CCR COMPLIANCE
LOCATION RESTRICTIONS DEMONSTRATION REPORT
NEW CASTLE NORTH ASH POND

Prepared for:

NRG Power Midwest LP
New Castle Generating Station
West Pittsburg, Pennsylvania

Prepared by:

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St. Charles, Illinois

October 2018

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1.0 INTRODUCTION AND PURPOSE

NRG Power Midwest LP, a subsidiary of GenOn Energy, Inc. (GenOn), operates the coal-fired New Castle Generating Station located in West Pittsburg, Pennsylvania. The Station has historically relied on coal-fired energy production (recently adding natural-gas firing capability in 2016), and therefore maintains a surface impoundment for the purpose of managing coal combustion residuals (CCR).

In 2015, the *Disposal of Coal Combustion Residuals from Electric Utilities Final Rule* (CCR Rule) was enacted within the Federal Register under 40 CFR §257. The CCR Rule establishes technical requirements for CCR landfills and surface impoundments under Subtitle D of the Resource Conservation and Recovery Act (RCRA), which is the primary law regulating solid waste. Multiple location restrictions are identified for landfills and surface impoundments to ensure that they are not placed in environmentally sensitive areas. These location requirements are defined under 40 CFR §257.60 through §257.64.

Demonstrations of compliance with locations restrictions are required to be placed in the facility's operating record [§257.105(e)] by October 17, 2018. In addition, the owner or operator must notify the State Director [§257.106(e)] that the demonstrations have been placed in the operating record and on the owner or operator's publicly accessible CCR internet site [§257.107(e)].

Per the applicable sections of the Rule, the location restrictions for CCR surface impoundments require that these units are NOT located:

- with a base that is constructed no less than 5 feet above the upper limit of the uppermost aquifer (§257.60);
- in wetlands (§257.61);
- within 200 feet of the outermost damage zone of a fault which has been displaced in Holocene time (§257.62);
- within a seismic impact zone (§257.63); or
- in an unstable area (§257.64).

The location restriction details are further described within **Section 3**.

2.0 OVERVIEW OF SURFACE IMPOUNDMENT

One CCR surface impoundment is located at the New Castle Generating Station, designated as the North Ash Pond. The pond, which is situated north of the main generating station and south of the Plant Ash Landfill, is reported to have been originally constructed in 1955 and encompasses an area of approximately 2.3 acres, as measured around the crest of the pond. It is approximately 450 feet long by 200 feet wide as measured from crest to crest at the widest sections, and has an average depth of 15 feet. Ground surface elevations around the top of the pond are in the range of 778 to 781 feet above mean sea level (ft MSL). The pond is primarily incised, having been constructed in an area where fly ash and fill were previously placed, but a dike is present around the eastern side of the pond. This dike has a height of approximately 1 to 3 feet above ground surface. Operationally, the average water surface elevation is maintained at an elevation of 768 ft MSL, while the elevation of the bottom of the pond is approximately 760 ft MSL. **Figure 1** shows the location of the pond.

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3.0 LOCATION DEMONSTRATIONS

3.1 PLACEMENT ABOVE UPPERMOST AQUIFER (§257.60(a))

> Per §257.60 (a) of the Rule, *"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)."*

The North Ash Pond is underlain by fly ash and bottom ash that were disposed in a former impoundment constructed on top of glacial outwash. The glacial outwash is comprised of interbedded silty sand, sandy silt, and sand and gravel. Sand and gravel becomes more prevalent with increasing depth. The top of rock lies at depths ranging from 45 feet to more than 120 feet below ground surface (bgs). The depth to the top of bedrock varies because pre-glacial tributaries to the Beaver River were filled with glacial outwash as the glaciers receded. Bedrock underlying the North Ash Pond belongs to the Pottsville Group of the Pennsylvanian System. The Pottsville Group is comprised mostly of sandstone with minor shale and conglomerate beds and some locally economically important coal beds.

Persistent shallow groundwater exists within the ash and upper portion of the glacial outwash deposits. Hence, the uppermost aquifer in the area of the North Ash Pond is an unconfined aquifer that exists in the unconsolidated materials (ash, fill, and glacial outwash deposits) that is laterally continuous across the site and vertically continuous below the top of the groundwater table. The unconsolidated materials are recharged primarily by infiltrating precipitation, and it is likely that some recharge also occurs from the forested upland east of the North Ash Pond. Groundwater in the area of the North Ash Pond flows westward and southward toward the Beaver River and McKee Run, both of which represent the principal groundwater discharge zones in this area.

The groundwater monitoring system for the North Ash Pond is comprised of four wells, including Well MP-20 (upgradient), and Wells MP-21, MP-22, and MP-23 (downgradient). The locations of the groundwater monitoring wells is shown on **Figure 2**, along with depiction of the generalized groundwater flow direction in the area of the pond.

The groundwater elevation in each of these wells (representing the upper surface of the uppermost aquifer) has been monitored on a routine basis since the inception of the CCR Rule. A summary of these observations is provided in **Table 1**.

TABLE 1 Groundwater Level Observations Near North Ash Pond				
Monitoring Date	Groundwater Elevation (ft MSL)			
	MP-20	MP-21	MP-22	MP-23
December 29, 2015	766.13	765.68	764.41	759.66
March 2, 2016	766.55	766.09	764.59	754.89
June 2, 2016	766.13	765.63	763.89	754.80
September 8, 2016	763.41	762.86	761.33	750.96
December 1, 2016	764.11	763.54	761.92	753.21
March 2, 2017	766.95	766.53	765.03	761.40
May 31, 2017	768.15	767.65	766.06	762.92
August 30, 2017	765.05	764.62	763.17	760.38
October 9, 2017	764.22	763.81	762.42	760.36
May 24, 2018	766.71	766.14	764.35	762.00
Highest Water Level:	768.15	767.65	766.06	762.92
Lowest Water Level:	763.41	762.86	761.33	750.96
Average Water Level:	765.74	765.26	763.72	758.06

As shown in **Table 1**, the highest observed groundwater elevation in all wells was recorded on May 31, 2017. The groundwater elevations from this date have been developed into a potentiometric surface and overlain on an aerial image of the ponds, as presented on **Figure 3**. As shown, the groundwater surface is greater than elevation 755.0 ft MSL in the location of the North Ash Pond; this elevation serves as the 5-ft vertical offset from the estimated bottom of the pond (i.e., 760.0 ft MSL – 5 ft separation = elevation 755.0 ft MSL). Upon closer examination of Figure 3, it is further observed that the groundwater suface from the May 31, 2017 monitoring event was actually 10-12 feet above the bottom of the pond. Moreover, nearly all of the respective monitoring events shown above in Table 1 would yield potentiometric surfaces affirming a fairly consistent connection with the bottom of the pond and the underlying aquifer. This information demonstrates that the North Ash Pond does not comply with the requirements of §257.60(a).

3.2 WETLANDS (§257.61(a))

> Per §257.61 (a) of the Rule, *"new CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section."*

Wetlands are defined under §232.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas"

APTIM reviewed the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) Database Surface Waters and Wetlands Map to determine whether wetlands are shown to overlap with the ponds. The map, presented as **Figure 4**, does not show any wetlands in or near the ponds, which is consistent with observed field conditions.

These data sources are presented as demonstration of compliance with the requirements of §257.61(a).

3.3 FAULT AREAS (§257.62(a))

> Per §257.62 (a) of the Rule, "n*ew CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit."*

APTIM compared the location of the North Ash Pond to the location of faults that have undergone displacement during the Holocene time, as shown in the United States Geological Survey (USGS) Quaternary Fault and Fold Database for the United States. There are no known faults that are identified within 200 feet of the North Ash Pond. This information demonstrates compliance with the requirements of §257.62(a).

3.4 SEISMIC IMPACT ZONE (§257.63(a))

> Per §257.63 (a) of the Rule, "n*ew CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site."*

A seismic impact zone is an area where with a ten percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitation pull (g), will exceed 0.10g in 250 years. Probabilistically, this is equal to a two percent or greater probability within a 50-year timeframe.

APTIM compared the location of the North Ash Pond to the location of seismic impact zones, as defined in §257.53, using the USGS map "Two Percent Probability of Exceedance in 50 Years Map of Peak Ground Acceleration", shown in **Figure 5**. The maximum ground acceleration for the location of the pond is estimated to be 0.059g, and is therefore not considered a seismic impact zone. This information demonstrates compliance with the requirements of §257.63(a).

3.5 UNSTABLE AREAS (§257.64(a))

> Per §257.64 (a) of the Rule, "a*n existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted."*

APTIM evaluated the location of the North Ash Pond for the presence of on-site or local unstable areas, as defined in §257.53. Evaluations of the conditions listed in §257.64(b)(1)-(3) were conducted and are discussed in the following subsections. Based on these evaluations, APTIM concludes that the pond is not located within an unstable area and is compliant with the requirements of §257.64(a).

The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

3.5.1 Unstable Factors Considered: Differential Settling (§257.64(b)(1))

On-site or local soil conditions that may result in significant differential settling;

As previously discussed, the North Ash Pond is underlain by fly ash and bottom ash that were disposed in a former impoundment constructed on top of glacial outwash. The glacial outwash is comprised of interbedded silty sand, sandy silt, and sand and gravel. Sand and gravel becomes more prevalent with increasing depth. Bedrock underlying the outwash in the vicinity of the site consists of Pennsylvanian-age Homewood sandstone and Mercer shale ranging from 45 feet to more than 120 feet below ground surface. The cohesive glacial outwash materials are generally not compressible and unlikely to undergo differential settlement. The placed ash may have undergone initial compression, which would have been largely complete prior to the construction of the North Ash Pond. No loess or compressible materials underlie the pond. Therefore, the on-site or local soil conditions are unlikely to result in significant differential settling.

3.5.2 Unstable Factors Considered: Geologic/Geomorphologic Features (§257.64 (b)(2))

On-site or local geologic or geomorphologic features;

The North Ash Pond was evaluated for the presence of on-site or local geologic and geomorphologic features, including the presence of karst terrain, steep slopes, and sinkholes. These features are not observed at the North Ash Pond. The underlying bedrock (sandstone and shale) is not conducive to karst features. No evidence of geologic/geomorphologic features contributing to an unstable condition has been observed during annual inspections. Based on a review of this information and site inspections, it was concluded that there is low probability that local geologic or geomorphologic features could feasibly result in an unstable condition at the pond.

3.5.3 Unstable Factors Considered: Human-made Features or Events (§257.64 (b)(3))

On-site or local human-made features or events (both surface and subsurface).

Based on the information provided, there are no on-site or local human-made features (surface or subsurface) that would create a potentially unstable condition to develop in the area of the ponds. This includes a determination that no former or currently active mining operations underlay this local area of the ponds.

Based on the evidence presented above in Sections 3.5.1 through 3.5.3, the North Ash Pond is not located in an unstable area and meets the requirements of §257.64(b)(1)-(3), and in turn, the requirements of §257.64(a).

4.0 SUMMARY

The New Castle Generating Station operates one CCR surface impoundment, which is known as the North Ash Pond. This pond meets some, but not all, location restrictions, as defined within §257.60 through §257.64, as summarized below in **Table 2**.

Table 2
Location Restriction Compliance Demonstration Summary

40 CFR Section	Location Restriction Description	Demonstration Provided
§257.60(a)	Placement above the uppermost aquifer	No
§257.61(a)	Wetlands	Yes
§257.62(a)	Fault Areas	Yes
§257.63(a)	Seismic Impact Zone	Yes
§257.64(a)	Unstable Areas	Yes

Due to the fact that all location restriction demonstrations cannot be made for the North Ash Pond, the pond is subject to closure requirements specified in §257.101(b)(1)(i).

5.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

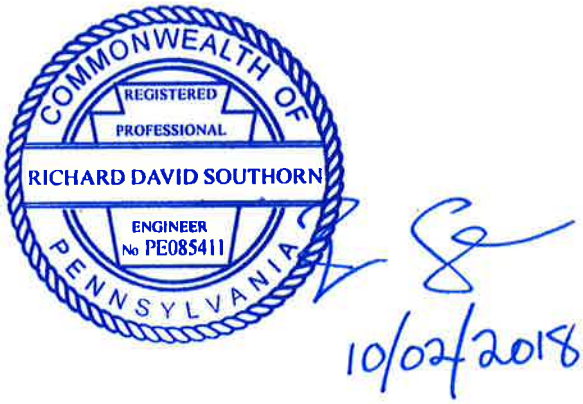
I, the undersigned Professional Engineer licensed in the Commonwealth of Pennsylvania, am familiar with the requirements of the CCR Rule Section 257. It is my professional opinion that the impoundment described in this report meets the requirements of §§257.61(a), 257.62(a), 257.63(a), and 257.64(a), but is not compliant with the requirements of §257.60(a). The basis of this professional opinion is described within this report and is limited to the available information known to APTIM. This professional opinion is not to be interpreted or construed as a guarantee, warranty, or legal opinion.

Name of Professional Engineer: Richard Southorn, P.E.,P.G.

Company: APTIM

PE Registration Number: PE 085411

Professional Engineer Seal:



6.0 REFERENCES

APTIM (2017), CCR Compliance Groundwater Monitoring and Corrective Action Annual Report Ash Filter Ponds and Ash Disposal Site.

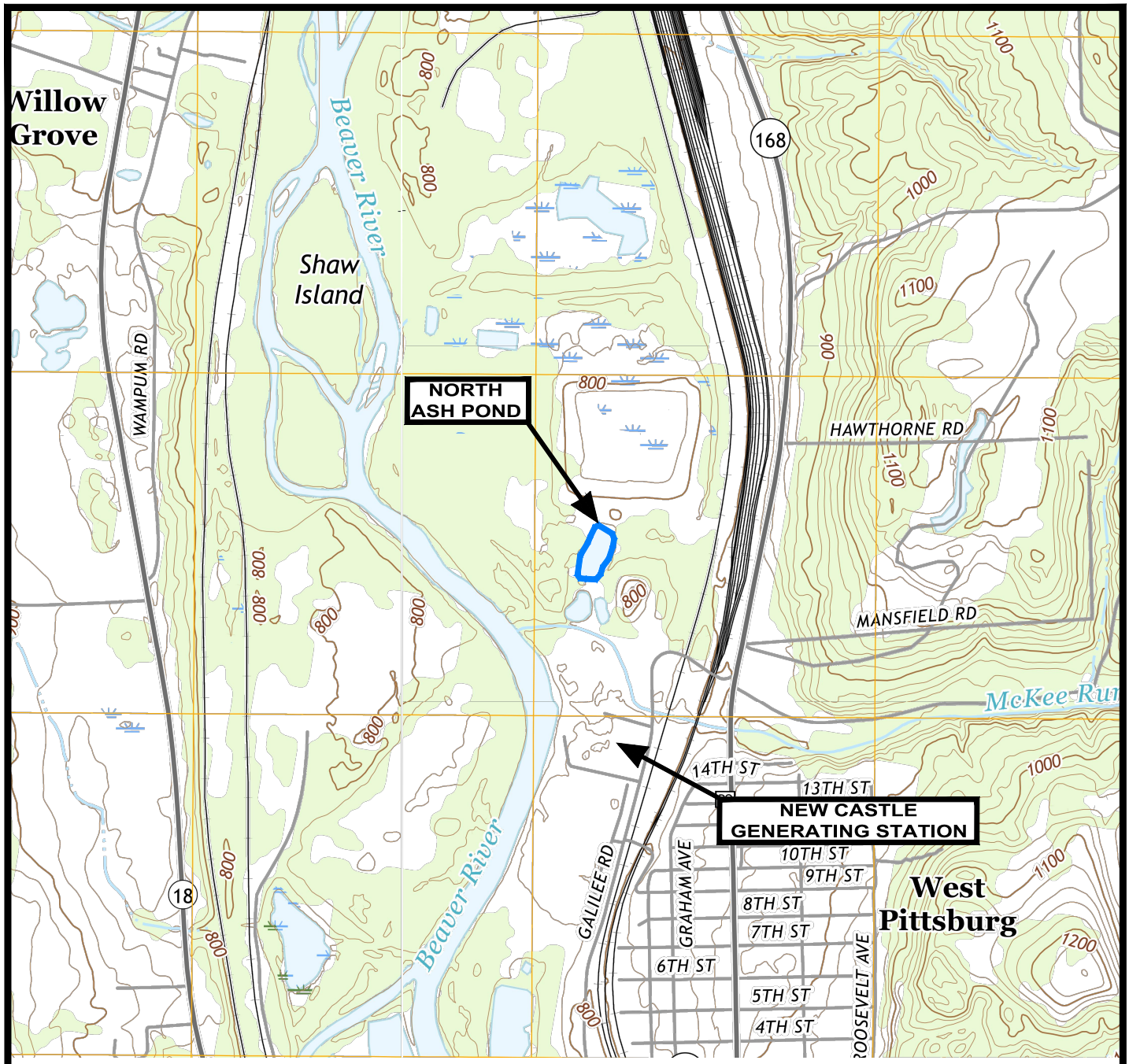
Civil & Environmental Consultants, Inc. (2008), Application for Major Permit Modification for Vertical Expansion and Permit Renewal.

O'Brien and Gere (2014), Dam Safety Assessment of CCW Impoundments, NRG Power Midwest LP New Castle Generating Station.

Pennsylvania Department of Environmental Protection (2018) Pennsylvania Oil and Gas Mapping Application.

Pennsylvania Department of Environmental Protection (2018) Pennsylvania Mine Map Atlas and Pennsylvania Historic Underground Mine Map Inventory System (PHUMMIS).

U.S. Environmental Protection Agency (2015), Hazardous Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, Federal Register Volume 80, No. 74 40 CFR Parts 257 and 261, April 17, 2015.



LEGEND

APPROXIMATE CCR UNIT BOUNDARY

N

0 1500'

GRAPHIC SCALE

NOTES

1. TOPOGRAPHY OBTAINED FROM USGS 7.5-MINUTE SERIES, NEW CASTLE SOUTH AND BESSEMER QUADRANGLE, PENNSYLVANIA, 2016.
2. ALL BOUNDARIES ARE APPROXIMATE

APTIM Environmental & Infrastructure, Inc.

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NEW CASTLE GENERATING STATION

FIGURE 1
SITE LOCATION PLAN

APPROVED BY:	RDS	PROJ. NO.:	1009194003	DATE:	SEPT. 2018

T:\AutoCAD\Projects\NRG\CCR - Location Evaluation Figures\New Castle\Impoundments\Figure 1 - Site Location (Impoundments).dwg, 9/26/2018 2:45:56 PM, AutoCAD PDF (High Quality Print).pc3

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	1/31/18	--	E. Schlegel	--	--	1009194003-B5

LEGEND:

MP-11 (776.06) — CCR GROUNDWATER MONITORING WELL FOR NEW CASTLE PLANT ASH LANDFILL WITH GROUNDWATER ELEVATIONS MEASURED ON OCTOBER 10, 2017.

MP-23 (760.36) — CCR GROUNDWATER MONITORING WELL FOR NORTH ASH POND WITH GROUNDWATER ELEVATIONS MEASURED ON OCTOBER 9, 2017.

GROUNDWATER FLOW DIRECTION

SCALE
0 400 800 FEET

REFERENCES:

1. GOOGLE AERIAL PHOTOGRAPH, DATED 9/11/2012.

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Pittsburgh, Pennsylvania 15235

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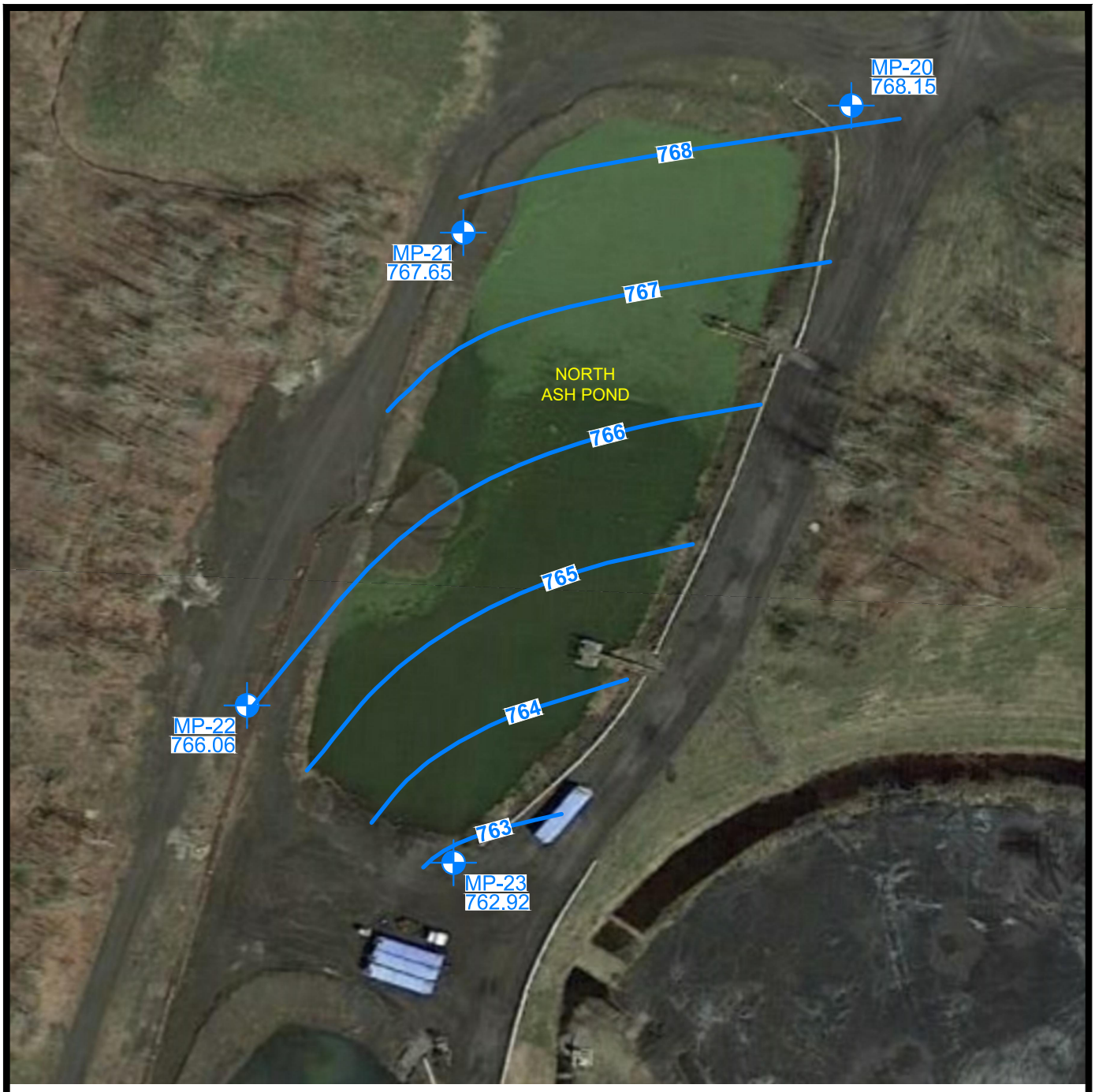
FIGURE 2
CCR COMPLIANCE GROUNDWATER MONITORING WELL LOCATION MAP
PLANT ASH LANDFILL AND NORTH ASH POND

NEW CASTLE GENERATING STATION
NEW CASTLE, PENNSYLVANIA

File: O:\PROJECT\1009194003_New Castle\1009194003-B5.dwg
Plot Date/Time: Jan 31, 2018 - 9:15am
Plotted By: Evan.Schlegel
Xref:
Image



LEGEND

MONITORING WELL

764 POTENTIOMETRIC CONTOUR

N

0 100'

GRAPHIC SCALE

NOTES

1. AERIAL IMAGERY OBTAINED FROM GOOGLE EARTH PRO DATED APRIL 2016.
2. POTENTIOMETRIC DATA COLLECTED DEC. 2015 - MAY 2018. (HIGHEST WATER LEVEL OBSERVED)

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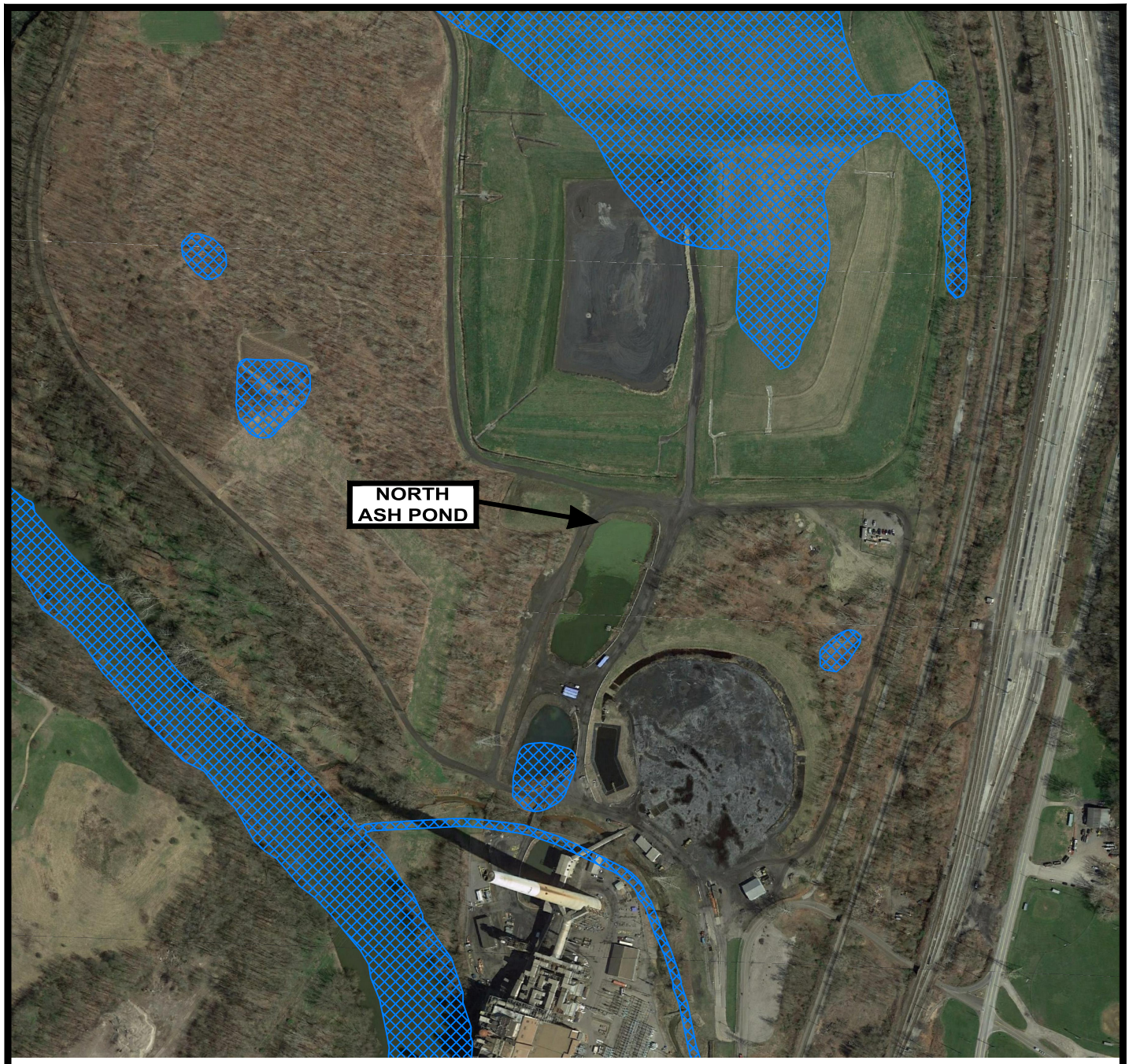
NEW CASTLE GENERATING STATION

FIGURE 3
UPPERMOST AQUIFER
POTENTIOMETRIC SURFACE: HIGHEST WATER LEVEL

APPROVED BY:	RDS	PROJ. NO.:	1009144003	DATE:	SEPT. 2018

T:\AutoCAD\Projects\NRG\CCR - Location Evaluation Figures\New Castle\Impoundments\Figure 3 - Potentiometric.dwg, 9/26/2018 2:46:13 PM, AutoCAD PDF (High Quality Print).pc3



LEGEND

APPROXIMATE NATIONAL WETLAND INVENTORY (NWI) WETLAND BOUNDARY

N

0 500'

GRAPHIC SCALE

NOTES

1. AERIAL IMAGERY OBTAINED FROM GOOGLE EARTH PRO DATED APRIL 2016.
2. APPROXIMATE WETLAND BOUNDARIES OBTAINED FROM THE UNITED STATES FISH AND WILDLIFE SERVICES NATIONAL WETLANDS INVENTORY DATABASE. WETLAND DELINEATIONS ARE PHOTO INTERPRETED USING IMAGERY FROM 1982.

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NEW CASTLE GENERATING STATION

FIGURE 4
NATIONAL WETLANDS INVENTORY

APPROVED BY:	RDS	PROJ. NO.:	1009194003	DATE:	SEPT. 2018

USGS
science for a changing world

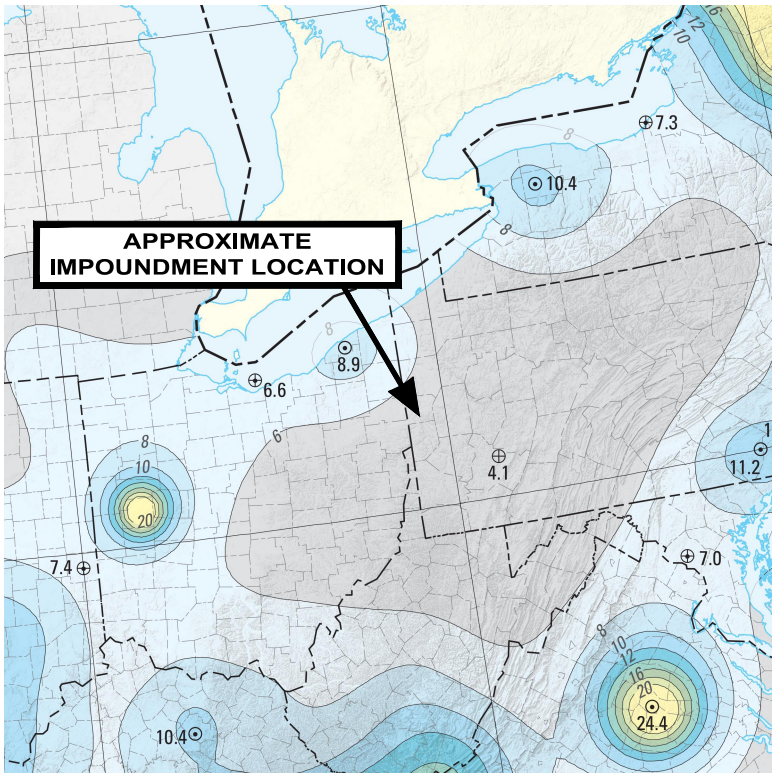
Earthquake Hazards Program

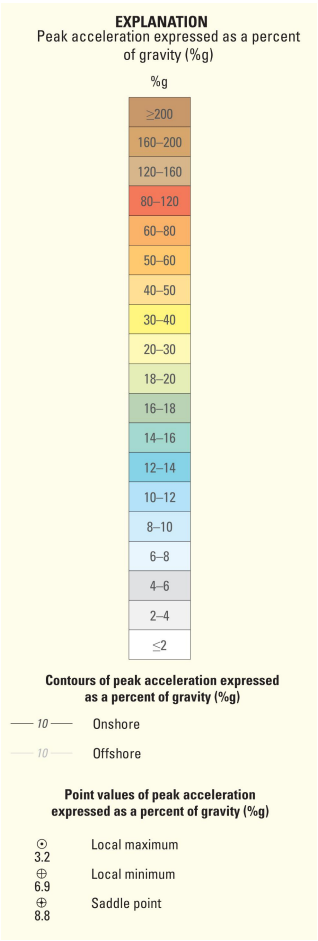
LOCATION 40.942004 Lat. -80.368159 Long.

The interpolated probabilistic ground motion values, in %g, at the requested point are:

P.E. %	Exp. Time (years)	Ground Motion (g)
2	50	0.0592

U.S. NATIONAL SEISMIC HAZARD MAPS: Peterson, M.D., et al, 2014





Peak Horizontal Acceleration with 2% Probability of Exceedance in 50 Years

NOTES

1. Information obtained from the United States Geological Survey website.

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NEW CASTLE GENERATING STATION

FIGURE 5
MAP OF HORIZONTAL ACCELERATION

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