HISTORY OF CONSTRUCTION

EXISTING CCR IMPOUNDMENTS

CCR Rule Section 257.73(c)

ASBURY POWER PLANT

21133 Uphill Lane
Asbury, Missouri 64832

May 30, 2023

The Empire District Electric Company

Prepared by:

PALMERTON & PARRISH, INC.

05/30/23

Brandon R. Parrish, P.E.
MO P.E. 2010000852

PALMERTON & PARRISH, INC.

GEOTECHNICAL & MATERIALS ENGINEERS
MATERIALS TESTING LABORATORIES
ENVIRONMENTAL SERVICES

4168 W. Kearney Street.
Springfield, MO 65803
Ph: (417) 864-6000
www.ppimo.com

May 30, 2023

Empire District Electric Company
Asbury Power Plant
21133 Uphill Lane
Asbury, Missouri 64832

RE: **History of Construction** – CCR Rule Section 257.73(c)
Empire District Electric Company – Asbury Power Plant
Asbury, Missouri
PPI Project Number 231518

To Whom It May Concern:

The attached Report summarizes the **History of Construction** of the Empire District Electric Company's CCR Impoundment at the Asbury Power Plant (Asbury CCR Impoundment). In accordance with Section 257.73(b), the Asbury CCR Impoundment has a height of five feet or more and a storage volume of 20 acre-feet or more, and is therefore subject to the requirements of Section 257.73(c) through (e). This document has been prepared to meet the requirements of Section 257.73(c) of the CCR Rule.

In accordance with Section 257.105(f)(5) of the CCR Rule, a copy of this document should be maintained in Empire's operating records. In accordance with Section 257.107(f)(4), a copy of this document should also be posted to Empire's CCR Compliance website. Notification of the availability of this document should be provided to the State Director, as required in Section 257.106(f)(8).

PALMERTON & PARRISH, INC.
By:

Brandon R. Parrish, P.E.
Professional Engineer
MO P.E. 2010000852

10,000 Hwy 160
Walnut Shade, MO 65771
Ph: (417) 561-8395

3500 East 13th Street
Joplin, MO 64801
Ph: (417) 624-2005

TABLE OF CONTENTS

APPENDICES

HISTORY OF CONSTRUCTION – EXISTING CCR IMPOUNDMENTS

CCR RULE SECTION 257.73(C)

EMPIRE DISTRICT ELECTRIC COMPANY – ASBURY POWER PLANT

ASBURY, MISSOURI

1.0 INTRODUCTION

"CCR Rule Section 257.73(c)(1) No later than October 17, 2016, the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs(c)(1)(i) through (xi) of this section…"

Section 257.73(c) of the CCR Rule requires compilation of a History of Construction. This Report summarizes the required information, to the extent feasible. As indicated in the Preamble of the CCR Rule, this Report only incorporates information where factual documentation exists and was available for review. This Report does not include anecdotal or speculative information regarding the Asbury CCR Impoundment's design and construction history.

2.0 OWNER / OPERATOR / IDENTIFICATION

CCR Rule Section 257.73(c)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identified number of the CCR unit if one has been assigned by the State.

Table 2.0-1: Impoundment Identification and Owner	
Impoundment Name	Asbury CCR Impoundment
Owner	Empire District Electric Company
Address	21133 Uphill Lane Asbury, Missouri 64832
Identification Number	None

3.0 SITE PLAN

CCR Rule Section 257.73(c)(ii): The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.

The location of the Asbury CCR Impoundment is shown on the United States Geological Survey (USGS) topographic quadrangle map on Figure 1, included in Appendix I.

4.0 STATEMENT OF PURPOSE

CCR Rule Section 257.73(c)(iii): A statement of the purpose for which the CCR unit is being used.

The primary purpose of the Asbury CCR Impoundment is for storage of coal combustion residuals. Closure of the Asbury CCR Impoundment was complete as of January 23, 2023.

5.0 WATERSHED DATA

CCR Rule Section 257.73(c)(iv): The name and size in acres of the watershed within which the CCR unit is located.

The Asbury CCR Impoundment is located in the Blackberry Creek watershed (USGS ID# 11070207-0507) within the larger Spring River Watershed (USGS ID# 11070207). The Blackberry Creek watershed drains approximately 13,888 acres.

6.0 FOUNDATION AND ABUTMENT

CCR Rule Section 257.73(c)(v): A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

Empire has some original design plan information for portions of the Asbury CCR Impoundment in their Operating Record, but essentially no as-built documentation. However, several studies have been completed at the Asbury CCR Impoundment to characterize the levee embankments for the purposes of slope stability analysis, and to estimate the volume of CCR stored in the Asbury CCR Impoundment.

The Asbury CCR Impoundment is contained by a perimeter earthen levee embankment. The Asbury CCR Impoundment was historically subdivided into three (3) operating ponds. The operating ponds were identified as the Lower Pond, Upper Pond, and the South Pond, and were separated by interior earthen embankments.

The Asbury CCR Impoundment does not have “abutments” in the context of the CCR Rule. The table below summarizes subsurface conditions within the Asbury CCR Impoundment levee embankments, and underlying foundation conditions, based on the results of previous subsurface investigations.

Table 6.0-1: Levee Embankment and Foundation Physical and Engineering Properties

Zone	Physical and Engineering Properties
Perimeter Levee Embankments	Earth fill typically consisting of stiff to very stiff lean clay. Field and laboratory test data indicates moderate to high in situ shear strength.
Interior Earthen Levee Embankments	Earth fill typically consisting of stiff to very stiff lean clay. Field and laboratory test data indicates moderate to high in situ shear strength.
Foundation Conditions	Natural lean clay soils, medium stiff to very stiff, often logged as shaley and/or with shale layers. Natural lean clay soils transition to weathered shale bedrock at depth.

7.0 CONSTRUCTION HISTORY

CCR Rule Section 257.73(c)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The Asbury CCR Impoundment is contained by a perimeter earthen levee embankment. The Asbury CCR Impoundment was historically subdivided into three (3) operating ponds. The operating ponds were identified as the Lower Pond, Upper Pond, and the South Pond, and were separated by interior earthen embankments.

Empire has some original design plan information for portions of the Asbury CCR Impoundment in their Operating Record, but essentially no as-built documentation. Records pertaining to initial geotechnical studies, including site characterization, soil borrow data, and construction-phase compaction records, could not be located.

As discussed in Section 6.0 of this Report, several studies have been completed to characterize the levee embankments for the purposes of slope stability analysis and to estimate the volume of CCR stored in the Asbury CCR Impoundment. Table 6.0-1 presents a general summary of the physical and engineering properties of the Asbury CCR Impoundment levee embankments and underlying foundation conditions.

The total volume of coal combustion residuals (CCR) stored at the Asbury CCR Impoundment is approximately 2,523,500 cubic yards. Historical development of this volume estimate is documented in Annual Inspection Reports completed by PPI and Reports completed by Midwest Environmental Consultants.

Table 7.0-1 below presents a general construction history timeline, to the extent factual documentation was available for review.

Table 7.0-1: Construction History Timeline

Approximate Date	Construction Activity and/or Operating Modification
1970	Original commissioning of Asbury Power Plant Unit 1, 213 MW.
1970	The Upper Pond was constructed as part of the original Asbury Power Plant construction.
1974	The Lower Pond was constructed.
1978	The South Pond was constructed.
1986	Commissioning of Asbury Power Plant Unit 2, 19 MW.
1987 / 1988	Design and construction, respectively, of the seepage cutoff trench around the Lower Pond.
2014	Commissioning of the Asbury Environmental Retrofit Project, which resulted in the termination of fly ash sluicing, and dry hauling of flue gas desulfurization (FGD) byproduct to the Asbury CCR Impoundment.
2016	Operating water level of the South Pond lowered to approximate pond bottom elevation.
2019	The Asbury Power Plant ceased burning coal in December 2019. Placement of bulk

	CCR resulting from power production into the Asbury CCR Impoundment was complete at the end of 2019.
2020 and 2021	The Asbury Power Plant was officially taken out of service on March 1, 2020. FGD byproduct resulting from the bag house decommissioning and materials from the coal pile area closure were disposed of in the Asbury CCR Impoundment prior to April 11, 2021.
2022	Closure activities commenced in the second quarter of 2022.
2023	Closure of the Asbury CCR Impoundment was complete on January 23, 2023.

8.0 ENGINEERING DRAWINGS

CCR Rule Section 257.73(c)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural and manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Original as-built engineering drawings for the Asbury CCR Impoundment do not exist.

Closure of the Asbury CCR Impoundment was complete as of January 23, 2023. During closure activities, CCR was placed and graded to provide positive drainage of stormwater. The final cover system was an alternative final cover system: ClosureTurf. ClosureTurf is a patented, three component system that includes the following components, from top to bottom: specified sand infill, engineered artificial turf, and flexible geomembrane liner installed on a prepared subgrade. The final cover system for the CCR Surface Impoundment was in compliance with 40 CFR 257.102(d)(3).

An as-built survey prepared by Allgeier, Martin & Associates, Inc., dated May 22, 2023, included in Appendix II.

9.0 INSTRUMENTATION

CCR Rule Section 257.73(c)(viii): A description of the type, purpose, and location of existing instrumentation.

Twelve (12) settlement monuments, identified as SM-1 through SM-12, were installed in 2012. Fifteen (15) vertical deflection monuments, identified as S-1 through S-15, were installed in 2016.

All of the vertical deflection monuments were removed as part of the closure project. Three (3) of the original twelve (12) settlement monuments were also removed during the closure project.

Settlement monuments SM-1, SM-2, SM-3, SM-4, SM-5, SM-6, SM-8, SM-11, and SM-12 are still intact as of the date of this report. Locations of the remaining settlement monuments are shown on the as-built survey prepared by Allgeier, Martin & Associates, Inc., dated May 22, 2023, included in Appendix II.

10.0 AREA CAPACITY CURVE

CCR Rule Section 257.73(c)(ix): Area capacity curves for the CCR unit

Closure of the Asbury CCR Impoundment was complete as of January 23, 2023. Development of area-capacity curves is not applicable to the closed CCR Impoundment.

11.0 SPILLWAY STRUCTURES

Section 257.73(c)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

Closure of the Asbury CCR Impoundment was complete as of January 23, 2023. Grading and final cover system installation were designed and constructed such that stormwater runoff drains by gravity sheet flow to rip rap channels within the footprint area of the closed Asbury CCR Impoundment. The rip rap channels extend to discharge into two (2) detention ponds, identified as the East and West Detention Ponds. Stormwater is then routed to spillway structures for eventual outflow into Blackberry Creek. An as-built survey prepared by Allgeier, Martin & Associates, Inc., dated May 22, 2023, is included in Appendix II.

12.0 OPERATION AND MONITORING

Section 257.73(c)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

Closure of the Asbury CCR Impoundment was complete as of January 23, 2023. Operation and monitoring will be in accordance with the most current version of the document entitled “Post-Closure Plan; Closed CCR Surface Impoundment; 40 CFR 257.104(d); Asbury Power Plant; 21133 Uphill Road; Asbury, Missouri 64832”, prepared by Midwest Environmental Consultants, and originally dated October 17, 2016.

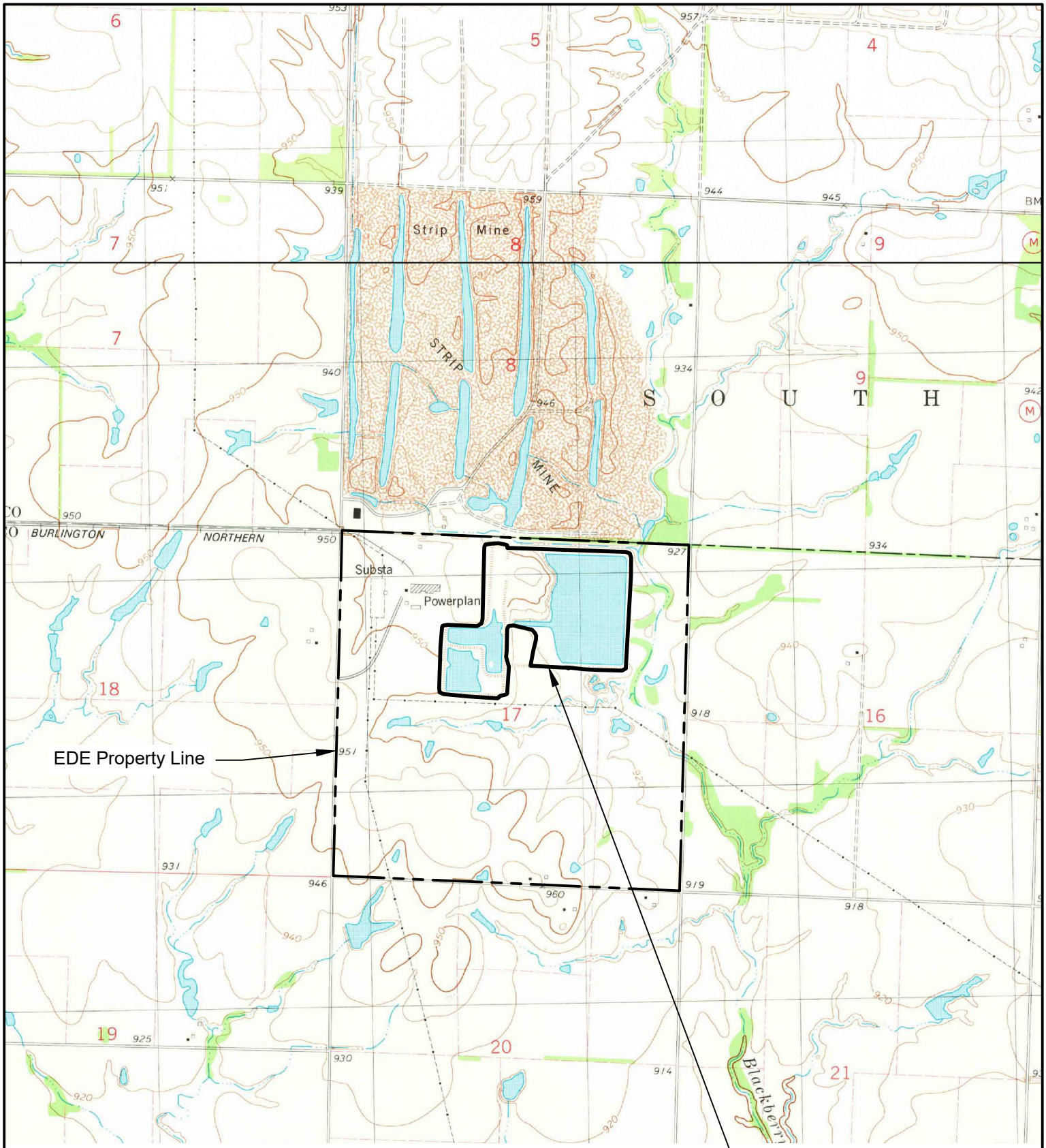
13.0 STRUCTURAL INSTABILITY

Section 257.73(c)(xii): Any record or knowledge of structural instability of the CCR unit.

There is no documentation of structural instability at the Asbury CCR Impoundment. Structural stability has not been observed by PPI since PPI’s involvement with the site commenced in 2012.

APPENDIX I

FIGURE 1 – SITE PLAN ON USGS TOPOGRAPHIC MAP



USGS Asbury 7.5 Minute Topographic Quadrangle, 1981
USGS Mindenmines 7.5 Minute Topographic Quadrangle, 1981

SCALE
1"=2000'

Project: Asbury Power Plant, 21133 Uphill Lane, Asbury, MO
Client: Empire District Electric Company

Site Location on Topographic Map

DATE: May 30, 2023

Project Number: 231518

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

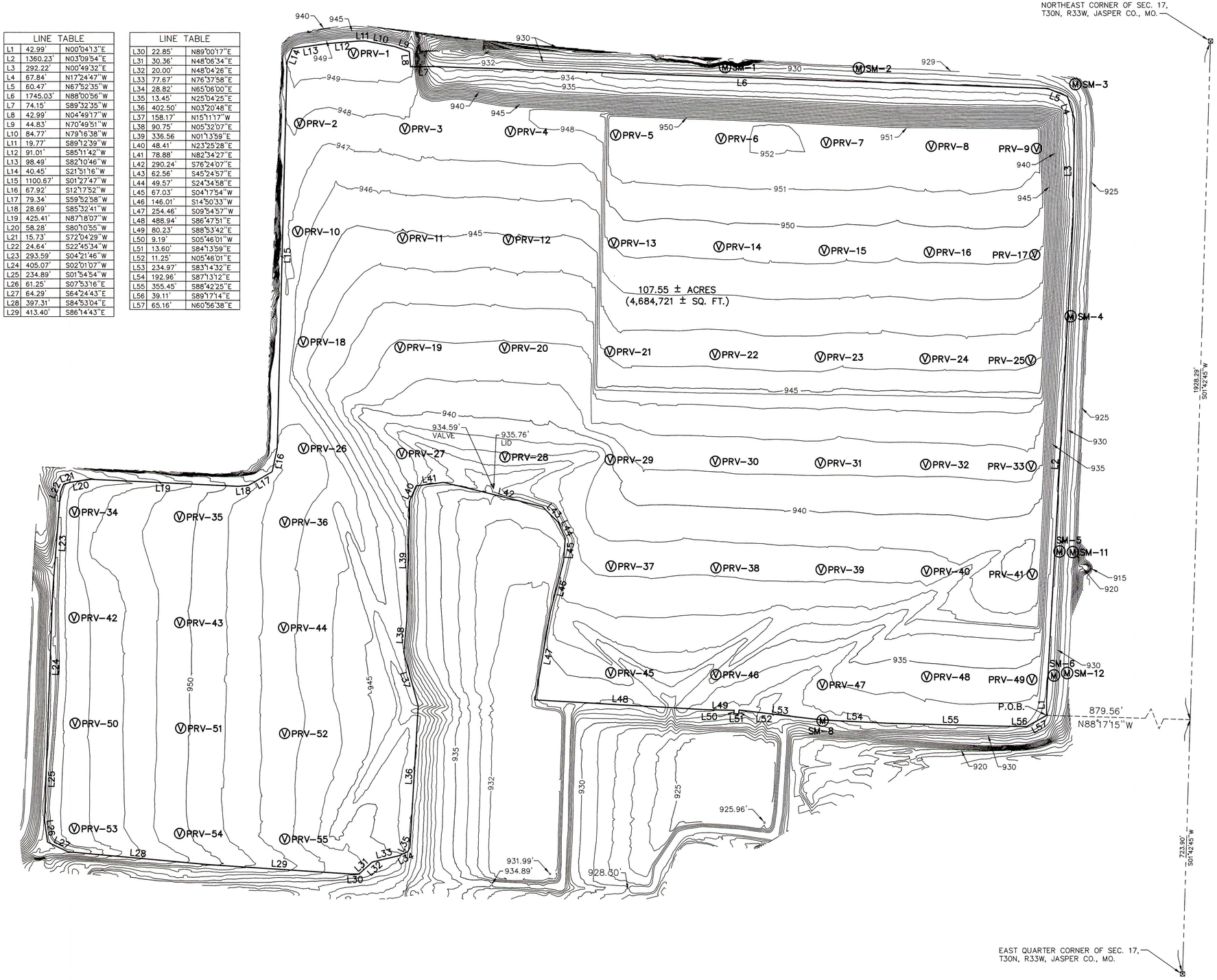
FIGURE 1

APPENDIX II

AS-BUILT SURVEY BY ALLGEIER, MARTIN & ASSOCIATES, INC.

LINE TABLE		
L1	42.99'	N00°04'13"E
L2	1360.23'	N03°09'54"E
L3	292.22'	N00°49'32"E
L4	67.84'	N17°24'47"W
L5	60.47'	N67°52'35"W
L6	1745.03'	N88°00'56"W
L7	74.15'	S89°32'35"W
L8	42.99'	N04°49'17"W
L9	44.83'	N70°49'51"W
L10	84.77'	N79°16'38"W
L11	19.77'	S89°12'39"W
L12	91.01'	S85°11'42"W
L13	98.49'	S82°10'46"W
L14	40.45'	S21°51'16"W
L15	1100.67'	S01°27'47"W
L16	67.92'	S12°17'52"W
L17	79.34'	S59°52'58"W
L18	28.69'	S85°32'41"W
L19	425.41'	N87°18'07"W
L20	58.28'	S80°10'55"W
L21	15.73'	S72°04'29"W
L22	24.64'	S22°45'34"W
L23	293.59'	S04°21'46"W
L24	405.07'	S02°01'07"W
L25	234.89'	S01°54'54"W
L26	61.25'	S07°53'16"E
L27	64.29'	S64°24'43"E
L28	397.31'	S84°53'04"E
L29	413.40'	S86°14'43"E

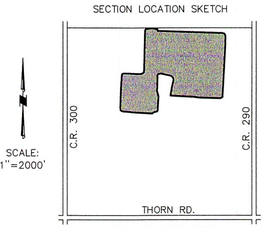
LINE TABLE		
L30	22.85'	N89°00'17"E
L31	30.36'	N48°06'34"E
L32	20.00'	N48°04'26"E
L33	77.67'	N76°37'58"E
L34	28.82'	N65°06'00"E
L35	13.45'	N25°04'25"E
L36	402.50'	N03°20'48"E
L37	158.17'	N15°11'17"W
L38	90.75'	N05°32'07"E
L39	336.56	N01°13'59"E
L40	48.41'	N23°25'28"E
L41	78.88'	N82°34'27"E
L42	290.24'	S76°24'07"E
L43	62.56'	S45°24'57"E
L44	49.57'	S24°34'58"E
L45	67.03'	S04°17'54"W
L46	146.01'	S14°50'33"W
L47	254.46'	S09°54'57"W
L48	488.94'	S86°47'51"E
L49	80.23'	S88°53'42"E
L50	9.19'	S05°46'01"W
L51	13.60'	S84°13'59"E
L52	11.25'	N05°46'01"E
L53	234.97'	S83°14'32"E
L54	192.96'	S87°13'12"E
L55	355.45'	S88°42'25"E
L56	39.11'	S89°17'14"E
L57	65.16'	N60°56'38"E



POINT OF COMMENCEMENT:
NORTHEAST CORNER OF SEC. 17,
T30N, R33W, JASPER CO., MO.

EAST QUARTER CORNER OF SEC. 17,
T30N, R33W, JASPER CO., MO.

SECTION LOCATION SKETCH



SCALE:
1"=2000'

SECTION 17, T30N, R33W
JASPER COUNTY, MISSOURI

SCALE: 1"=140'
140 70 0 140

BASIS OF BEARINGS: MISSOURI STATE PLANE COORDINATE SYSTEM, WEST ZONE.

EASEMENT DESCRIPTION:

A TRACT OF LAND BEING PART OF THE NORTH-HALF (N1/2) OF SECTION 17 TOWNSHIP 30 NORTH RANGE 33 WEST ALL IN JASPER COUNTY, MISSOURI. PARENT TRACT BEING RECORDED IN BOOK 1158 AT PAGE 1930 AND BOOK 1085 AT PAGE 613 IN THE JASPER COUNTY RECORDER'S OFFICE IN CARTHAGE, MISSOURI. BEING DESCRIBED MORE FULLY AS FOLLOWS:

COMMENCING AT A FOUND IRON PIN AT THE NORTHEAST CORNER OF SAID SECTION 17, A FOUND SURVEY MONUMENT IN PLACE;
THENCE S01°42'45"W A DISTANCE OF 1928.29 FEET ALONG THE EAST LINE OF SAID NORTH-HALF (N1/2) OF SECTION 17;
THENCE N88°17'15"W LEAVING SAID EAST LINE A DISTANCE OF 879.56 FEET TO THE POINT OF BEGINNING;

THENCE N00°04'13"E A DISTANCE OF 42.99 FEET;
THENCE N03°09'54"E A DISTANCE OF 1360.23 FEET;
THENCE N00°49'32"E A DISTANCE OF 292.22 FEET;
THENCE N17°24'47"W A DISTANCE OF 67.84 FEET;
THENCE N67°52'35"W A DISTANCE OF 60.47 FEET;
THENCE N88°00'56"W A DISTANCE OF 1745.03 FEET;
THENCE S89°32'35"W A DISTANCE OF 74.15 FEET;
THENCE N04°49'17"W A DISTANCE OF 42.99 FEET;
THENCE N70°49'51"W A DISTANCE OF 44.83 FEET;
THENCE N79°16'38"W A DISTANCE OF 84.77 FEET;
THENCE S89°12'39"W A DISTANCE OF 19.77 FEET;
THENCE S85°11'42"W A DISTANCE OF 91.01 FEET;
THENCE S82°10'46"W A DISTANCE OF 98.49 FEET;
THENCE S21°51'16"W A DISTANCE OF 40.45 FEET;
THENCE S01°27'47"W A DISTANCE OF 1100.67 FEET;
THENCE S12°17'52"W A DISTANCE OF 67.92 FEET;
THENCE S59°52'58"W A DISTANCE OF 79.34 FEET;
THENCE S85°32'41"W A DISTANCE OF 28.69 FEET;
THENCE N87°18'07"W A DISTANCE OF 425.41 FEET;
THENCE S80°10'55"W A DISTANCE OF 58.28 FEET;
THENCE S72°04'29"W A DISTANCE OF 15.73 FEET;
THENCE S22°45'34"W A DISTANCE OF 24.64 FEET;
THENCE S04°21'46"W A DISTANCE OF 293.59 FEET;
THENCE S02°01'07"W A DISTANCE OF 405.07 FEET;
THENCE S01°54'54"W A DISTANCE OF 234.89 FEET;
THENCE S07°53'16"E A DISTANCE OF 61.25 FEET;
THENCE S64°24'43"E A DISTANCE OF 64.29 FEET;
THENCE S84°53'04"E A DISTANCE OF 397.31 FEET;
THENCE S86°14'43"E A DISTANCE OF 413.40 FEET;
THENCE N89°00'17"E A DISTANCE OF 22.85 FEET;
THENCE N48°06'34"E A DISTANCE OF 30.36 FEET;
THENCE N48°04'26"E A DISTANCE OF 20.00 FEET;
THENCE N76°37'58"E A DISTANCE OF 77.67 FEET;
THENCE N65°06'00"E A DISTANCE OF 28.82 FEET;
THENCE N25°04'25"E A DISTANCE OF 13.45 FEET;
THENCE N03°20'48"E A DISTANCE OF 402.50 FEET;
THENCE N15°11'17"W A DISTANCE OF 158.17 FEET;
THENCE N05°32'07"E A DISTANCE OF 90.75 FEET;
THENCE N01°13'59"E A DISTANCE OF 336.56 FEET;
THENCE N23°25'28"E A DISTANCE OF 48.41 FEET;
THENCE N82°34'27"E A DISTANCE OF 78.88 FEET;
THENCE S76°24'07"E A DISTANCE OF 290.24 FEET;
THENCE S45°24'57"E A DISTANCE OF 62.56 FEET;
THENCE S24°34'58"E A DISTANCE OF 49.57 FEET;
THENCE S04°17'54"W A DISTANCE OF 67.03 FEET;
THENCE S14°50'33"W A DISTANCE OF 146.01 FEET;
THENCE S09°54'57"W A DISTANCE OF 254.46 FEET;
THENCE S86°47'51"E A DISTANCE OF 488.94 FEET;
THENCE S88°53'42"E A DISTANCE OF 80.23 FEET;
THENCE S05°46'01"W A DISTANCE OF 9.19 FEET;
THENCE S84°13'59"E A DISTANCE OF 13.60 FEET;
THENCE N05°46'01"E A DISTANCE OF 11.25 FEET;
THENCE S83°14'32"E A DISTANCE OF 234.97 FEET;
THENCE S87°13'12"E A DISTANCE OF 192.96 FEET;
THENCE S88°42'25"E A DISTANCE OF 355.45 FEET;
THENCE S89°17'14"E A DISTANCE OF 39.11 FEET;
THENCE N60°56'38"E A DISTANCE OF 65.16 FEET TO THE POINT OF BEGINNING.

CONTAINING 107.55 ACRES (4,684,721 SQUARE FEET) MORE OR LESS.
BASIS OF BEARINGS: MISSOURI STATE PLANE COORDINATE SYSTEM, WEST ZONE, GRID NORTH.

SURVEYOR'S DECLARATION:

ON THE 27TH DAY OF FEBRUARY, 2023, THE HEREON DESCRIBED EASEMENT WAS MADE UNDER MY SUPERVISION AND, TO THE BEST OF MY KNOWLEDGE, CONDITIONS ARE AS SHOWN.

ALL COPIES THAT DO NOT BEAR AN ORIGINAL SEAL AND SIGNATURE MAY HAVE BEEN ALTERED.

THE ACCURACY STANDARD THAT APPLIES TO THIS SURVEY IS FOR TYPE URBAN PROPERTY. (SURVEYOR DOES NOT CERTIFY AS TO ACTUAL USE OF PROPERTY)

ALLGEIER, MARTIN & ASSOCIATES
BY DARIN D. CARPENTER (AGENT)

SIGNATURE MUST BE IN BLUE INK
SEAL MUST BE IN RED INK

STATE OF MISSOURI
DARIN D CARPENTER
NUMBER
DARIN D CARPENTER
2002006001 68
PROFESSIONAL LAND SURVEYOR

5/22/23

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY
MISSOURI NO. 000427

DATE	REVISION
5-22-23	ADDED SETTLING MONUMENTS

DWN. BY:	BF
CKD. BY:	DDC
APPD. BY:	DDC
DATE :	2-27-2023

ASBURY PLANT - POND CLOSURE

SECTION 17, T30N, R33W — JASPER COUNTY, MO

DWG. NO.