September 28, 2016 Project No. 1651599

Mr. Joseph E. Kutch
Coal Combustion Residuals Program Manager
Northern Indiana Public Service Company
2755 Raystone Drive
Valparaiso, IN 46383

RE: NIPSCO - R.M. SCHAHFER GENERATING STATION, WHEATFIELD, JASPER COUNTY, INDIANA – WASTE DISPOSAL AREA – HISTORY OF CONSTRUCTION

Dear Mr. Kutch:

The United States Environmental Protection Agency (EPA) promulgated the Resource Conservation and Recovery Act (RCRA) Coal Combustion Residuals (CCR) Final Rule (CCR Rule) on April 17, 2015. The CCR Rule requires that owners or operators of existing CCR surface impoundments with a height of five feet or more and a storage volume of 20 acre-feet or more compile a history of construction, which shall contain, to the extent feasible, the information specified in 40 CFR 257.73 (c)(1)(i) through (xi).

Golder Associates Inc. (Golder) was retained by Northern Indiana Public Service Company (NIPSCO) to assist in the compilation of the necessary documentation associated with construction of the Waste Disposal Area (WDA) CCR unit located at the R.M. Schahfer Generating Station (RMSGS). This letter report details the available information, figures, and previous reports associated with the WDA pursuant to 40 CFR 257.73 (c)(1)(i) through (xi).

The documents reviewed are listed below.

Table 1: Construction Background Documentation

Document	Date	Author
Various construction drawings	1982	Sargent & Lundy Engineers
Assessment of Dam Safety of Coal Combustion Surface Impoundments, NIPSCO, RM Schahfer Generating Station	July 2010	CDM for the EPA
Report on Inspection of The Waste Disposal Area	January 2011	Golder Associates Inc.
Final Hazard Classification Review Report – NIPSCO Schahfer Generating Station	January 2011	Golder Associates Inc.
Embankment Elevation Survey, Waste Disposal Area and Recycle Pond, NIPSCO Schahfer Generating Station	December 2011	Marbach, Brady and Weaver, Inc.
Schahfer Spillway Hydrologic and Hydraulic Evaluation	December 2011	Golder Associates Inc.

Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, MI 48906 USA
Tel: (517) 482-2262 Fax: (517) 482-2460 www.golder.com

Final Geotechnical Investigation and Embankment Stability Analyses	June 2012	Golder Associates Inc.
Report on Inspection of The Waste Disposal Area	September 2012	Golder Associates Inc.
Construction in a Floodway Permit Application, NIPSCO R.M. Schahfer Generating Station	November 2012	Golder Associates Inc.
Basin Operation, Maintenance and Inspection Plan, NIPSCO R. M. Schahfer Generating Station	February 2013	Golder Associates Inc.
Emergency Action Plan, Final Settling Basin (FSB), Intake Settling Basin (ISB), Waste Disposal Area (WDA), Recycle Basin (RB), Northern Indiana Public Service Company (NIPSCO), R.M. Schahfer Generating Station	February 2013	Golder Associates Inc.
State of Indiana Department of Natural Resources (DNR), Certificate of Approval, After-the-Fact, Construction in a Floodway	April 23, 2013	State of Indiana DNR
Report on Inspection of The Waste Disposal Area	April 2014	Golder Associates Inc.
Construction Observation Documentation Report, Surface Water Basin Erosion Repairs, NIPSCO R.M. Schahfer Generating Station	October 2014	Golder Associates Inc.
First Annual RCRA CCR Unit Inspection Report – NIPSCO Schahfer Generating Station	January 2016	Golder Associates Inc.

1.0 40 CFR 257.73 (C)(1)(I) – CCR UNIT NAME AND ADDRESS OF OWNER

Owner and Address:

Northern Indiana Public Service Company (NIPSCO)
R.M. Schahfer Generating Station
2723 East 1500 North
Wheatfield, Jasper County
Indiana
46392

CCR Unit: Waste Disposal Area (WDA)

Indiana Department of Water State Inventory Identification Number: FW-26932

CCR Unit Contact: Joseph E. Kutch, Coal Combustion Residuals Program Manager, Phone: 1-800-464-7726.

2.0 40 CFR 257.73 (C)(1)(II) – CCR UNIT LOCATION

The WDA CCR Unit is located in Wheatfield, Jasper County, Indiana, as shown on Figure 1 – Site Location Map, attached. An aerial view of the WDA is shown on Figure 2, attached.

3.0 40 CFR 257.73 (C)(1)(III) – CCR UNIT PURPOSE

The WDA was designed by Sargent & Lundy Engineers of Chicago, Illinois in 1982. The WDA is formed by a ring earth-fill dike with slurry trench core that is approximately 17 feet high and 7,540 feet long (including the common embankment) with a crest elevation of 681 feet above mean sea level (Marbach, 2011). The WDA was constructed for NIPSCO, put in service in 1982, and has been continuously owned and operated by NIPSCO.

The WDA accepts sluiced bottom ash and boiler slag CCR and various sump discharges from the generating station. The sluiced CCR enters the WDA via elevated pipes at the north side and also via buried pipes located at the northwest corner, the pipes do not penetrate the slurry wall core. Water exits the WDA via an overflow weir, to the Recycle Basin, or through the auxiliary spillway located at the northwest side. The overflow weir is located at the southern end of the east side of the WDA. There is a spillway consisting of two, 24 inch diameter corrugated steel pipes with a concrete down-slope channel transitioning to a rip-rap lined downstream channel located near the northwest corner of the WDA. The east side of the WDA is common with the west side of the adjacent Recycle Basin. A survey of the WDA was performed by Marbach, Brady and Weaver, Inc. in December 2011 (Marbach, 2011).

4.0 40 CFR 257.73 (C)(1)(IV) – CCR UNIT WATERSHED

According to the Indiana Geological Survey's, IndianaMap Viewer website (http://maps.indiana.edu/layerGallery.html?category=Watersheds), the WDA is located within the Upper Mississippi Region Watershed, and more specifically the Upper Illinois Watershed. The Sub-basin is the Kankakee watershed. The area of the first-level watershed is 1,938,427 square meters (3,029 square miles).

5.0 40 CFR 257.73 (C)(1)(V) – FOUNDATION DESCRIPTION

Golder performed a geotechnical investigation of the WDA and prepared the *2012 Geotechnical Investigation and Embankment Stability Analyses* report, dated August 27, 2012. Topographically, the area is generally flat to gently rolling with isolated hills. In the northern and northeastern portions of Jasper County where the WDA is located, the soil is sandy, and is interspersed with sandy knolls and ridges. The northern part of the county is covered by Pleistocene aged, alluvial sand overlying shale of Carboniferous age.

The WDA is located in a rural area and is surrounded by farmland, forested areas, and isolated farm buildings to the south, and by the generating station and other infrastructure to the north. The Recycle Basin is contiguous to the east. The Retired WDA is contiguous to the north.

5.1 Physical Properties of Foundation Materials

Based on the site specific available boring logs (Golder, 2012), the site is underlain by a relatively uniform deposit of coarse to fine sand with traces of gravel and silt overlying shale bedrock. Locally, there is a clayey or fine-grained deposit just above the shale bedrock, but this stratum is not evident at all boring locations.

Based on the available construction drawings (Sargent and Lundy, 1982), the WDA embankment is constructed of the native sand materials obtained from on-site borrow areas. The embankment footprint was stripped to a depth of approximately 1 foot below natural grade prior to embankment construction. The embankment fill placement and compaction was completed prior to construction of the slurry trench, which is located along the embankment centerline. The slurry trench is approximately 1.5 feet wide, and extends from 2 feet below the embankment crest down to the shale bedrock. The interior of the WDA is at

approximately original ground surface elevation less the approximate 1 foot strip depth. The WDA's inlet and outlet pipes are located above the top of the slurry trench and do not penetrate it.

5.2 Engineering Properties of Foundation Materials

The *Final 2012 Geotechnical Investigation and Embankment Stability Analyses*, prepared by Golder, was referenced during the file review for the WDA. Historic construction drawings and technical specifications suggest that the WDA was constructed with reasonable and sound construction practices. However, it cannot be determined with complete certainty that the available specifications apply to the WDA embankment construction. Select drawings (Sargent and Lundy, 1982) can be attributed to the WDA, and these drawings indicate reasonable construction configurations, e.g. 3 horizontal to 1 vertical (3H:1V) upstream and downstream side slopes; embankment constructed of controlled compacted fill; central slurry trench extending down to shale bedrock at depth; inlet and outlet pipes that do not penetrate the slurry trench; rip-rap with bedding on the upstream slope; reinforced concrete structures at the primary and auxiliary spillway, and inlet and outlet pipes; and detailed surface water control around the structure.

The available historic construction drawings also contain some geotechnical data indicating relatively uniform embankment foundation conditions at the WDA consisting of coarse to fine sand with traces of gravel and silt down to shale bedrock at a depth of approximately 40 feet. .

Based on the *2012 Geotechnical Investigation and Embankment Stability Analyses*, cone penetration soundings were conducted in June 2011 at the WDA. Four cone penetration test (CPT) probes were advanced at the WDA. The subsurface conditions encountered during the June 2011 investigation are reasonably consistent with those encountered during the previous CPT probing performed at the site, and also with information available from previous historic geotechnical information at the site. The exploration indicated subsurface conditions are dense to very dense Sand to Silty Sand from ground surface to the full depth of the exploration. The geotechnical model for the WDA is dense Silty Sand (embankment fill) overlying dense Silty Sand (subgrade). Figure 3, below, shows the design cross section of the WDA, and Figure 4, below, shows the geotechnical model for the WDA.

Figure 3: WDA Design Cross Sections from Sargent and Lundy (1982)

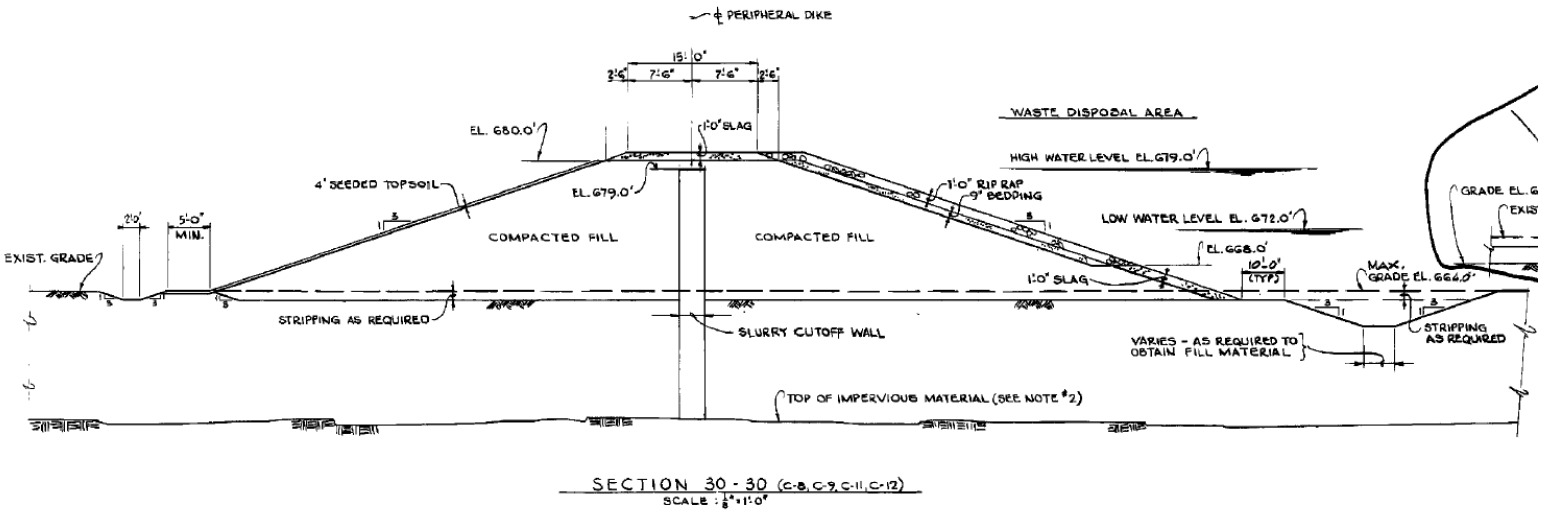
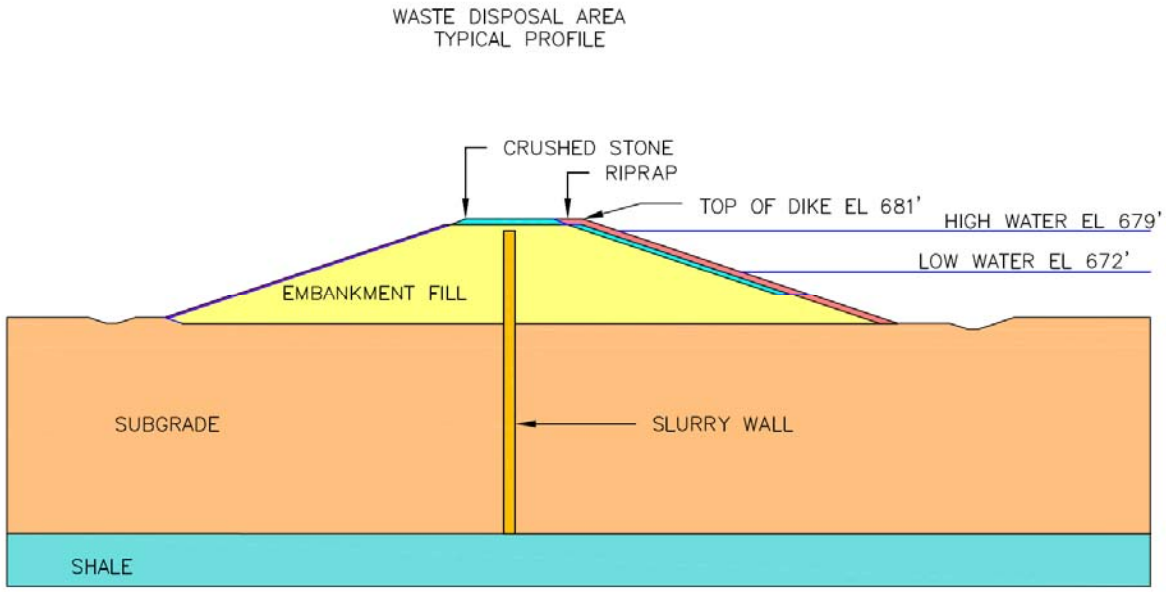


Figure 4: Geotechnical Model at the Waste Disposal Area Embankment (not to scale)



Material properties of each of the modeled layers are included in Table 1 below. These properties are based on the geotechnical investigation and associated laboratory testing that was performed by Golder (Golder, 2012).

Table 1: Geotechnical Model Material Properties

Material	Internal Friction Angle (deg.)	Peak Cohesion (psf)	Dry Unit Weight (pcf)	Saturated Unit Weight (pcf)	Undrained Shear Strength (psf)	Layer Thick-ness (ft)
Embank-ment Fill	42	0	125	135	NA	Varies
Topsoil	35	0	120	120	NA	0.5
Existing Subgrade	39	0	110	125	NA	Varies
Slurry Wall	NA	300	NA	NA	NA	Varies
Riprap	45	0	140	145	NA	1
Crushed Stone/Slag	45	0	140	145	NA	Varies
Loose Silty Sand Subgrade	37	0	125	132	NA	Varies
Shale	45	0	145	150	0	Varies

Notes: deg. = degrees, psf = pounds per square foot, pcf = pounds per cubic foot, ft = feet, and cm/s = centimeters per second.

6.0 40 CFR 257.73 (C)(1)(VI) – CONSTRUCTION INFORMATION

Available applicable Sargent & Lundy (1982) construction drawings provided by NIPSCO were reviewed and utilized during the preparation of this letter report.

A crest survey was performed the week of December 19, 2011 by Marbach, Brady & Weaver, Inc. (Marbach 2011). Survey data was obtained at 50 foot intervals along the crest centerline and embankment cross-section data was obtained on 500 foot intervals. Note that the 2011 survey reference vertical datum is North American Vertical Datum (NAVD) 88, while the original Sargent & Lundy construction drawing reference is U.S. Geological Survey (USGS) 1929 vertical datum adjustment.

The WDA was constructed for NIPSCO, put in service in 1982, and has been continuously owned and operated by NIPSCO. The WDA was designed by Sargent & Lundy Engineers of Chicago, Illinois. The WDA is formed by a ring dike approximately 7,540 feet long (including the common embankment). The constructor of the WDA is not known. Salisbury Engineering of Griffiths, Indiana performed at least some of the historical geotechnical soil borings and geotechnical laboratory testing associated with the WDA geotechnical investigation and subsurface characterization. An additional geotechnical investigation was performed by Golder in 2011/2012.

7.0 40 CFR 257.73 (C)(1)(VII) – CONSTRUCTION DRAWINGS

Available applicable Sargent & Lundy (1982) construction drawings provided by NIPSCO were reviewed and utilized during the preparation of this letter report.

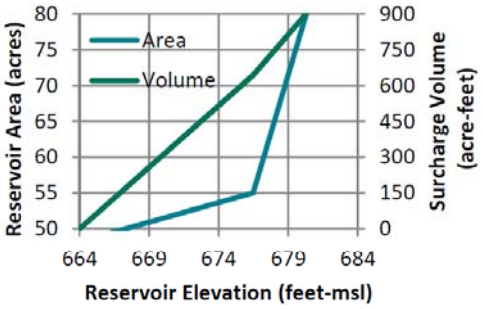
8.0 40 CFR 257.73 (C)(1)(VIII) – EXISTING INSTRUMENTATION

No existing piezometers or other monitoring equipment is present at the time of this letter report.

9.0 40 CFR 257.73 (C)(1)(IX) – AREA CAPACITY CURVES

Area capacity curves for the WDA were calculated by Golder during the completion of the Analyses of the hydraulic capacity of the WDA spillway system which was completed in December 2011 and included with the *Construction in a Floodway Permit Application, NIPSCO R.M. Schahfer Generating Station*, dated November 2012. The WDA is an "offline" structure, and is an elevated structure, so it has no drainage area beyond the inside crest of the ring dike. The area capacity curve prepared for the WDA is shown on Figure 5 below.

Figure 5: WDA Area Capacity Curve



Upstream Slope = 3 :1 (h:v)

Horizontal Offsets

Bottom to Normal Pool = 37.5 feet

Normal Pool to Top = 11.4 feet

	Elevation (feet-msl)	Area (acres)	Volume (acre-feet)
Bottom of Pond	664.0	48.2	0
Normal Pool	676.5	55.0	645
Top of Dam	680.3	80.0	901
	683.0	80.0	1118

Upstream slope from the design drawing set: Grading, Road Work & Drainage Plan prepared by Sargent and Lundy (1983).
Horizontal Offset = Upstream Slope x (Normal Pool Elevation - Bottom of Pond Elevation)
Horizontal Offset = Upstream Slope x (Top of Dam Elevation - Normal Pool Elevation)

10.0 40 CFR 257.73 (C)(1)(X) – SPILLWAY AND DIVERSION DESCRIPTIONS

The location of the WDA relative to the generating station and surrounding structures is shown on Figure 1, attached. A closer aerial view of the WDA is shown on Figure 2, attached. The WDA accepts sluiced water containing ash, slag and various sump discharges from the generating station. The sluiced water enters the WDA via elevated pipes at the north side and also via pipes located at the northwest corner. Water exits the WDA via an overflow weir, to the Recycle Basin. The overflow weir is located at the southern end of the east side of the WDA. There is an emergency spillway consisting of two, 24 inch diameter corrugated steel pipes with a concrete down-slope channel with a rip-rap lined downstream channel located near the west-northwest corner of the WDA. The east side of the WDA is common with the west side of the adjacent Recycle Basin.

SIZE AND PHYSICAL DATA

Designed Crest Elevation:	681 feet above mean sea level (ft MSL) (USGS 29) based on construction drawings
Current Lowest Crest Elevation:	680 ft MSL based on the December 2011 (Marbach, 2011) crest survey (NAVD 88)
Surrounding Ground Elevation:	Approximately 664 ft MSL
High Water Level:	678.9 ft MSL based on invert elevations of spillway pipes
Height:	17 feet
Surface Area:	75.5 acres
Reservoir Volume:	1,530 acre-feet

11.0 40 CFR 257.73 (C)(1)(XI) – SURVEILLANCE, MAINTENANCE, AND REPAIR INFORMATION

The current Operation, Inspection, and Maintenance (OIM) Plan was prepared by Golder and finalized in February 2013, and implemented by NIPSCO in 2014. The current OIM Plan outlines a regular program of safe operation, maintenance, and monitoring of the four largest surface impoundments at NIPSCO's R. M. Schahfer Generating Station. It defines methods and responsibilities for inspecting and maintaining the basins to detect potential problems at an early stage, to reduce the likelihood of large-scale problems developing, and to avert potential failure of an embankment or some other associated part of a basin.

Minor erosion repairs were installed around the perimeter of the WDA in April, May and June of 2014. The repair activities were performed in substantial accordance with the plans, details, and specifications included with the April 14, 2014 Erosion Repair Construction Drawings, prepared by Golder (Golder, 2014). The drawings were prepared to comply with the RMSGS, State of Indiana Department of Natural Resources (IDNR) Certificate of Approval, After-the-Fact Construction in a Floodway, for Application Number FW-26932, dated April 25, 2013, under authority of Indiana Administrative Code IC 14-27-7.5 with 312 IAC 10.5.

12.0 40 CFR 257.73 (C)(1)(XII) – STRUCTURAL INSTABILITY KNOWLEDGE

A geotechnical model of the embankment and embankment foundation was developed based on the conditions inferred from the geotechnical investigation. Slope stability analyses were performed on the modeled slopes using Rocscience 'Slide' software (Golder 2012). The analyses were performed in general accordance with Indiana Department of Natural Resources, Division of Water guidelines. The analyses

results indicate acceptable factors of safety for all cases considered when evaluated with respect to US Army Corps of Engineers criteria for the conditions analyzed.

Golder has also performed numerous inspections of the WDA at the RMSGS in accordance with the site's Permit FW-26932 and with applicable provisions of the USEPA CCR Final Rule. The inspections included a review of the previous inspection reports and recommendations for the site as well as an onsite visual inspection of the impoundment and landfill facilities. Based on the conditions observed at the time of inspection, no significant changes have occurred at the WDA since the previous inspection.

Sincerely,

GOLDER ASSOCIATES INC.

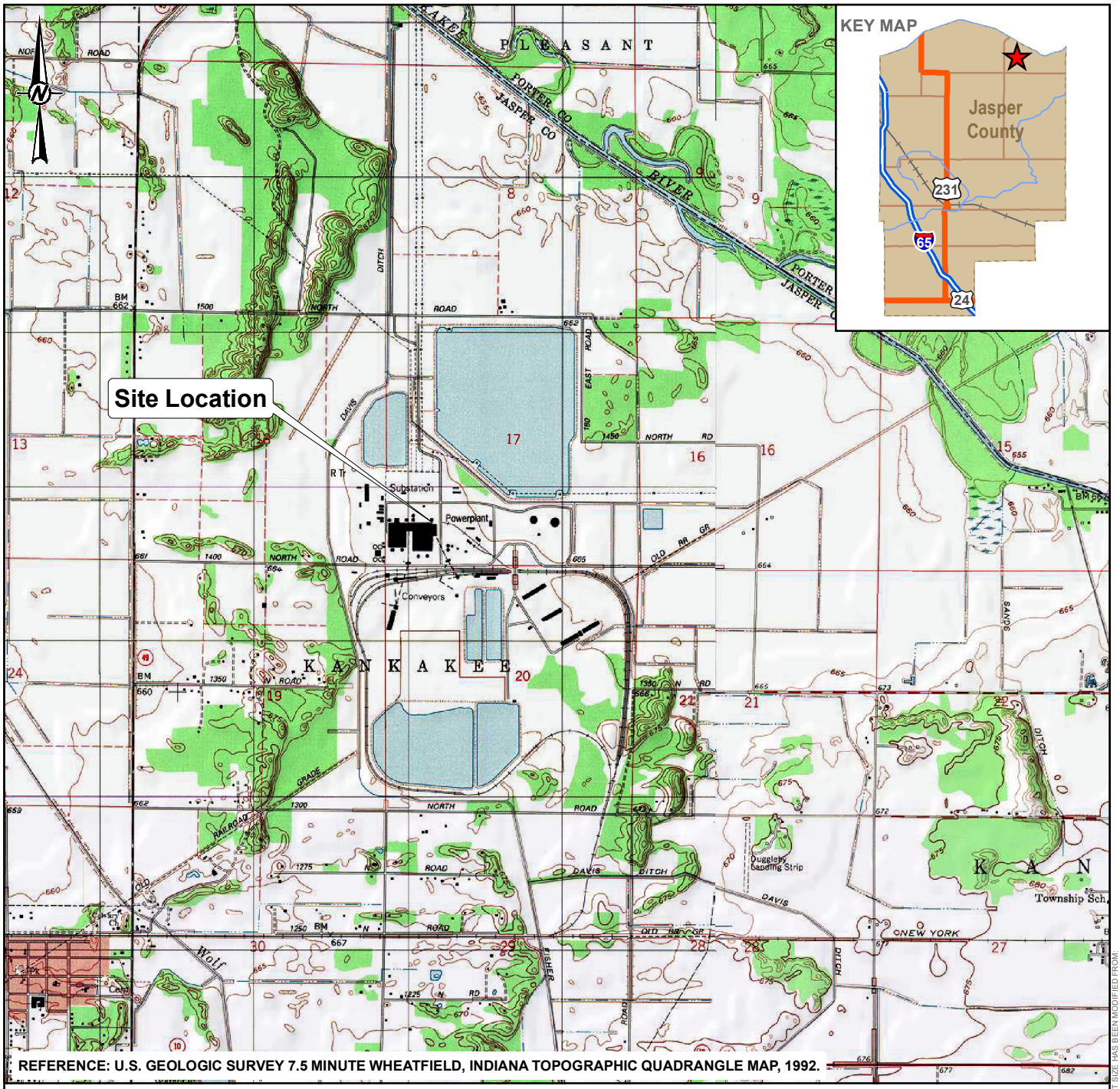
Tiffany D. Johnson, P.E.
Senior Consultant

David M. List, P.E.
Principal

Attachments:

Figure 1 – Site Location Map

Figure 2 – Site Plan – Waste Disposal Area



REFERENCE: U.S. GEOLOGIC SURVEY 7.5 MINUTE WHEATFIELD, INDIANA TOPOGRAPHIC QUADRANGLE MAP, 1992.

0 4,000 8,000

APPROXIMATE SCALE FEET

Indiana

CLIENT
NIPSCO

PROJECT
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
SITE LOCATION MAP

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-9-28
PREPARED	JJS
DESIGN	TDJ
REVIEW	TDJ
APPROVED	DML

PROJECT 1651599 CONSULTANT Rev. FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 1 in 0

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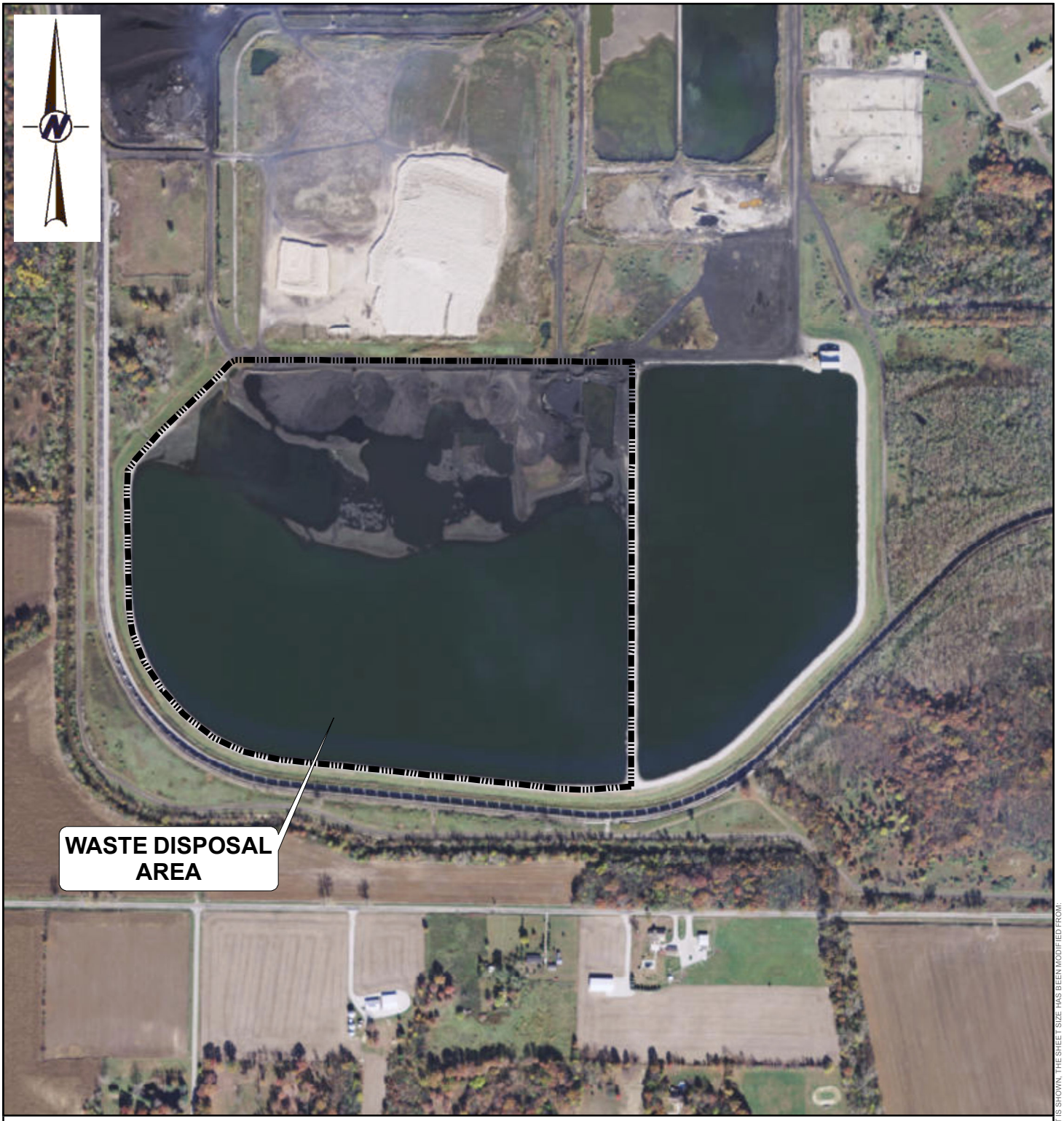

0 400 800 1,600 Feet

APPROXIMATE SCALE

CLIENT
NIPSCO

PROJECT
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
SITE PLAN
WASTE DISPOSAL AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-9-28
PREPARED	JJS
DESIGN	TDJ
REVIEW	DML
APPROVED	TDJ

PROJECT 1651599 CONSULTANT Rev. FIGURE **2**

REFERENCE

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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