

Intended for
Electric Energy, Inc.

Date
December 28, 2022

Project No.
1940103307

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN

JOPPA POWER PLANT EAST ASH POND JOPPA, ILLINOIS

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN JOPPA POWER PLANT EAST ASH POND

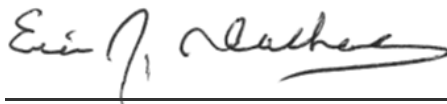
Project Name **Joppa Power Plant East Ash Pond**
Project No. **1940103307**
Recipient **Electric Energy, Inc.**
Document Type **Groundwater Monitoring Plan**
Revision **FINAL**
Date **December 28, 2022**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
<https://ramboll.com>



Brian G. Hennings, PG
Senior Managing Hydrogeologist



Eric J. Tlachac, PE
Senior Managing Engineer



Melanie K. Conklin
Senior Engineer

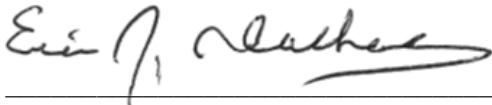
LICENSED PROFESSIONAL CERTIFICATIONS

40 C.F.R. § 257.91(f) Groundwater Monitoring System Certification

In accordance with Title 40 of the Code of Federal Regulations (40 C.F.R.), Part 257, Subpart D, Section (§) 257.91(f) the owner or operator of a coal combustion residuals (CCR) unit must obtain certification from a qualified professional engineer stating that the groundwater monitoring system at the CCR unit has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91. If the groundwater monitoring system includes the minimum number of monitoring wells specified in 40 C.F.R. § 257.91(c)(1), the certification must document the basis supporting use of the minimum number of monitoring wells. Further, in accordance with 40 C.F.R. § 257.91(e)(1), when completing the groundwater monitoring system certification, the qualified professional engineer must be given access to documentation regarding the design, installation, development, and decommissioning of any monitoring wells, piezometers, and other measurement, sampling, and analytical devices.

The groundwater monitoring system designed and constructed for the Joppa Power Plant (JPP) East Ash Pond (EAP) includes more than the minimum number of wells specified in 40 C.F.R. § 257.91(c)(1). The undersigned has been given access to documentation regarding the design, installation, development, and decommissioning of monitoring wells, piezometers and other measurement, sampling, and analytical devices concerning the JPP EAP.

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the groundwater monitoring system at the JPP EAP has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91.



Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Date: December 28, 2022



I, Brian G. Hennings, a qualified professional geologist in good standing in the State of Illinois, certify that the groundwater monitoring system at the JPP EAP has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91.



Brian G. Hennings
Professional Geologist
196-001482
Illinois
Date: December 28, 2022



CONTENTS

Licensed Professional Certifications	2
1. Introduction	6
1.1 Overview	6
1.2 Site Location and Background	6
1.3 Conceptual Site Model	7
2. Groundwater Monitoring Systems	8
2.1 Existing Monitoring Well Network and Analysis	8
2.1.1 Existing 40 C.F.R. § 257 Monitoring Program	8
2.1.2 35 I.A.C. § 845 Well Installation and Monitoring	9
2.2 Expansion of Existing 40 C.F.R. § 257 Monitoring Well Network	10
2.3 Well Abandonment	11
2.4 Groundwater Monitoring System Maintenance Plan	11
3. Groundwater Monitoring Plan	12
3.1 Sampling Schedule	12
3.2 Groundwater Sample Collection	13
3.3 Laboratory Analysis	13
3.4 Quality Assurance Project Plan	14
3.5 Statistical Analysis	14
3.6 Data Reporting	14
3.7 Compliance with Groundwater Quality Standards	14
3.7.1 SSI Determination in Detection Monitoring	14
3.7.2 GWPS and SSL Determination in Assessment Monitoring	14
3.8 Alternate Source Demonstrations	15
3.8.1 Detection Monitoring Program	15
3.8.2 Assessment Monitoring Program	15
3.9 Corrective Action	15
3.10 Annual Report	16
4. References	18

TABLES (IN TEXT)

Table A	40 C.F.R. § 257 Groundwater Monitoring Program Parameters
Table B	35 I.A.C. § 845 Groundwater Monitoring Program Parameters
Table C	Expanded 40 C.F.R. § 257 Monitoring Well Network
Table D	40 C.F.R. § 257 Sampling Schedule

TABLES (ATTACHED)

Table 2-1	Monitoring Well Locations and Construction Details
-----------	----------------------------------------------------

FIGURES (ATTACHED)

Figure 1-1	Site Location Map
Figure 1-2	Site Map
Figure 1-3	Uppermost Aquifer Potentiometric Surface Map, March 3-4, 2021
Figure 2-1	Expanded 40 C.F.R. § 257 Groundwater Monitoring Well Network

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
§	section
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
CSM	conceptual site model
EAP	East Ash Pond, also referred to as Site
EEl	Electric Energy, Inc.
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HBL	health-based level
HCR	Hydrogeologic Site Characterization Report
ID	identification
IEPA	Illinois Environmental Protection Agency
JPP	Joppa Power Plant
LAU	Lower Aquifer Unit
LCL	lower confidence limit
LCU	Lower Confining Unit
LPL	lower prediction limit
MCL	maximum contaminant level
NA	not applicable
NRT/OBG	Natural Resource Technology, an OBG Company
NAVD88	North American Vertical Datum of 1988
NID	National Inventory of Dams
No.	number
OBG	O'Brien & Gere Engineers, Inc.
QAPP	Multi-Site Quality Assurance Project Plan
QA/QC	quality assurance/quality control
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RL	reporting limit
SAP	Multi-Site Sampling and Analysis Plan
SI	surface impoundment
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UA	Uppermost Aquifer
UCU	Upper Confining Unit
UPL	upper prediction limit
UTL	upper tolerance limit
USEPA	United States Environmental Protection Agency
WLO	water level only

1. INTRODUCTION

1.1 Overview

Ramboll Americas Engineering Solutions, Inc. (Ramboll) has prepared this Groundwater Monitoring Plan (GMP) on behalf of JPP, operated by Electric Energy, Inc. (EEI), to align the 40 C.F.R. § 257 compliance groundwater monitoring program with the Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845 compliance groundwater monitoring program.

This GMP applies specifically to the CCR unit referred to as the EAP, also referred to as Site (CCR unit identification [ID] Number [No.] 401, Illinois Environmental Protection Agency [IEPA] ID No. W1270100004-02, and National Inventory of Dams [NID] No. IL50714). The EAP is a 111-acre inactive unlined CCR surface impoundment (SI) used to manage CCR and non-CCR waste streams at the JPP. This GMP includes content requirements specific to 40 C.F.R. § 257.91 (Groundwater Monitoring Systems), 40 C.F.R. § 257.93 (Groundwater Sampling and Analysis Requirements), 40 C.F.R. § 257.94 (Detection Monitoring Program), and 40 C.F.R. § 257.95 (Assessment Monitoring Program) for the EAP at JPP.

1.2 Site Location and Background

The JPP is west of the Village of Joppa in Massac County, Illinois, northeast of the Ohio River in Section 14, Township 15 South, Range 3 East (**Figure 1-1**). The JPP property is bordered by LaFarge North America cement plant to the west, Trunkline Gas Company-Joppa Compressor Station to the north and west, the Village of Joppa to the east, and the Ohio River to the south. The EAP is located in the west half of Section 14 directly north of the JPP and is bounded immediately to the east by the railway right-of-way which is adjacent to forested portions of residential property in the Village of Joppa.

The EAP was used by JPP for management of CCR waste streams. A permit exempt CCR landfill is present in the northwestern portion of the JPP property. In addition, there is a former CCR disposal area, Joppa West, located in the western portion of the JPP property (**Figure 1-2**). The landfill and Joppa West are not the subject of this GMP.

The EAP is classified as an existing unlined CCR SI which was used to manage both fly ash and bottom ash. The EAP was built in two phases. The northern portion (Phase I) was placed into service in late 1973, while the southern portion (Phase II) was permitted in May 1985 with completion of construction occurring in late 1985. These two sections are separated by a dividing dike (*i.e.*, Central Dike) and are referred to as the Northern and Southern Ponds. The pond embankment has not been raised since its construction in 1973, but material has been added in some areas to increase the width. The Northern Pond is diked over the length of its perimeter and the height of the dike varies from approximately 15 to 45 feet above the outboard toe of slope. The crest is at an approximate elevation of 380 feet North American Vertical Datum of 1988 (NAVD88). The Southern Pond is also a diked earthen embankment structure with a height that varies from approximately 15 to 45 feet above its outboard toe. As with the Northern Pond, the crest is at an approximate elevation of 380 feet NAVD88 (O'Brien & Gere Engineers, Inc. [OBG], 2010).

1.3 Conceptual Site Model

Significant site investigation has been completed at the JPP to characterize the geology, hydrogeology, and groundwater quality. Based on extensive investigation and monitoring, the EAP has been well characterized and detailed in the Hydrogeologic Site Characterization Report (HCR; Ramboll, 2021) [<https://www.luminant.com/ccr/illinois-ccr/?dir=il-ccr%2FJoppa%2F2021>], that was included with the Operating Permit application submitted to the IEPA. The HCR was prepared to comply with the requirements specified in 35 I.A.C. § 845.620 and expands upon the Hydrogeologic Monitoring Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017). A conceptual site model (CSM) has been developed and is discussed below. A conceptual site model (CSM) has been developed and is discussed below.

In addition to the CCR present at the Joppa EAP, there are four distinct hydrostratigraphic units summarized below that have been identified based on stratigraphic relationships and common hydrogeologic characteristics:

- **Upper Confining Unit (UCU):** Includes low permeability silt and clay of the Equality Formation, silts of the Peoria/Roxana/Loveland, and clay and silt of the Metropolis Formation. This unit was encountered in all borings advanced at the EAP in 2021 and limits the vertical migration of CCR impacts into the Uppermost Aquifer (UA).
- **UA:** Includes high permeability sands with gravel, silt, and clay lenses of the Upper McNairy Formation. The UA at the EAP was encountered at elevations ranging from 222.6 to 318.6 feet NAVD88.
- **Lower Confining Unit (LCU):** Includes clay and silt of the Lower McNairy Formation that was encountered in all borings advanced to bedrock. Based on material description, continuous lateral extent, and observed vertical gradients this unit is identified as an LCU.
- **Lower Aquifer Unit (LAU):** The lowermost unit identified at the EAP which underlies all unlithified deposits and is considered a potential migration pathway. This unit is comprised of the Salem Limestone, which is the uppermost lithified unit identified at the EAP and used as a potable and non-potable water supply in the vicinity of the JPP.

The CSM for groundwater flow in the vicinity of the EAP is as follows:

- Groundwater migrates downward through the UCU which is composed of the Equality Formation, Silt Unit, and Metropolis Formation into the UA.
- Groundwater migrates within high permeability sands and gravels of the McNairy Formation which comprises the UA generally south and east towards the Ohio River.
- Vertical gradients measured between the LAU and the UA indicate upward migration of groundwater from the LAU to the UA and into the Ohio River.

Groundwater elevations and contours for March 3 and 4, 2021 are presented in **Figure 1-3**.

Additional monitoring wells were installed in 2022 and groundwater samples were collected from the installed wells. The additional monitoring wells were installed for further hydrogeologic investigation and water quality delineation. Following investigation activities and collection of background groundwater quality, a subset of monitoring wells will be proposed for inclusion with the groundwater monitoring well network.

2. GROUNDWATER MONITORING SYSTEMS

2.1 Existing Monitoring Well Network and Analysis

Two monitoring programs specific to the EAP exist, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. This GMP is being provided to expand the 40 C.F.R. § 257 groundwater monitoring network and monitoring program specific to the EAP to align with the monitoring network established for 35 I.A.C. § 845. Monitoring networks and programs that apply to other units are not discussed in this GMP. Consistent with compliance commitment agreements (CCAs) entered into between other facility owners and IEPA on December 28, 2022, groundwater monitoring in accordance with the proposed groundwater monitoring plan and sampling methodologies provided in the operating permit application for the EAP is scheduled to commence no later than the second quarter of 2023. Following initiation of quarterly groundwater monitoring and identification of exceedances of the groundwater protection standards (GWPSs) established in accordance with 35 I.A.C § 845.600(a), EEI will conduct a confirmatory resample consistent with 35 I.A.C § 845.600(d). When the confirmatory resample suggests an exceedance of a GWPS, EEI will commence with the other steps required under 35 I.A.C § 845.650(d), 845.650(e), 845.660, 845.670, and 845.680(a)(3), as necessary.

After the EAP has been issued an approved operating permit, groundwater monitoring shall be conducted in accordance with that operating permit. Groundwater sampling requirements that apply to the CCR SI under other existing state permit programs will become void upon issuance of an approved operating permit pursuant to 35 I.A.C. § 845.

2.1.1 Existing 40 C.F.R. § 257 Monitoring Program

The 40 C.F.R. § 257 well network for the EAP consists of six monitoring wells installed nearby or adjacent to the EAP within the unlithified UA. The EAP 40 C.F.R. § 257 well network consists of two background monitoring wells (G01D and G02D) and four compliance monitoring wells (G51D, G52D, G53D, and G54D). The boring logs, well construction forms, and other related monitoring well forms are available in the EAP Operating Record as required by 40 C.F.R. § 257.91 for each monitored CCR Unit or CCR Multi-Unit and are included in Appendix B of the HCR (Ramboll, 2021).

Assessment monitoring in accordance with 40 C.F.R. § 257.95 was initiated on April 9, 2018. Details on the procedures and techniques used to fulfill the groundwater sampling and analysis program requirements are found in the Multi-Site Sampling and Analysis Plan (SAP) for the EAP (Ramboll, 2022a).

Groundwater samples are collected semiannually and analyzed for the laboratory and field parameters from Appendix III and Appendix IV of 40 C.F.R. § 257, summarized in **Table A** on the following page.

Table A. 40 C.F.R. § 257 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH		
Appendix III Parameters (Total, except total dissolved solids [TDS])			
Boron	Chloride	Sulfate	
Calcium	Fluoride	TDS	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lithium	Selenium
Arsenic	Chromium	Mercury	Thallium
Barium	Cobalt	Molybdenum	Radium 226 and 228 combined
Beryllium	Lead		

¹ Dissolved oxygen, temperature, specific conductance, oxidation/reduction potential, and turbidity are recorded during sample collection.

Results and analysis of groundwater sampling are reported annually by January 31 of the following year and made available on the CCR public website as required by 40 C.F.R. § 257.

2.1.2 35 I.A.C. § 845 Well Installation and Monitoring

In 2021, 12 additional monitoring wells (G03, G04, G05, G06, G06S, G07, G08, G09, G09M, G10, G11, and G54S) were installed along the perimeter of the EAP to assess the vertical and horizontal lithology, stratigraphy, chemical properties, and physical properties of geologic layers to a minimum of 100 feet below ground surface (bgs) as specified in 35 I.A.C. § 845.620(b). Additionally, three leachate monitoring wells (XPW01, XPW02, and XPW03) were installed within the EAP unit to characterize the CCR materials.

Prospective 35 I.A.C. § 845 monitoring wells were sampled for eight rounds from February to August 2021 and the results were assessed for selection of the EAP 35 I.A.C. § 845 monitoring well network. Groundwater samples were collected and analyzed for 35 I.A.C. § 845.600 parameters as summarized in **Table B** on the following page.

Table B. 35 I.A.C § 845 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH	Turbidity	
Metals (Total)			
Antimony	Boron	Cobalt	Molybdenum
Arsenic	Cadmium	Lead	Selenium
Barium	Calcium	Lithium	Thallium
Beryllium	Chromium	Mercury	
Inorganics (Total)			
Fluoride	Sulfate	Chloride	TDS
Other (Total)			
Radium 226 and 228 combined			

¹ Dissolved oxygen, temperature, specific conductance, and oxidation/reduction potential were recorded during sample collection.

Data and results from the 35 I.A.C. § 845 background monitoring were included in the water quality discussion included in the HCR (Ramboll, 2021). The data collected from background locations during the 35 I.A.C. § 845 monitoring were used to evaluate and calculate background concentrations for the EAP.

2.2 Expansion of Existing 40 C.F.R. § 257 Monitoring Well Network

The existing 40 C.F.R. § 257 network is being expanded to include 14 monitoring wells screened in the UA (G01D, G02D, G03, G05, G06, G07, G08, G09, G10, G11, G51D, G52D, G53D, and G54D) and two temporary water level only surface water staff gages (XSG01 and SG02). The proposed network is summarized in **Table C** on the following page and displayed on **Figure 2-1**. Fourteen wells (two background and 12 compliance) will be used to monitor groundwater concentrations within the UA.

The groundwater samples collected from the 14 wells will be used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards included in 40 C.F.R. § 257.94(e) and 40 C.F.R. § 257.95(h). The proposed monitoring wells will yield groundwater samples that accurately represent the quality of background groundwater that has not been affected by leakage from the EAP, as well as downgradient groundwater at the waste boundary of the EAP (as required in 40 C.F.R. § 257.91(a)(1) and (2)). Monitoring well depths and construction details are listed in **Table 2-1** and summarized in **Table C** on the following page.

Any future changes to the groundwater monitoring well network as approved by the IEPA under 35 I.A.C. § 845 will also be incorporated into the 40 C.F.R. § 257 network.

Table C. Expanded 40 C.F.R. § 257 Monitoring Well Network

Well ID	Monitored Unit	Well Screen Interval (feet bgs)	Well Type ¹
G01D	UA	54.2 – 63.9	Background
G02D	UA	62.2 – 71.8	Background
G03	UA	55.0 – 65.0	Compliance
G05	UA	50.0 – 60.0	Compliance
G06	UA	75.0 – 85.0	Compliance
G07	UA	50.0 – 60.0	Compliance
G08	UA	75.0 – 85.0	Compliance
G09	UA	59.5 – 69.5	Compliance
G10	UA	60.3 – 70.3	Compliance
G11	UA	55.7 – 65.7	Compliance
G51D	UA	49.6 – 53.0	Compliance
G52D	UA	69.9 – 79.6	Compliance
G53D	UA	47.3 – 56.9	Compliance
G54D	UA	70.0 – 79.7	Compliance
XSG01 ^{2,3}	CCR	NA	WLO
SG02 ^{2,3}	Surface Water	NA	WLO

¹ Well type refers to the role of the well in the monitoring network.

² Surface water level measuring points

³ Location is temporary pending implementation of impoundment closure per an approved Construction Permit Application.

NA = not applicable

WLO = water level only

2.3 Well Abandonment

No wells are currently proposed for abandonment.

2.4 Groundwater Monitoring System Maintenance Plan

Maintenance procedures have been developed in the Multi-Site SAP will be performed as needed to assure that the monitoring wells provide representative groundwater samples (Ramboll, 2022a).

3. GROUNDWATER MONITORING PLAN

The GMP will monitor and evaluate groundwater quality to demonstrate compliance with the groundwater quality standards included in 40 C.F.R. § 257.94(e) and 40 C.F.R. § 257.95(h). The groundwater monitoring program will include sampling and analysis procedures that are consistent and that provide an accurate representation of groundwater quality at the background and downgradient wells as required by 40 C.F.R. § 257.91. As discussed in **Section 2**, two monitoring programs specific to the EAP exist, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. Groundwater sampling requirements that apply to the CCR SI under other existing state permit programs will become void upon issuance of an approved operating permit pursuant to 35 I.A.C § 845.

3.1 Sampling Schedule

Groundwater sampling for the 40 C.F.R. § 257 monitoring well network was initially performed quarterly between 2015 and 2017 to establish baseline groundwater quality. Detection monitoring began in the first quarter of 2017 with semiannual sampling. Assessment monitoring began in the second quarter of 2018. The EAP is currently in assessment monitoring and sampling will continue in 2023 according to the schedule summarized in **Table D** on the following page.

Table D. 40 C.F.R. § 257 Sampling Schedule

Frequency	Duration
Quarterly (groundwater quality)	<p>Baseline</p> <p>Began: monitoring began in 2015</p> <hr/> <p>Ended: monitoring was completed in 2017 to establish baseline groundwater quality for existing landfills and SIs</p>
At least Semi-annually (groundwater quality)	<p>Detection Monitoring</p> <p>Begins: monitoring began no later than October 17, 2017, for existing landfills and SIs, following collection of a minimum of eight independent samples for constituents from Appendix III and Appendix IV from each background and downgradient well.</p> <p>At least semiannual sampling continues for Appendix III constituents throughout the active life of the CCR unit and the post-closure period.</p> <p>For new landfills and SIs, and lateral expansion of existing CCR units, a minimum of eight independent samples from each background well must be collected and analyzed for the constituents in Appendix III and Appendix IV during the first six months of sampling.</p> <hr/> <p>Ends: Following 30-year post-closure care period or statistically significant increase (SSI) determination and unsuccessful Alternate Source Demonstration (ASD) evaluation within 90 days of SSI determination.</p> <hr/> <p>Assessment Monitoring</p> <p>Begins: within 90 days of unsuccessful ASD evaluation for SSIs determined during Detection Monitoring; samples must be collected and analyzed for all constituents listed in Appendix IV. Within 90 days of obtaining the of the initial sample results, and on at least a semiannual basis thereafter, wells must be resampled for Appendix III and for those constituents in Appendix IV that have been detected during sampling.</p> <hr/> <p>Ends: Following demonstration that concentrations of all constituents in Appendices III and IV are below background values for two consecutive sampling events.</p>

Groundwater monitoring for the 40 C.F.R. § 257 well network will continue to follow a schedule in accordance with the requirements of 40 C.F.R. § 257.94 and 40 C.F.R. § 257.95. Upon United States Environmental Protection Agency (USEPA) approval of 35 I.A.C. § 845 as a State CCR Permit Program, the 40 C.F.R. § 257 monitoring will be discontinued and replaced by the 35 I.A.C. § 845 monitoring.

3.2 Groundwater Sample Collection

Groundwater sampling procedures have been developed in the Multi-Site SAP (Ramboll, 2022a) and the collection of groundwater samples is being implemented to meet the requirements of 40 C.F.R. § 257.93. In addition to groundwater well samples, quality assurance samples will be collected as described in the Multi-Site Quality Assurance Project Plan (QAPP) (Ramboll, 2022b).

3.3 Laboratory Analysis

Laboratory analysis will be performed consistent with the specifications of the Multi-Site QAPP. Laboratory methods may be modified based on laboratory equipment availability or procedures, but the Reporting Limit (RL) for all parameters analyzed, regardless of method, will be lower than

the applicable groundwater quality standard. Data reporting requirements and workflow are provided in the Multi-Site Data Management Plan (Ramboll, 2022c).

3.4 Quality Assurance Project Plan

The Multi-Site QAPP includes procedures and techniques for laboratory quality assurance/quality control (QA/QC). Additionally, the Multi-Site SAP includes requirements for field data collection QA/QC.

3.5 Statistical Analysis

A Multi-Site Statistical Analysis Plan (Ramboll, 2022d) has been developed to describe procedures that will be used to establish background conditions and determine SSIs over background concentrations and statistically significant levels (SSL) over GWPSs as required by 40 C.F.R. § 257.94 and 257.95. The Multi-Site Statistical Analysis Plan was prepared in accordance with the requirements of 40 C.F.R. § 257.93(f), with reference to the acceptable statistical procedures provided in *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009). The determination of SSIs over background concentrations and SSLs over GWPSs will be completed at least semiannually in accordance with the sampling schedule provided in **Section 3.1**.

3.6 Data Reporting

Data reporting for the 40 C.F.R. § 257 monitoring well network will be consistent with recordkeeping, notification, and internet posting requirements described in 40 C.F.R. § 257.105 through 257.107.

3.7 Compliance with Groundwater Quality Standards

Compliance with the groundwater quality standards for the detection monitoring program referenced in 40 C.F.R. § 257.94(e) and the assessment monitoring program referenced in 40 C.F.R. § 257.95(h) will be determined as described in the following sections.

3.7.1 SSI Determination in Detection Monitoring

One-sided upper prediction limits (UPL) will be calculated for each Appendix III constituent using the background samples, with the exception of pH, for which both upper and lower prediction limits (LPLs) will be calculated. A tabular summary of UPLs will be provided in the Annual Groundwater Monitoring and Corrective Action Reports. Individual sampling event concentrations for each constituent detected in the downgradient monitoring wells will then be compared to the background UPL. An exceedance of the UPL for any constituent measured at any downgradient well constitutes an SSI. For pH, a measurement above the UPL or below the LPL constitutes an SSI. As required by 40 C.F.R. § 257.93(h)(2), SSI determination will be completed within 90 days of sampling and analysis.

3.7.2 GWPS and SSL Determination in Assessment Monitoring

A GWPS will be established for Appendix IV constituents. The GWPS will be either the USEPA maximum contaminant levels (MCLs) or the health-based levels (HBLs) established in 40 C.F.R. § 257.95(h)(2) for cobalt, lead, lithium, and molybdenum. The exception to this is when the background concentration is greater than the established MCL or HBL. For this exception, background concentrations will be used to define the GWPS. The background will be calculated

using a parametric or non-parametric upper tolerance limit (UTL), depending on the data distribution. A tabular summary of GWPSs will be provided in the Annual Groundwater Monitoring and Corrective Action Reports.

Compliance will be determined by comparing the lower confidence limit (LCL) of the downgradient concentrations to the GWPS. An SSL will be identified when the LCL exceeds the GWPS. The method of calculating the LCL is described in the Multi-Site Statistical Analysis Plan. If there are too few data points to calculate an LCL (a minimum of four data points is required), the most recent data point is compared to the GWPS. If all the downgradient samples for a well constituent pair are non-detect, the most recent RL is compared to the GWPS. Additionally, an SSL will be identified if all previous samples at a downgradient well were not-detect, and the two most recent samples have both detections and GWPS exceedances. SSL determination will be completed within 90 days of sampling and analysis.

3.8 Alternate Source Demonstrations

An ASD may be completed for a unit under the detection monitoring program in 40 C.F.R. § 257.94(e)(2) or assessment monitoring program in 40 C.F.R. § 257.95(g)(3)(ii) to provide lines of evidence that a source other than the monitored unit caused the SSI/SSL or that the SSI/SSL resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The ASD will include information and analysis that supports the conclusions and a certification of accuracy by a qualified professional engineer. ASDs will be completed within 90 days of SSI/SSL determination and be provided in the Annual Groundwater Monitoring and Corrective Action Reports as required by 40 C.F.R. § 257.94(e)(2) and 40 C.F.R. § 257.95(g)(3)(ii).

3.8.1 Detection Monitoring Program

As allowed in 40 C.F.R. § 257.94(e)(2), following the determination of an SSI over background for groundwater constituents listed in Appendix III of 40 C.F.R. § 257, an ASD will be evaluated, and if completed within 90 days of the SSI determination, detection monitoring will continue.

If an ASD has not been successfully completed within 90 days of the SSI determination, Assessment Monitoring in accordance with 40 C.F.R. § 257.95 will be initiated within 90 days and the associated notification will be made to the CCR unit operating record and state director (and/or appropriate tribal authority, if applicable).

3.8.2 Assessment Monitoring Program

As allowed in 40 C.F.R. § 257.95(g)(3)(ii), following the determination of an SSL over the GWPS of constituents listed in Appendix IV of 40 C.F.R. § 257, an ASD will be evaluated and, if completed within 90 days of the SSL determination, assessment monitoring will continue.

If an ASD has not been successfully completed within the 90 days of the SSL determination, a Corrective Measures Assessment (CMA) in accordance with 40 C.F.R. § 257.96 will be initiated and the associated notification will be made to the CCR unit operating record and state director (and/or appropriate tribal authority, if applicable).

3.9 Corrective Action

As described in 40 C.F.R. § 257.96, if the ASD summarized in **Section 3.8** has not been successfully completed, the CMA must be completed within 90 days, unless the owner or

operator demonstrates the need for up to an additional 60 days to complete the CMA due to site-specific conditions of circumstances.

Remedy selection will follow the CMA and be documented in a remedy selection report in accordance 40 C.F.R. § 257.97. A corrective action monitoring plan will be developed to monitor the performance of the selected remedy.

3.10 Annual Report

An Annual Groundwater Monitoring and Corrective Action Report will be completed and placed in the CCR unit operating record by January 31st of the following calendar year. At a minimum, the annual report must contain the following information, to the extent available:

1. A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit.
2. Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
3. In addition to all the monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs.
4. A narrative discussion of any transition between monitoring programs (*e.g.*, the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at an SSI relative to background levels).
5. Other information required to be included in the annual report as specified in 40 C.F.R. §§ 257.90 through 257.98.
6. A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:
 - i) At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in 40 C.F.R. § 257.95.
 - ii) At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in 40 C.F.R. § 257.94 or the assessment monitoring program in 40 C.F.R. § 257.95.
 - iii) If it was determined that there was an SSI over background for one or more constituents listed in Appendix III of 40 C.F.R. § 257 pursuant to 40 C.F.R. § 257.94(e):
 - A. Identify those constituents listed in Appendix III of 40 C.F.R. § 257 and the names of the monitoring wells associated with such an increase.
 - B. Provide the date when the assessment monitoring program was initiated for the CCR unit.

- iv) If it was determined that there was an SSL above the GWPS for one or more constituents listed in Appendix IV of 40 C.F.R. § 257 pursuant to 40 C.F.R. § 257.95(g) include all of the following:
 - A. Identify those constituents listed in Appendix IV of 40 C.F.R. § 257 and the names of the monitoring wells associated with such an increase.
 - B. Provide the date when the CMA was initiated for the CCR unit.
 - C. Provide the date when the public meeting was held for the CMA.
 - D. Provide the date when the CMA was completed.
- v) Whether a remedy was selected pursuant to 40 C.F.R. § 257.97 during the current annual reporting period, and if so, the date of remedy selection.
- vi) Whether remedial activities were initiated or are ongoing pursuant to 40 C.F.R. § 257.98 during the current annual reporting period.

4. REFERENCES

- Illinois Environmental Protection Agency (IEPA), 2021. *Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments: Title 35 of the Illinois Administrative Code § 845*. April 15, 2021.
- O'Brien & Gere Engineers, Inc. (OBG), 2010. *Dam Safety Assessment of CCW Impoundments. Joppa Plant, Prepared for: US Environmental Protection Agency, Washington, DC*. September 24, 2010.
- Natural Resource Technology, an OBG Company (NTR/OBG), 2017. *Hydrogeologic Monitoring Plan, Joppa East Ash Pond, CCR Unit ID 401, Joppa Power Station, Joppa, Illinois*. October 17, 2017.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2021. *Hydrogeologic Site Characterization Report, East Ash Pond, Joppa Power Plant, Joppa, Illinois*. October 25, 2021.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022a. *Multi-Site Sampling and Analysis Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022b. *Multi-Site Quality Assurance Project Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022c. *Multi-Site Data Management Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022d. *Multi-Site Statistical Analysis Plan*. December 28, 2022.
- United States Environmental Protection Agency (USEPA), 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance*. Office of Resource Conservation and Recovery, Program Implementation and Information Division, United States Environmental Protection Agency, Washington D.C. EPA/530/R-09/007. March 2009.
- United States Environmental Protection Agency (USEPA), 2015. *Title 40 of the Code of Federal Regulations, Part 257*.

TABLES

TABLE 2-1. MONITORING WELL LOCATIONS AND CONSTRUCTION DETAILS

GROUNDWATER MONITORING PLAN
 JOPPA POWER PLANT
 EAST ASH POND
 JOPPA, ILLINOIS

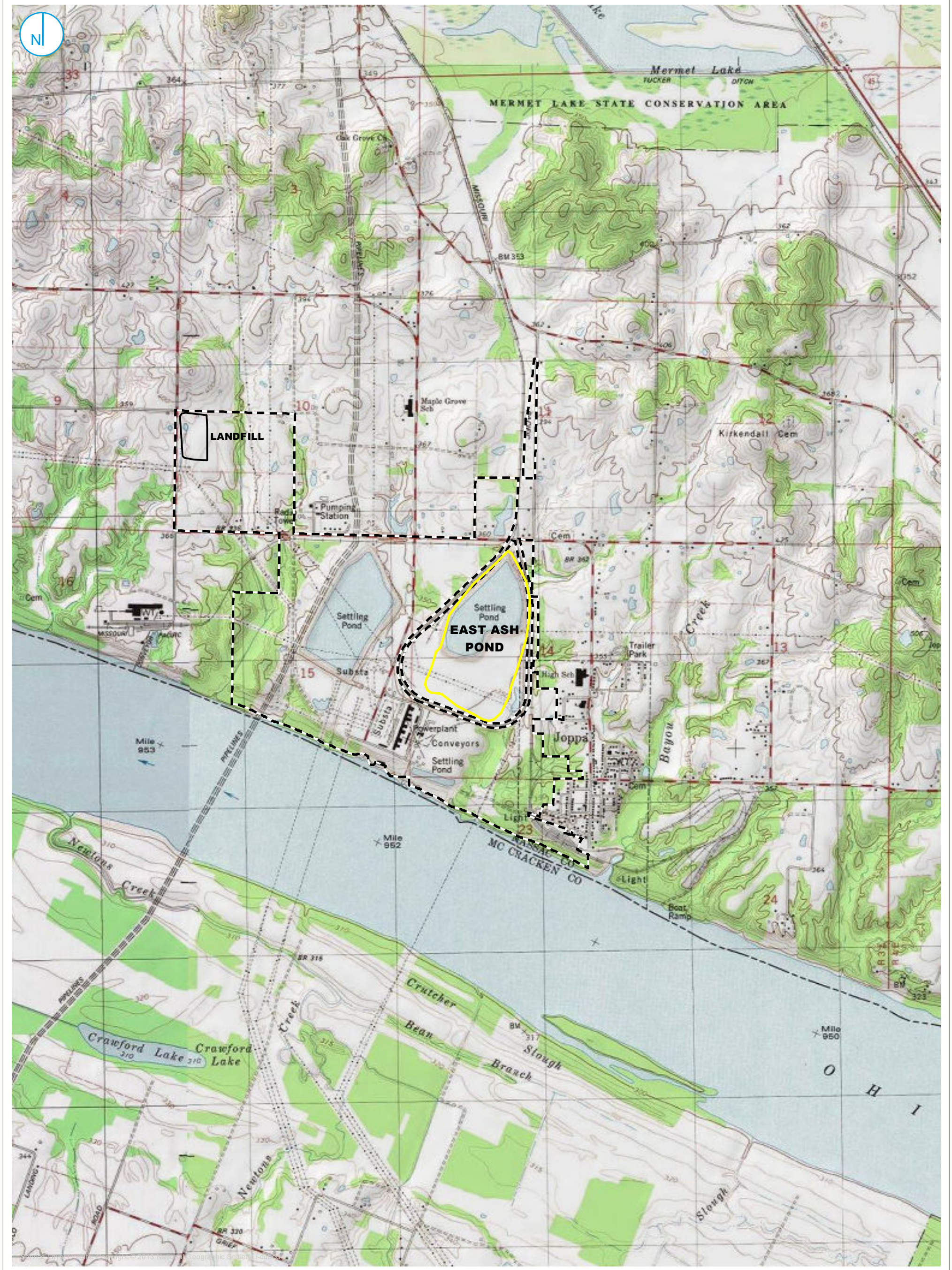
Well Number	Type	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft BGS)	Screen Bottom Depth (ft BGS)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft BGS)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
G01D	B	UA	08/14/2015	364.19	364.19	Top of Disk	361.50	54.19	63.85	307.31	297.65	64.40	297.10	9.7	2	37.220429	-88.857179
G02D	B	UA	08/13/2015	363.65	363.65	Top of Disk	360.82	62.21	71.84	298.61	288.98	72.40	288.50	9.6	2	37.220715	-88.853311
G03	C	UA	02/02/2021	357.87	357.87	Top of PVC	354.84	55.00	65.00	302.90	292.90	65.00	289.80	10	2	37.220682	-88.850376
G05	C	UA	02/01/2021	361.21	361.21	Top of PVC	358.45	50.00	60.00	311.20	301.20	60.00	298.50	10	2	37.21719	-88.849014
G06	C	UA	01/29/2021	355.24	355.24	Top of PVC	352.60	75.00	85.00	280.20	270.20	85.00	267.60	10	2	37.212929	-88.848893
G07	C	UA	01/29/2021	353.53	353.53	Top of PVC	350.34	50.00	60.00	303.50	293.50	60.00	290.30	10	2	37.211001	-88.848969
G08	C	UA	01/28/2021	343.54	343.54	Top of PVC	341.72	75.00	85.00	268.50	258.50	85.00	256.70	10	2	37.210531	-88.851015
G09	C	UA	01/31/2021	351.70	351.70	Top of PVC	348.69	59.50	69.50	292.20	282.20	69.50	279.20	10	2	37.210336	-88.854116
G10	C	UA	02/01/2021	353.49	353.49	Top of PVC	350.75	60.30	70.30	293.20	283.20	70.30	280.50	10	2	37.211272	-88.855841
G11	C	UA	01/19/2021	366.55	366.55	Top of PVC	363.38	55.70	65.70	310.90	300.90	65.70	297.70	10	2	37.214408	-88.85633
G51D	C	UA	08/18/2015	363.85	363.85	Top of PVC	361.10	49.61	59.27	311.49	301.83	59.90	301.20	9.7	2	37.216016	-88.855653
G52D	C	UA	08/19/2015	348.41	348.41	Top of PVC	345.88	69.85	79.55	276.03	266.33	80.01	265.90	9.7	2	37.209626	-88.852943
G53D	C	UA	08/21/2015	355.47	355.47	Top of PVC	352.16	47.29	56.89	304.87	295.27	57.33	294.20	9.6	2	37.215069	-88.849367
G54D	C	UA	08/11/2015	357.03	357.03	Top of PVC	353.71	69.96	79.66	283.75	274.05	80.14	273.60	9.7	2	37.212264	-88.857485
XSG01	WLO	CCR	--	--	371.78	Staff gauge	--	--	--	--	--	--	--	--	--	37.21517	-88.8498
SG02	WLO	SW	--	--	--	Staff gauge	--	--	--	--	--	--	--	--	--	37.207287	-88.860503

Notes:

All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
 Type refers to the role of the well in the monitoring network: background (B), compliance (C), or water level measurements only (WLO)
 WLO wells are temporary pending implementation of impoundment closure per an approved Construction Permit application
 -- = data not available
 BGS = below ground surface
 CCR = Coal Combustion Residual
 ft = foot or feet
 HSU = Hydrostratigraphic Unit
 PVC = polyvinyl chloride
 SW = surface water
 UA = uppermost aquifer

generated 10/16/2021, 8:39:41 PM CDT

FIGURES



- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- OTHER UNIT
- PROPERTY BOUNDARY

SITE LOCATION MAP

FIGURE 1-1

0 1,000 2,000
 Feet

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
EAST ASH POND
 JOPPA POWER PLANT
 JOPPA, ILLINOIS

RAMBOLL AMERICAS
 ENGINEERING SOLUTIONS, INC.





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

- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- OTHER UNIT
- CENTRAL DIKE
- PROPERTY BOUNDARY



SITE MAP

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
 EAST ASH POND
 JOPPA POWER PLANT
 JOPPA, ILLINOIS

FIGURE 1-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.





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

- MONITORING WELL
- STAFF GAUGE
- GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY

NOTES:
 1. ELEVATIONS IN PARENTHESIS WERE NOT USED FOR CONTOURING.
 2. ELEVATIONS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988

0 200 400 Feet

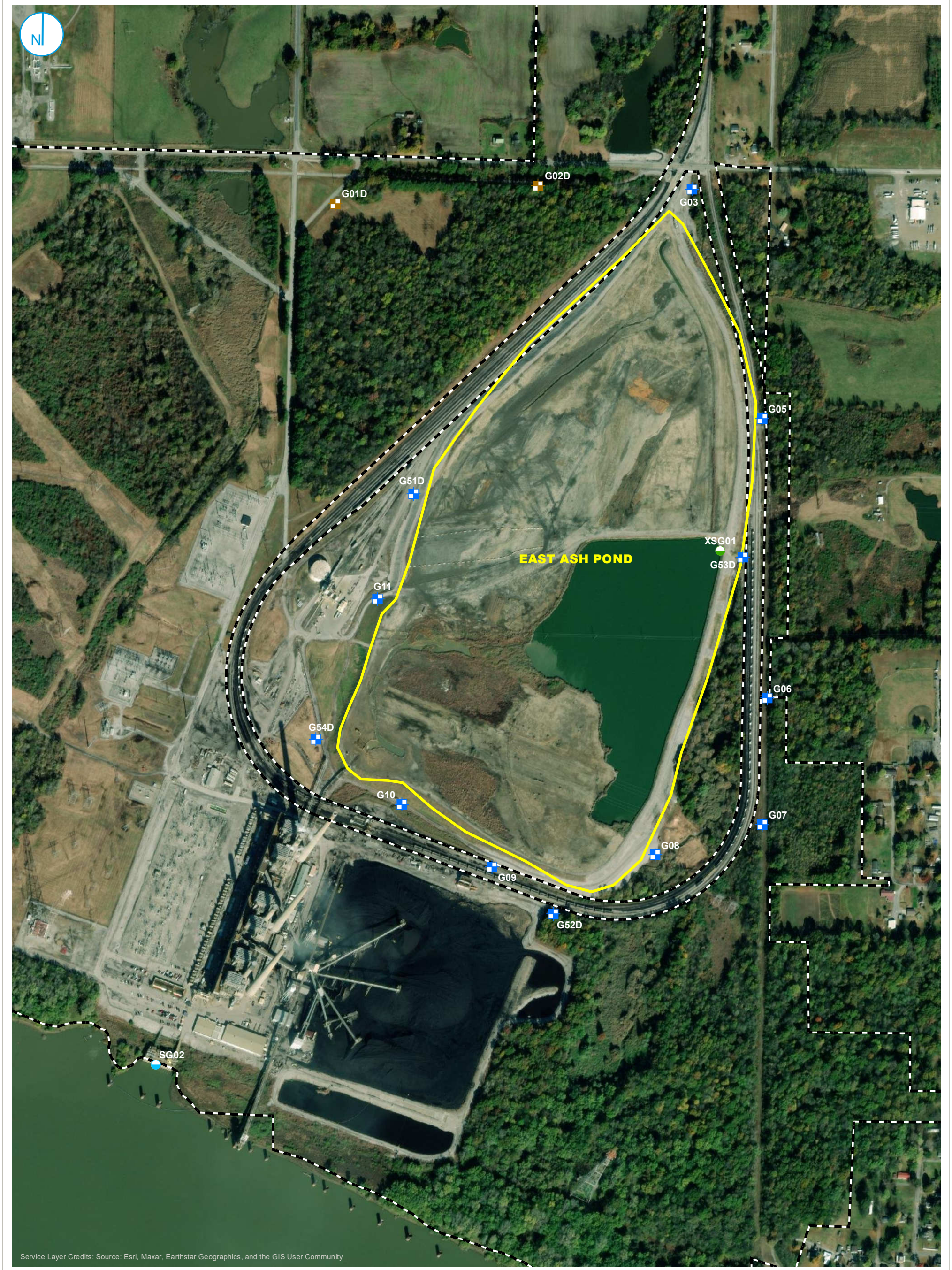
**UPPERMOST AQUIFER
 POTENTIOMETRIC SURFACE MAP
 MARCH 3 - 4, 2021**

**40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
 EAST ASH POND
 JOPPA POWER PLANT
 JOPPA, ILLINOIS**

FIGURE 1-3

RAMBOLL AMERICAS
 ENGINEERING SOLUTIONS, INC.





Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- STAFF GAGE, CCR UNIT
- STAFF GAGE, RIVER
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY



EXPANDED 40 C.F.R. § 257 GROUNDWATER MONITORING WELL NETWORK

FIGURE 2-1

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
EAST ASH POND
 JOPPA POWER PLANT
 JOPPA, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

