

**PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTIONS
EAST AND WEST ASH BASINS
WAUKEGAN STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.60 (Rule), Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to placement above the uppermost aquifer for the existing East Ash Basin and West Ash Basin (the Basins) at the Waukegan Station (Site) in Waukegan, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with Section 257.60 of the Federal Coal Combustion Residual (CCR) rule. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. Federal Coal Combustion Residual Rule, 40 CFR 257

Section 257.60(a) of the Federal CCR rule states:

“New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table).” *40 CFR §257.60(a)*

“Normal Fluctuations” of the groundwater elevation is defined in the Preamble of the Federal CCR rule as:

“including, but not limited to, seasonal or temporal variations, groundwater withdrawal, mounding effects, etc....The phrase “normal fluctuations” has been used to clarify that EPA does not intend for the facility to account for extraordinary or highly aberrant conditions...Normal fluctuations can include those resulting from natural as well as anthropogenic sources. Natural sources that could affect groundwater levels include, but are not limited to precipitation, run-off, and high river levels.” (80 Fed Reg. 74 at pg. 21362 (April 17, 2015) *Federal Register: Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*)

2. *Placement Above the Uppermost Aquifer Restriction Determination*

The East and West Basins are so located so that there will not be intermittent, recurring, or sustained hydraulic connection between any portion of the base of the Basins and the uppermost aquifer due to normal fluctuations in groundwater elevations. Analysis that support this conclusion include:

- The 95 percent upper confidence limit (UCL), the seasonal high monthly average and the maximum uppermost aquifer groundwater elevations are below the base of the Basins and therefore do not intersect their base.
- Low permeability geomembrane liners (engineered liner systems) were constructed on the base and side slopes of the East and West Basins. The engineered liner systems will provide additional protection to prevent hydraulic connection between the base of the Basins and the uppermost aquifer in the event of unusually high fluctuations in groundwater elevation.

The locations of the East and West Basin are in compliance with the requirements in §257.60.

3. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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**WETLANDS LOCATION RESTRICTIONS
EAST AND WEST ASH BASINS
WAUKEGAN STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.61, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to wetlands for the existing East Ash Basin and West Ash Basin (the Basins) at the Waukegan Station (Site) in Waukegan, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.61. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. Wetlands Location Restriction Determination

The East Ash Basin and West Ash Basin are not located in mapped wetlands included in the National Wetlands Inventory – Version 2 presented by the U.S. Fish and Wildlife Service (USFW) [USFW, 2018]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.61(a).

2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Wetlands Location Restrictions
East Ash Basin and West Ash Basin, Waukegan Station
October 2018

3. *References*

USFS, 2018. "National Wetlands Inventory, Version 2," <https://www.fws.gov/wetlands/data/Mapper.html>, updated 1 May 2018, accessed 28 August 2018.

**FAULT AREAS LOCATION RESTRICTIONS
EAST AND WEST ASH BASINS
WAUKEGAN STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.62, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to fault areas for the existing East Ash Basin and West Ash Basin (the Basins) at the Waukegan Station (Site) in Waukegan, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.62. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Fault Areas Location Restriction Determination*

The East Ash Basin and West Ash Basin are not located within 200 feet (60 meters) of a mapped Holocene-aged fault, as mapped by the United States Geological Survey (USGS) Quaternary Fault Database [USGS, 2018]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.62(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Fault Areas Location Restrictions
East Ash Basin and West Ash Basin, Waukegan Station
October 2018

3. *References*

USGS, 2018. "Quaternary Fault and Fold Database,"
<https://earthquake.usgs.gov/hazards/qfaults/>, accessed 28 August 2018.

**SEISMIC IMPACT ZONES LOCATION RESTRICTIONS
EAST AND WEST ASH BASINS
WAUKEGAN STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.63, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to seismic impact areas for the existing East Ash Basin and West Ash Basin (the Basins) at the Waukegan Station (Site) in Waukegan, Illinois.


The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.63. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Seismic Impact Zones Restriction Determination*

The East Ash Basin and West Ash Basin are not located within a seismic impact zone as defined in §257.53 and as mapped by the United States Geological Survey (USGS) [USGS, 2014]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.63(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Seismic Impact Zones Location Restrictions
East Ash Basin and West Ash Basin, Waukegan Station
October 2018

3. *References*

USGS, 2014. “2014 U.S. Geological Survey National Seismic Hazard Maps, PGA 2% in 50 Years,” <https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014>, accessed 28 August 2018.

**UNSTABLE AREAS LOCATION RESTRICTIONS
EAST AND WEST ASH BASINS
WAUKEGAN STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.64, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to unstable areas for the existing East Ash Basin and West Ash Basin (the Basins) at the Waukegan Station (Site) in Waukegan, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.64. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Unstable Areas Restriction Determination*

The East Ash Basin and West Ash Basin are not located in unstable areas [Geosyntec, 2016]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.64(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Unstable Areas Location Restrictions
East Ash Basin and West Ash Basin, Waukegan Station
October 2018

3. *References*

Geosyntec, 2016. Structural Stability and Factor of Safety Assessment, Ash Surge Basin and Bypass Basin, Powerton Station, October.