MWG

Midwest Generation, LLC

Waukegan Generating Station

2024 Inflow Design Flood Control System Plan for East Ash Pond & West Ash Pond

Revision 0

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EXECUTIVE SUMMARY

This report presents the 2024 inflow design flood control system plan for the East Ash Pond and West Ash Pond at Midwest Generation, LLC's (MWG) Waukegan Generating Station ("Waukegan" or the "Station"). This annual plan, prepared by Sargent & Lundy (S&L) on behalf of MWG, documents how the inflow design flood control system for the East and West Ash Ponds has been designed and constructed to meet the hydrologic and hydraulic capacity requirements for coal combustion residual (CCR) surface impoundments promulgated by 35 Ill. Adm. Code 845.510.

To complete this assessment, S&L re-evaluated the bases of the most recent hydrologic and hydraulic calculations prepared for the East and West Ash Ponds, which were completed in 2021. These calculations were performed using a 1,000-year design storm and by conservatively assuming (1) no rainfall abstraction (*i.e.*, the full precipitation depth over a pond's catchment area was assumed to enter the pond) and (2) the surface water elevations in the ponds at the time of the design storm event were at the ponds' respective maximum design operating levels (597.50 feet above mean sea level (amsl) for the East Ash Pond and 600.00 feet amsl for the West Ash Pond). To verify that the results of the 2021 hydrologic and hydraulic calculation were still valid, S&L determined (1) whether any changes to the calculation inputs have occurred since 2021 and (2) whether identified changes warrant updating the calculations. Where changes were determined to impact the results and conclusions of the calculations, the 2021 hydrologic and hydraulic calculation was revised in accordance with the updated input. Where no changes were noted for a given input, or where identified changes were determined to have no impact to the results and conclusions of the 2021 hydrologic and hydraulic calculation, the previous evaluation of that input was considered to remain valid for this 2024 inflow design flood control system plan.

After implementing modifications to its stormwater management system in May 2024, the Station ceased placing stormwater run-off into the East Ash Pond, and MWG filed a notice of intent to close the East Ash Pond in June 2024. In addition, the Station opened the Recycle Water Sump drain gates to lower the water level in the East Ash Pond, and the Station continues to keep these gates open to limit water accumulation in the East and West Ash Ponds, essentially leaving the ponds in a constant dewatering state. Because these drain gates are situated one foot above the bottom of each pond, the normal water level in each pond will be limited to one foot. Given that each pond's floor is at elevation 585 feet, the maximum surface water elevation in each pond prior to the design storm event is 586 feet.

Per the ponds' 2024 hazard potential classification assessment prepared in accordance with 35 Ill. Adm. Code 845.440(a)(1), the East and West Ash Ponds remain classified as Class 2 CCR surface impoundments. Therefore, the inflow design flood event for the East and West Ash Ponds remains the 1,000-year storm per 35 Ill. Adm. Code 845.510(a)(3). In addition, there have been no significant

modifications to the embankments for the East and West Ash Ponds (mass excavations, mass fill placement, etc.) since the latest hydrologic and hydraulic calculations were completed in 2021.

Based on the preceding discussion, S&L revised the 2021 hydrologic and hydraulic calculations for the East and West Ash Ponds to account for the reduced normal water levels therein. Consistent with the reduced normal water levels in the ponds, the maximum surface water elevation in each pond prior to the design storm event was taken as 586 feet. Consistent with the 2021 hydrologic and hydraulic calculations, the revised calculations were performed by conservatively assuming no rainfall abstraction (*i.e.*, the full design precipitation depth over a pond's catchment area was assumed to enter the pond).

Table ES-1 presents the results from the revised hydrologic and hydraulic calculations performed for the East and West Ash Ponds at Waukegan in accordance with 35 Ill. Adm. Code 845.510(c)(1). Based on these results, water entering the ponds during the inflow design flood event will not overtop the ponds' crests. The water level in the East and West Ash Ponds during the design event was estimated to be 12.2 and 15.5 feet below the ponds' crests, respectively.

Table ES-1 – Summary of Hydrologic & Hydraulic Assessment Results for East & West Ash Ponds

CCR Surface Impoundment	Illinois Hazard Potential Classification	Inflow Design Flood	Maximum Surface Water Elevation	Pond Crest Elevation
East Ash Pond	Class 2	1,000 Year	587.30 feet	599.50 feet
West Ash Pond	Class 2	1,000 Year	587.00 feet	602.50 feet

1.0 PURPOSE & SCOPE

1.1 PURPOSE

The East Ash Pond and the West Ash Pond at Midwest Generation, LLC's (MWG) Waukegan Generating Station ("Waukegan" or the "Station") are existing coal combustion residual (CCR) surface impoundments that are regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." Pursuant to 35 Ill. Adm. Code 845.510(c)(1), MWG must prepare an annual inflow design flood control system plan documenting how the inflow design flood control systems for the East and West Ash Ponds have been designed and constructed to meet the hydrologic and hydraulic capacity requirements for CCR surface impoundments promulgated by 35 Ill. Adm. Code 845.510.

This report documents the 2024 inflow design flood control system plan prepared in accordance with the Illinois CCR Rule by Sargent & Lundy (S&L) on behalf of MWG for the East and West Ash Ponds at Waukegan. This report:

- Lists the inputs and assumptions used to determine whether the East and West Ash Ponds can manage the inflow design flood,
- Discusses the methodology used to prepare the 2024 inflow design flood control system plan,
- Summarizes the results of the 2021 hydrologic and hydraulic calculations performed to support the conclusion of whether the East and West Ash Ponds meet the hydrologic and hydraulic requirements for CCR surface impoundments promulgated by the Illinois CCR Rule,
- Evaluates potential changes to the inputs used in the 2021 hydrologic and hydraulic calculations to determine whether new or updated calculations are warranted, and
- Provides the results of the hydrologic and hydraulic calculations used to determine whether the East and West Ash Ponds can manage the inflow design flood.

1.2 SCOPE

In addition to being regulated under the Illinois CCR Rule, Waukegan's East and West Ash Ponds are also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), also referred to herein as the "Federal CCR Rule." Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the East and West Ash Ponds will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program; the Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval. However, the scope of this 2024 inflow flood control system plan is strictly limited to demonstrating compliance with the Illinois

CCR Rule. Pursuant to 40 CFR 257.82(c)(4), the next inflow design flood control system plan for demonstrating compliance with the Federal CCR Rule is not required until 2026, five years after the last periodic plan was completed (2021).

2.0 INPUTS

Ash Pond Operations & Inflow Design Flood Control System

The operating and physical conditions for the East and West Ash Ponds and for their inflow design flood control systems were based on the following inputs:

- Observations made during a site visit by S&L on September 11, 2024.
- Discussions with MWG personnel.
- The ponds' initial federal inflow design flood control system plan (Ref. 3).
- The history of construction prepared for the CCR surface impoundments in accordance with 40 CFR 257.73(c) (Ref. 7).
- The 2023 annual inspection report prepared for the CCR surface impoundment in accordance with 35 Ill. Adm. Code 845.540(b) (Ref. 9).
- The weekly inspection reports prepared in accordance with 35 Ill. Adm. Code 845.540(a) since the 2023 inflow design flood control system plan was issued (Ref. 10).

Finally, the area-capacity curves for the ponds were obtained from the aforementioned history of construction (Ref. 7).

Inflow Design Flood Event

Per the ponds' 2024 hazard potential classification assessment (Ref. 4), the East and West Ash Ponds are both classified as Class 2 CCR surface impoundments pursuant to 35 Ill. Adm. Code 845.440(a)(1). Therefore, the inflow design flood event for both ponds is based on the 1,000-year storm (Ref. 1, § 845.510(a)(3)). Per the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 (Ref. 5), the precipitation value for the 1,000-year, 24-hour storm event at the Waukegan site is 8.30 inches.

Site Topography

Topographic data for the East Ash Pond, the West Ash Pond, and the surrounding areas was obtained from the photogrammetric survey performed by Geo Terra in 2015 (Ref. 6) that is documented in the ponds' history of construction (Ref. 7).

Aerial Images

Historical and recent aerial images of the Station and surrounding areas were obtained from Google Earth Pro (Ref. 8).

3.0 ASSUMPTIONS

There are no assumptions in this document that require verification.

4.0 METHODOLOGY

The inputs for the latest hydrologic and hydraulic calculations performed for the East and West Ash Ponds, which were completed in October 2021, were reviewed to determine if any changes have occurred since these calculations were completed. Identified changes were then evaluated to determine if updates to these calculations were warranted. If changes were identified, then the 2021 hydrologic and hydraulic calculations performed for the East and West Ash Ponds were revised for this 2024 inflow design flood control system plan. Where no changes were noted for a given input, or where identified changes were determined to have no impact to the results and conclusions of the 2021 hydrologic and hydraulic calculation, the previous evaluation of that input was considered to remain valid for this 2024 inflow design flood control system plan.

5.0 HYDROLOGIC & HYDRAULIC ASSESSMENT

5.1 SUMMARY OF 2021 HYDROLOGIC & HYDRAULIC CALCULATIONS

The latest hydrologic and hydraulic calculations for Waukegan's East and West Ash Ponds were completed in October 2021. The inputs, methodology, and results of these calculations are documented in the ponds' 2021 inflow design flood control system plan (Ref. 11). As stated in the 2021 plan, these calculations were performed by conservatively assuming (1) no rainfall abstraction (*i.e.*, the full design precipitation depth over a pond's catchment area was assumed to enter the pond) and (2) that the surface water elevations in the ponds at the time of the design storm event were at the ponds' respective maximum design operating levels (597.50 feet above mean sea level (amsl) for the East Ash Pond and 600.00 feet amsl for the West Ash Pond). The results of this 2021 assessment indicated that water entering the ponds during the inflow design flood event would not overtop the ponds' dikes. The freeboards in the East and West Ash Ponds during the design event were estimated to be 1.1 feet and 1.7 feet, respectively. Based on these results, it was concluded that the ponds have adequate hydraulic capacities to retain the 1,000-year flood event without water overtopping the ponds' dikes and were therefore in conformance with 35 Ill. Adm. Code 845.510(a).

5.2 CHANGES TO INPUTS FOR 2021 HYDROLOGIC & HYDRAULIC CALCULATIONS

The following subsections summarize the evaluation conducted to determine if changes to the inputs used in the latest hydrologic and hydraulic calculations for the East and West Ash Ponds have occurred since the calculations were completed in 2021 that warrant updating the calculations.

5.2.1 CHANGES IN ASH POND OPERATIONS & INFLOW DESIGN FLOOD CONTROL SYSTEMS

In June 2020, Waukegan took the West Ash Pond out of service for routine cleaning. In April 2021, MWG filed a notice of intent to close the West Ash Pond in accordance with the Federal CCR Rule's closure criteria (Ref. 2, § 257.102). Following the retirements of Units 7 and 8 in June 2022, Waukegan ceased placing CCR wastestreams into the East Ash Pond but continued to use the pond to manage stormwater run-off from the Station property. After implementing modifications to its stormwater management system in May 2024, the Station ceased placing stormwater run-off into the East Ash Pond, and MWG filed a notice of intent to close the East Ash Pond in June 2024. Because the East and West Ash Ponds remain isolated and out of service, the inlet flumes and distribution troughs along the ponds' northern dikes no longer convey flows into the ponds. Finally, closure construction activities will commence at both ponds upon receipt of closure construction permits from the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule.

As a part of the modifications made in 2024 to the Station's stormwater management system, the Station opened the Recycle Water Sump drain gates to lower the water level in the East Ash Pond, and the Station continues to keep these gates open to limit water accumulation in the East and West Ash Ponds, essentially leaving the ponds in a constant dewatering state. Because these drain gates are situated one foot above the bottom of each pond, the normal water level in each pond will be limited to one foot (Ref. 10). Indeed, S&L did not observe appreciable surface water in either pond during our site visit on September 11, 2024.

The 2021 hydrologic and hydraulic calculations for the East and West Ash Ponds evaluated pond capacity scenarios assuming both ponds were operating at their original design capacities. However, the opened Recycle Water Sump drain gates limit the amount of stormwater that can accumulate in the ponds. In addition, the only water entering the East and West Ash Ponds is direct precipitation (i.e., rain or snow) and run-off from the crests of the ponds' dikes. Therefore, the operating conditions at the ponds have changed since the initial assessment, and these changes warrant updating the 2021 hydrologic and hydraulic calculations.

5.2.2 CHANGES IN ASH POND TOPOGRAPHY

Based on visual observations made during S&L's site visit on September 11, 2024, review of the 2023 annual inspection report (Ref. 9), and reviews of Google Earth aerial images (Ref. 8), there have been no significant modifications to embankments for the East and West Ash Ponds (mass excavations, mass fill placement, *etc*.) since the latest hydrologic and hydraulic calculations were completed in 2021. Therefore, the topographic data (Ref. 6) and the area-capacity curves (Ref. 7) used in the 2021 hydrologic and hydraulic calculations are unchanged and remain valid for use in this 2024 assessment.

5.2.3 CHANGES TO INFLOW DESIGN FLOOD EVENT

Per the ponds' 2024 hazard potential classification assessment (Ref. 4), the East and West Ash Ponds are both classified as Class 2 CCR surface impoundments pursuant to 35 Ill. Adm. Code 845.440(a)(1), the same hazard potential classifications the ponds were assigned in 2021. Therefore, the inflow design flood event for both ponds remains the 1,000-year storm (Ref. 1, § 845.510(a)(3)). As documented in the ponds' 2021 inflow design flood control system plan (Ref. 11), the precipitation value for the 1,000-year, 24-hour storm event used in the latest hydrologic and hydraulic calculations completed for the East and West Ash Ponds was 8.30 inches per NOAA's Atlas 14. NOAA's 1,000-year, 24-hour precipitation value for the Waukegan site remains 8.30 inches (Ref. 5). Therefore, the inflow design flood event used in the 2021 hydrologic and hydraulic calculations is unchanged and remains valid for use in this 2024 assessment.

5.3 REVISED HYDROLOGIC & HYDRAULIC CALCULATION RESULTS

Changes in the operational statuses of the East and West Ash Ponds, primarily the reduction of normal water levels to a maximum of one foot, warrant updating the hydrologic and hydraulic calculations in the 2021 inflow design flood controls system plan (Ref. 10). Other than the reduced normal water levels, there have been no significant modifications to the East and West Ash Ponds and no changes to the ponds' inflow design flood event since the latest hydrologic and hydraulic calculations were prepared in 2021. Therefore, the topographic data (Ref. 6), area-capacity curves (Ref. 7), and 1,000-year, 24-hour precipitation value for the Waukegan site (Ref. 5) used in the 2021 hydrologic and hydraulic calculations were unchanged and remain valid for use in the revised hydrologic and hydraulic calculations.

Based on the preceding discussion, S&L revised the 2021 hydrologic and hydraulic calculations for the East and West Ash Ponds to account for the reduced normal water levels therein (Ref. 12). Given that the opened Recycle Water Sump drain gates limit the water level in each pond to one foot, and given that each pond's floor is at elevation 585 feet, the maximum surface water elevation in each pond prior to the design storm event was taken as 586 feet. Consistent with the 2021 hydrologic and hydraulic calculations, the revised calculations were performed by conservatively assuming no rainfall abstraction (*i.e.*, the full design precipitation depth over a pond's catchment area was assumed to enter the pond).Table 5-1 summarizes the results from the revised hydrologic and hydraulic calculations performed for the East and West Ash Ponds. Based on these results, water entering the ponds during the inflow design flood event will not overtop the ponds' dikes. The freeboards in the East and West Ash Ponds during the design event were estimated to be 12.2 feet and 15.5 feet, respectively.

Table 5-1 – Summary of Hydrologic & Hydraulic Assessment Results for East & West Ash Ponds

CCR Surface Impoundment	Illinois Hazard Potential Classification	Inflow Design Flood	Maximum Surface Water Elevation	Pond Crest Elevation
East Ash Pond	Class 2	1,000 Year	587.30 feet	599.50 feet
West Ash Pond	Class 2	1,000 Year	587.00 feet	602.50 feet

6.0 CONCLUSIONS

Based on the results from the revised hydrologic and hydraulic calculations summarized in Table 5-1, Waukegan's East and West Ash Ponds have adequate hydraulic capacities to retain the 1,000-year flood event without water overtopping the ponds' dikes. Therefore, the East and West Ash Ponds are able to collect and control the inflow design flood event specified in 35 Ill. Adm. Code 845.510(a)(3).

7.0 CERTIFICATION

I certify that:

- This inflow design flood control system plan was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.510.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas Dehlin Date: 10/13/2024

Seal:

Digitally signed by Thomas Dehlin
Date: 2024.10.13 11:32:48-05'00'

8.0 REFERENCES

1. Illinois Pollution Control Board. “Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments.” 35 Ill. Adm. Code 845. Accessed September 27, 2024.
2. U.S. Environmental Protection Agency. “Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.” 40 CFR Part 257 Subpart D. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D. Accessed September 27, 2024.
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7. Geosyntec Consultants. “History of Construction, East and West Ash Basins, Waukegan Station.” October 2016.
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