2019 Landfill CCR Inspection Report

Entergy Arkansas, LLC White Bluff Plant
Class 3N Landfill
Redfield, Arkansas

Permit No. 0199-S3N-R3
AFIN: 35-00110

January 2020
Project No. 35197248

Prepared for:
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PROFESSIONAL ENGINEER'S CERTIFICATION

This report on the annual engineering inspection of the Entergy Arkansas, LLC White Bluff Plant Class 3N Landfill and supporting documentation was prepared under the direction and supervision of a qualified, State of Arkansas-registered Professional Engineer. Mr. David McCormick, PE, of Terracon Consultants, Inc. (Terracon), was responsible for the overall preparation of this report. The report has been prepared to fulfill the requirements of §257.84(b). Based on the inspection of the landfill facility and review of available landfill documents the design, construction, operation, and maintenance of the landfill is consistent with recognized and generally accepted good engineering standards

1/16/20

David C. McCormick, P.E. — Date
Arkansas Professional Engineer No. 9199

Expires 12.31.20

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1.0 INTRODUCTION

1.1 Purpose of Report

The purpose of this report is to document the annual inspection of the White Bluff Plant's Landfill in accordance with 40 CFR *§257, Subpart D - Disposal of Coal Combustion Residuals From Electric Utilities* (the CCR Rule). In particular, the report has been prepared to comply with §257.84(b), which requires an inspection to be conducted by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the landfill is consistent with recognized and generally accepted good engineering standards.

The report includes:

- Information on the current layout of the landfill,
- Waste volume estimates for the amount of waste contained in the landfill and remaining disposal capacity, and
- An assessment of the landfill including structural integrity and overall operations with respect to the CCR Rule and the facility permit requirements.

1.2 White Bluff Power Plant Information

Entergy Arkansas, LLC (Entergy) operates the White Bluff Steam Electric Station, located on the west bank of the Arkansas River, near Redfield in Jefferson County, Arkansas, as shown on **FIGURE 1** (all figures are located in **APPENDIX A**). The 3,400-acre site is situated on a bluff overlooking the relatively flat alluvial plain east of the Arkansas River.

The plant generates electricity through the combustion of coal and has been in operation since 1981. Coal combustion by-products (residues) (CCRs) that are generated during the electrical generation process are disposed in the on-site landfill. The ash is generally segregated into two categories, "fly" and "bottom."

Approximately 80% of the ash produced is classified as fly ash, which is derived from the boiler exhaust gas and is collected in electrostatic precipitators. The fly ash is composed of very fine particles similar to glass and has the consistency of a powder. Collected fly ash is pneumatically transferred to silos for short-term storage. A subcategory of the fly ash is known as economizer ash. This material is the coarsest fraction of the fly ash, which drops out before the electrostatic precipitators, and represents approximately 2% of the fly ash production. The plant collects this material in a separate silo system.

The bottom ash is composed of angular, glassy particles with a porous surface texture and has the consistency of coarse sand. The bottom ash is sluiced to dewatering hoppers for removal of water and for storage.

Historically, approximately 60 to 70 % of the two types of ash have been marketed regionally to construction-related industries. The remaining amount of ash is placed in the on-site landfill for disposal.

1.3 Permit History

The Landfill was initially issued a permit in 1982 by the Arkansas Department of Pollution Control and Ecology, now the Arkansas Energy & Environmental Division of Environmental Quality (DEQ), and has received three permit modifications to date. The facility permit history is as follows:

1. In October 1982, Chem-Ash, Inc. (Chem-Ash), the on-site landfill contractor which managed coal ash sales and landfill disposal operations for Arkansas Power & Light (AP&L), was granted a permit (No. 199-S) from the DEQ to construct and operate a solid waste disposal facility at the White Bluff Plant (Entergy Arkansas, Inc., now known as Entergy Arkansas, LLC, became AP&L's successor in interest as of April 1996).

2. In March 1983, DEQ granted among other provisions a permit modification request to transfer the landfill permit from Chem-Ash to AP&L and revised the permit number to 199-SR-1.

3. In June 1984, AP&L submitted an application for permit modification requesting operational changes and other provisions to include an increase of the permitted landfill area from 110 acres to 177 acres, with 153 acres for waste disposal. DEQ granted the permit modification request in September 1985. The permit number was revised to 199-SR-2.

4. Entergy Arkansas submitted a permit modification application to the DEQ-SWMD to upgrade the Landfill to Arkansas Regulation No. 22 (Regulation No. 22) standards in December 1997. The DEQ issued the permit November 2000.

5. Entergy Arkansas submitted a minor permit modification in April 2011 and the DEQ approved the request in May 2011 to reconfigure the waste disposal areas into five disposal cells, which is the current landfill configuration. However, the DEQ permitted Landfill footprint remains at 153 acres.

2.0 LANDFILL LAYOUT

2.1 Existing Conditions of Landfill

The permitted landfill area consists of approximately 177 acres (153 acres for solid waste disposal) and is located in the southwestern portion of the plant site as shown on **FIGURE 2**.

The current layout of the Landfill includes a total of 5 disposal cells and has a permitted waste capacity of approximately 4,688,200 cubic yards (cy). Waste Cells 1 through 4 have been constructed and comprise the active disposal area of the Landfill having received CCR materials after October 19, 2015.

Construction of the disposal cells has followed the numerical sequence of the cell numbers with all design, construction, operation and maintenance in compliance with the requirements of APCEC Regulation 22. Cells 1 through 4 are existing landfill CCR units and are operated in accordance with requirements of the CCR Rule.

No final cover system has been installed on Waste Cells 1 through 4. Older portions of the landfill that received CCR and were closed prior to the effective date of the Rule (October 2015) have been closed per the permit requirements in effect at the time of closure.

TABLE 2.1 presents a summary of the disposal cells that have been constructed at the White Bluff Landfill.

TABLE 2.1. Construction Summary of White Bluff Plant Class 3N Landfill

Cell Number	Year Built	Year Closed	Final Cover System	Status
1	2005	N/A	N/A	Open
2	2007	N/A	N/A	Open
3	2010	N/A	N/A	Open
4	2016	N/A	N/A	Open

2.2 Changes Made to Landfill Configuration During Reporting Period

During the reporting period, no changes were made to the landfill configuration. Cells 1 through 4 are open and are actively receiving waste. No new cells were opened, and no existing cells were closed.

The landfill manager that works for the contracted landfill management company, Charah Solutions Inc. (Charah) reported improvements during the year that included repairs to slopes exhibiting rills and gullies.

3.0 WASTE VOLUME CALCULATIONS

The landfill facility has been surveyed annually since 1996. Each year's survey is compared to the previous year to compute the amount of CCR disposed. The current survey is also compared to the permitted top of waste elevations to determine remaining capacity, or airspace. Additionally, the current survey is compared to an estimated "operational" top of waste to determine the remaining operational capacity. The operational top of waste is the maximum disposal elevation that can be achieved within the open cells while maintaining the required 4:1 exterior and 3:1 interior slopes along with a top width sufficient for disposal activities. If additional operational capacity is needed, construction of an adjacent disposal cell will be required.

Disposal rates for the facility are calculated using the average of the disposal rates from the five most recent years. Disposal rates depend upon CCR production at the plant and sales of the ash. These can vary significantly year to year based upon the current economic climate, weather, and how much the plant is operational.

During the reporting period, there were four waste cells (Waste Cells 1 through 4) open at the site. These areas are shown on **FIGURE 2**.

Digital terrain modeling techniques were used to determine volumes of ash disposed during the current reporting period. For this report, the active disposal areas of the landfill were surveyed on December 3, 2019. The surface generated from the current survey was compared to the previous reporting period's survey on December 18, 2018 survey surface model utilizing AutoCAD Civil 3D software to estimate volume changes to that have occurred over the reporting period. **TABLE 3.1** summarizes volume changes for the current reporting period and estimated remaining capacity by waste cell.

TABLE 3.1 Summary of Waste Volume Calculations.

Cell Number	Status	Area (ac)	DEQ Permitted Waste Capacity (cy)	2019 Volume Placed* (cy)	Total Volume Placed (cy)	Operational Remaining Disposal Capacity (cy)	Operational Remaining Life (years)
Cell 1	Active	6.0	307,500	7,480	181,580	125,920	2.41
Cell 2	Active	9.0	712,100	16,120	375,520	232,080	4.43
Cell 3	Active	9.4	557,200	3,240	326,840	230,360	4.40
Cell 4	Active	6.5	517,100	27,920	126,620	302,980	5.79
Totals		**30.9**	**2,093,900**	**54,760**	**1,010,560**	**891,340**	**17.03**

* Volume cut or filled during the 12-month period between December 2018 and December 2019.

Based upon the digital terrain model, the net volume of material filled in Waste Cells 1 through 4 during the reporting period was calculated to be approximately 54,760 cubic yards (cy). Final permitted contours are shown in **FIGURE 3**. The 5-year average disposal rate, including this reporting period, is approximately 52,340 cubic yards per year, in-place (The reported quantity from 2015 was removed from the 5-year average for 2019 as an outlier to give a more consistent result). At this rate, the calculated available airspace, 891,340 cubic yards, provides approximately 17.03 years of remaining operation capacity. This time frame is affected by the market for ash material and may be shorter or longer depending on market conditions. Also, the closure of the facility's recycling ponds will affect the remaining operational capacity.

4.0 ASSESSMENT OF LANDFILL FACILITY

This section of the report provides a summary of the inspection of the White Bluff Landfill facility that was conducted on December 3, 2019. Boral was the landfill's operations company from 1/1/2019 to 11/30/2019. Charah began operating the Landfill on 12/1/2019. The assessment included an interview with the landfill operating company Charah personnel and Entergy personnel, review of weekly inspections of the facility, review of documents pertaining to the operation and compliance of the landfill, and an on-site inspection of the landfill facility. Photographs of the site inspection are included in **APPENDIX B**.

4.1 General Operations

The operator uses Cell 1 for production of a product named "flex-base". CCR materials including bottom-ash and fly-ash are stockpiled, blended to make the "flex-base" and loaded to trucks in this area. Active disposal was conducted primarily in the Cell 3 and Cell 4 areas.

The side-slopes of the landfill are generally at the required 4:1 external and 3:1 interior slope requirements. The slopes in the larger Cells 2 and 3 are set back from the landfill perimeter berm. This allows stormwater runoff from the slopes to be collected and routed to the cell discharge points. Cell 3 discharges leachate to Cell 4, which contains a leachate collection system.

No tension cracks, seeps, or other features that indicate a potential slope failure were observed during the site inspection. In addition, no active seeps were noted.

The general operations of the landfill facility are being done in a safe manner and the overall maintenance of the facility is in good condition.

4.2 Landfill Cover System

As noted, no final cover system has been installed on Waste Cells 1 through 4. However, and as previously discussed, older portions of the landfill that received CCR and were closed prior to the effective date of the Rule (October 2015) have been closed per the permit requirements in effect at the time of closure. **FIGURE 3** presents contours for the currently permitted cover system for the permitted active cells.

All four active cells remain open. Interim cover soil has not been placed on any of the existing side slopes. A large quantity of soil has been stockpiled near the landfill during previous construction projects for future interim cover placement.

4.3 Leachate Collection System

Waste Cells 1 through 3 do not have leachate collection systems. Cells 1 and 2 are graded to drain to the southeast corner of Cell 2 where leachate discharges to an adjacent stormwater channel, as required by the 2000 permit under which they were constructed.

Cell 4 was designed with leachate collection and transmission systems. Additionally, new collection lines were installed along the west and south sides of the existing Cell 3. These new collection lines were connected to the new Cell 4 leachate collection system, which was designed to handle leachate from both cells. The automated pumping system will remove the Cell 3 and Cell 4 leachate from a sump in the southern corner of Cell 4. The leachate is pumped via a dual-contained underground pipeline and discharged to the plant's Surge Pond. Weekly inspections during the reporting period noted the automated leachate pump was not working and that a temporary pump has been added to keep leachate levels in compliance. During the site inspection the temporary pump was working and keeping the leachate from leaving Cell 4.

4.4 Stormwater Control System

Stormwater at the landfill site flows south and then east to the plant Surge Pond. To prevent run-on, a lined stormwater channel was constructed along the north side of the landfill, routing storm water east or west around the landfill. Additionally, clay perimeter berms prevent both run-on and run-off, except at designated discharge points as described in Section 4.3.

The White Bluff plant is permitted to discharge storm water to the Arkansas River under NPDES Permit No. AR0036331, as issued by the DEQ effective June 1, 2012. Ash disposal runoff is listed as a potential constituent of discharges from Outfall 002, overflow from the plant Clear Water Holding Pond. Discharges, when they occur, are monitored daily for flow, total suspended solids (TSS), oil and grease (O&G), total iron, total copper and pH. Discharges, if they occur, are also monitored quarterly for E-coli and require acute WET testing.

4.5 Facility Roads

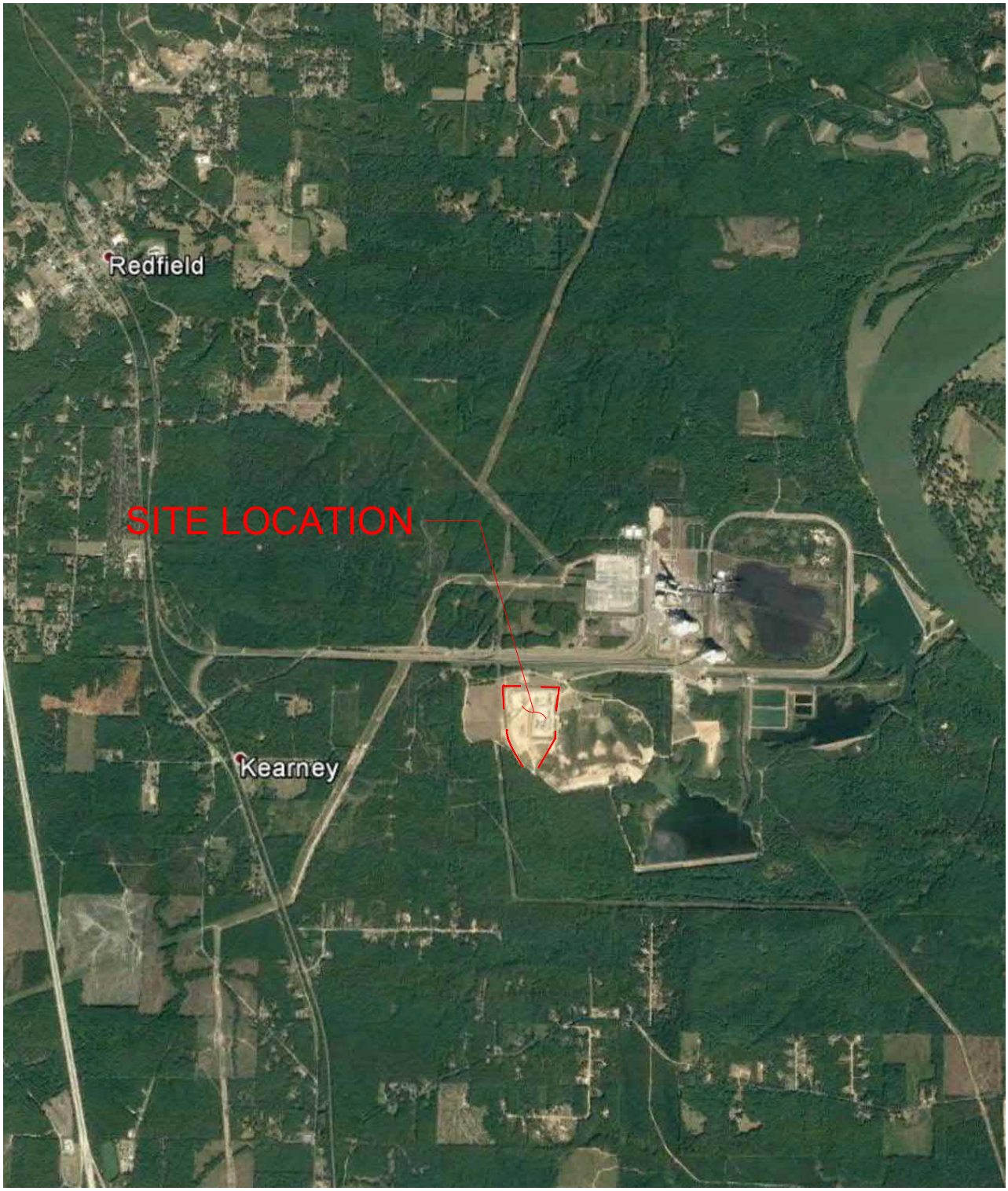
The facility roads were well maintained at the time of the inspection. The disposal access road to the active cells is paved, and it was in excellent condition at the time of the inspection. The perimeter access road has an all-weather surface coarse and was in good condition.

4.6 Fugitive Dust Control

The facility is operated as outlined by the CCR Fugitive Dust Control Plan, prepared in October 2015.

The landfill was actively disposing of CCR during the December site visit. Fly ash is transported to the landfill and dumped using bottom-dump trailers to minimize fugitive dust issues. Bottom ash, in a moist condition, is hauled to the landfill using dump trucks. Economizer ash is loaded to covered dump truck prior to transfer to the landfill. A windsock is used to visually gauge wind direction and intensity. Water is applied, when necessary, for dust suppression on roads and the landfill using a water truck. The landfill access roads have enforced posted speed limit of 25 mph. Within the landfill boundary, a 5 mph speed limit is enforced.

APPENDIX A
Figures



Project Mngr:	TLB
Drawn By:	KHJ/TLB
Checked By:	DCM
Approved By:	DCM

Project No.	026-001-35197248
Scale:	N.T.S.
File No.	001
Date:	12/26/2019

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SITE MAP

2019 LANDFILL INSPECTION REPORT

ENTERGY WHITE BLUFF PLANT

CLASS 3N LANDFILL

REDFIELD ARKANSAS

FIG. No. 1

N:\GEC\ARCHIVE\CAD\026\001\35197248 - WB CCR 2019\001 - SITE MAP WHITE BLUFF 2019.DWG

LEGEND

EXISTING GRADE CONTOUR	PAVED ROAD
CELL BOUNDARIES	UNPAVED ROAD
WATER LINE	SURVEY CONTROL POINT (HV11 327.17)
ELECTRIC TRANSMISSION LINE	

NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN AERIAL SURVEY BY TERRACON CONSULTANTS, INC. ON DECEMBER 3, 2019.

150 0 50 100 150

SCALE IN FEET

N

REV	DATE	BY	DESCRIPTION

EXISTING CONDITIONS

2019 LANDFILL INSPECTION REPORT

ENTERGY WHITE BLUFF PLANT

CLASS 3N LANDFILL

REDFIELD ARKANSAS

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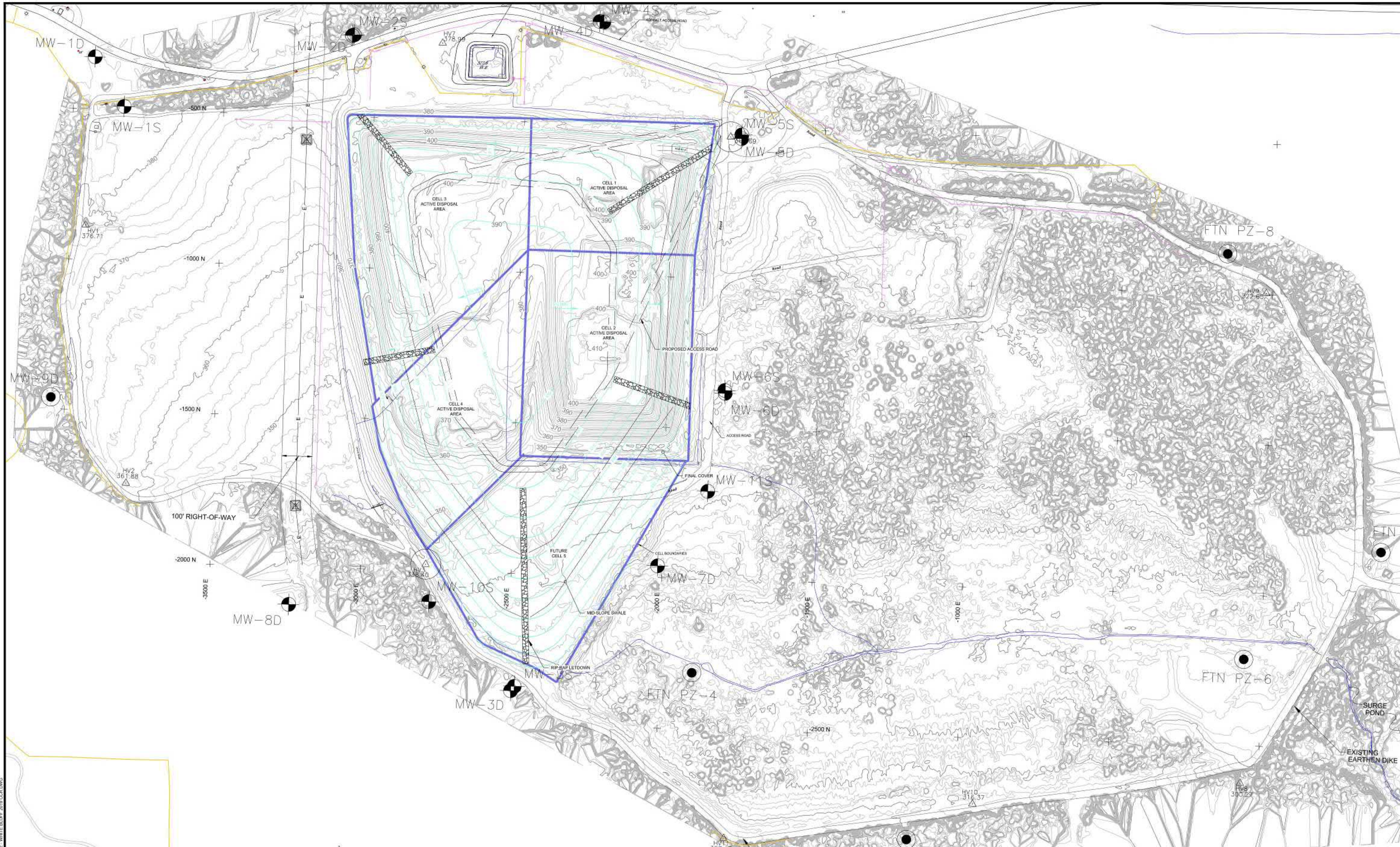
FIGURE 2

DESIGNED BY:	TLB
DRAWN BY:	TLB
APPVD. BY:	DCM
SCALE:	SEE SCALEBAR
DATE:	12/26/2019
JOB NO.	026-002-35197248
ACAD NO.	002
SHEET NO.:	2 OF 3



LEGEND

EXISTING GRADE CONTOURS	PAVED ROAD
PROPOSED TOP OF FINAL COVER CONTOURS	UNPAVED ROAD
CELL BOUNDARIES	SURVEY CONTROL POINT (HV11 327.17)
WATER LINE	PROPOSED ACCESS ROAD
ELECTRIC TRANSMISSION LINE	PROPOSED MID-SLOPE SWALE
	PROPOSED RIP-RAP LETDOWN STRUCTURE

NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN AERIAL SURVEY BY TERRACON CONSULTANTS, INC. ON DECEMBER 3, 2019.

150 0 50 100 150

SCALE IN FEET

N

REV	DATE	BY	DESCRIPTION

FINAL PERMIT CONTOURS

2019 LANDFILL INSPECTION REPORT

ENTERGY WHITE BLUFF PLANT

CLASS 3N LANDFILL

REDFIELD ARKANSAS

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FIGURE 3

DESIGNED BY:	TLB
DRAWN BY:	TLB
APPVD. BY:	DCM
SCALE:	SEE SCALEBAR
DATE:	12/26/2019
JOB NO.	026-002-35197248
ACAD NO.	002
SHEET NO.:	3 OF 3

APPENDIX B

Photos of Annual Engineering Inspection

1. Looking northwest at south slope of Cell 2.

2. Looking west across future Cell 5 area at south side of Cells 3 and 4.

3. Looking north at Cell 4 sump.

4. Looking north across west slope of Cell 3.

5. Looking south across west slope of Cell 4.

6. Looking east across north slope of Cell 3.

7. Looking south across west slope of Cell 3

8. Looking east at active area.