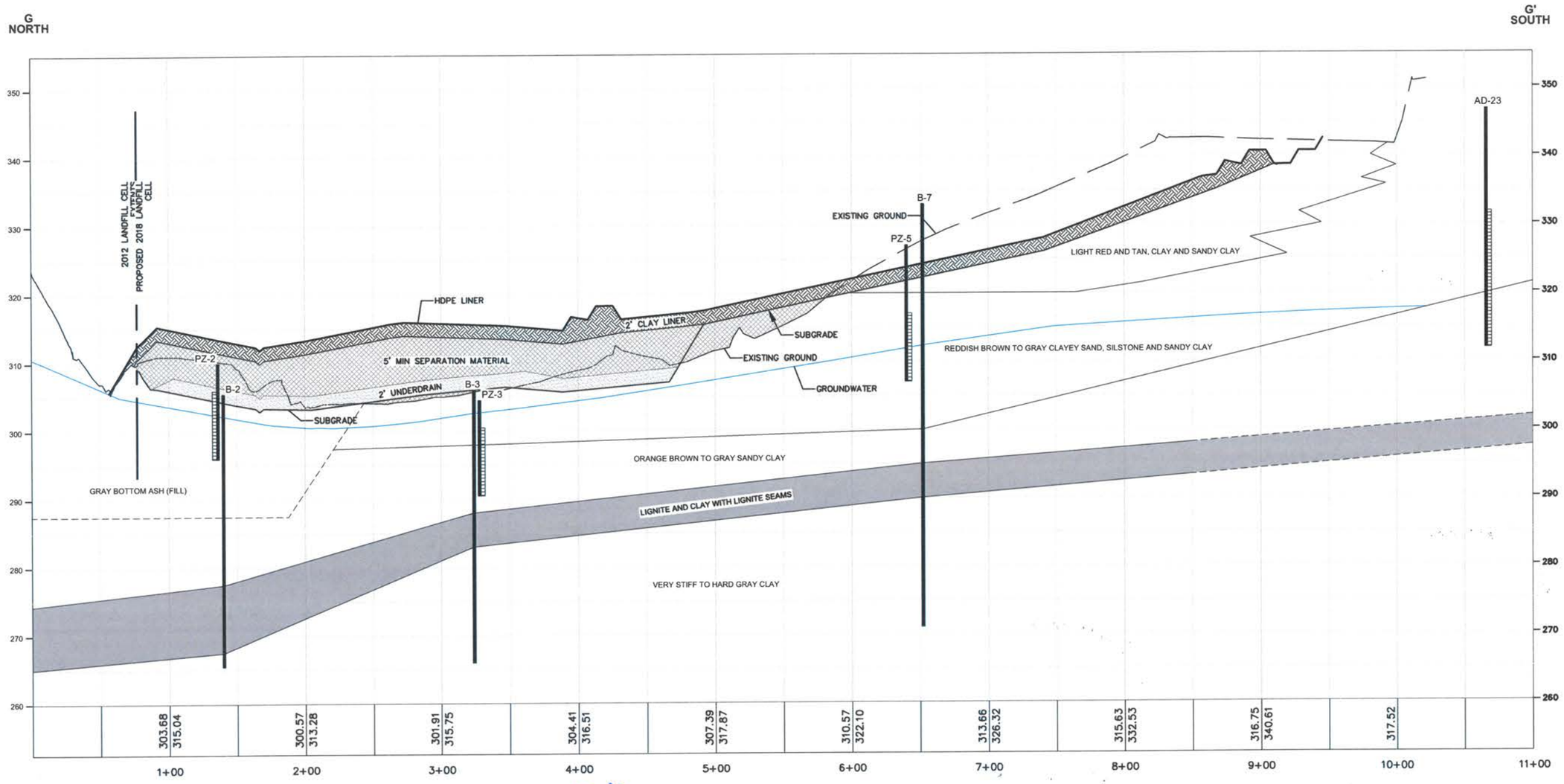
FIGURE
12



HORIZONTAL SCALE 1" = 80'
VERTICAL SCALE 1" = 8'

0 80' 80'
GRAPHIC SCALE

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NOTES:
1. MODIFIED FROM AKRON CONSULTING, LLC FIGURE TITLED "2018 LF EXPANSION CROSS SECTIONS A & B, DRAWING NO. 1-3494".
2. MONITORING WELLS, SOIL BORINGS, AND GEOLOGIC DESCRIPTIONS WERE ADDED BY ARCADIS TO ORIGINAL SOURCE FILE. THEY ARE PROJECTED ONTO THE SECTION LINE. THEREFORE, STRATIGRAPHIC INTERPRETATIONS ARE CONSIDERED APPROXIMATE.
3. THE GROUNDWATER ELEVATION PROFILE IS CONSISTENT WITH GROUNDWATER MEASUREMENTS COLLECTED BETWEEN 6/20/2018 AND 7/6/2018.

LEGEND
PZ-3 — SAMPLE IDENTIFICATION
BORING/WELL
WELL SCREEN

MATERIAL LEGEND
BOTTOM ASH
CLAY LINER
FGD SLUDGE PROTECTIVE CAP
SEPARATION MATERIAL

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION G-G'

ARCADIS

FIGURE
13

C:\Users\bsmith\OneDrive - ARCADIS\BIM360 - OneDrive Sync Location\AUS-AEP-PIRKEY POWER PLANT-HALLSVILLE Texas\2022\01-In Progress\01-DWG\PIRKEY TX CS FIGURES.dwg LAYOUT: GG SAVED: 1/19/2022 5:30 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTHALF.CTB PLOTTED: 1/20/2022 7:11 AM BY: SMITH, BOB
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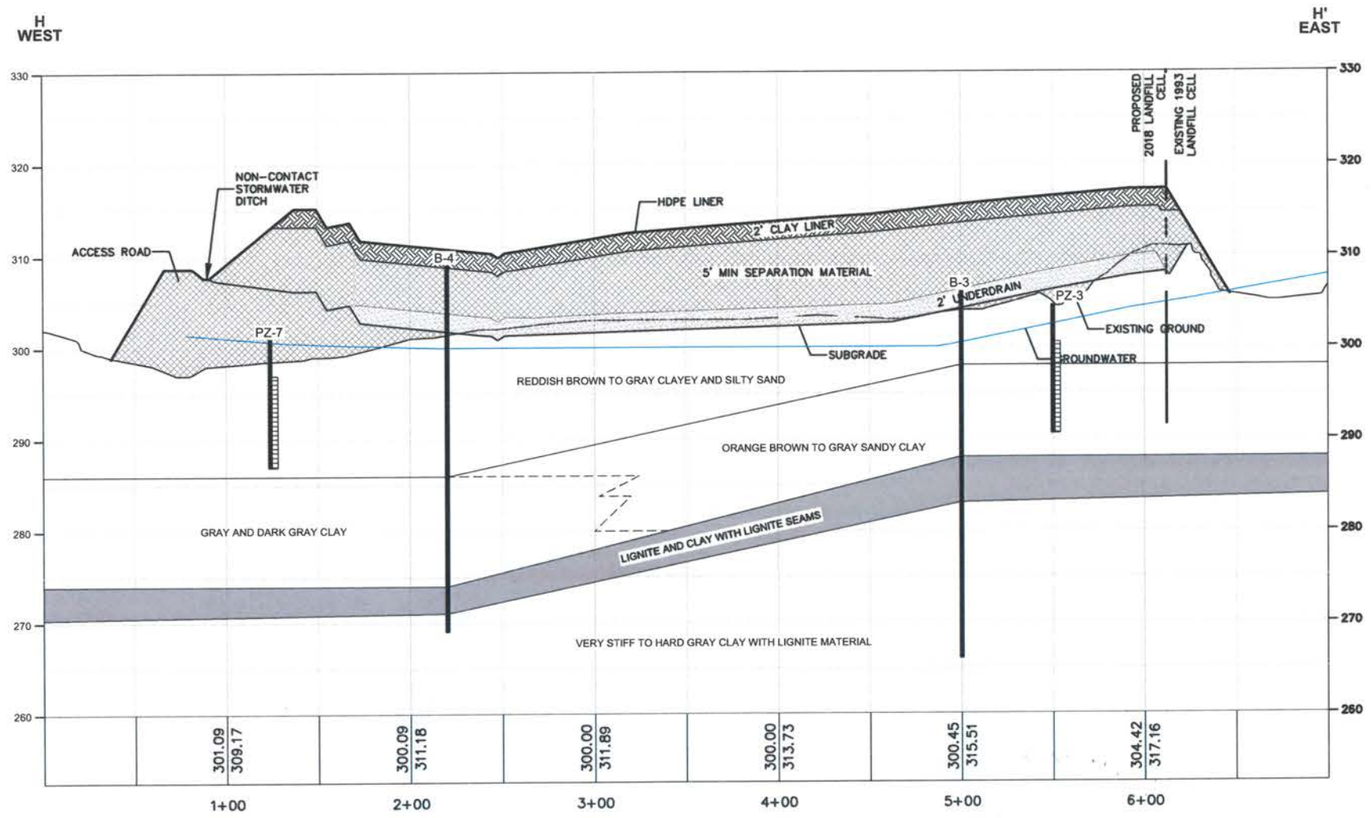

HORIZONTAL SCALE 1" = 80'
VERTICAL SCALE 1" = 8'

0 80' 80'
GRAPHIC SCALE

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1787
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1-20-22

NOTES:
1. MODIFIED FROM AKRON CONSULTING, LLC FIGURE TITLED "2018 LF EXPANSION CROSS SECTIONS C & D, DRAWING NO. 1-3494".
2. MONITORING WELLS, SOIL BORINGS, AND GEOLOGIC DESCRIPTIONS WERE ADDED BY ARCADIS TO ORIGINAL SOURCE FILE. THEY ARE PROJECTED ONTO THE SECTION LINE. THEREFORE, STRATIGRAPHIC INTERPRETATIONS ARE CONSIDERED APPROXIMATE.
3. THE GROUNDWATER ELEVATION PROFILE IS CONSISTENT WITH GROUNDWATER MEASUREMENTS COLLECTED BETWEEN 6/20/2018 AND 7/6/2018.

LEGEND
PZ-7 — SAMPLE IDENTIFICATION
BORING/WELL
WELL SCREEN

MATERIAL LEGEND
BOTTOM ASH
CLAY LINER
FGD SLUDGE PROTECTIVE CAP
SEPARATION MATERIAL

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION H-H'

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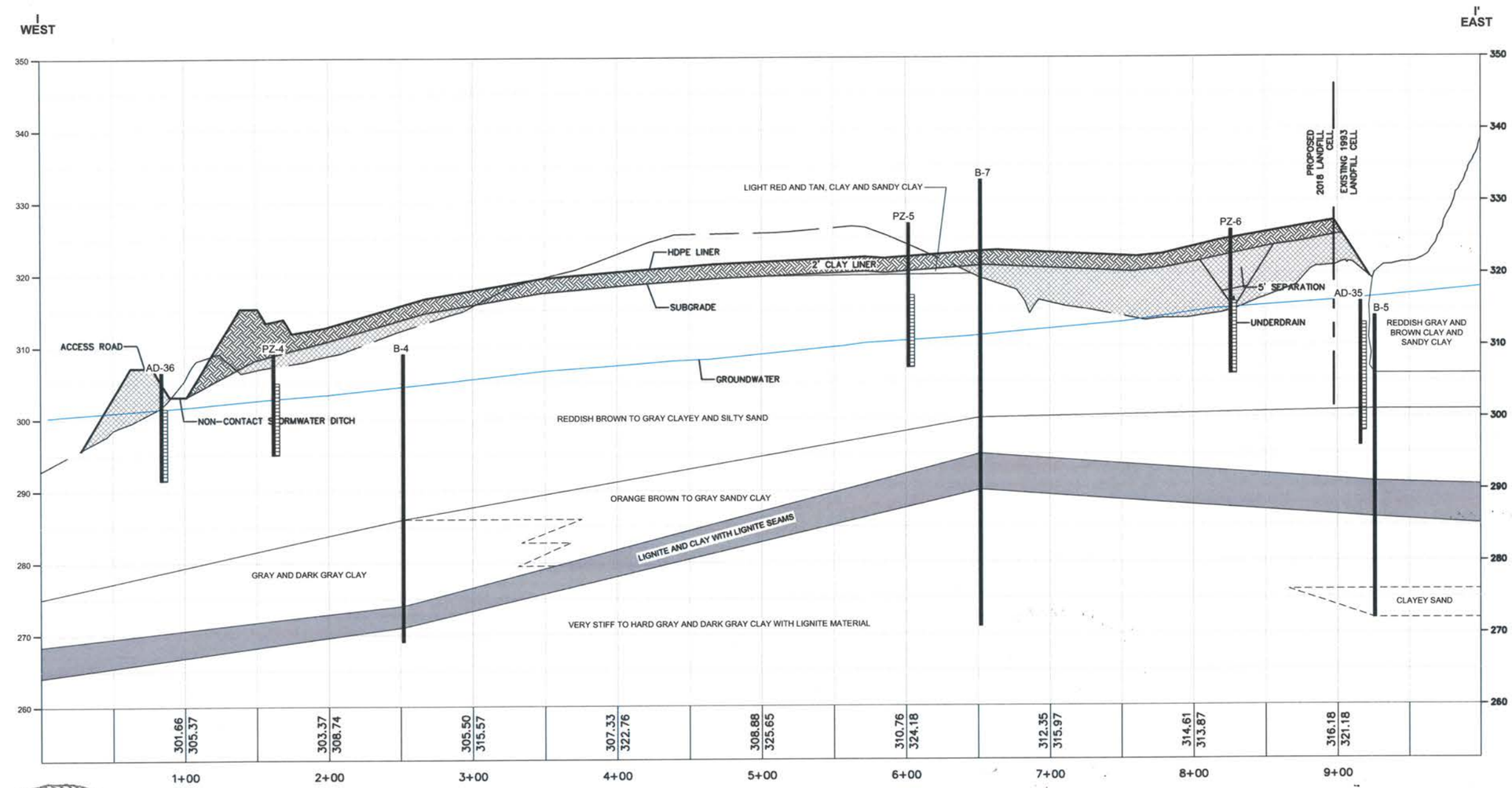
FIGURE
14

C:\Users\bsmith\OneDrive - ARCADIS\BM360 - OneDrive Sync Location\AUS-AEP-PIRKEY POWER PLANT-HALLSVILLE Texas\2022\01-In Progress\01-DWG\PIRKEY TX CS FIGURES.dwg LAYOUT: HH SAVED: 1/19/2022 5:30 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTHALF.CTB PLOTTED: 1/20/2022 7:11 AM BY: SMITH, BOB
XREFS: IMAGES: PROJECTNAME: ----



HORIZONTAL SCALE 1" = 80'
VERTICAL SCALE 1" = 8'

0 80' 80'
GRAPHIC SCALE

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1-20-22

NOTES:
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2. MONITORING WELLS, SOIL BORINGS, AND GEOLOGIC DESCRIPTIONS WERE ADDED BY ARCADIS TO ORIGINAL SOURCE FILE. THEY ARE PROJECTED ONTO THE SECTION LINE. THEREFORE, STRATIGRAPHIC INTERPRETATIONS ARE CONSIDERED APPROXIMATE.
3. THE GROUNDWATER ELEVATION PROFILE IS CONSISTENT WITH GROUNDWATER MEASUREMENTS COLLECTED BETWEEN 6/20/2018 AND 7/6/2018.

LEGEND
PZ-4 — SAMPLE IDENTIFICATION
BORING/WELL
WELL SCREEN

MATERIAL LEGEND
BOTTOM ASH
CLAY LINER
FGD SLUDGE PROTECTIVE CAP
SEPARATION MATERIAL

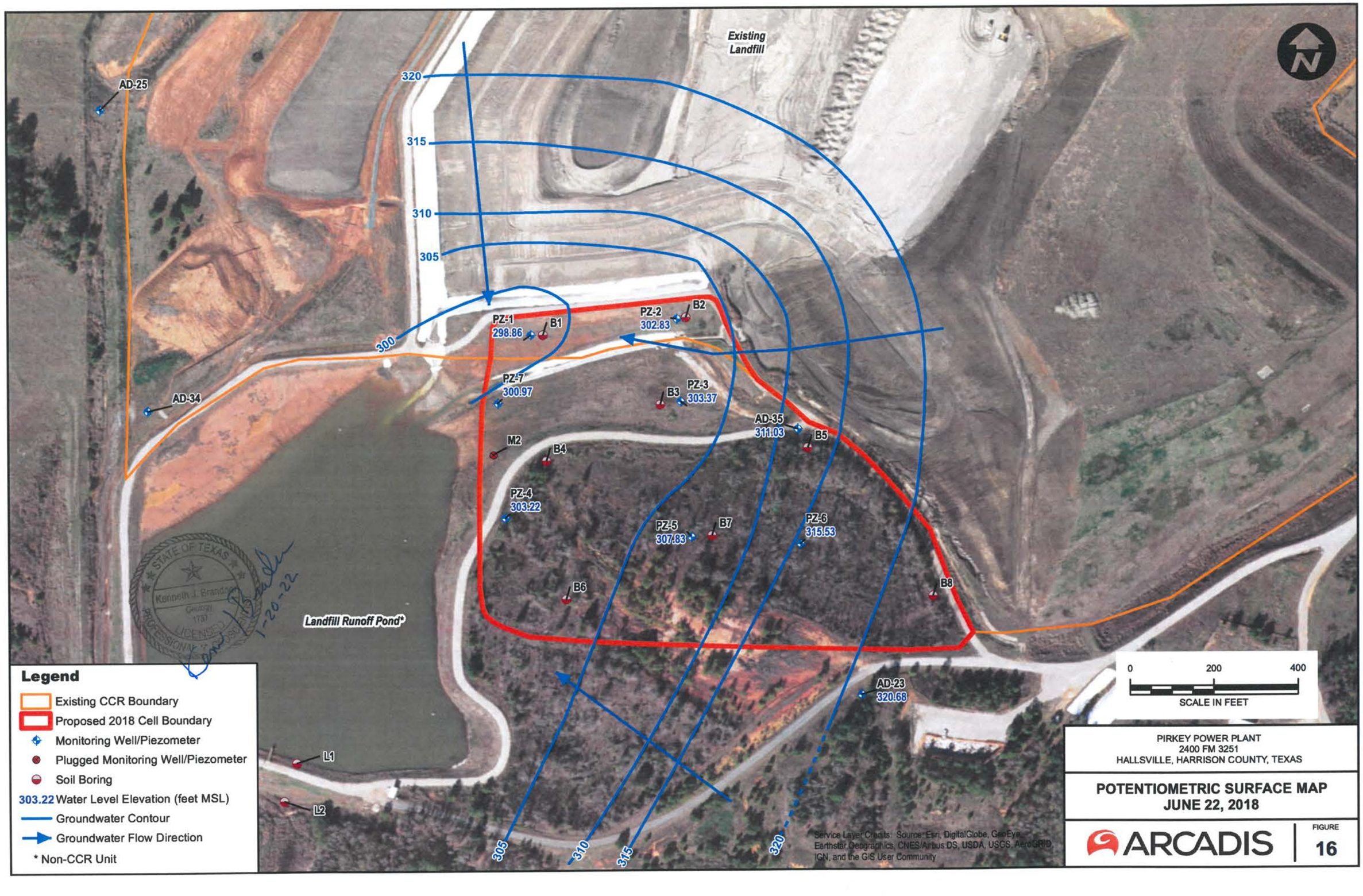
PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION I-I'

ARCADIS

FIGURE
15

C:\Users\bsmith\OneDrive - ARCADIS\BIM360 - OneDrive Sync Location\AUS-AEP-PIRKEY POWER PLANT-HALLSVILLE Texas\2022\01-In Progress\01-DWG\PIRKEY TX CS FIGURES.dwg LAYOUT: II SAVED: 1/19/2022 5:30 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTHALF.CTB PLOTTED: 1/20/2022 7:12 AM BY: SMITH, BOB
XREFS: IMAGES: PROJECTNAME: ---



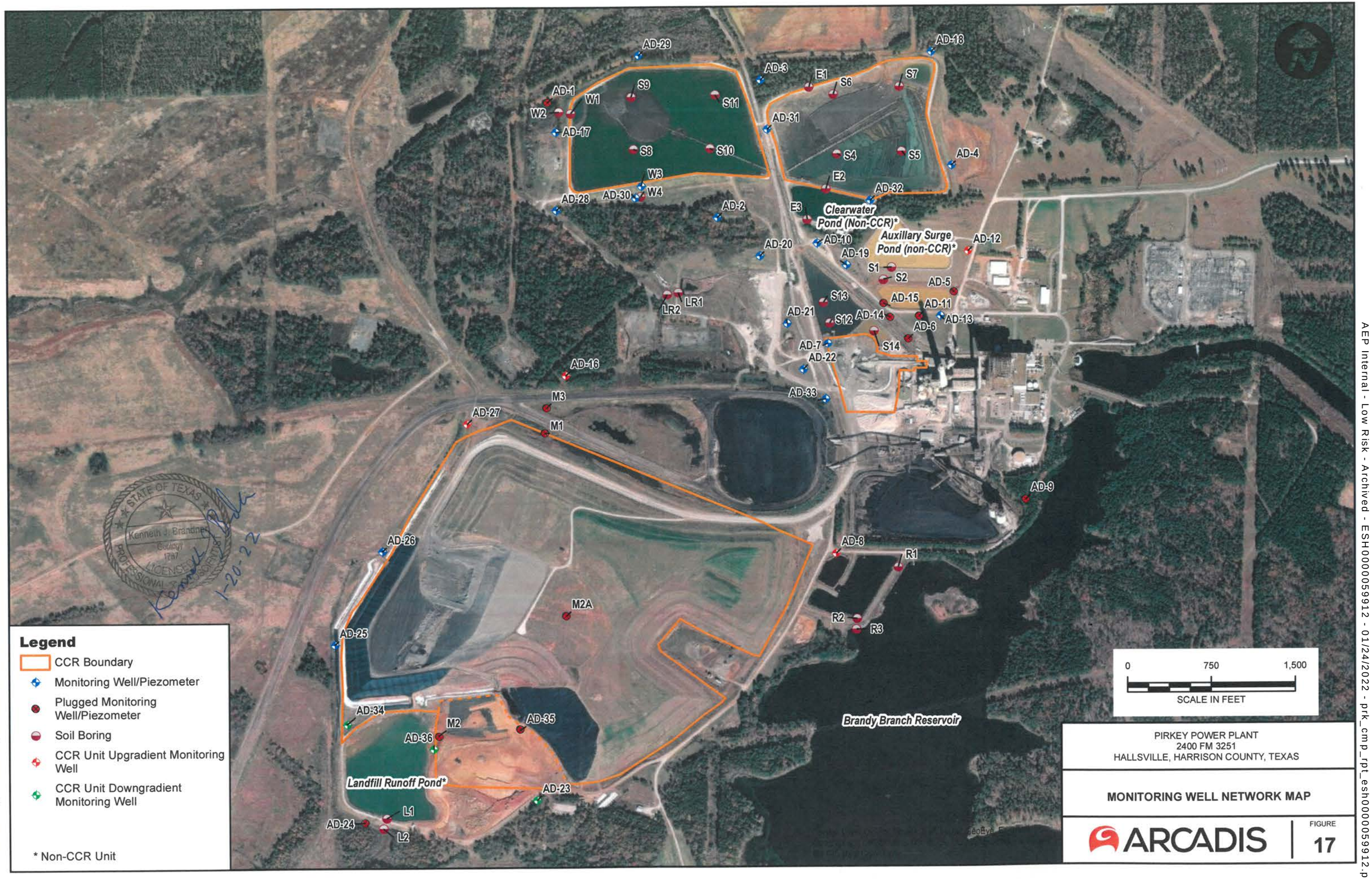
PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

POTENTIOMETRIC SURFACE MAP
JUNE 22, 2018

ARCADIS

FIGURE
16

Document Path: Z:\GISProjects_ENVAEP\Pirkey Plant\MXD\Figure 15 - Potentiometric Surface Map June 22_2018.mxd



Legend

- CCR Boundary
- Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- CCR Unit Upgradient Monitoring Well
- CCR Unit Downgradient Monitoring Well

* Non-CCR Unit

STATE OF TEXAS
Kenneth J. Brandner
Geology
1747
LICENSED
PROFESSIONAL GEOSCIENTIST
1-20-22

PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

MONITORING WELL NETWORK MAP

ARCADIS

FIGURE 17

Document Path: T:_ENV\AEP\Pirkey Plant\MXD\Updated\Figure 17 - Proposed Well Network - Landfill.mxd

Appendix A

Soil Boring Logs and Piezometers - 2018 Landfill Lateral Expansion Area

Auckland Consulting LLC

LOG OF BORING B1

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/07/2016

GPS Coordinates: N32° 27' 12.0" W94° 29' 48.6"
Surface Elevation: N/A
Drilling Method: HSA

Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Medium Stiff, red, brown and gray, Sandy Lean Clay (CL), mottled, few gravel	8			52	16	39	13	26	
	5			Gray, Bottom Ash	13	N/A			15				64
▼					6								
	10												
	15			Very Loose, brown, gray and red, Silty Clayey Sand (SC-SM), mottled, with organics (roots)	3			49	24	22	16	6	
	20			- red, tan and gray at 18 ft	1								
	25			Very Loose, light gray, red and tan, Silty Sand (SM), mottled	1	N/A		36	19	NP	NP	NP	
	30			- loose, few clay below 28 ft	10			31	19				
	35			Very Stiff, dark gray and gray, Sandy Lean Clay (CL)	24			55	21	29	13	16	
	40			Black, Lignite	50/2								
	45			Hard, dark gray and gray, Lean Clay (CL), laminated, few lignitic material	61	4.5		97	20	38	20	18	105
	50			Boring terminated at 47 feet.									

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 8 ft during drilling. Water level at 8 feet upon completion.
N/A: Not Attempted

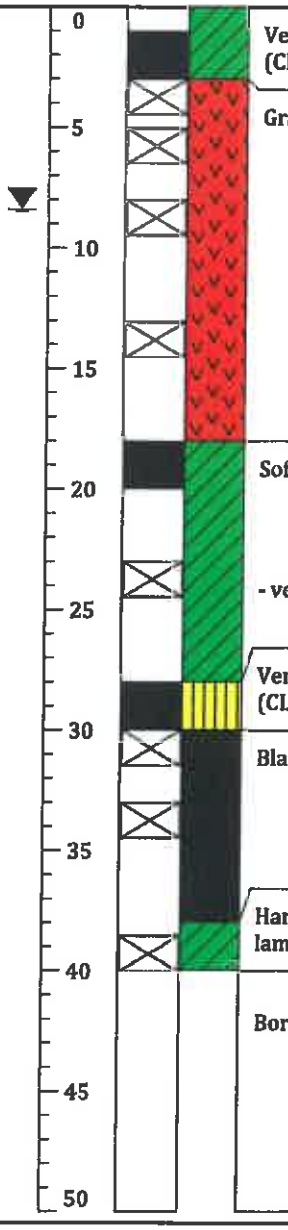
Auckland Consulting LLC

LOG OF BORING B2

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/06/2016

GPS Coordinates: N32° 27' 12.3" W94° 29' 45.3"
Surface Elevation: N/A
Drilling Method: HSA



Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Very Stiff, red and brown, Sandy Lean Clay (CL), mottled, few gravel		2.5		57	18	30	12	18	
	5			Gray, Bottom Ash	4								
					3								
▼					1								
	10												
					2								
	15												
	20			Soft, dark gray, Sandy Lean Clay (CL)		0.5		62	20	34	13	21	91
				- very soft below 23 ft	1								
	25												
				Very Stiff, dark gray and gray, Sandy Silty Clay (CL-ML), with lignitic material		3.0		50	15	20	16	4	117
	30			Black, Lignite	50/3								
					50/3								
	35												
				Hard, gray and dark gray, Lean Clay (CL), laminated, trace gypsum	44			95	22	38	17	21	
	40			Boring terminated at 40 feet.									
	45												
	50												

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 8 ft during drilling. Water level at 8 feet upon completion.

N/A: Not Attempted

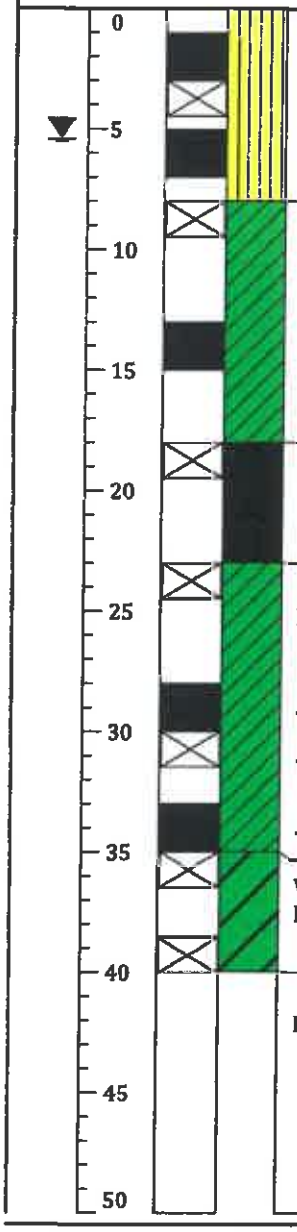
Auckland Consulting LLC

LOG OF BORING B3

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/08/2016

GPS Coordinates: N32° 27' 10.3" W94° 29' 45.9"
Surface Elevation: N/A
Drilling Method: HSA



Depth (feet)	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
0	Soft, brown, tan and red, Sandy Silty Clay (CL-ML), mottled, with few organics		N/A							
5		4	N/A		53	19	20	15	5	
10	Very Stiff, brown and gray, Lean Clay with Sand (CL), mottled, laminated	24			77	19	29	17	12	
15	- stiff below 13 ft		1.5		75	22	31	17	14	103
20	Black, Lignite	50/3.75								
25	Hard, gray, Lean Clay (CL), mottled, laminated, few lignitic material	55								
30	- very stiff between 28 ft and 30 ft		2.5		99	17	38	18	20	117
	- hard below 30 ft	33								
35	- attempted, no recovery		N/A							
	Very Stiff, gray, Fat Clay (CH), mottled, laminated, trace gypsum	27			97	23	51	17	34	
40		26								
	Boring terminated at 40 feet.									
45										
50										

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 5 ft during drilling. Water level at 5 feet upon completion.
N/A: Not Attempted

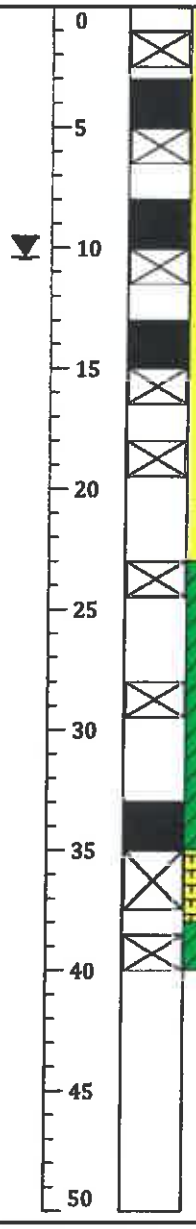
Auckland Consulting LLC

LOG OF BORING B4

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/12/2016

GPS Coordinates: N32° 27' 9.0" W94° 29' 48.6"
Surface Elevation: N/A
Drilling Method: HSA



Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Very Loose, reddish brown, Clayey Sand (SC), mottled	2								
	5			- medium dense between 3 ft and 10 ft		3.5		27	14	23	14	9	
				- few gravel below 5 ft	15								
▼	10			- loose between 10 ft and 15 ft	5	2.5		49	18	28	13	15	115
	15			- medium dense between 15 ft and 18 ft	27	0.5		49	20	29	15	14	
	20			- very dense below 18 ft	60								
	25			Hard, gray and dark gray, Lean Clay (CL), mottled, laminated	32								
	30			- very stiff at 28 ft	17			88	22	45	16	29	
	35			- attempted, no recovery		N/A							
				Very Dense, gray and tan, Silty Sand (SM), with lignitic material	50/2								
	40			Hard, gray, dark gray and black, Lean Clay (CL), mottled, with lignitic material	95/11								
				Boring terminated at 40 feet.									
	45												
	50												

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 10 ft during drilling. Water level at 10 feet upon completion.
N/A: Not Attempted

Auckland Consulting LLC

LOG OF BORING B5

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/09/2016

GPS Coordinates: N32° 27' 9.2" W94° 29' 42.4"
Surface Elevation: N/A
Drilling Method: HSA

Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Loose, reddish brown, Clayey Sand (SC), mottled	8								
	5			Very Stiff, red and brown, Sandy Lean Clay (CL), mottled, few gravel	19	4.0	6.6	51	16	34	14	20	116
	10			Dense, red, tan and brown, Clayey Sand (SC), mottled	34	4.0		40	20				
▼	15			Very Stiff, gray and tan, Lean Clay (CL), mottled, laminated	17			96	21	41	16	25	
	20			Very Stiff, gray and dark gray, Lean Clay with Sand (CL), mottled	38	3.0		55	18	29	17	12	
	25			Black, Lignite	50/6								
	30			Hard, gray and dark gray, Lean Clay (CL), mottled, laminated	39	4.0		99	21				
	35			- very stiff at 33 ft	24								
	40			Medium Dense, gray and dark gray, Clayey Sand (SC)	27	2.5		45	27	36	16	20	
	45			Boring terminated at 42 feet.									
	50												

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 13 ft during drilling. Water level at 13 feet upon completion.

N/A: Not Attempted

Auckland Consulting LLC

LOG OF BORING B6

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Project No.: 2016-011
Drilling Contractor: C&S Lease
Drill Date(s): 09/16/2016

GPS Coordinates: N32° 27' 5.7" W94° 29' 48.0"
Surface Elevation: N/A
Drilling Method: HSA

Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Very Stiff, red and brown, Sandy Fat Clay (CH), mottled	17	4.5		55	19	61	25	36	
	5			Medium Dense, light red, tan and brown, Silty Clayey Sand (SC-SM), mottled	28			48	11				
	10			- tan, light red and gray below 8 ft, with few gravel between 8 ft and 10 ft	19	3.5							
	15			Very Dense, tan, light red and gray, Silty Sand (SM), mottled	88/10	2.5		33	12	19	15	4	
	20			- dense between 18 ft and 23 ft	42								
	25			- medium dense between 23 ft and 28 ft	28								
▼	30			- very dense below 28 ft	85/11			17	22	NP	NP	NP	
	35			Hard, gray and dark gray, Lean Clay (CL), mottled, laminated	72								
	40			- little recovery, few sand between 38 ft and 40 ft	48	N/A		97	22	42	17	25	
	45			- gray, dark gray and black, with lignitic material, laminated between 43 ft and 45 ft	50/3								
	50				40								
	55				60								
	60				40			98	19	42	17	25	
	65			Boring terminated at 60 feet.									

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 28 ft during drilling. Water level at 28 feet upon completion.

N/A: Not Attempted

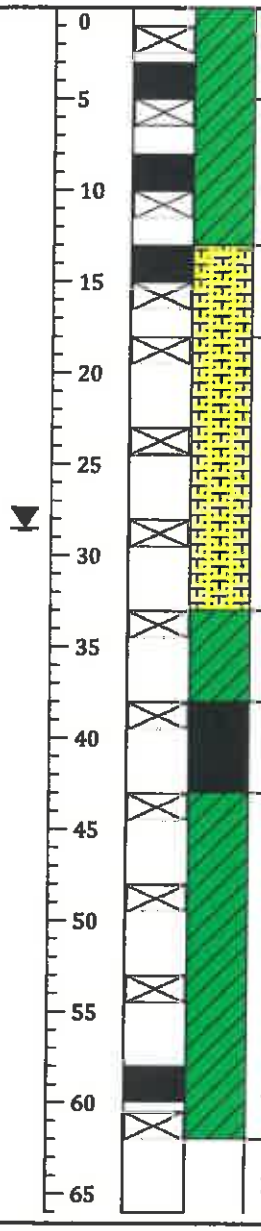
Auckland Consulting LLC

LOG OF BORING B7

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/14/2016

GPS Coordinates: N32° 27' 7.1" W94° 29' 44.6"
Surface Elevation: N/A
Drilling Method: HSA



Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Stiff, light red and tan, Sandy Lean Clay (CL), mottled	13	N/A		51	19				
	5			Very Stiff, light tan, red and brown, Lean Clay (CL), mottled	20	N/A		85	17	29	14	15	
	10				21	N/A							
	15			Very Dense, light gray, Silty Sand (SM)	87/10			45	10	NP	NP	NP	
	20			Very Dense, red, brown and gray, Silty Sand (SM)	60								
	25				84/11			18	21				
	30				50/2								
	35			Hard, gray and dark gray, Lean Clay (CL), mottled, laminated	40								
	40			Black, Lignite	50/5								
	45			Hard, dark gray, Lean Clay (CL), mottled, laminated, trace gypsum	81								
	50				64								
	55				35			95	18	43	17	26	
	60			- attempted, no recovery	77	N/A							
	65			Boring terminated at 62 feet.									

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 28 ft during drilling. Water level at 28 feet upon completion.

N/A: Not Attempted

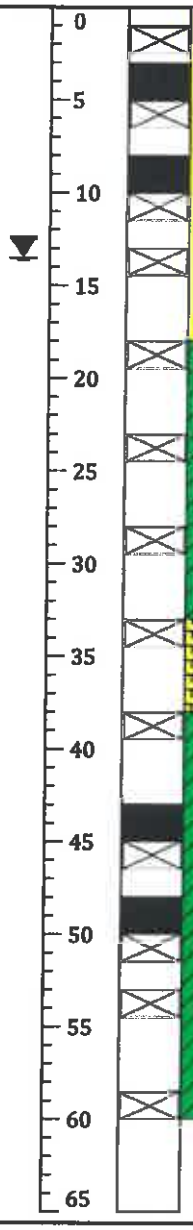
Auckland Consulting LLC

LOG OF BORING B8

Project Name: Pirkey - 2019 Landfill Expansion
Project Location: Hallsville, Texas
Drilling Contractor: C&S Lease

Project No.: 2016-011
Drill Date(s): 09/13/2016

GPS Coordinates: N32° 27' 5.7" W94° 29' 39.6"
Surface Elevation: N/A
Drilling Method: HSA

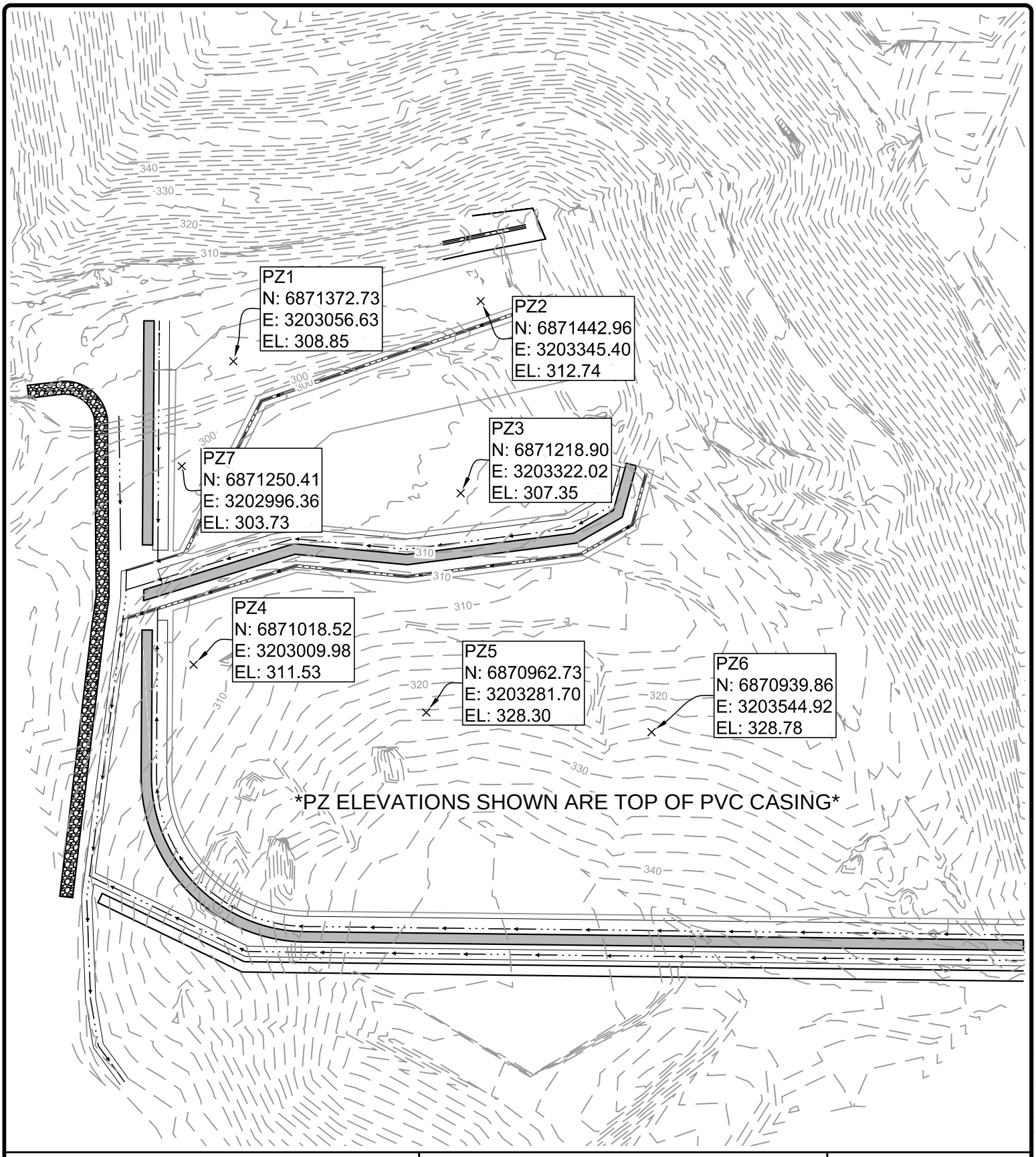


Groundwater Elevation (ft)	Depth (feet)	Sample Type	Graphic Log	Material Description	N-Value (Blows/ft)	Pocket Penetrometer (tsf)	Unconfined Strength (tsf)	Passing #200 Sieve (%)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Unit Dry Weight (pcf)
	0			Loose, red, tan, and brown, Clayey Sand (SC)	6	2.0		39	13	19	12	7	
	5				7								
	10			- medium dense, light gray, red and tan below 8 ft	18	N/A		37	23				
▼	15				15								
	20			Very Stiff, gray and brown, Lean Clay (CL), mottled, laminated	22			91	25	42	16	26	
	25			- hard below 23 ft	79								
	30				79/11								
	35			Very Dense, dark gray, Silty Sand (SM)	76/11			43	30	NP	NP	NP	
	40			Very Stiff, gray and dark gray, Lean Clay (CL), mottled, laminated	21			97	23				
	45			Stiff, gray and dark gray, Sandy Lean Clay (CL), mottled, with occasional lignitic seams	22	1.5		59	25	33	18	15	93
	50			- attempted, no recovery	16	N/A		48	30				
	55				22								
	60			- laminated at 58 ft	29			62	25	44	21	23	
	65			Boring terminated at 60 feet.									

Additional Information/Comments:

Logger: D. Diduch

Notes/Comments: Seepage encountered at 13 ft during drilling. Water level at 13 feet upon completion.
N/A: Not Attempted



AKRON CONSULTING, LLC.
431 N. CENTER ST.
LONGVIEW, TX 75601
TBPE Firm Reg. # 14014
(O) 903-236-9744
(F) 903-236-9745
www.akron-consulting.com

0 150' 300'

1"=150'

N

PZ WELL AS-BUILT LOCATIONS

STATE OF TEXAS WELL REPORT for Tracking #482280

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-1**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 11.79" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 48.1" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/14/2018** Drilling End Date: **6/14/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**14**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
3	**14**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**3**	**Bentonite 2 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Clay**
5	**10**	**Very Soft Red/Grey Clay**
10	**14**	**Very Soft Brown Sandy Clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**4**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**4**	**14**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

STATE OF TEXAS WELL REPORT for Tracking #482283

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-2**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 12.36" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 44.64" W**
Well County:	**Harrison**	Elevation:	**No Data**

Type of Work: **New Well** Proposed Use: **Piezometer**

Drilling Start Date: **6/14/2018** Drilling End Date: **6/14/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**14**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
3	**14**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**3**	**Bentonite 2 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Clay**
5	**10**	**Very Soft Red/Grey Clay**
10	**14**	**Very Soft Brown Sandy Clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**4**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**4**	**14**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

STATE OF TEXAS WELL REPORT for Tracking #482286

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-3**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 10.18" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 45.15" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/14/2018** Drilling End Date: **6/14/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**14**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
3	**14**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**3**	**Bentonite 2 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Clay**
5	**10**	**Very Soft Red/Grey Clay**
10	**14**	**Very Soft Brown Sandy Clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**4**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**4**	**14**

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(512) 334-5540

STATE OF TEXAS WELL REPORT for Tracking #482290

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-4**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 08.3" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 48.73" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/15/2018** Drilling End Date: **6/15/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**14**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
3	**14**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**3**	**Bentonite 2 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Clay**
5	**10**	**Very Soft Red/Grey Clay**
10	**14**	**Very Soft Brown Sandy Clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**4**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**4**	**14**

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STATE OF TEXAS WELL REPORT for Tracking #482295

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-5**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 07.7" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 45.72" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/15/2018** Drilling End Date: **6/15/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**20**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
8	**20**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**8**	**Bentonite 4 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Sandy Clay**
5	**10**	**Very Soft Red/Brown Clay**
10	**15**	**Very Soft Red/Tan Sandy Clay**
15	**20**	**Tan/Red Silty Sand**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**10**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**10**	**20**

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STATE OF TEXAS WELL REPORT for Tracking #482297

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-6**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 07.69" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 42.56" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/15/2018** Drilling End Date: **6/15/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**20**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
8	**20**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**8**	**Bentonite 4 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Sandy Clay**
5	**10**	**Very Soft Red/Brown Clay**
10	**15**	**Very Soft Red/Tan Sandy Clay**
15	**20**	**Tan/Red Silty Sand**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**10**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**10**	**20**

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STATE OF TEXAS WELL REPORT for Tracking #482288

Owner:	**American Electric Power Company**	Owner Well #:	**PZ-7**
Address:	**502 N. Allen Strreet Shreveport, LA 71101**	Grid #:	**35-37-4**
		Latitude:	**32° 27' 10.81" N**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Longitude:	**094° 29' 48.7" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Piezometer**

Drilling Start Date: **6/14/2018** Drilling End Date: **6/14/2018**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**14**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
3	**14**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**1**	**Cement 1 Bags/Sacks**
1	**3**	**Bentonite 2 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Alternative Procedure Used** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C&S Lease**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **Michael Aaron Dodson** Apprentice Number: **59693**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Red Soft Clay**
5	**10**	**Very Soft Red/Grey Clay**
10	**14**	**Very Soft Brown Sandy Clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**4**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**4**	**14**

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Appendix B

Boring/Well Construction Logs

832964

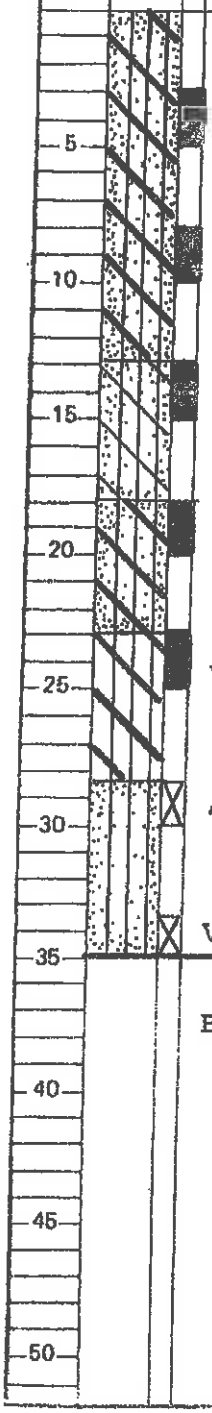
LOG OF BORING

PROJECT: Waste Water Ponds
CLIENT: SWEPCO

BORING NO.: MW-8
LOCATION: Hallsville

Date: 10-4-83 Type: Auger Ground Elevation:

Legend: ■ Sample X Penetration ▼ Water



Description of Stratum
Stiff tan silty sandy clay w/iron ore
Stiff tan and grey silty sandy clay w/iron ore
Firm tan and grey clayey silty sand
Medium tan and grey very silty sandy clay w/iron ore
Very stiff grey silty clay lenses
43-7=5½" 50 B/5½"
Very dense tan and grey silty sand 50 B/5½"
Bottom of boring at 35 feet.

APEX PROJECT NO.: 110-089 ☐ BORING BORING NUMBER: ___ ■ MONITOR WELL MONITOR WELL NUMBER: AD-16

FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/30/2010

PREPARED BY: Jeff Sammons LOGGED BY: Matt Lyon/Jeff Sammons

LATTITUDE: N 32°27.680' Datum: WGS-84 WELL LOCATION: North of Mine Haul Road
LONGITUDE: W94°29.642'

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1 2			0-2	SM	Silty sand, very fine grained, light brown	None	Dry
3 4 5 6 7 8			2-8	CL	Sandy clay, yellowish brown, reddish brown -some iron oxide concretions at 2.5' -light gray at 5'	None	Dry
9 10			8-10	CL	Clay, red, light yellowish brown, gray, fat, hard, some very fine laminated sand seams	None	Dry
11			10-11	CL	Sandy clay, red, light gray, yellowish brown, stiff to hard	None	Dry
12 13 14			11-14.25	CL	Clay, yellowish brown, some sand, reddish brown, light gray, hard -clayey sand seam at 14-14.25', yellowish brown, light gray	None	Dry Moist
15 16 17 18			14.25-18	CL	Sandy clay, red, light gray, gray, very thin sand lenses interbedded in clay	None	Moist to V. Moist
19 20 21 22 23 24 25 26 27 28 29 30 31 32			18-29.5	CL	Clay, reddish gray, light gray, yellowish brown, hard, gray -2" reddish brown iron oxide cemented sand laminations at 19.75' -very moist, 1" gravelly sand lense, very fine gypsum crystals at 21' -sandy 22', 22.5', 24' -gray, yellowish brown at 24-24.5' - dark gray, very fine gypsum crystals, trace sand, hard, dry, at 25'	None	Moist V. Moist Dry
33 34 35			32-35	SC	Clayey sand, greenish gray, light gray, some very fine gypsum crystals, dense	None	Moist
36 37 38 39 40					Boring Terminated at 35'		

▽ Water Level

Cement | Bentonite | Filter Sand

Apex geoscience inc.

Total Depth: 35 feet
Filter Sand (Size/Interval): 13-35'
Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-13'
Surface Completion ☐ Flush ■ Above Ground

Riser Interval: +3 (ags)-15'
Screen Interval: 15-35'
Water level: 23.37'
3'

Note: This log is not to be used separate from this report.

APEX PROJECT NO.: 110-089 ☐ BORING BORING NUMBER: ____ ■ MONITOR WELL MONITOR WELL NUMBER: AD-23

FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/15/2010

PREPARED BY: David Bedford LOGGED BY: David Bedford

LATTITUDE: N 32°27'03.3" Datum: WGS-84 WELL LOCATION: ____
LONGITUDE: W94°29'41.3"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1-9				SC	Clayey sand, brown, with yellowish brown and orangish brown laminations, very fine grained, very silty, few light gray clay streaks	None	Moist
10-14				ML	Siltstone with light gray clay streaks, light gray with orangish brown streaks, few small iron ore pebbles	None	Moist
15-20				SM	Sand, light gray with orangish brown streaks, very silty, very fine grained, few clay laminations	None	Slightly Moist
21-27				ML	Siltstone, light gray with orangish brown streaks	None None	Very Moist V. Moist
28-30				SM	Sand, light brown mottled with orangish brown, very fine grained, very silty	None	Wet
31-32			▽	SC	Slightly sandy clay, orangish brown mottle with orangish brown, silty, very fine grained (30-31.5')	None	Moist
33-35				CL	Lean clay, dense, small sandy streaks, dark gray, very fine grained (31.5-35')	None	Moist
36-40					Boring Terminated at 35'		

Cement Bentonite Filter Sand Water Level

Apex geoscience inc.

Total Depth: 35 feet
Filter Sand (Size/Interval): 13-35'
Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-13'
Surface Completion Flush ■ Above Ground

Riser Interval: +3 (ags)-15'
Screen Interval: 15-35'
Water level: 30.83
Above Ground 3'

Note: This log is not to be used separate from this report.

APEX PROJECT NO.: 110-089 | ☐ BORING BORING NUMBER: | ■ MONITOR WELL MONITOR WELL NUMBER: AD-24

FACILITY NAME: AEP- Pirkey Power Plant | FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. | COMPLETION DATE: 12/27/2010

PREPARED BY: Jeff Sammons | LOGGED BY: Jeff Sammons

LATTITUDE: N 32°27.024' Datum: WGS-84 | WELL LOCATION: South of LF pond dam

LONGITUDE: W94°29.940'

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1 2			0-1.5	SM	Silty sand, very fine grained, some clay, brown and reddish brown, medium dense	None	Moist
3 4 5 6			1.5-6.5	SC	Clayey sand, silty, gray, yellowish brown, reddish brown, very fine grained, dense -some iron oxide concretions and gravel at 5-6', trace organic matter at 6', gray, dark gray, reddish brown, loose to med. dense	None	Dry Moist
7 8 9 10 11 12 13 14 15 16			6.5-16	SM	Silty sand, very fine grained, red, loose, trace clay -some gravel at 10' -hard cemented sandstone with iron oxide at 11' - some clay at 15-16', medium dense, gray, dark gray	None	Saturated Moist
17 18 19 20			16-20	Lignite	Lignite, black, loose, saturated at 16-17' - medium dense, moist at 17-20'	None	Saturated
21 22 23 24 25 26 27 28 29 30					Boring Terminated @ 20'		

▽ Water Level

Cement | Bentonite | Filter Sand

Apex geoscience inc.

Total Depth: 20 feet | Riser Interval: +3 (ags)-5'

Filter Sand (Size/Interval): 3-20' | Screen Interval: 5-20'

Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-3' | Water level: 8.4

Surface Completion ☐ Flush ■ Above Ground | 3'

Note: This log is not to be used separate from this report.

APEX PROJECT NO.: 110-089 ☐ BORING BORING NUMBER: ____ ■ MONITOR WELL MONITOR WELL NUMBER: AD-25

FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/14/2010

PREPARED BY: David Bedford LOGGED BY: David Bedford

LATTITUDE: N 32°27'17.2" Datum: WGS-84 WELL LOCATION: S. of Diesel ASTs

LONGITUDE: W94°29'59.1"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1			0-1.5	SC	Clayey sand, brown, silty, very fine grained, moist	None	Moist
2			1.5-7	CH	Fat sandy clay, orangish brown, very fine grained, moist	None	Moist
3							
4							
5							
6							
7							
8			7-30	SC	Clayey sand, orangish brown mottled with dark gray, very fine grained, few light gray clay inclusions	None	Moist
9							
10							
11							
12							
13							
14		▽			Wet @ 14'		Wet
15							
16					15-20' - few pieces of dark gray cystalline rock		
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32					Boring Terminated at 30'		
33							
34							
35							

Cement Bentonite Filter Sand ▽ Water Level

☒ *Apex geoscience inc.*

Total Depth: 30 feet Riser Interval: +3 (ags)-10'

Filter Sand (Size/Interval): 8-30' Screen Interval: 10-30'

Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-8' Water level: 12.69'

Surface Completion ☐ Flush ■ Above Ground 3'

Note: This log is not to be used separate from this report.

APEX PROJECT NO.: 110-089 ☐ BORING BORING NUMBER: ____ ■ MONITOR WELL MONITOR WELL NUMBER: AD-26

FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/14/2010

PREPARED BY: David Bedford LOGGED BY: David Bedford

LATTITUDE: N 32°27'25.3" Datum: WGS-84 WELL LOCATION: By silt fence and plastic lined trench
LONGITUDE: W94°29'54.8"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1				0-1 SC	Slightly clayey sand, light brown, very fine grained, silty	None	Moist
2 3				1-3 CL	Sandy clay, lean, very fine grained, reddish brown	None	Moist
4 5				3-5 CL	Lean, slightly sandy clay with clayey sand streaks, orangish brown, small coal pieces, very fine grained	None	Moist
6 7				5-7 SC	Clayey sand, orangish brown, very fine grained, brown clay inclusions	None	Moist
8 9 10 11 12 13 14				7-14 CL	Lean clay, orangish brown mottled with brown/light gray clayey sand streaks, very fine grained, few coal pieces	None	Moist
15 16 17 18 19 20 21 22 23 24 25 26 27 28			▽	14-28 SC	Clayey sand, dark brown with orangish brown streaks, very fine grained, coal pieces 20-22' - Large clay inclusions, brown Wet from 25-26'	None	Slightly Wet Wet Very Moist
29 30				28-30 CL	Lean clay, light gray with orangish brown streaks, few small sandy streaks, very fine grained	None	V. Moist
31 32				30-32 SC	Clayey sand, light black, very fine grained, small pieces mica Wet from 30-30.5'	None	Wet Moist
33 34 35 36 37 38 39 40				32-40 CL	Lean clay, orangish brown, small clayey sand streaks, very fine grained, brown streaks	None	Moist Slightly Wet
					Boring Terminated at 40'		

Cement Bentonite Filter Sand ▽ Water Level

Apex geoscience inc.

Total Depth: 40 feet Riser Interval: +3 (ags)-10'
Filter Sand (Size/Interval): 8-40' Screen Interval: 10-40'
Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-8' Water level: 19.45'
Surface Completion ☐ Flush ■ Above Ground 3'

Note: This log is not to be used separate from this report.

APEX PROJECT NO.: 110-089 | ☐ BORING BORING NUMBER: ____ | ■ MONITOR WELL MONITOR WELL NUMBER: AD-27

FACILITY NAME: AEP- Pirkey Power Plant | FACILITY ID NO.: N/A

FACILITY ADDRESS: Hallsville, Texas

DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig

DRILLER: Ed Wilson, Apex Geoscience Inc. | COMPLETION DATE: 12/15/2010

PREPARED BY: David Bedford | LOGGED BY: David Bedford

LATTITUDE: N 32°27'36.8" Datum: WGS-84 | WELL LOCATION: By corner lined ditch

LONGITUDE: W94°29'47.3"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture
1 2			0-2	SC	Clayey sand, orangish brown with dark gray laminations, very fine grained	None	Slightly Moist
3 4 5 6 7 8 9 10 11 12 13 14 15			2-15.5	CL	Lean clay, dense, few thin sandy streaks, reddish orange, very fine grained, mottled with light brownish gray Orange to brown with orangish brown streaks, at 10' becomes brittle	None	Slightly Moist
16 17 18 19 20 21 22 23			15.5-23	SC	Clayey sand, greenish brown with orangish brown streaks, few thin tan clay streaks, very fine grained	None	Moist
24			23-24	SM	Sand, orangish brown, silty, very fine grained	None	Wet
25 26 27 ▽			24-27	CH	Fat clay, brown with orangish brown streaks, many sandy streaks, very fine grained	None	Very Moist
28 29 30			27-30	SM	Sand, greenish gray with orangish brown streaks, very fine to fine grained, wet	None	Wet
31 32 33 34 35 36 37			30-37.5	SC	Clayey sand with clay streaks, light greenish black, very fine grained Wet red brittle shale from 35-35.2	None	Slightly Wet
38 39 40					Boring Terminated at 37.5'		

Cement | Bentonite | Filter Sand | ▽ Water Level

Apex geoscience inc.

Total Depth: 40 feet | Riser Interval: +3 (ags)-17.5'

Filter Sand (Size/Interval): 15.5-37.5' | Screen Interval: 17.5-37.5'

Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-15.5' | Water level: 26.73'

Surface Completion ☐ Flush ■ Above Ground | 3'

Note: This log is not to be used separate from this report.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.: AD-34

PROJECT INFORMATION

PROJECT:	Pirkey Power Plant
PROJECT NO.:	I-04-1021
LOGGED BY:	Jeffrey D. Sammons, P.G.
SUPERVISING PG:	Jeffrey D. Sammons, P.G.
COMPLETION:	12/11/2015
DEVELOPMENT:	12/16/2015
SITE LOCATION:	2400 FM 3251, Hallsville, Texas
WELL OWNER:	AEP

DRILLING INFORMATION

DRILLER:	Buford Collier
DRILLER'S LICENSE NO.:	60089
RIG TYPE:	Geoprobe 3230DT
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core
SURFACE ELEVATION:	307.61 (Top of Casing)
HOLE DIAMETER:	8.25"
LATITUDE	32 27' 10.13" LONGITUDE 94 29' 57.93"

STATE OF TEXAS — JEFFREY D. SAMMONS — GEOLOGY #10070 — LICENSED PROFESSIONAL GEOSCIENTIST — JDS 1-21-16

▼ Water Level Upon Installation ▽ Water Level at Time of Drilling ■ Geotechnical Lab Sample

TBPG No. 50027

DESCRIPTION	USCS	DEPTH	SAMPLE	% MOISTURE	% FINES	LL	PL	PI	WELL CONSTRUCTION
		-4 to 0							Locking Well Casing Cover; Locking Well Cap; Protective Well Casing; Concrete Pad; Ground Surface
CLAYEY SAND: very fine to fine sand, some silt, reddish brownish, light reddish brown, light gray, moist	SC	0 to 1							Cement
FAT CLAY: trace sand and silt, some iron oxide concretions, dark reddish brown, reddish brown, and and light gray, moist	CH	1 to 3							
- some silt and very fine to fine sand at 5', light gray, light reddish brown, and light yellowish brown, moist to very moist		3 to 4		31	89	63	23	40	Bentonite
		4 to 5							2" Sch. 40 PVC Riser
SANDY LEAN CLAY: some very fine to fine sand, dark gray, moist	CL	5 to 12							
- reddish brown, dark reddish brown, dark gray, light gray at 10' to 12.5'									
SILTY SAND: very fine to fine sand, some clay, gray and dark gray, saturated	SM	12 to 16	▽	23	64	26	18	8	
- increasing clay content with depth		16 to 19		22	29	25	NP	-	20/40 Silica Sand; 0.010" Slotted Sch. 40 PVC Well Screen
FAT CLAY: trace sand and silt, gray, moist	CH	19 to 21		23	90	55	27	28	
CLAYEY SAND: fine to very fine sand, dark gray, moist to very moist	SC	21 to 25							PVC Bottom Cap

NOTES: This log should not be used separately from the original report. Not all USCS descriptors were laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.: AD-35

PROJECT INFORMATION

PROJECT:	Pirkey Power Plant
PROJECT NO.:	I-04-1021
LOGGED BY:	Jeffrey D. Sammons, P.G.
SUPERVISING PG:	Jeffrey D. Sammons, P.G.
COMPLETION:	12/11/2015
DEVELOPMENT:	12/16/2015
SITE LOCATION:	2400 FM 3251, Hallsville, Texas
WELL OWNER:	AEP

DRILLING INFORMATION

DRILLER:	Buford Collier
DRILLER'S LICENSE NO.:	50089
RIG TYPE:	Geoprobe 3230DT
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core
SURFACE ELEVATION:	318.95 (Top of Casing)
HOLE DIAMETER:	8.25"
LATITUDE	32 27' 9.64" LONGITUDE 94 29' 42.74"

STATE OF TEXAS — JEFFREY D. SAMMONS — GEOLOGY #10070 — LICENSED PROFESSIONAL GEOSCIENTIST — JDS 1-21-16

▽ Water Level Upon Installation ▽ Water Level at Time of Drilling ■ Geotechnical Lab Sample

TBPG No. 50027

DESCRIPTION	USCS	SAMPLE	% MOISTURE	% FINES	LL	PL	PI
CLAYEY SAND: very fine to fine sand, some iron ore gravel, reddish brownish, dark reddish brown, yellowish brown, gray, moist	SC		13	46	32	15	17
SILTY SAND: very fine to fine sand, trace clay, trace iron ore gravel, light reddish brown, moist, increasing moisture content with depth	SM		12	26	16	NP	
- saturated at 10' to 11'							
CLAYEY SAND: very fine to fine sand, trace iron ore gravel, light reddish brown, very moist - thin seams of saturated very fine sand with trace of clay at 12.25' to 12.5' - light reddish brown and light gray, moist to very moist at 12.5' to 15'	SC		19	33	31	18	13
LEAN CLAY: intebedded clays and silts with laminations of very fine sand, light gray, gray and light reddish brown, moist to very moist	CL		21	93	34	20	14
- thin lenses of very moist very fine sand and partially cemented very fine sand at 17.5' and 18', reddish brown							

WELL CONSTRUCTION

- Locking Well Casing Cover
- Locking Well Cap
- Protective Well Casing
- Concrete Pad
- Ground Surface
- Cement
- 2" Sch. 40 PVC Riser
- Bentonite
- 20/40 Silica Sand
- 0.010" Slotted Sch. 40 PVC Well Screen
- PVC Bottom Cap

NOTES: This log should not be used separately from the original report. Not all USCS descriptors were laboratory verified.

SOIL/WELL BORING LOG

Auckland Consulting LLC

TBPE Firm No. F16721

Project:	AEP - Pirkey Power Station Harrison County
Drilling Co.:	C&S Lease
Driller:	Buford E. Collier
Drilling Method:	Hollow Stem Auger

STATE OF TEXAS
JOHN J. TAYNTOR
99202
LICENSED
PROFESSIONAL ENGINEER

04/30/2019

Well/Boring #:	AD-36	Date Drilled:	4/24/19
Depth of Boring/well:	15 feet	Diameter of Boring:	8.25 inches
Length of Screen:	10 feet	Diameter of Screen:	2 inches
Length of Casing:	5 feet	Diameter of Casing:	2 inches
Filter Pack:	20/40	Slot Size:	0.010 inches
Logged By:	John J. Tayntor	Screen Material:	Sch 40 PVC

- Concrete/cement
- Clay
- Silty Sand
- Bentonite
- Silty Clay
- Sandy Clay
- Well Screen
- Sand
- Lignite
- Gravel
- ▽ - Initial Water Level

Depth Feet	GEOLOGIC DESCRIPTION	Lithology Classification	PID ppm	Depth Feet	Well Completion and Lithology	Remarks
0.0						
	Fill - Reddish Brown, Sandy Lean Clay (CL) with gravel	CL/Fill		0-9		
5.0						
	Reddish Brown and Tan, Clayey Sand (SC), with gravel	SC		9-11		
10.0	Reddish brown, Sandy Lean Clay (CL), few gravel	CL		11-14		
	Reddish brown, Clayey Sand (SC), with gravel	SC		14-15		
15.0	Well TD = 15 feet.					

*Soil descriptions based on visual observations and intervals are approximate.
MW Location Coordinates: N6871017.4, E3202874.4

STATE OF TEXAS WELL REPORT for Tracking #511623

Owner:	**American Electric Power Company**	Owner Well #:	**AD-36**
Address:	**502 N. Allen Street Shreveport, LA 71101**	Grid #:	**35-37-4**
Well Location:	**2400 Farm Road Hallsville, TX 75650**	Latitude:	**32° 27' 05.39" N**
		Longitude:	**094° 29' 50.99" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **4/24/2019** Drilling End Date: **4/24/2019**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8.25**	**0**	**15**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

	Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
Filter Pack Intervals:	**4**	**15**	**Sand**	**20/40**

Annular Seal Data: **No Data**

Seal Method: **Gravity**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	No Data

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **C & S Lease Service**

1873 FM 1252 E
Kilgore, TX 75663

Driller Name: **Buford E. Collier** License Number: **50089**

Apprentice Name: **David Diduch** Apprentice Number: **60297**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	9	Sandy clay with gravel, mainly fill
9	11	Clayey sand, mainly Iron ore
11	14	Sandy clay
14	15	clayey sand with iron ore

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	Riser	New Plastic (PVC)	40	0	5
2	Screen	New Plastic (PVC)	40 0.010	5	15

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

LOG OF BORING

852164
PROJECT: Monitoring Well Instllation
CLIENT: Southwestern Electric Power Company

BORING NO.: M-1
LOCATION: Hallsville, TX
S 12+32.79; W 35+34.55

Date: 1/29/86 Type: Rotary Ground Elevation: 337.67

Legend:
■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
5			Brown and tan sandy clay
10			Brown and tan sandy clay w/iron ore
15			Brown and tan sandy clay w/iron ore
20			Gray silty sand
25			Gray silty sand
30			Gray silty sand
35			Bottom of Boring at 30 feet. Water encountered at 10 feet.
40			
45			
50			

SOUTHWESTERN LABORATORIES

LOG OF BORING

852164

PROJECT: Monitoring Well Installation
CLIENT: Southwestern Electric Power Company

BORING NO.: M-2
LOCATION: Hallsville, TX
S 38+86.22; W 45+76.41

Date: 1/29/86 Type: Rotary Ground Elevation: 302.19

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
5			Brown silty sand w/iron ore
10			Brown silty sand w/iron ore
15			Brown and gray silty sand
20			Gray silty sand
25			Gray silty sand
30			Bottom of Boring at 27 feet. Water encountered at 11 feet.
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

LOG OF BORING

852164
PROJECT: Sludge Disposal Area
CLIENT: Southwestern Electric Power Company

BORING NO.: M. 2A
LOCATION: Hallsville, TX

Date: 6/20/85 Type: Auger Ground Elevation: 308.40

Legend: ■ Sample X Penetration

Plant Site Coordinates: South S 27+55.45 West W 36+47.44

▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
0			Red-brown clayey sand
10			Gravel
15		■	Gray clayey silty sand
20		■	Gray silty sand
25			Bottom of Boring at 22 feet. Water encountered at 12 feet. Bottom of Casing at 22 feet. Screen length 15 feet.
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Log of Boring

Number: M-3

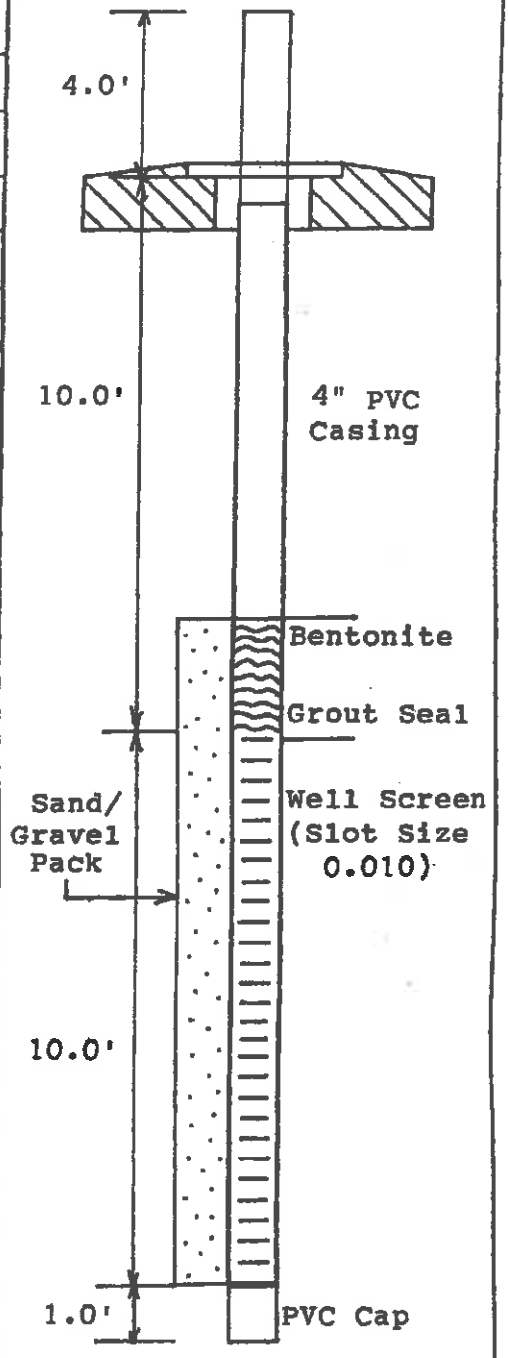
Location: Harrison Co., miles SW Marshall City Ha

Project: New Monitor Well Installation, H.W. Pirkey Power Plant

Type: Groundwater Monitor Well

Surface Elevation: 275.0'

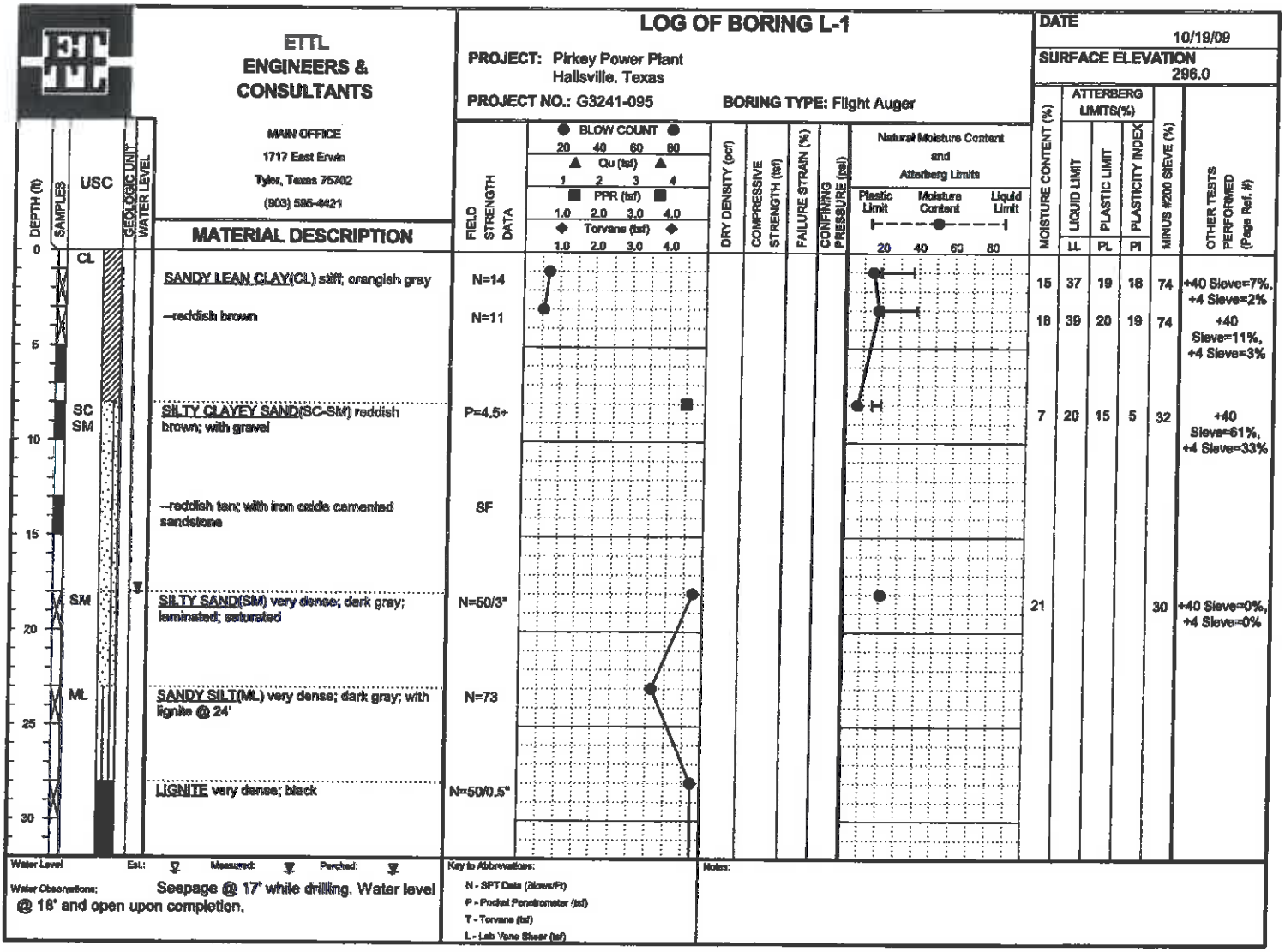
Feet Depth	Samples	Hand Penetrometer (Tons/Sq. Ft.)	Standard Penetration (Blows/Foot)	STRATUM DESCRIPTION
				Sod
				Brown Silty Clay
5				Brown Silty Sandy Clay
				Red & Gray Silty Clay
10				
15				Lignite
				Tan Silty Sandy Clay
20				
25				



Completion Depth: 20'

Date: 7-1-93

Water Observations: Water Encountered at 10.0'



ETTL
ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING L-1

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095 **BORING TYPE:** Flight Auger

DATE 10/19/09

SURFACE ELEVATION 296.0

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT / WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL		SANDY LEAN CLAY(CL) stiff; orangish gray	N=14	15	37	19	18	74	+40 Sieve=7%, +4 Sieve=2%
5				--reddish brown	N=11	18	39	20	19	74	+40 Sieve=11%, +4 Sieve=3%
10		SC SM		SILTY CLAYEY SAND(SC-SM) reddish brown; with gravel	P=4.5+	7	20	15	5	32	+40 Sieve=61%, +4 Sieve=33%
15				--reddish tan; with iron oxide cemented sandstone	SF						
20		SM		SILTY SAND(SM) very dense; dark gray; laminated; saturated	N=50/3"	21				30	+40 Sieve=0%, +4 Sieve=0%
25		ML		SANDY SILT(ML) very dense; dark gray; with lignite @ 24'	N=73						
30				LIGNITE very dense; black	N=50/0.5"						

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

DRY DENSITY (pcf) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi)

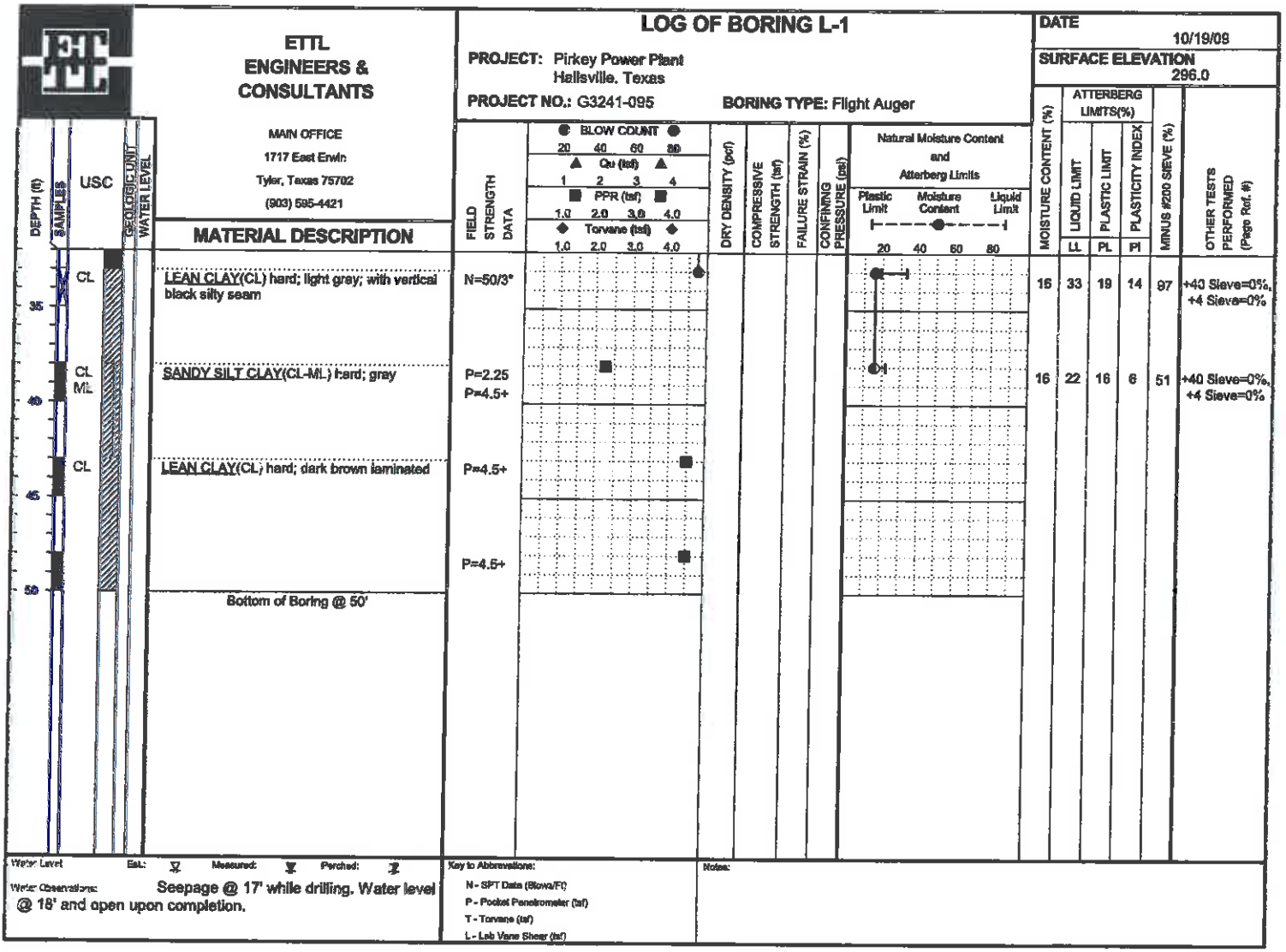
Natural Moisture Content and Atterberg Limits: Plastic Limit | Moisture Content | Liquid Limit (20 40 60 80)

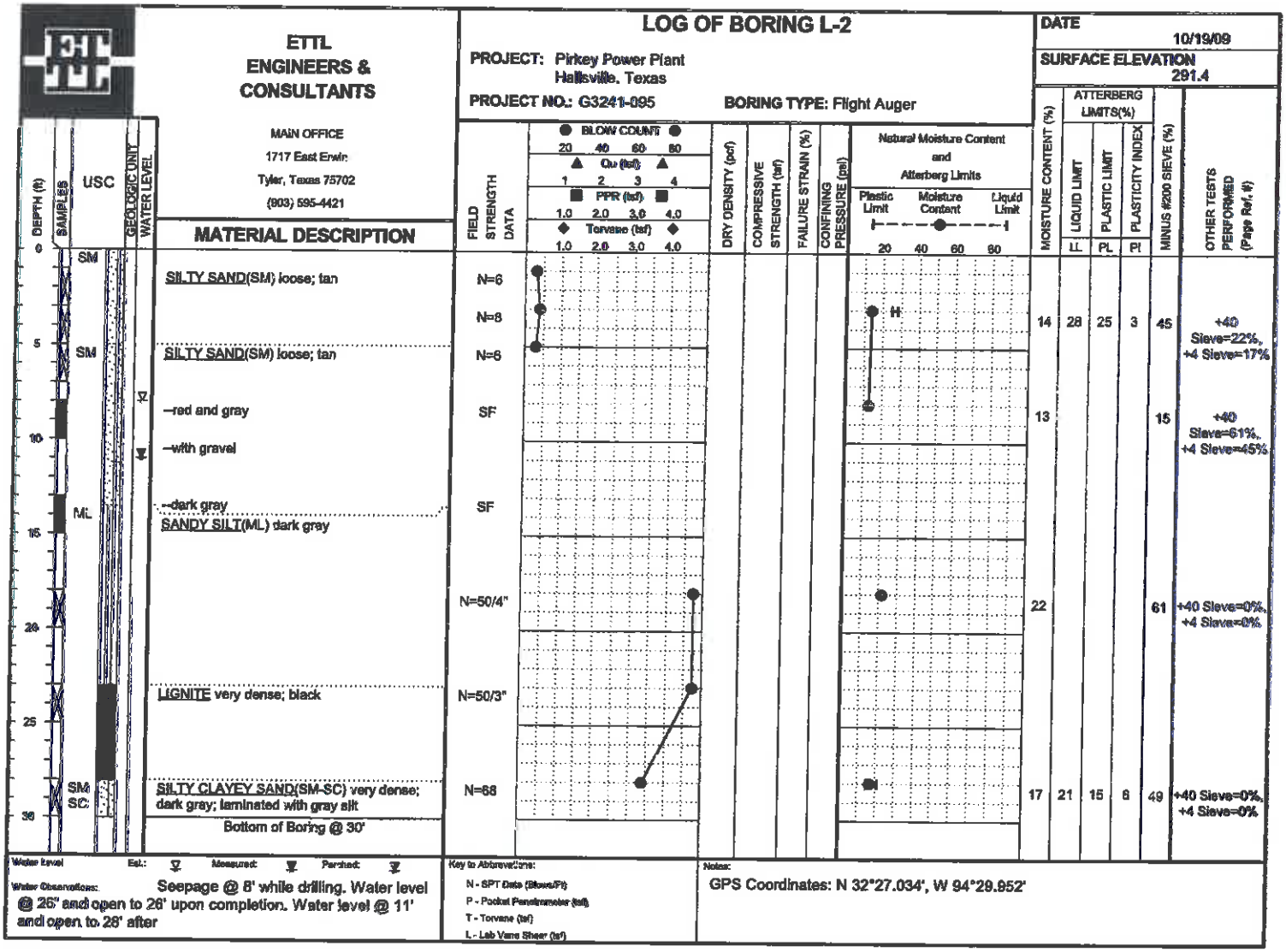
Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Seepage @ 17' while drilling. Water level @ 18' and open upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:





ETTL
ENGINEERS &
CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING L-2

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095

BORING TYPE: Flight Auger

DATE: 10/19/09

SURFACE ELEVATION: 291.4

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT (LL)	ATTERBERG LIMITS(%) PLASTIC LIMIT (PL)	ATTERBERG LIMITS(%) PLASTICITY INDEX (PI)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SM			SILTY SAND(SM) loose; tan	N=6					H	14	28	25	3	45	+40 Sieve=22%, +4 Sieve=17%
						N=8											
5		SM			SILTY SAND(SM) loose; tan	N=6											
					–red and gray	SF						13				15	+40 Sieve=61%, +4 Sieve=45%
10					–with gravel												
					–dark gray	SF											
15		ML			SANDY SILT(ML) dark gray												
						N=50/4"						22				61	+40 Sieve=0%, +4 Sieve=0%
20																	
					LIGNITE very dense; black	N=50/3"											
25																	
		SM SC			SILTY CLAYEY SAND(SM-SC) very dense; dark gray; laminated with gray silt	N=68						17	21	15	6	49	+40 Sieve=0%, +4 Sieve=0%
30					Bottom of Boring @ 30'												

FIELD STRENGTH DATA: BLOW COUNT (20, 40, 60, 80); Qu (tsf) (1, 2, 3, 4); PPR (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (tsf) (1.0, 2.0, 3.0, 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20, 40, 60, 80)

Water Level — Est.: ▽ Measured: ▼ Perched: ▽

Water Observations: Seepage @ 8' while drilling. Water level @ 26" and open to 26' upon completion. Water level @ 11' and open to 26' after

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 32°27.034', W 94°29.952'

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1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING R-1

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095 **BORING TYPE:** Flight Auger

DATE 10/19/09

SURFACE ELEVATION 356.3

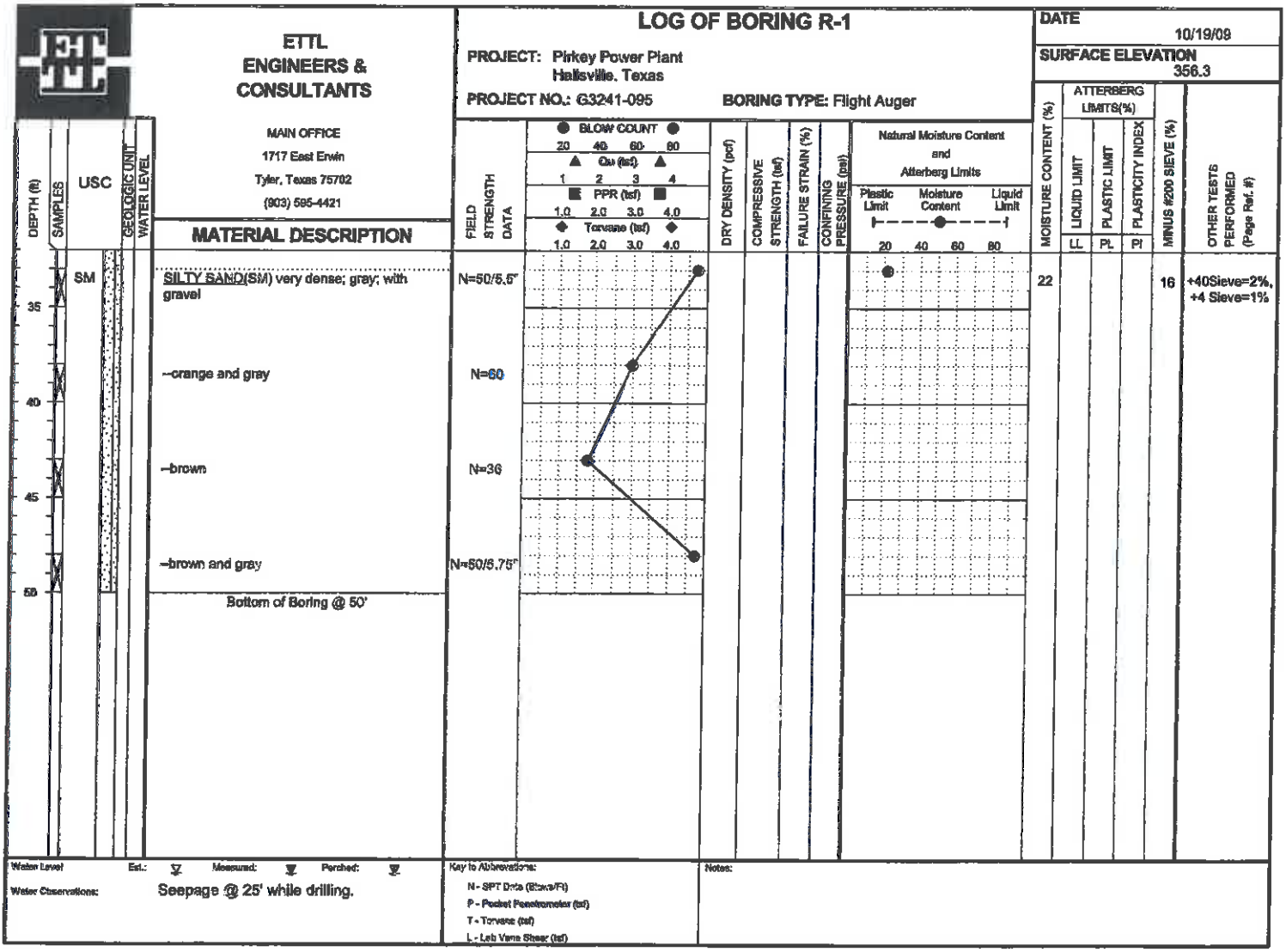
DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			SANDY LEAN CLAY(CL) medium stiff; red and brown; with gravel	N=9										
					–stiff; clay content increasing	N=13					17	47	19	28	52	+40Sieve=4%, +4 Sieve=1%
5		SC			CLAYEY SAND(SC) medium dense; reddish brown; with ferric seams	P=2.75										
						P=3.0					13	33	16	17	22	+40Sieve=36%, +4 Sieve=30%
10						P=2.5										
					–with clay nodules	P=1.75	106	1.10	4	9						
15						SF					20					
						P=3.0					17	34	15	19	39	+40Sieve=8%, +4 Sieve=1%
20																
		CL			SANDY LEAN CLAY(CL) very stiff; orange and tan; saturated	N=25					18	42	21	21	57	+40Sieve=9%, +4 Sieve=6%
25						P=3.5										
		SC SM			CLAYEY SILTY SAND(SC-SM) orange and gray	SF										
30																

Water Level Est.: Measured: Perched:

Water Observations: Seepage @ 25' while drilling.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:



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LOG OF BORING R-1

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095

BORING TYPE: Flight Auger

DATE: 10/19/09

SURFACE ELEVATION: 356.3

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35		SM			SILTY SAND(SM) very dense; gray; with gravel	N=50/5.5"					22				16	+40Sieve=2%, +4 Sieve=1%
40					--orange and gray	N=60										
45					--brown	N=36										
50					--brown and gray	N=50/5.75"										
					Bottom of Boring @ 50'											

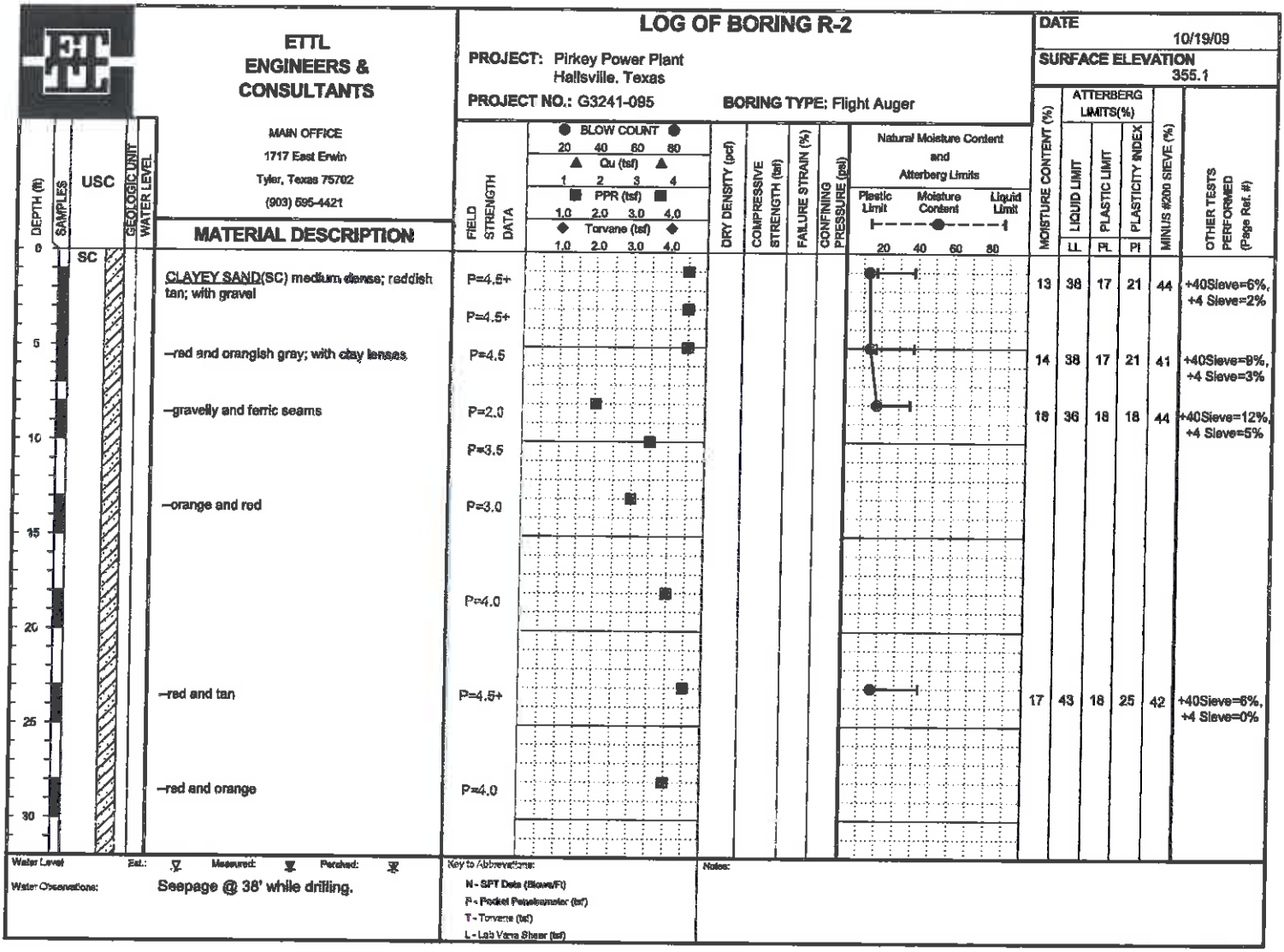
Natural Moisture Content and Atterberg Limits: Plastic Limit | Moisture Content | Liquid Limit

Water Level — Est.: ▽ Measured: ▼ Perched: ▽

Water Observations: Seepage @ 25' while drilling.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:



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LOG OF BORING R-2

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095 **BORING TYPE:** Flight Auger

DATE 10/19/09

SURFACE ELEVATION 355.1

DEPTH (ft)	USC	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0	SC	CLAYEY SAND(SC) medium dense; reddish tan; with gravel	P=4.5+	13	38	17	21	44	+40Sieve=6%, +4 Sieve=2%
			P=4.5+						
5		–red and orangish gray; with clay lenses	P=4.5	14	38	17	21	41	+40Sieve=9%, +4 Sieve=3%
		–gravelly and ferric seams	P=2.0	18	36	18	18	44	+40Sieve=12%, +4 Sieve=5%
10			P=3.5						
		–orange and red	P=3.0						
15			P=4.0						
20		–red and tan	P=4.5+	17	43	18	25	42	+40Sieve=6%, +4 Sieve=0%
25		–red and orange	P=4.0						
30									

DRY DENSITY (pcf) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi)

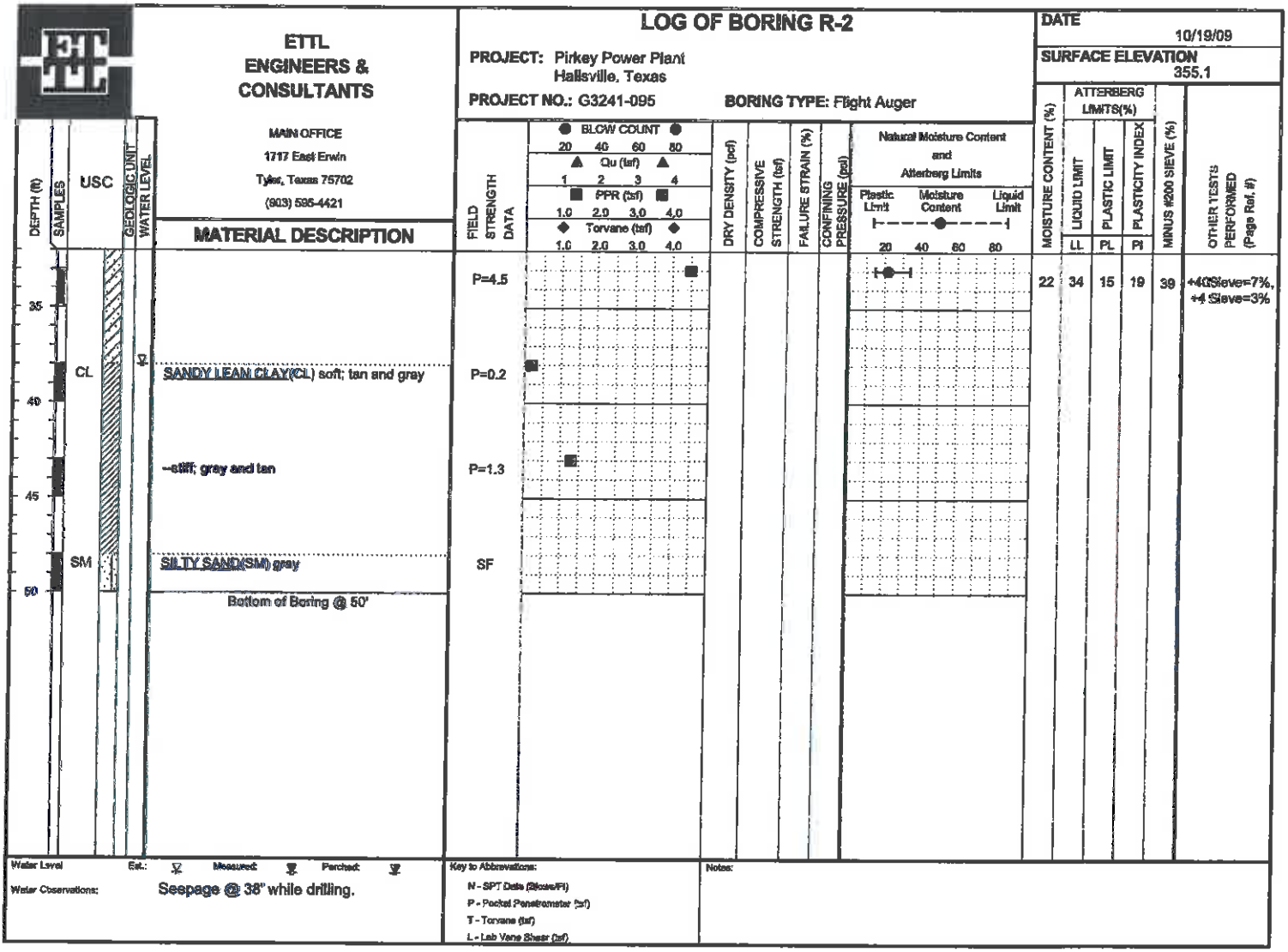
Natural Moisture Content and Atterberg Limits: Plastic Limit | Moisture Content | Liquid Limit (20 40 60 80)

Water Level Est.: Measured: Perched:

Water Observations: Seepage @ 38' while drilling.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:



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Tyler, Texas 75702
(903) 595-4421

LOG OF BORING R-3

PROJECT: Pirkey Power Plant
Hallsville, Texas

PROJECT NO.: G3241-095 **BORING TYPE:** Flight Auger

DATE 10/19/09

SURFACE ELEVATION 342.5

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SC			CLAYEY SAND(SC) medium dense; tan	N=15										
		CL			LEAN CLAY(CL) very stiff; tan and gray; laminated	P=2.5					18	30	16	14	38	+40Sieve=5%, +4 Sieve=1%
5		SM			SILTY SAND(SM) tan; with gravel	SF					17				30	+40Sieve=16%, +4 Sieve=9%
		ML			SANDY SILT(ML) very loose; tan	P=0.8										
10		CL			LEAN CLAY(CL) very stiff; tan	P=2.5 P=2.9	108	1.60	7	7	19 20	33	17	16	86	+40Sieve=1%, +4 Sieve=0%
		SC SM			SILTY CLAYEY SAND(SC-SM) medium dense; tan and gray	P=3.0										
15																
		SM			SILTY SAND(SM) very dense; tan and gray	N=68										
20																
						N=50/6"					20				21	+40Sieve=1%, +4 Sieve=0%
25																
						N=50/4"										
30					Bottom of Boring @ 30'											

FIELD STRENGTH DATA: BLOW COUNT (20, 40, 60, 80); Qu (tsf) (1, 2, 3, 4); PPR (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (tsf) (1.0, 2.0, 3.0, 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20, 40, 60, 80)

Water Level — Est.: ▽ Measured: ▼ Perched: ▽

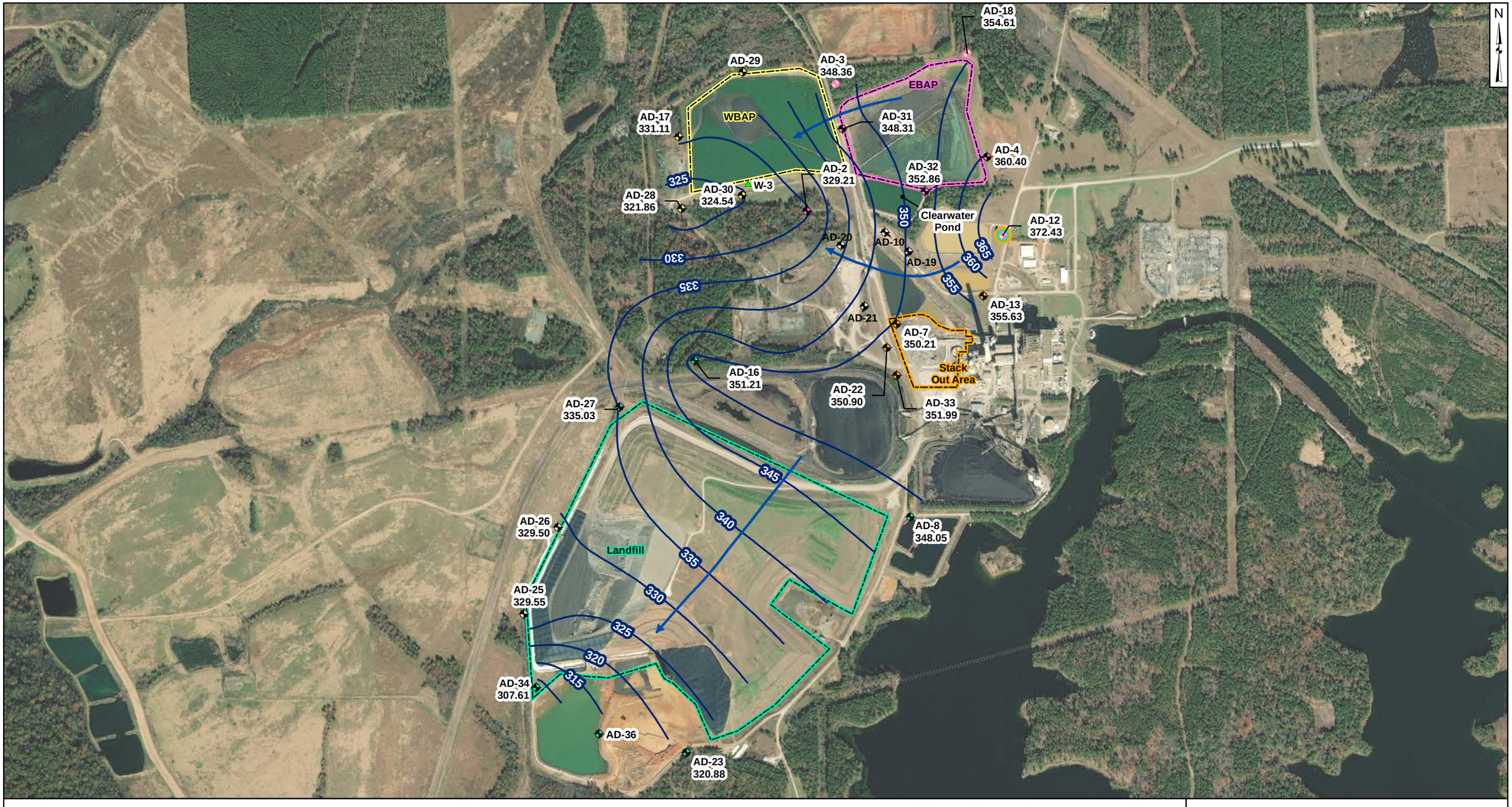
Water Observations: Seepage @ 6' while drilling. Water level @ 1' and open to 26' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 32°27.313', W 94°29.240'

Appendix C

Potentiometric Surface Maps, 2019-2021



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)

Notes

- Monitoring well coordinates and water level data (collected on February 23-28, 2019) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3 was not gauged in February 2019.
- AD-35 was abandoned November 13, 2018. AD-36 was installed April 24, 2019.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer February 2019

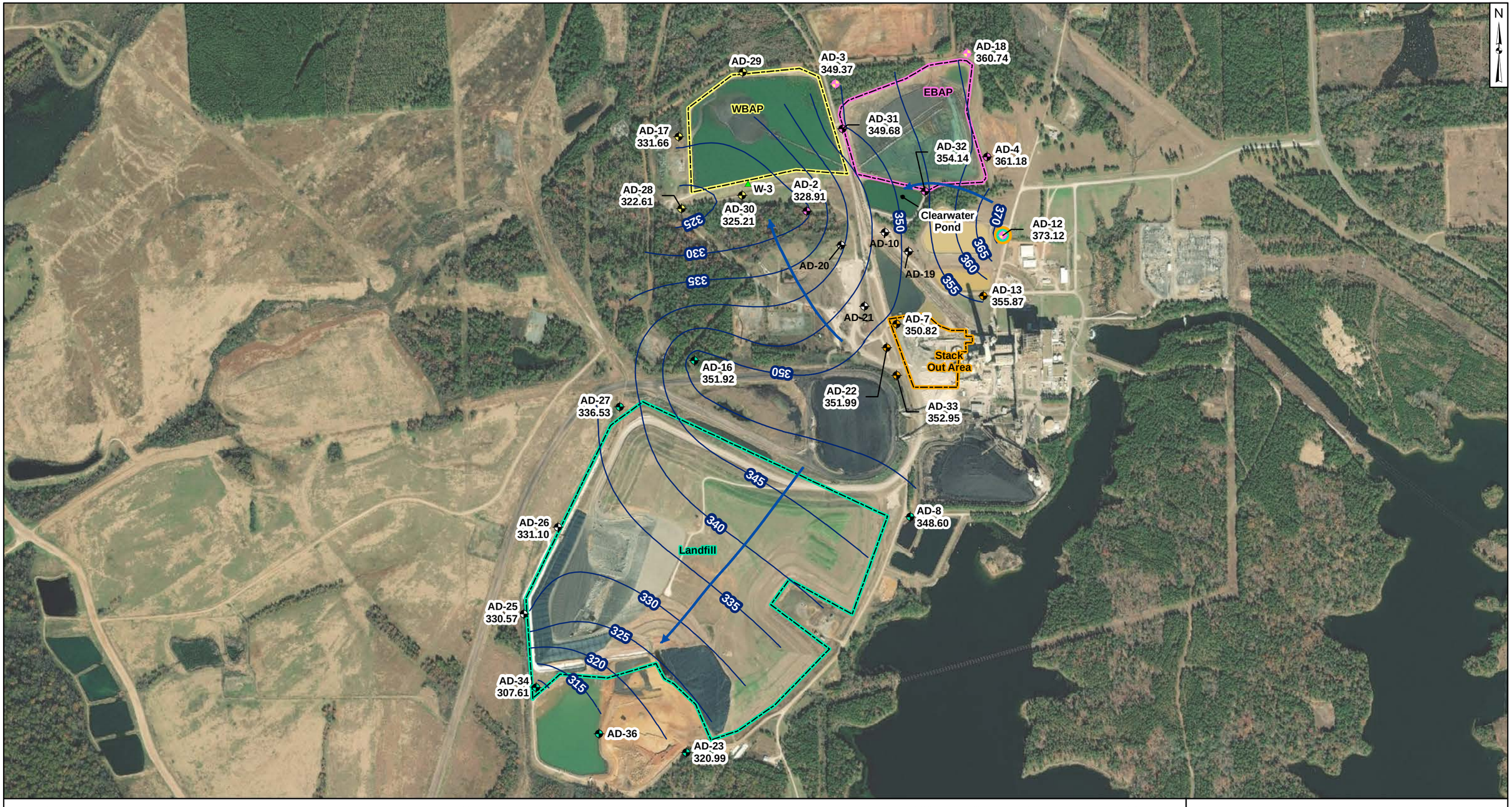
AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec consultants

Columbus, Ohio | 2020/01/16

Figure 1

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2019\AEP-Pirkey_GW_201902-February.mxd. ARevezzo. 1/16/2020. Project/Phase/Task.



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction

Notes

- Monitoring well coordinates and water level data (collected on May 21-23, 2019) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3 was not gauged in May 2019.
- AD-35 was abandoned November 13, 2018. AD-36 was installed April 24, 2019.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer May 2019

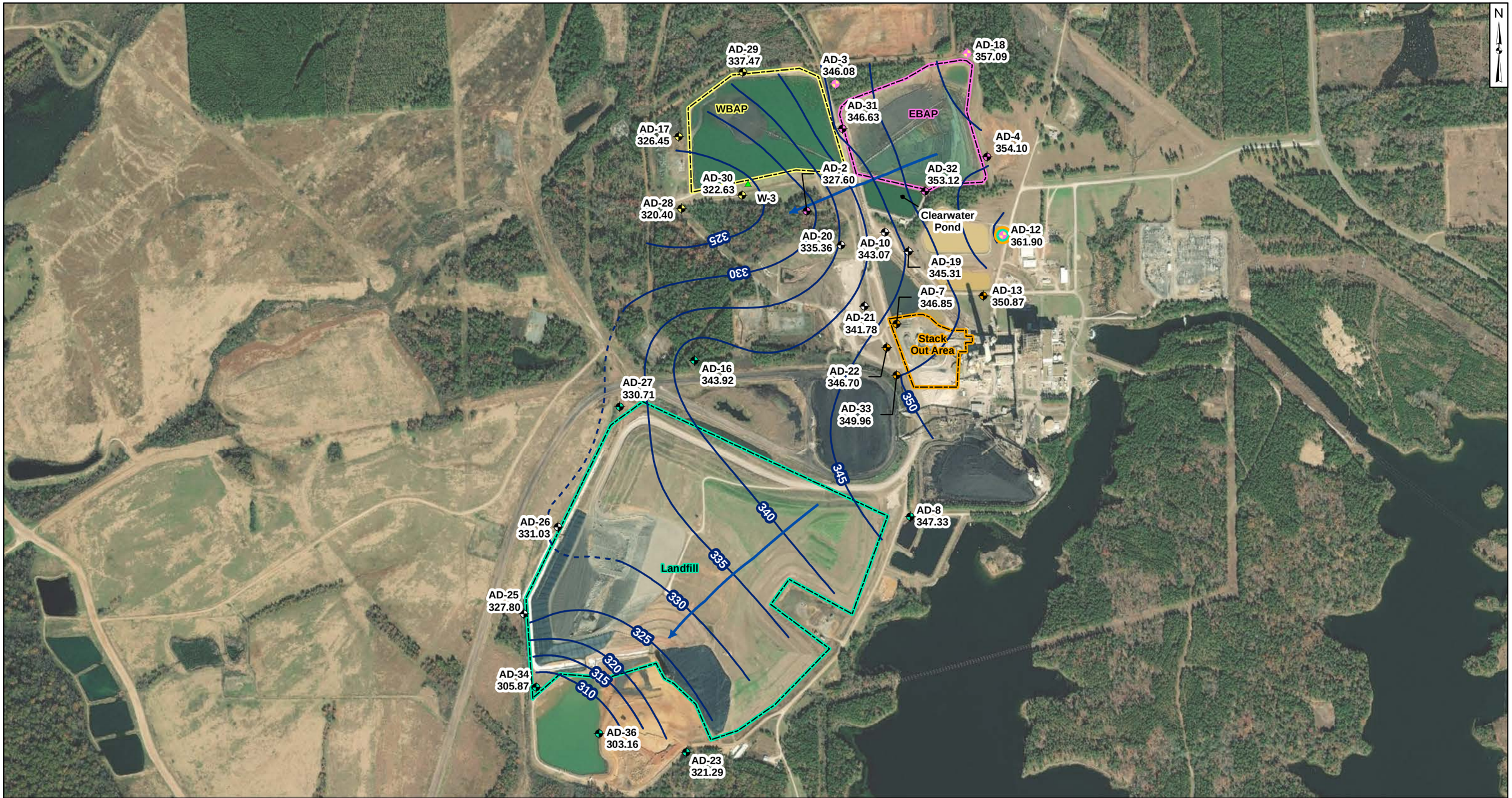
AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec consultants

Columbus, Ohio | 2020/01/16

Figure 2

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2019\AEP-Pirkey_GW_201905-May.mxd. ARevezzo. 1/16/2020. Project/Phase/Task.



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Groundwater Elevation Contour (Inferred)

Notes

- Monitoring well coordinates and water level data (collected on August 12-16, 2019) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3 was not gauged in August 2019.
- AD-35 was abandoned November 13, 2018. AD-36 was installed April 24, 2019.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer August 2019

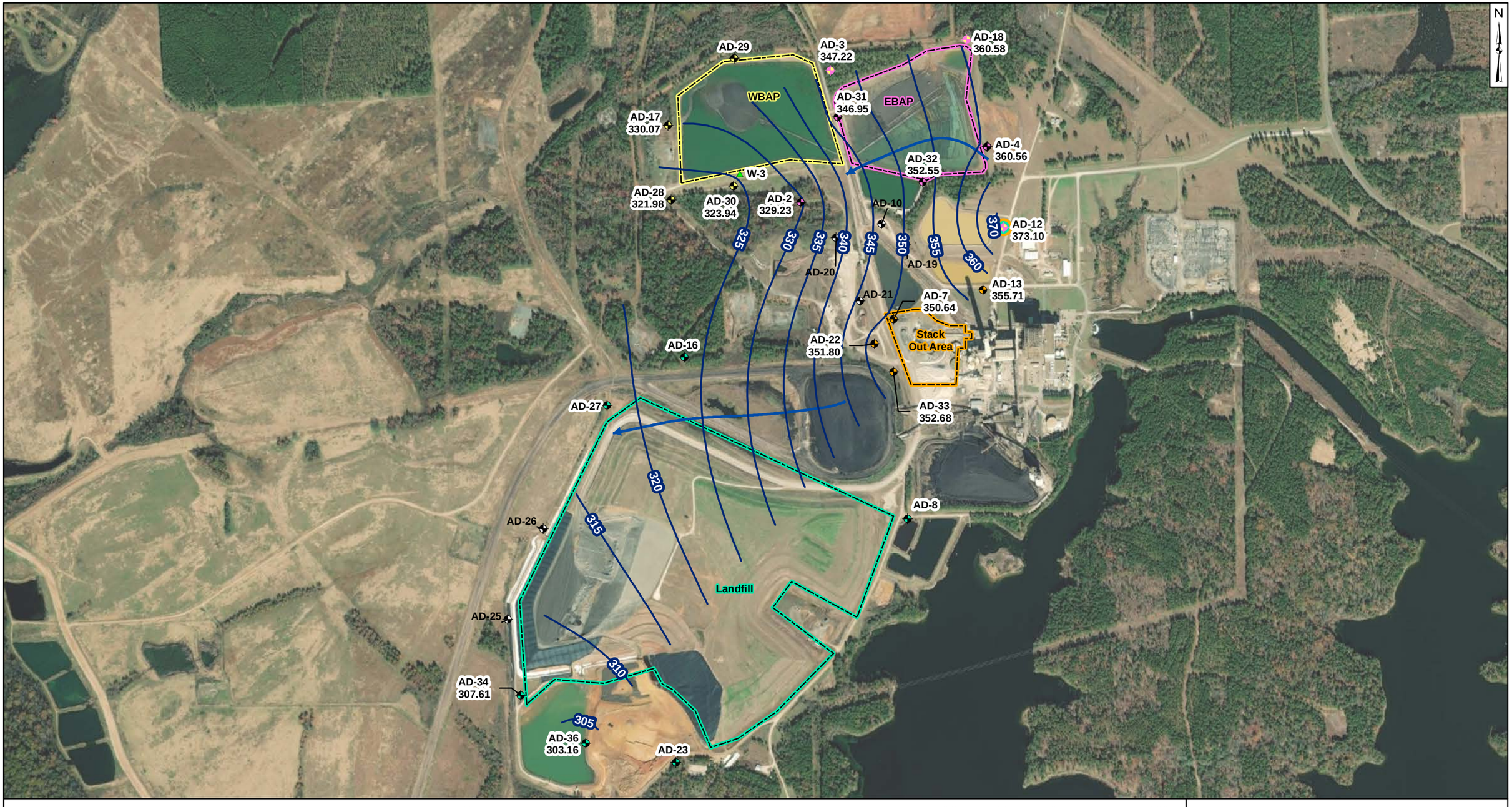
AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec consultants

Columbus, Ohio | 2020/01/16

Figure 3

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2019\AEP-Pirkey_GW_201908-August.mxd. ARevezzo. 1/16/2020. Project/Phase/Task.



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction

Notes

- Monitoring well coordinates and water level data (collected on March 10-11, 2020) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3, AD-16, AD-27, and AD-29 were not gauged in March 2020.
- AD-34 is an artesian well.
- AD-35 was abandoned November 13, 2018. AD-36 was installed April 24, 2019.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer March 2020

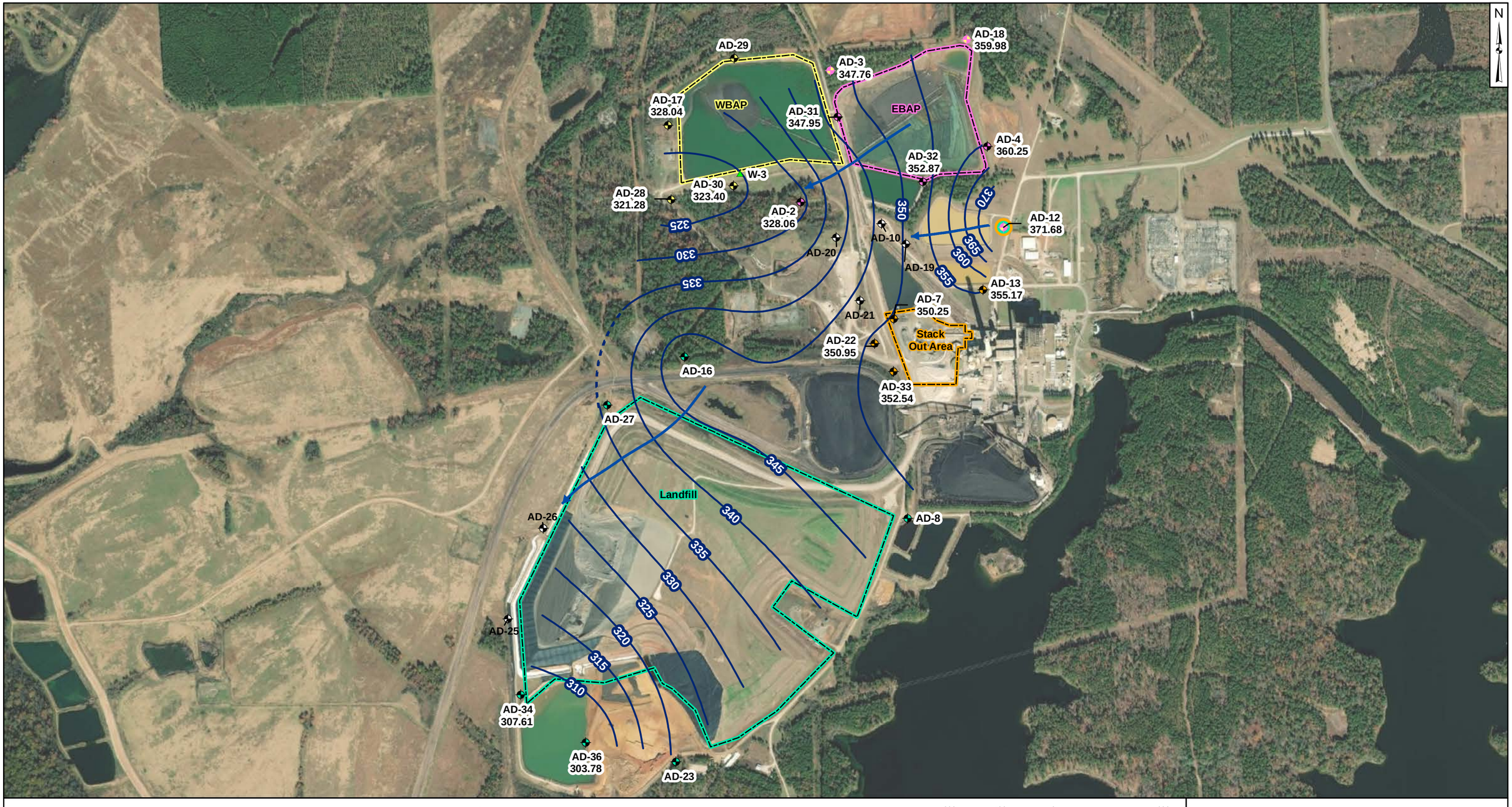
AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec consultants

Columbus, Ohio | 2020/06/12

Figure 1

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2020\AEP-Pirkey_GW_2020-03March.mxd. ARevezzo. 6/12/2020. Project/Phase/Task.



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Grondwater Elevation Contour (Inferred)

Notes

- Monitoring well coordinates and water level data (collected on June 2 - 3, 2020) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3, AD-8, AD-16, AD-23, AD-27, and AD-29 were not gauged in June 2020.
- AD-34 is an artesian well.
- AD-35 was abandoned November 13, 2018. AD-36 was installed April 24, 2019.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer June 2020

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec consultants

Columbus, Ohio | 2020/11/13

Figure **2**

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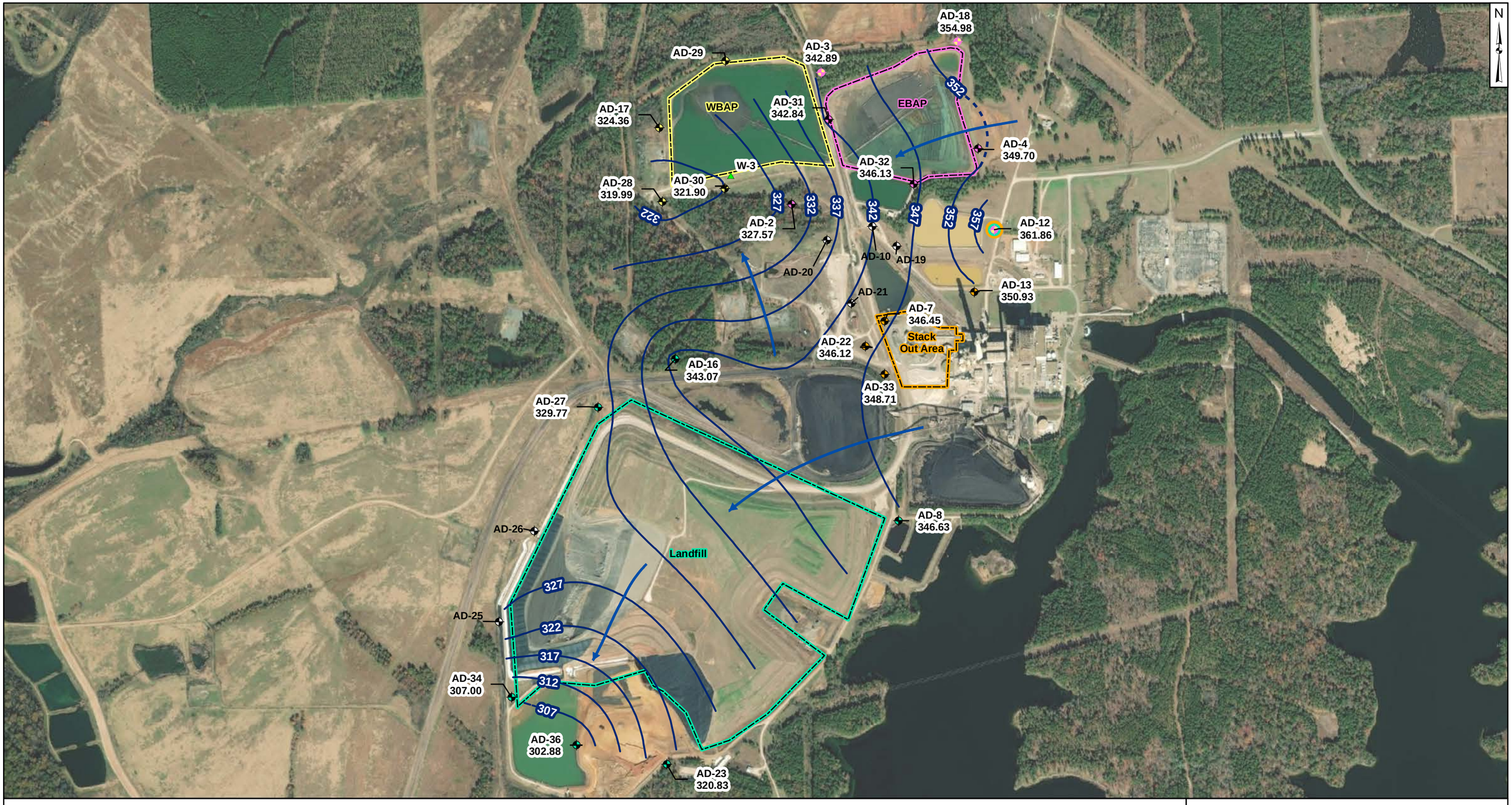

Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Grondwater Elevation Contour (Inferred)

Notes

- Monitoring well coordinates and water level data (collected on November 2-4, 2020) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- W-3 and AD-29 were not gauged in November 2020.

1,000 500 0 1,000 Feet

Potentiometric Contours - Uppermost Aquifer November 2020

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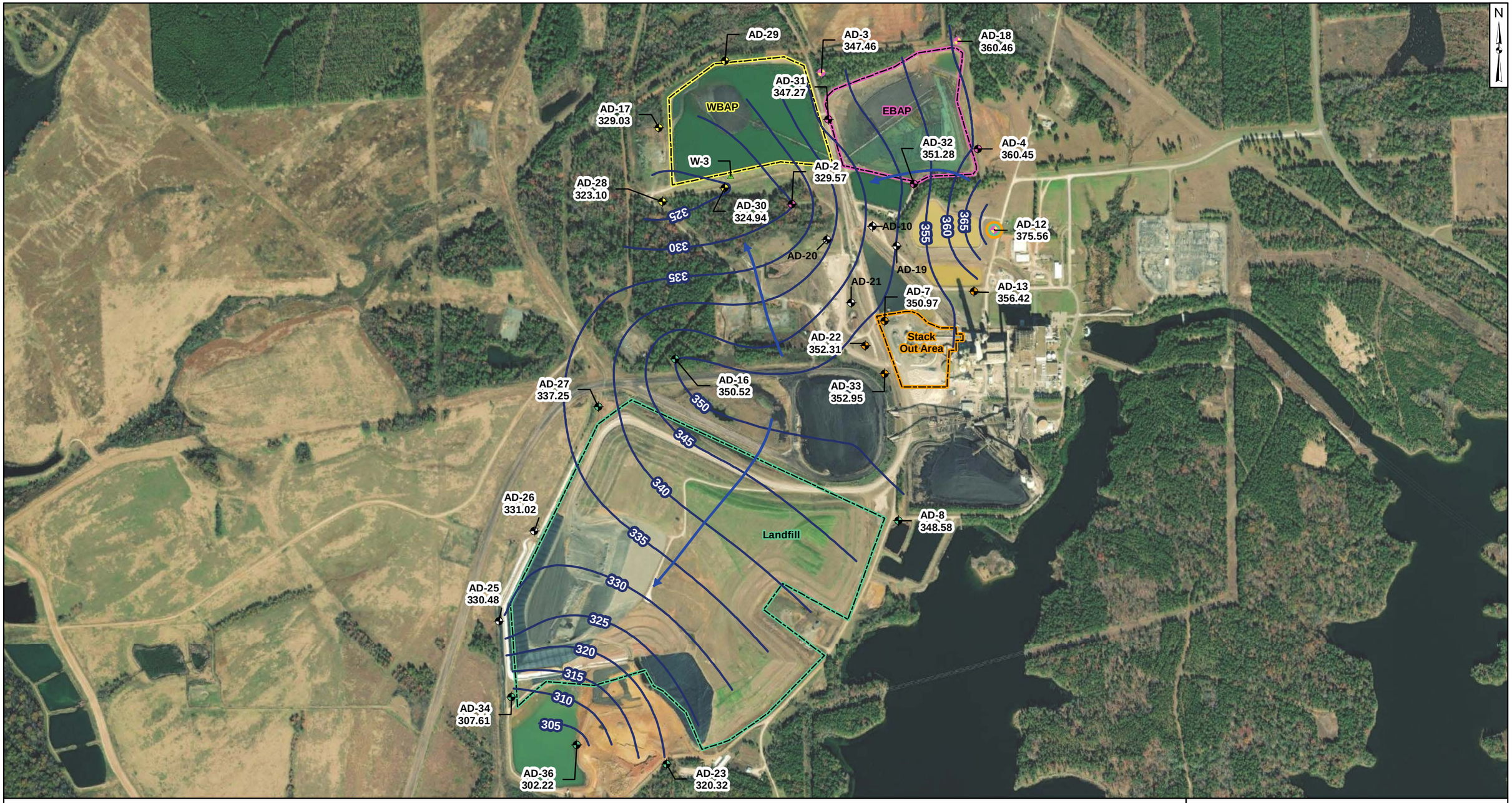
Figure 3

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2020\AEP-Pirkey_GW_2020-11November_new.mxd. HDuff. 1/6/2021. Project/Phase/Task.



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP

- All CCR Unit Networks
- Piezometer
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on May 24-26, 2021) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluations (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- AD-10, AD-19, AD-20, AD-21, AD-29, AD-35, and W-3 were not gauged during the May 2021 event.

1,000 500 0 1,000 Feet

STATE OF TEXAS
BETH ANN GROSS
79864
LICENSED
PROFESSIONAL ENGINEER

Beth Ann Gross

Oct 24, 2021

Geosyntec Consultants, Inc.
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Registration No. 1182

Potentiometric Contours - Uppermost Aquifer May 2021

AEP Pirkey Power Plant
Hallsville, Texas

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Columbus, Ohio | 2021/08/18

Figure 2

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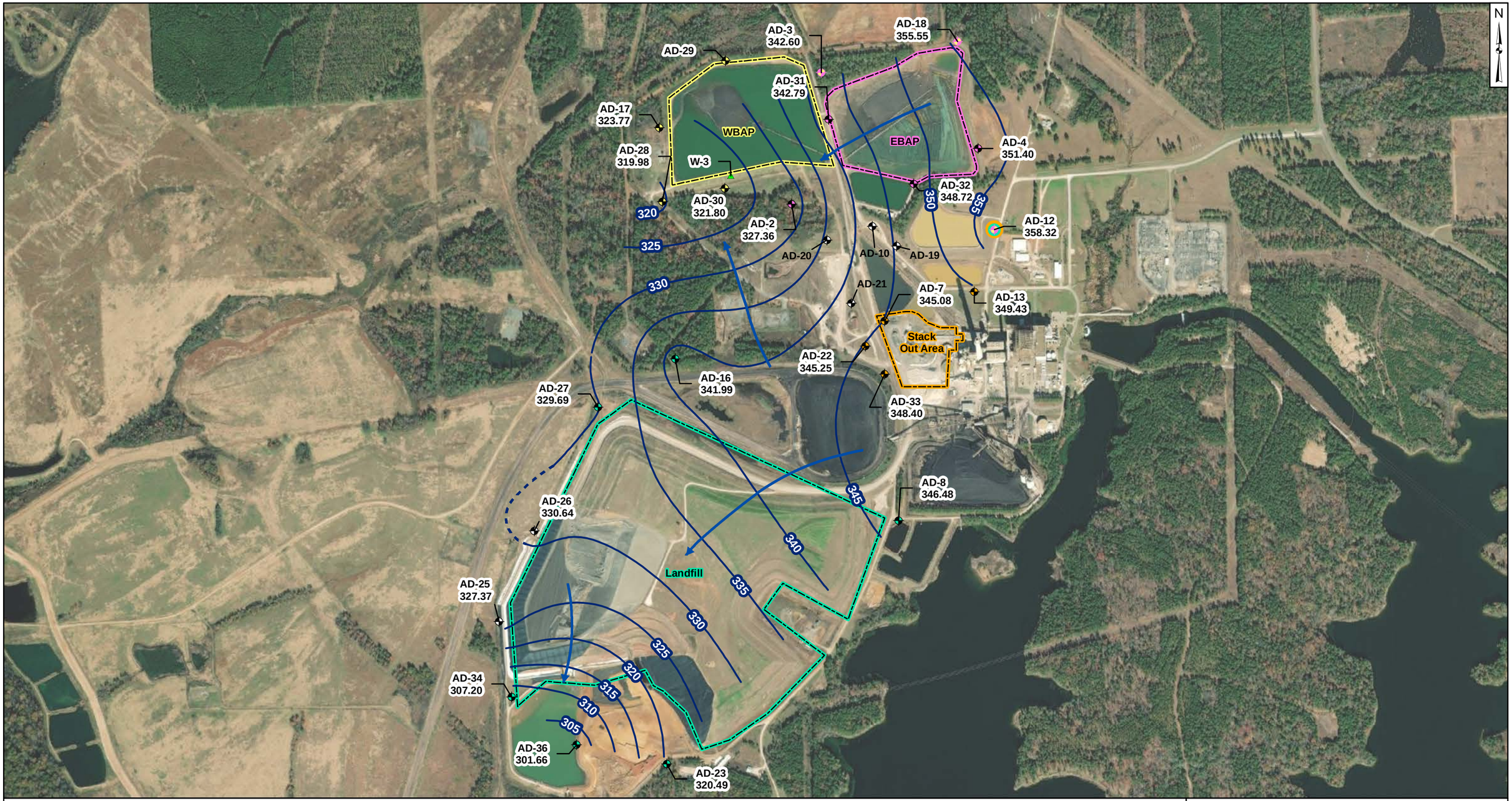

Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Groundwater Elevation Contours (Inferred)
- Approximate Groundwater Flow Direction

Notes

- Monitoring well coordinates and water level data (collected on November 15 - 17, 2021) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- East and West Bottom Ash Ponds have compacted cohesive soil from elevation 344 to 347 ft. msl (Sargent and Lundy, 1984; AMEC, 2011).
- Clearwater pond base elevation is 344 ft. msl (Sargent and Lundy, 1983).
- AD-10, AD-19, AD-20, AD-21, AD-29, AD-35, and W-3 were not gauged during the May 2021 event.

1,000 500 0 1,000 Feet

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Beth Ann Gross

Jan 14, 2022

Geosyntec Consultants, Inc.
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Registration No. 1182

Potentiometric Contours - Uppermost Aquifer November 2021

AEP Pirkey Power Plant
Hallsville, Texas

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Figure 3

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Pirkey\2021\AEP-Pirkey_GW_2021-November.mxd. ASoltero. 1/13/2022. Project/Phase/Task.