Intended for
Dynegy Midwest Generation, LLC

Date
December 28, 2022

Project No.
1940103307

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

BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

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40 C.F.R. § 257 GROUNDWATER MONITORING PLAN BALDWIN POWER PLANT BOTTOM ASH POND

Project Name	**Baldwin Power Plant Bottom Ash Pond**
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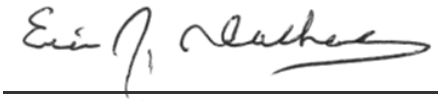

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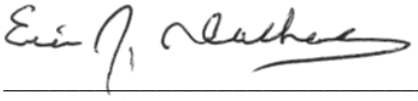
LICENSED PROFESSIONAL CERTIFICATIONS

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 Baldwin Power Plant (BPP) Bottom Ash Pond (BAP) 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 BPP BAP.

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

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

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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
BAP	Bottom Ash Pond
bgs	below ground surface
BPP	Baldwin Power Plant
CCA	compliance commitment agreement
CCR	coal combustion residuals
Cooling Pond	Baldwin Lake
CMA	Corrective Measures Assessment
CSM	conceptual site model
DMG	Dynegy Midwest Generation, LLC
FAPS	Fly Ash Pond System
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HBL	health-based level
HCR	Hydrogeologic Site Characterization Report
ID	identification
IEPA	Illinois Environmental Protection Agency
LCL	lower confidence limit
LPL	lower prediction limit
MCL	maximum contaminant level
mp	measuring point
NA	not applicable
NID	National Inventory of Dams
No.	number
NPDES	National Pollutant Discharge Elimination System
NRT	Natural Resource Technology, Inc.
NRT/OBG	Natural Resource Technology, an OBG Company
PMP	potential migration pathway
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
Site	the BAP
SSL	statistically significant level
SSI	statistically significant increase
TDS	total dissolved solids
UA	Uppermost Aquifer

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 BPP, operated by Dynegy Midwest Generation, LLC (DMG) 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 BAP (CCR unit identification [ID] Number [No.] 601, Illinois Environmental Protection Agency [IEPA] ID No. W1578510001-06, and National Inventory of Dams [NID] No. IL50721). The BAP is a 177-acre unlined CCR surface impoundment (SI) used to manage CCR and non-CCR waste streams at the BPP. 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 BAP at the BPP.

1.2 Site Location and Background

The BPP is located in southwest Illinois in Randolph and St. Clair Counties. The Randolph County portion of the BPP is located within Sections 2, 3, 4, 9, 10, 11, 14, 15, and 16 of Township 4 South and Range 7 West. The St. Clair County portion of the property is located within Sections 33, 34, and 35 of Township 3 South and Range 7 West. The BAP is approximately one-half mile west-northwest of the Village of Baldwin (**Figure 1-1**).

The BPP property is bordered to the west by the Kaskaskia River; to the east by Baldwin Road, farmland, and strip-mining areas; to the southeast by the village of Baldwin; to the south by the Illinois Central Gulf railroad tracks, scattered residences, and State Route 154; and to the north by farmland. The St. Clair/Randolph County Line crosses east-west at approximately the midpoint of Baldwin Lake (*i.e.,* Cooling Pond). **Figure 1-1** shows the location of the BPP; **Figure 1-2** is a site map showing the location of the BAP (the subject of this GMP), Fly Ash Pond System (FAPS; an IEPA closed CCR Unit), Secondary Pond, Tertiary Pond, and Cooling Pond. Information regarding the FAPS, Secondary Pond, Tertiary Pond, and Cooling Pond is solely for background information, as this GMP applies specifically to the BAP CCR unit, which will hereinafter be referred to as the Site. The BAP is adjacent to the FAPS which was approved for closure by IEPA on August 16, 2016.

1.3 Conceptual Site Model

Multiple site investigations have been completed at the BPP to characterize the geology, hydrogeology, and groundwater quality as required by 40 C.F.R. § 257.91 (Groundwater Monitoring Systems). The BAP has been well characterized, as detailed in the Hydrogeologic Site Characterization Report (HCR) (Ramboll, 2021) [https://www.luminant.com/ccr/illinois-ccr/?dir=il-ccr%2FBaldwin%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.

Three hydrostratigraphic units are present at the Site:

- **CCR:** CCR, consisting primarily of fly ash, bottom ash, and boiler slag. Also includes earthen fill deposits of predominantly clay and silt materials from on-site excavations that were used to construct berms and roads surrounding the various impoundments across the Site.
- **Upper Groundwater Unit:** Predominantly clay with some silt and minor sand, silt layers, and occasional sand lenses. Includes the lithologic layers identified as the Cahokia Alluvium, Peoria Loess, Equality Formation, and Vandalia Till Member. This unit is composed of unlithified natural geologic materials and extends from the water table to the bedrock. Thin sand seams and the interface (contact) between the Upper Groundwater Unit and bedrock have been identified as potential migration pathways (PMPs).
- **Bedrock Unit:** This unit is considered the Uppermost Aquifer (UA) and is composed of interbedded shale and limestone bedrock, which underlies and is continuous across the entire Site.

Groundwater occurs within both the unlithified materials and bedrock and flows to the west and southwest toward a current and historic drainage feature and bedrock valley. Groundwater flow in both the Upper Groundwater Unit and the Bedrock Unit are to the west and southwest toward the historic drainage feature and bedrock valley. The receiving surface water bodies for groundwater in the Upper Groundwater Unit are assumed to be the Secondary and Tertiary ponds, while the receiving surface water body for groundwater in the Bedrock Unit is the Kaskaskia River (**Figure 1-3** and **Figure 1-4**). Immediately upgradient and downgradient of the BPP property boundaries, both the shallow glacial deposits and the shallow bedrock have served as a source of water supply. The shallow unlithified deposits off-site have yielded water through intermittent, discontinuous sand lenses and, in the bedrock, through fractured sandstone and limestone. However, within the area of the Site, investigations have indicated only thin and intermittent sand lenses are present within predominantly clay deposits; thus, the unlithified materials do not represent a continuous aquifer unit. Based on these details, the Bedrock Unit was designated as the UA in the Supplemental Hydrogeologic Site Characterization and Groundwater Monitoring Plan (Natural Resources Technology, Inc. [NRT], 2016), consistent with the United States Environmental Protection Agency (USEPA) definition in 40 C.F.R. § 257.53 (USEPA, 2015).

Water quality in the UA (*i.e.,* Pennsylvanian and Mississippian-aged bedrock) decreases with increasing depth as water becomes increasingly mineralized. Further, the ability of the unit to store and transmit water is dependent on the density of bedrock features that contribute to secondary porosities and whether those features are interconnected enough to yield water. Therefore, the lower limit of the UA is the depth at which either the groundwater is mineralized to a point that it is no longer a useable water source, or the secondary porosities do not yield a sufficient volume of groundwater to produce a useable water supply.

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 evaluation. 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

Historically, three monitoring programs specific to the BAP existed, the National Pollutant Discharge Elimination System (NPDES) monitoring program, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. Effective November 1, 2022, NPDES Special Condition No. 17 of NPDES Permit IL0000043 requiring groundwater monitoring and reporting was removed from the Permit. This GMP is being provided to expand the 40 C.F.R. § 257 groundwater monitoring network and monitoring program specific to the BAP 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. DMG entered into a compliance commitment agreement (CCA) with the IEPA on December 28, 2022. Groundwater monitoring in accordance with the CCA and the 35 I.A.C. § 845 proposed groundwater monitoring plan and sampling methodologies provided in the operating permit application for the BAP is scheduled to commence no later than the second quarter of 2023. After the BAP has been issued an approved operating permit, groundwater monitoring shall be conducted in accordance with that operating permit. As specified in the CCA, groundwater sampling requirements that apply to the CCR SI under other existing permit programs will become void upon issuance of an approved operating permit pursuant to 35 I.A.C § 845.

2.1.1 NPDES Monitoring Program

The NPDES permit updated in 2022 no longer requires sampling of groundwater monitoring wells effective November 1, 2022.

The NPDES monitoring well network associated with the BAP and FAPS included ten compliance monitoring wells (MW-150, MW-350, MW-152, MW-252, MW-352, MW-153, MW-253, MW-154, MW-155, and MW-355) and two background monitoring wells (MW-104SR and MW-104DR).

These wells were sampled and analyzed quarterly for the laboratory and field parameters as required by Special Condition No. 17 of NPDES Permit IL0000043 listed in **Table A** on the following page. The NPDES monitoring program is supplemented by two locations (MW-156 and MW-157S) screened in unlithified materials and monitored for field parameters only.

Nine of the BAP and FAPS NPDES monitoring program wells (MW-104SR, MW-104DR, MW-150, MW-152, MW-153, MW-154, MW-155, MW-252, and MW-253) are screened in the unlithified materials (*i.e.,* PMP) and three wells (MW-350, MW-352 and MW-355) are screened in the bedrock (*i.e.,* UA). The two supplemental monitoring wells (MW-156 and MW-157S) are screened in the unlithified materials (*i.e.,* PMP).

Results are submitted to IEPA by February 28 of the following year as required by the NPDES Permit.

Table A. NPDES Permit Groundwater Monitoring Program Parameters

Field Parameters [1]		
pH	Depth to Water (bgs; feet)	
Groundwater Elevation (feet)	Depth to Water (below mp; feet)	
Specific Conductance	Elevation of mp; feet	
Temperature		
Inorganics		
Chloride (dissolved)	Sulfate (dissolved)	
Nitrate	TDS	
Metals		
Boron (dissolved)	Iron (total)	Manganese (total)

[1] Dissolved oxygen, oxidation/reduction potential, and turbidity are recorded during sample collection.

bgs – below ground surface

mp – measuring point

TDS – total dissolved solids

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

The 40 C.F.R. § 257 well network for the BAP consists of six monitoring wells installed at locations adjacent to the BAP and screened within the bedrock (*i.e.,* UA). The 40 C.F.R. § 257 well network for the BAP consists of four compliance monitoring wells (MW-356, MW-369, MW-370, and MW-382) and two background monitoring wells (MW-304 and MW-306). One piezometer (TPZ-164), installed within the BAP, is monitored periodically to evaluate potential porewater concentrations, although not a requirement of 40 C.F.R. § 257 monitoring. The boring logs, well construction forms, and other related monitoring well forms are available in the Operating Records 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) (Ramboll, 2022a).

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

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

Field Parameters[1]			
Groundwater Elevation	pH		
Appendix III Parameters (Total, except TDS)			
Boron	Chloride	Sulfate	
Calcium	Fluoride	TDS	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Lithium	Thallium
Barium	Cobalt	Mercury	Radium 226 and 228 combined
Beryllium	Fluoride	Molybdenum	

[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 the following year and made available on the CCR public website as required by 40 C.F.R. § 257.

2.1.1 35 I.A.C. § 845 Well Installation and Monitoring

The 35 I.A.C. § 845 monitoring well network consists of six monitoring wells (MW-304, MW-306, MW-356, MW-369, MW-370, and MW-382) screened in the bedrock (*i.e.,* UA), four monitoring wells (OW-256, OW-257, PZ-170, and PZ-182) screened in the unlithified materials (*i.e.,* PMP), and one temporary (water level only) piezometer (TPZ-164). Ten wells (two background and eight compliance) are used to monitor groundwater concentrations within the bedrock (*i.e.,* UA) and unlithified materials (*i.e.,* PMP).

Groundwater samples are collected quarterly and analyzed for the laboratory and field parameters from 35 I.A.C. § 845.600 as summarized in **Table C** on the following page. The groundwater samples collected from the ten wells are used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards listed in 35 I.A.C. § 845.600(a).

In 2022 14 additional monitoring wells (MW158R, MW192, MW193, MW194, MW258, MW358, MW392, MW393, MW394, XPW01, XPW02, XPW04, XPW05, and XPW06) were installed, and groundwater samples were collected from the monitoring wells at the BAP. The additional monitoring wells were installed for further hydrogeologic investigation and water quality evaluation. Following investigation activities and collection of background groundwater quality, a subset of monitoring wells will be proposed to the IEPA for inclusion into the current 35 I.A.C. § 845 groundwater monitoring well network.

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

Field Parameters[1]			
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.

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 six monitoring wells (MW-304, MW-306, MW-356, MW-369, MW-370, and MW-382) screened in the bedrock (*i.e.,* UA), four monitoring wells (OW-256, OW-257, PZ-170, and PZ-182) screened in the unlithified materials (*i.e.,* PMP), and one temporary (water level only) piezometer (TPZ-164). The proposed network is summarized in **Table D** on the following page and displayed on **Figure 2-1**. Ten wells (two background and eight compliance) will be used to monitor groundwater concentrations within the bedrock (*i.e.,* UA) and unlithified materials (*i.e.,* PMP).

The groundwater samples collected from the ten 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 BAP, as well as downgradient groundwater at the waste boundary of the BAP (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 D** on the following page.

Any future changes to the groundwater monitoring well network as approved by the IEPA under 35 I.A.C. § 845, as discussed earlier in Section 2.1.1, will also be incorporated into the 40 C.F.R. § 257 network.

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

Well ID	Monitored Unit	Well Screen Interval (feet bgs)	Well Type[1]
MW-304	UA	45.0 – 55.0	Background
MW-306	UA	72.7 – 82.7	Background
MW-356	UA	56.0 – 66.0	Compliance
MW-369	UA	56.0 – 66.0	Compliance
MW-370	UA	53.0 – 63.0	Compliance
MW-382	UA	56.0 – 66.0	Compliance
OW-256	PMP	28.0 – 32.5	Compliance
OW-257	PMP	34.0 – 38.5	Compliance
PZ-170	PMP	21.1 – 31.1	Compliance
PZ-182	PMP	24.0 – 34.0	Compliance
TPZ-164[2]	CCR	5.2 – 9.7	WLO

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

[2] Location is temporary pending implementation of impoundment closure per an approved Construction Permit Application.

WLO = water level only

2.3 Well Abandonment

No wells are currently proposed for abandonment.

2.4 Groundwater Monitoring System Maintenance Plan

Maintenance procedures provided in the 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**, three monitoring programs specific to the BAP exist, the NPDES monitoring program, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. As specified in the CCA, groundwater sampling requirements that apply to the CCR SI under other existing 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 BAP is currently in assessment monitoring and sampling will continue in 2023 according to the schedule summarized in **Table E** on the following page.

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

Frequency	Duration
Quarterly (groundwater quality)	**Baseline** Began: monitoring began in 2015.
	Ended: monitoring was completed in 2017 to establish baseline groundwater quality for existing landfills and SIs.
At least Semi-annually (groundwater quality)	**Detection Monitoring** 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. At least semiannual sampling continues for Appendix III constituents throughout the active life of the CCR unit and the post-closure period. 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.
	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.
	Assessment Monitoring 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.
	Ends: Following demonstration that concentrations of all constituents in Appendices III and IV are below background values for two consecutive sampling events.

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 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 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 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 Program

The QAPP includes procedures and techniques for laboratory quality assurance/quality control (QA/QC). Additionally, the 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 (SSLs) over groundwater protection standards (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 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 lower prediction limit (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 groundwater protection standard 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

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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
BALDWIN POWER PLANT
BOTTOM ASH POND
BALDWIN, 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)
MW-304	B	UA	10/20/2015	455.49	455.49	Top of PVC	453.03	45.00	55.00	408.00	398.00	55.00	317.60	10	2	38.188332	-89.853441
MW-306	B	UA	09/25/1991	453.17	453.17	Top of PVC	450.91	72.70	87.70	378.20	363.20	87.70	361.20	15	2	38.20114	-89.846756
MW-356	C	UA	10/01/2015	427.60	427.60	Top of PVC	425.18	56.00	66.00	369.20	359.20	66.00	290.20	10	2	38.198963	-89.869578
MW-369	C	UA	11/19/2015	422.71	422.71	Top of PVC	420.49	56.00	66.00	364.50	354.50	66.00	349.80	10	2	38.196986	-89.870258
MW-370	C	UA	11/25/2015	420.85	420.85	Top of PVC	418.67	53.00	63.00	365.70	355.70	63.00	352.70	10	2	38.195603	-89.869669
MW-382	C	UA	11/23/2015	431.19	431.19	Top of PVC	428.67	56.00	66.00	372.70	362.70	66.00	358.10	10	2	38.19454	-89.868044
OW-256	C	PMP	08/01/2013	427.70	427.70	Top of PVC	425.20	28.00	32.50	397.20	392.70	33.10	389.20	4.5	2	38.198966	-89.86961
OW-257	C	PMP	08/01/2013	431.02	431.02	Top of PVC	428.17	34.00	38.50	394.20	389.70	39.10	388.60	4.5	2	38.193865	-89.867456
PZ-170	C	PMP	07/29/2015	421.43	421.43	Top of PVC	418.58	21.10	31.10	397.50	387.50	31.10	387.50	10	2	38.195585	-89.869632
PZ-182	C	PMP	07/30/2015	431.61	431.61	Top of PVC	428.47	24.00	34.00	404.50	394.50	34.00	394.50	10	2	38.194512	-89.86801
TPZ-164	WLO	CCR	08/01/2013	435.10	435.10	Top of PVC	432.50	5.20	9.70	427.30	422.80	10.30	422.20	4.5	2	38.195586	-89.862797

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
BGS = below ground surface
CCR = Coal Combustion Residual
ft = foot or feet
HSU = Hydrostratigraphic Unit
PMP = potential migration pathway
PVC = polyvinyl chloride
UA = Uppermost Aquifer

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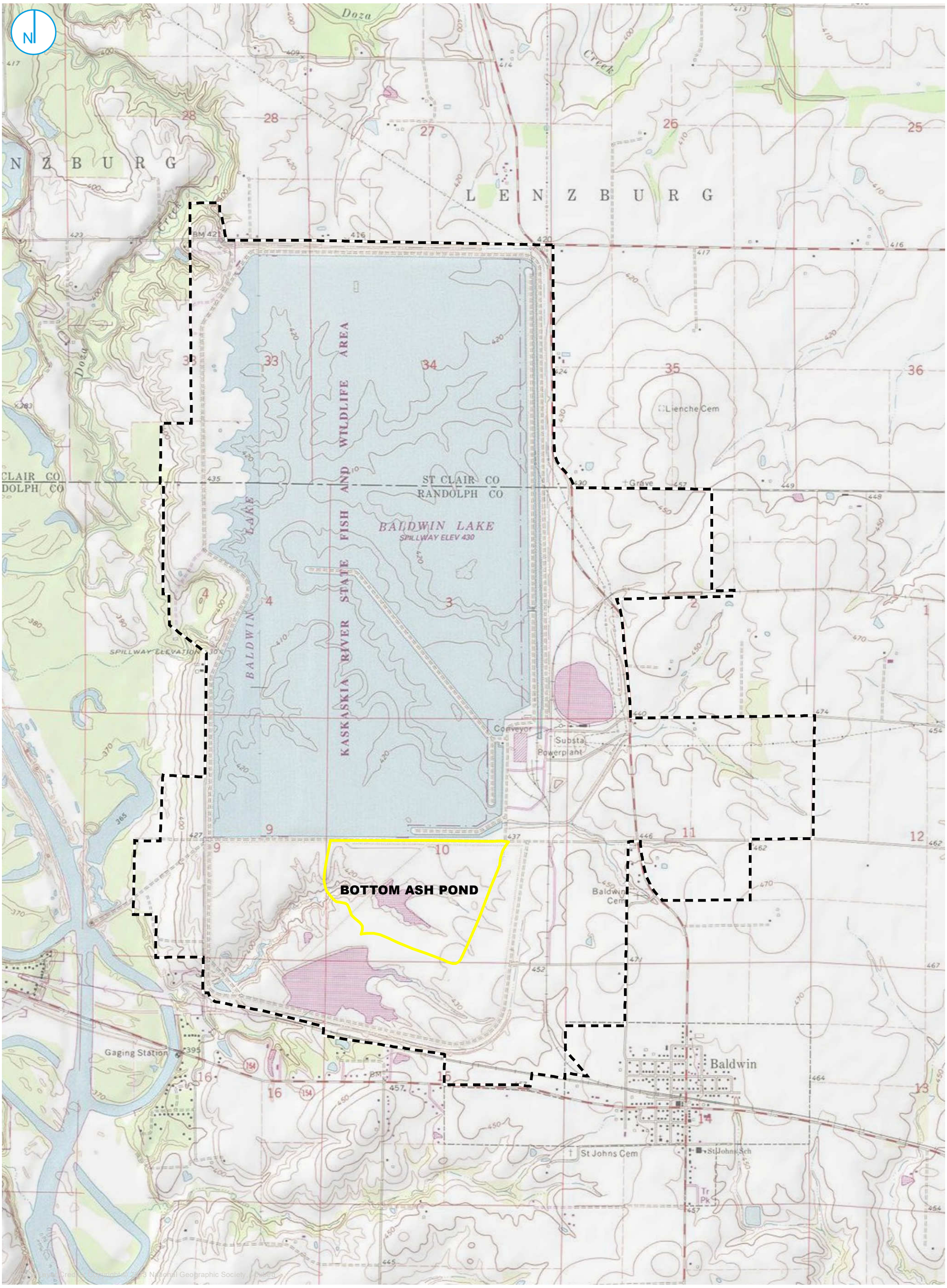
FIGURES

PROJECT: 169000XXXX | DATED: 7/15/2021 | DESIGNER: galarnmc

Y:\Mapping\Projects\22\2285_Baldwin\MXD\GMP_Addendum\BAP\Figure 1-1_Site Location Map.mxd



40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)

PROPERTY BOUNDARY

0 1,000 2,000 Feet

SITE LOCATION MAP

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

FIGURE 1-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
FLY ASH POND SYSTEM (CLOSED) CAPPED AREA
SITE FEATURE
PROPERTY BOUNDARY

0 400 800 Feet

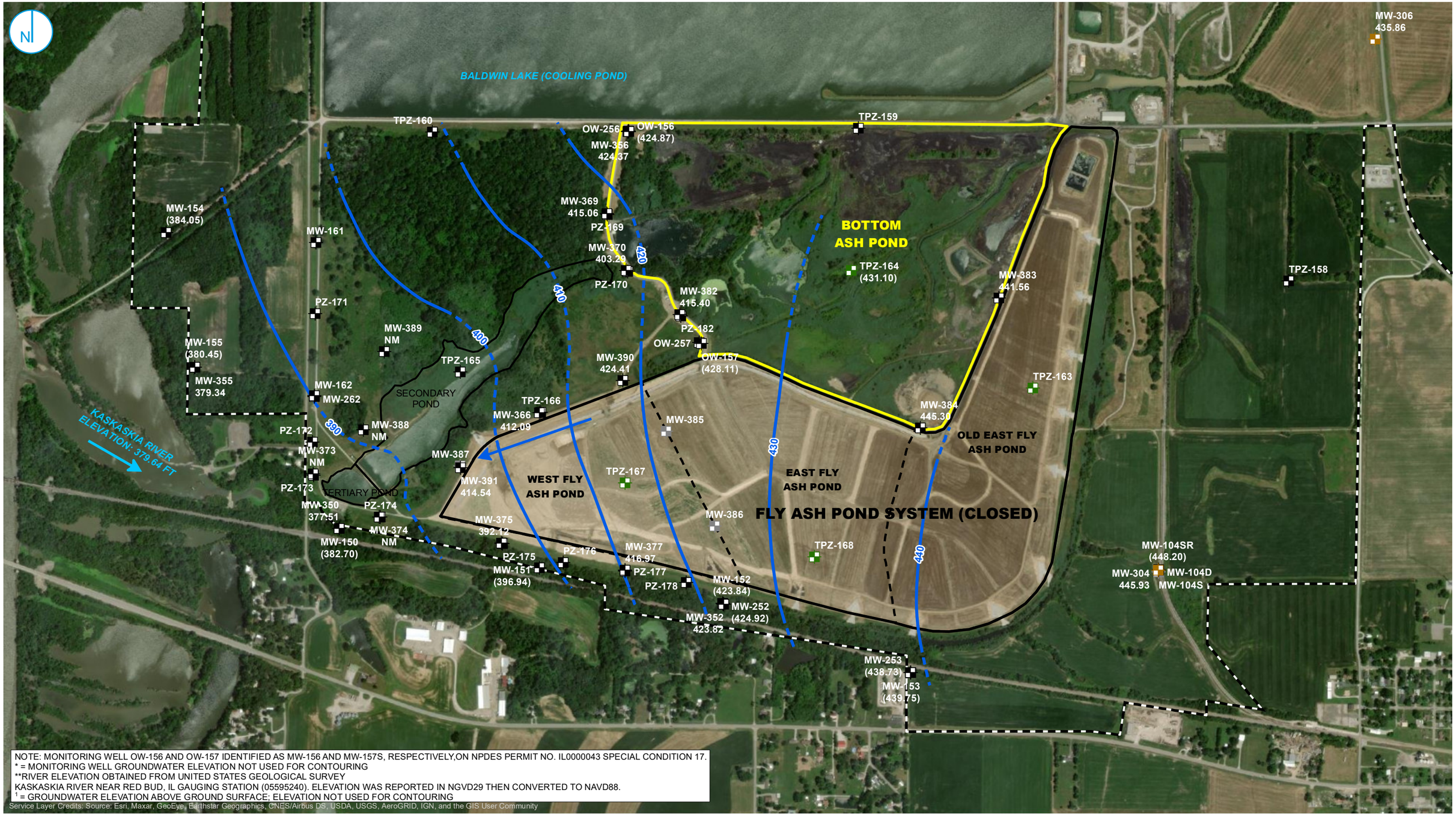
SITE MAP

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

FIGURE 1-2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY,ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING
**RIVER ELEVATION OBTAINED FROM UNITED STATES GEOLOGICAL SURVEY
KASKASKIA RIVER NEAR RED BUD, IL GAUGING STATION (05595240). ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88.
[1] = GROUNDWATER ELEVATION ABOVE GROUND SURFACE; ELEVATION NOT USED FOR CONTOURING

- BACKGROUND WELL
- MONITORING WELL
- SOURCE SAMPLE LOCATION
- ABANDONED MONITORING WELL

- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- FLY ASH POND SYSTEM (CLOSED) PROPERTY
- BOUNDARY

0 400 800 Feet

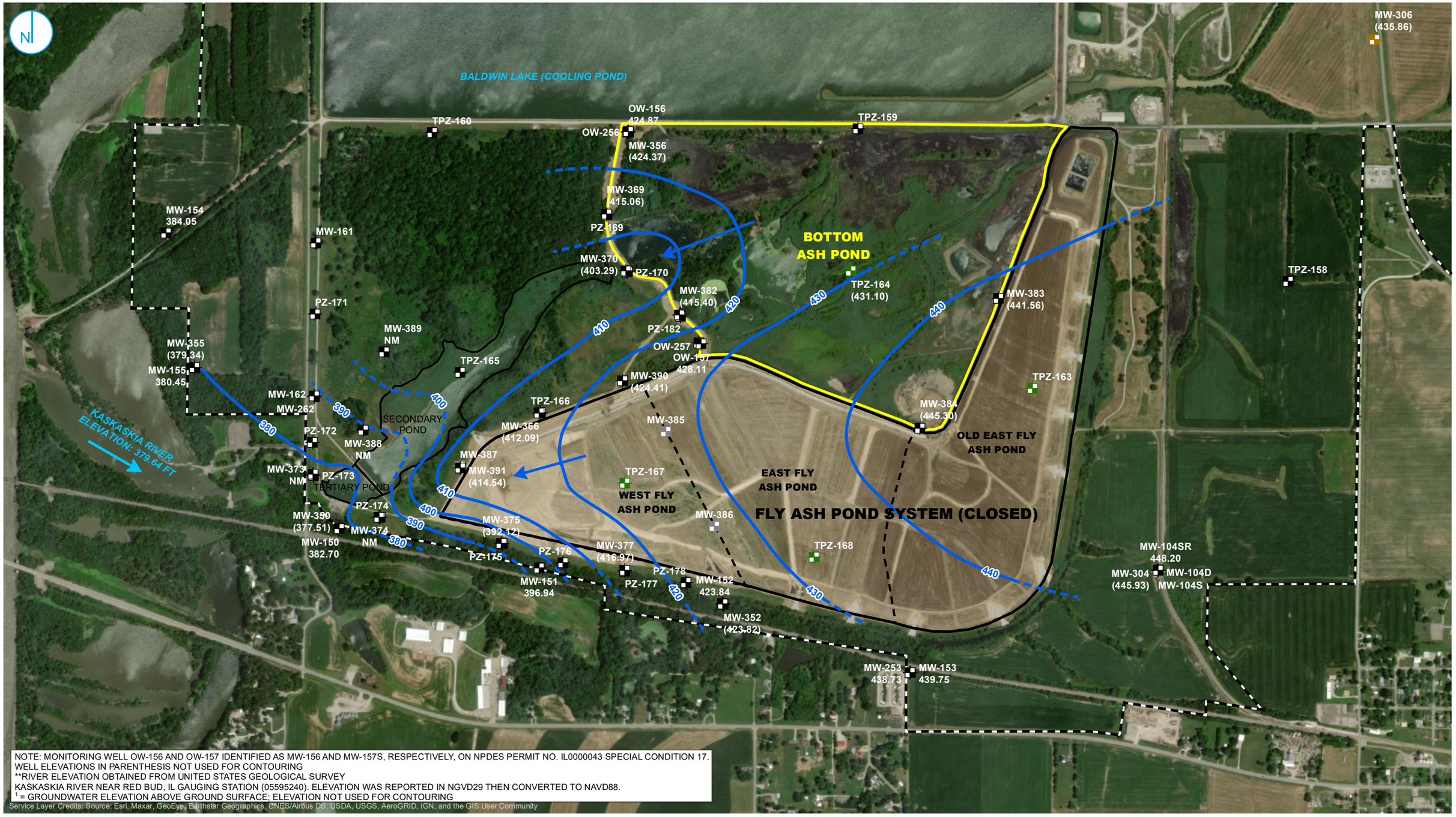
SHALLOW UNLITHIFIED POTENTIOMETRIC SURFACE MAP MARCH 24, 2020

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

FIGURE 1-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL



NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
WELL ELEVATIONS IN PARENTHESIS NOT USED FOR CONTOURING
**RIVER ELEVATION OBTAINED FROM UNITED STATES GEOLOGICAL SURVEY
KASKASKIA RIVER NEAR RED BUD, IL GAUGING STATION (05595240). ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88.
[1] = GROUNDWATER ELEVATION ABOVE GROUND SURFACE; ELEVATION NOT USED FOR CONTOURING

- BACKGROUND WELL
- MONITORING WELL
- SOURCE SAMPLE LOCATION
- ABANDONED MONITORING WELL

0 400 800 Feet

- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- FLY ASH POND SYSTEM (CLOSED) PROPERTY
- BOUNDARY

BEDROCK POTENTIOMETRIC SURFACE MAP
MARCH 24, 2020

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

FIGURE 1-4

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- PORE WATER WELL
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- FLY ASH POND SYSTEM (CLOSED)
- SITE FEATURE
- CAPPED AREA
- PROPERTY BOUNDARY

0 400 800 Feet

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

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

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL