HALEY ALDRICH

www.haleyaldrich.com

REPORT ON
INITIAL PERIODIC STRUCTURAL STABILITY ASSESSMENT
POND 3A
J.M. STUART ELECTRIC GENERATING STATION
ABERDEEN, OHIO

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Dayton Power & Light Company
Aberdeen, Ohio

File No. 40373-347
October 2016

HALEY & ALDRICH, INC.
6500 Rockside Road
Suite 200
Cleveland, OH 44131
216.739.0555

12 October 2016
File No. 40373-347

Dayton Power & Light Company
P.O. Box 468
Aberdeen, Ohio 45101

Attention: Mr. Craig Spangler
Leader, Commodities

Subject: Initial Periodic Structural Stability Assessment
Pond 3A
J.M. Stuart Electric Generating Station
Aberdeen, Ohio

Mr. Spangler:

Enclosed please find our report on the Initial Periodic Structural Stability Assessment for the Dayton Power & Light Company (DP&L) Pond 3A Coal Combustion Residuals (CCR) surface impoundment located at J.M. Stuart Electric Generating Station in Aberdeen, Ohio.

This work was performed by Haley & Aldrich, Inc. (Haley & Aldrich) on behalf of DP&L in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257, specifically §257.73(d).

The scope of our work consisted of the following: 1) obtain and review readily available reports, investigations, plans and data pertaining to the Pond 3A surface impoundment; 2) visit the site to observe Pond 3A; 3) evaluate whether the design, construction, operation, and maintenance of Pond 3A are consistent with recognized and generally accepted good engineering practices; and 4) prepare and submit this report presenting the results of our assessment including recommendations.

Thank you for inviting us to complete this assessment and please feel free to contact us if you wish to discuss the contents of the report.

Sincerely yours,
HALEY & ALDRICH, INC.

Steven F. Putrich, P.E.
Vice President

Enclosures

Table of Contents

Page

List of Figures ii

1. General 1

1.1 AUTHORITY 1
1.2 PURPOSE OF STRUCTURAL STABILITY ASSESSMENT 1

2. Description and Operation of Pond 3A 2

2.1 DESCRIPTION OF POND 3A 2
2.2 OPERATION, MAINTENANCE AND INSPECTION 2

3. Structural Stability Assessment 4

3.1 REVIEW OF EXISTING INFORMATION 4
3.2 SITE VISIT AND FIELD OBSERVATIONS 4
3.3 STRUCTURAL STABILITY ASSESSMENT 4

4. Conclusions/Certification 7

Figures
Appendix A – References

List of Figures

Figure No.	Title
1	Project Locus
2	Site Plan

1. General

1.1 AUTHORITY

Haley & Aldrich, Inc. (Haley & Aldrich) has been contracted by Dayton Power & Light Company (DP&L) to perform the Initial Periodic Structural Stability Assessment for the DP&L Pond 3A Coal Combustion Residuals (CCR) surface impoundment located at J.M. Stuart Electric Generating Station (JMSS) in Aberdeen, Ohio. This work was completed in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257, specifically §257.73(d).

1.2 PURPOSE OF STRUCTURAL STABILITY ASSESSMENT

The purpose of this Initial Structural Stability Assessment was to document whether the design, construction, operation, and maintenance of Pond 3A are consistent with recognized and generally accepted good engineering practices.

The scope of our work consisted of the following: 1) obtain and review readily available reports, investigations, plans and data pertaining to the Pond 3A surface impoundment; 2) visit the site to observe Pond 3A; 3) evaluate whether the design, construction, operation, and maintenance of Pond 3A are consistent with recognized and generally accepted good engineering practices; and 4) prepare and submit this report presenting the results of our evaluation, including recommendations.

2. Description and Operation of Pond 3A

2.1 DESCRIPTION OF POND 3A

Pond 3A is a Coal Combustion Residuals (CCR) surface impoundment located immediately to the east of the J.M. Stuart Station power plant and coal storage area. The pond was designed by Bowser-Morner in 1976 and construction completed in 1978. The southern two-thirds of Pond 3A was constructed on top of Pond 3 which was closed and capped with 2 feet of clay prior to construction of Pond 3A.

Pond 3A is surrounded by above-grade earthen embankments with clay core on the south, east and west sides. The north embankment of Pond 3A is comprised of the south embankment of the former Pond 8 which is currently occupied by Landfill 11. This embankment was constructed from compacted clay. The pond is located 200 to 300 ft from the banks of the Ohio River.

The pond was designed with 2.5H:1V interior and exterior slopes. Crest width of the above-grade dikes is typically 12 ft. The impoundment has a maximum embankment height of approximately 26 ft. The pond has an area of 52.7 acres and storage volume of 1,257 acre-ft as measured from the crest.

Pond 3A receives sluiced fly ash from the J.M. Stuart plant via five HDPE pipes which are moved as the pond fills with ash. The impoundment's rectangular concrete decant structure is located in the northeast corner of the pond. The level in the pond is controlled by removable stop logs installed in the structure. Water entering the decant structure flows into a 30-inch diameter reinforced concrete pipe (RCP) which penetrates the east embankment and discharges to a channel that conveys the flow to Pond 6.

Pond 3A is periodically drained for removal of accumulated ash. During this time, sluiced fly ash is directed to one of two other ponds that are also periodically rotated. Accumulated fly ash in Pond 3A is excavated and placed in an on-site landfill.

In June 2010, after removing fly ash and re-filling Pond 3A with water, DP&L personnel noted seeps emanating from three locations at the south embankment exterior toe of slope. DP&L contacted BBCM Engineering, Inc. who recommended the impoundment be promptly lowered. After the pond was drained, BBCM performed subsurface explorations and engineering analyses to determine the cause of the seepage and develop recommendations to address the seepage. BBCM recommended that a new 2-ft thick compacted clay liner be installed in the bottom of Pond 3A within the limits where the former Pond 3 is buried. In 2010-2011, the new clay liner was installed and it has successfully addressed the seepage.

2.2 OPERATION, MAINTENANCE AND INSPECTION

Pond 3A is operated, maintained and inspected by DP&L personnel in accordance with DP&L's "Operation Maintenance and Inspection (OM&I) Manual" dated April 2014 (Reference 14).

DP&L has developed impoundment inspection forms and DP&L personnel are conducting 7-day inspections of the Pond 3A in accordance with EPA's Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257.83. In addition, the OM&I manual calls for annual visual inspections and semi-annual operational inspections to be performed by

DP&L personnel, as well as inspections following heavy rain events. Five-year inspections are performed by Ohio Department of Natural Resources Dam Safety personnel.

Maintenance of the impoundment includes regular mowing of grass, seeding of thinly vegetated areas, control of woody growth, repair of erosion and riprap as needed, and backfilling of animal burrows.

Operation includes regulating and monitoring wastewater discharge from the plant to Pond 3A, regulating water levels in the pond, and monitoring discharges to Pond 6.

3. Structural Stability Assessment

3.1 REVIEW OF EXISTING INFORMATION

In 1975, Bowser-Morner Testing Laboratories, Inc. conducted subsurface explorations, laboratory testing, slope stability analyses, and hydrologic studies to support the design of Pond 3A. The Bowser-Morner report also included recommended embankment cross-sections. The results of the field and laboratory program and engineering analyses were presented in their report entitled, "Soil Investigation and Design for Proposed Fly Ash Dikes – J.M. Stuart Electric Generating Station" dated January 30, 1975 (Reference 1).

For this assessment, Haley & Aldrich reviewed Bowser-Morner's 1975 engineering report and multiple other sources of information including: 1) report on the Initial Annual Inspection performed by DP&L in accordance with 40 CFR §257.83, dated December 21, 2015, 2) previous impoundment inspection reports by ODNR, CHA (on behalf of EPA), CEC, and DP&L, 3) OM& I manual, 4) Emergency Action Plan, 5) topographic plans and aerial photos, 6) construction drawings, 7) subsurface information, 8) geotechnical laboratory test results, 9) slope stability evaluations, 10) correspondence, and 11) a variety of other information in addition to verbal information provided by DP&L during our assessment. Our review included, but was not limited to the references listed in Appendix A.

3.2 SITE VISIT AND FIELD OBSERVATIONS

On 18 March 2016, Haley & Aldrich visited J.M. Stuart Station to observe conditions at Pond 3A, and to meet with DP&L personnel to discuss operations and maintenance of the impoundment. Prior to the site visit, we reviewed previous inspection reports including the above-referenced Initial Annual Inspection Report by DP&L, and several previous inspection reports referenced above and listed in Appendix A. At the time of our site visit, Pond 3A had been drained and was inactive.

3.3 STRUCTURAL STABILITY ASSESSMENT

In accordance with 40 CFR §257.73(d), the owner or operator of a CCR surface impoundment must conduct initial and periodic structural stability assessments to determine whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

Haley & Aldrich reviewed the information provided to us and visited the site to observe Pond 3A. Based on our review of available information and observations during our 18 March 2016 site visit, we have concluded the following in accordance with 40 CFR §257.73(d):

1. *§257.73(d)(1)(i):* *Stable foundations and abutments.*

   Based on our review of available subsurface information, construction records, design reports, impoundment inspection reports, geotechnical test results, and observations during our 18 March 2016 site visit, Pond 3A was judged to have stable foundations. The Pond 3A embankments have not exhibited signs of excessive settlement, instability or other signs of inadequate foundation support.

2. *§257.73(d)(1)(ii):* *Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.*

   The Pond 3A interior slopes are protected with riprap within the zone of wave action and are vegetated on the upper portion of the slope. Based on observations during our 18 March 2016 site visit, the slope protection on the interior slopes was generally in good condition and was judged to provide adequate slope protection against surface erosion, wave action and adverse effects from sudden drawdown. In some areas, the vegetated upper portion of the slope was thinly vegetated. A few areas showed localized erosion on the interior slope.

   The exterior slopes are generally well vegetated with grass and were judged to have adequate slope protection.

3. *§257.73(d)(1)(iii):* *Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.*

   Bowser-Morner Testing Laboratories, Inc., performed numerous laboratory Proctor tests and field density tests during construction of the Pond 3A embankments. The results of these tests are presented in a series of "Report of Proctor Curve" and "Report of Density Determination Tests" spanning the construction during the period 1977 to 1978.

   Based on our review of the above reports, the fill soils used to construct the Pond 3A embankments were mechanically compacted during construction.

4. *§257.73(d)(1)(iv):* *Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection.*

   At the time of our 18 March 2016 site visit, the grass on the Pond 3A exterior slopes was generally less than 6 inches in height with the exception of the west exterior slope and isolated other areas where the vegetation exceeded 6 inches.

5. *§257.73(d)(1)(v)(A):* *Spillway Erosion Protection – All spillways must be either: (1) Of non-erodible construction and designed to carry sustained flows; or (2) Earth- of grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.*

   The spillway in Pond 3A consists of the concrete decant structure located in the northeast corner of the impoundment as described in 3.3.7 below. The decant structure was judged to be in good condition with no evidence of degradation or erosion.

6. *§257.73(d)(1)(v)(B): Spillway Capacity – The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a: (1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or (2) 1000-year flood for a significant hazard potential CCR surface impoundment; or (3) 100-year flood for a low hazard potential CCR surface impoundment.*

   The decant structure in Pond 3A overflows to Pond 6 for further settling. Ultimately the water exiting Pond 3A is directed to the Ohio River after settling has occurred in the subsequent ponds. Because the impoundment was classified as Significant Hazard Potential, the spillway capacity was analyzed using the 1,000-year rainfall event (Reference 21) in conjunction with HydroCAD v10.0. The spillway was found to have adequate capacity to convey the 1,000-year rainfall event while maintaining greater than 1.0 ft of impoundment berm freeboard.

7. *§257.73(d)(1)(vi): Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.*

   Pond 3A has only one hydraulic structure. The decant structure is located in the northeast corner of the pond. Flow entering the decant structure is conveyed through the Pond 3A east embankment via a 30-inch reinforced concrete pipe which discharges to a drainage ditch that flows to Pond 6.

   The rectangular concrete decant structure has some minor surface pitting but was judged to be in good condition overall. The 30-inch discharge pipe is buried and is only visible for the last few feet at the discharge location.

8. *§257.73(d)(1)(vii): For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.*

   The only water body in the vicinity of the Pond 3A is the Ohio River. The lowest level of the exterior toe of slope is at El. 530, along the south embankment. Based on information obtained from the National Oceanic and Atmospheric Administration (NOAA), the highest level ever recorded in the Ohio River in the vicinity of the J.M. Stuart site was El. 526 in 1937.

   Based on the above information, the Ohio River has never reached the Pond 3A exterior toe of slope elevation during more than 100 years of record keeping. Therefore, the possibility of inundation impacting the stability of the Pond 3A embankments is extremely remote.

9. *§257.73(d)(2): Identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures.*

   Based on observations of Pond 3A during our 18 March 2016 site visit, as well as our review of available subsurface information, impoundment inspection reports, construction records, design reports, geotechnical test results and other information, we did not identify any structural stability deficiencies in Pond 3A.

4. Conclusions/Certification

Based on our review of the information provided to us and observations during our 18 March 2016 site visit, it is our opinion that the design, construction, operation, and maintenance of Pond 3A at J.M. Stuart Station is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded in Pond 3A.

Professional Engineer Certification

I certify that the Periodic Structural Stability Assessment for DP&L's Pond 3A at the J.M. Stuart Electric Generating Station was conducted in accordance with the requirements of §257.73(d) of the USEPA's Final CCR Rule.

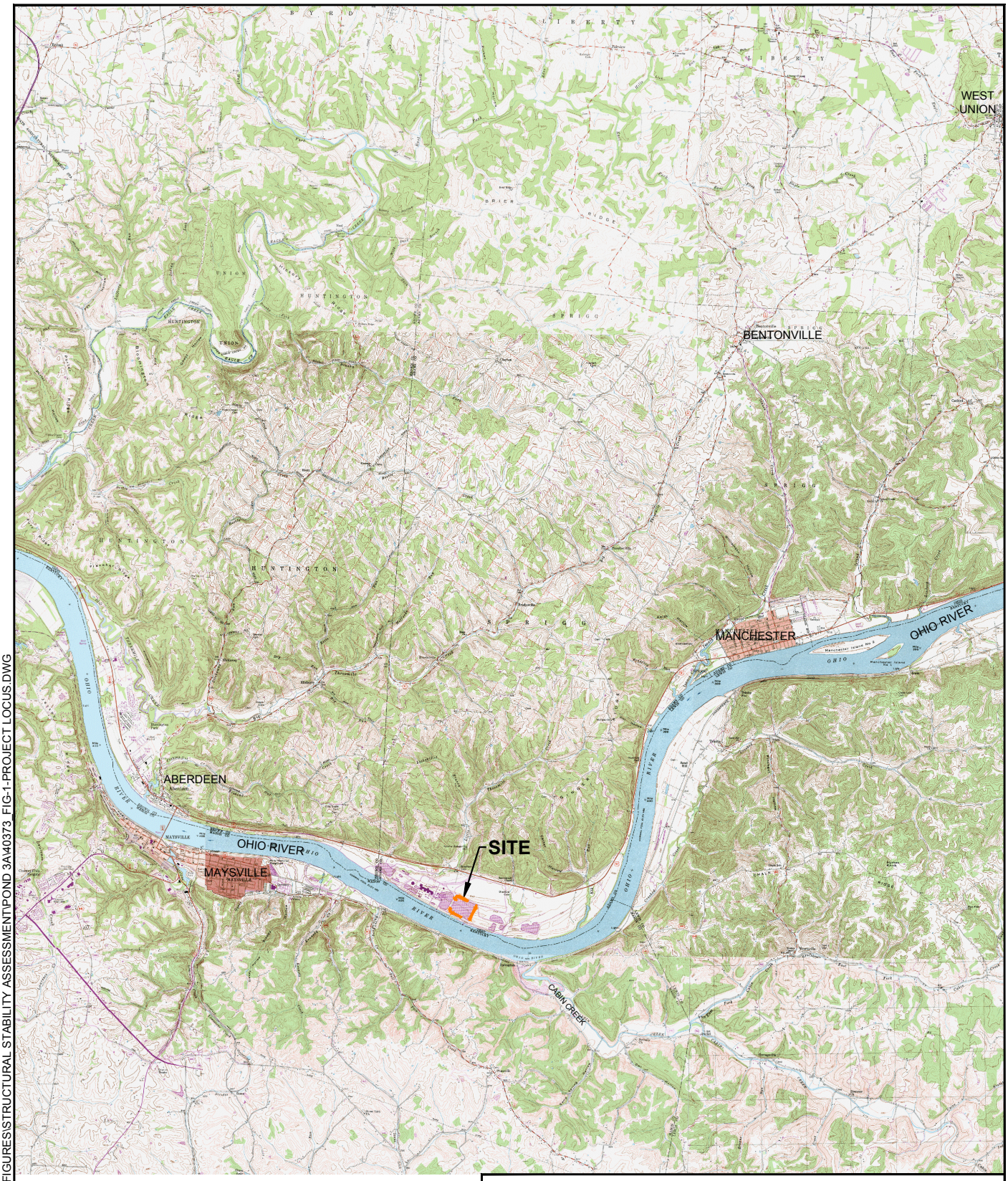
Signed: _____

Consulting Engineer

Print Name: Steven F. Putrich
Ohio License No.: 67329
Title: Vice President
Company: Haley & Aldrich, Inc.

Professional Engineer's Seal and date:

HALEY ALDRICH



TOPO SOURCE: USGS TOPOGRAPHIC MAPS
RUSSELLVILLE, DECATUR, WEST UNION, MAYSVILLE EAST, MAYSVILLE WEST , MANCHESTER ISLANDS - OHIO
MAYS LICK, ORANGEBURG, TOLLESBORO - KENTUCKY
QUADRANGLES (2013)

HALEY ALDRICH

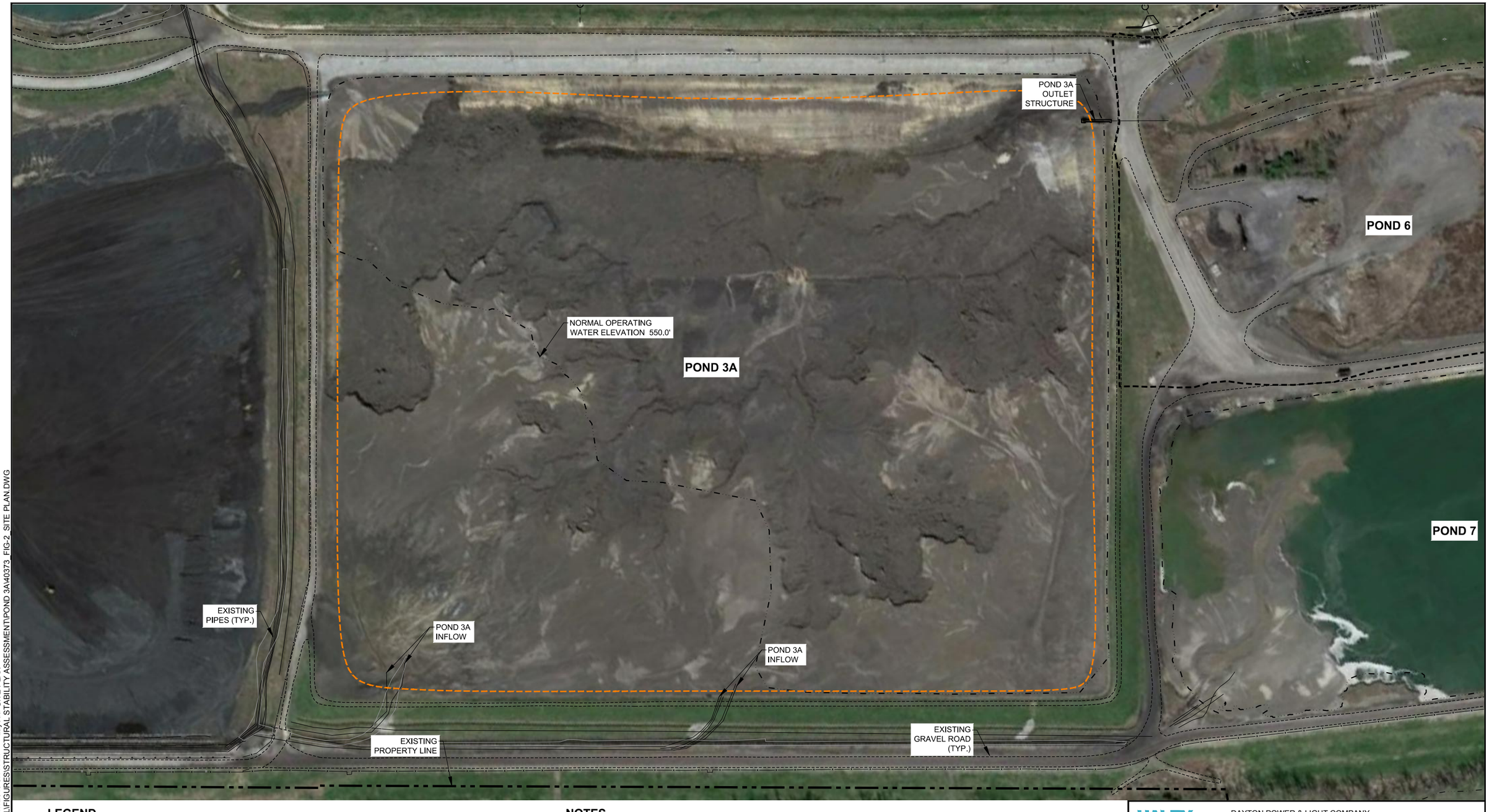
DAYTON POWER & LIGHT COMPANY
J. M. STUART GENERATING STATION
745 U.S. ROUTE 52
ABERDEEN, OHIO

POND 3A
PROJECT LOCUS

APPROXIMATE SCALE: 1" = 10 000'
OCTOBER 2016

FIGURE 1

LUCAS, ANDY Printed: 6/17/2016 9:11 AM Layout: PROJECT LOCUS
G:\40373_DP&LICAD-JMSS\GLOBAL\FIGURES\STRUCTURAL STABILITY ASSESSMENT\POND 3A\40373_FIG-1-PROJECT LOCUS.DWG



LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROCESS PIPES
- EXISTING STORMWATER PIPES
- EXISTING GRAVEL ROAD
- NORMAL OPERATING WATER
- APPROXIMATE POND 3A BOUNDARY
- TYPICAL OPERATING WATER LEVEL

NOTES

1. AERIAL IMAGERY PROVIDED BY GOOGLE EARTH PRO. PHOTO TAKEN ON 4 APRIL 2016.

0 200
SCALE IN FEET

HALEY ALDRICH

DAYTON POWER & LIGHT COMPANY
J.M. STUART STATION
ABERDEEN, OHIO

POND 3A
SITE PLAN

SCALE: AS SHOWN
OCTOBER 2016

FIGURE 2

APPENDIX A

References

References

1. Bowser-Morner Testing Laboratories, Inc., “Soil Investigation and Design for Proposed Fly Ash Dikes, James M. Stuart Electric Generating Station,” dated January 30, 1975.

2. Bowser-Morner Testing Laboratories, Inc., “Addendum #2 for Ash Pit #3A,” dated December 20, 1976.

3. Bowser-Morner Testing Laboratories, Inc., “Report of Aggregate Gradation Tests,” various dates in 1977.

4. Bowser-Morner Testing Laboratories, Inc., Weekly Construction Field Reports, various dates in 1977-1978.

5. Bowser-Morner Testing Laboratories, Inc., “Report of Proctor Curve,” various dates in 1977.

6. Bowser-Morner Testing Laboratories, Inc., “Report of Density Determination Tests,” various dates in 1977-1978.

7. BBC&M Engineering, Inc., “Ponds 3A, 5, 6 & 7 Slope Stability Investigation, J.M. Stuart Station,” dated May 28, 2010.

8. BBC&M Engineering, Inc., Letter entitled, “Seepage Observations, Ash Pond 3A, J.M. Stuart Station,” dated June 4, 2010.

9. BBC&M Engineering, Inc., “Pond 3A Seepage Investigation, J.M. Stuart Station,” dated October 8, 2010.

10. Civil & Environmental Consultants, Inc., “Coal Ash Impoundment Inspection Report, DP&L J.M. Stuart Station,” dated April 30, 2009.

11. CHA, “Assessment of Dam Safety, Coal Combustion Surface Impoundment (Task 3) Final Report,” dated March 26, 2010.

12. Dayton Power & Light Company, “J.M. Stuart Station Ash Pond 3A Annual Inspection,” dated December 21, 2015.

13. Dayton Power & Light Company - Various weekly, monthly and annual impoundment inspection reports – Various dates

14. Dayton Power & Light Company, “Operation Maintenance and Inspection Manual, Ash Impoundment Dike, Stuart Electric Generating Station - Pond 3A, 5, 6, 7 & 10,” dated April 8, 2014.

15. Dayton Power & Light Company, “Emergency Action Plan - Pond 3A, 5, 6, 7 & 10,” dated May 2013.

16. Dayton Power & Light Company – Drawing No. GCS 100181, entitled “Pond 3A Liner Repair Plan,” dated September 8, 2010.

17. Ebasco, DP&L, Bowser-Morner – Various construction drawings and specifications

18. Ohio Department of Natural Resources, “Dam Safety Inspection Report – J.M. Stuart Station Ash Pond 3A,” dated October 28, 2009.

19. Ohio Department of Natural Resources, “Dam Safety Inspection Report – J.M. Stuart Station Ash Pond 3A,” dated June 27, 2013.

20. Ohio Department of Natural Resources, “Construction Inspection Report, J.M. Stuart Ash Pond No. 3A,” dated March 1, 2102.

21. US Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, “NOAA Atlas 14 Point Precipitation Frequency Estimates: OH,” dated August 27, 2014.