Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

2022 ANNUAL INSPECTION REPORT ASH BASIN

MONROE POWER PLANT

Monroe, Michigan

Prepared by

Geosyntec consultants
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CHE8242V

January 2023

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1. INTRODUCTION

1.1 Overview

The 2022 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants of Michigan, Inc. (Geosyntec) to provide the results of the annual inspection of the Monroe Fly Ash Impoundment (Ash Basin) at DTE Electric Company's (DTE) Monroe Power Plant disposal facility. The annual inspection has been prepared to comply with the United States Environmental Protection Agency (USEPA) Coal Combustion Residual (CCR) Rule (CCR Rule) published on April 17, 2015, as amended July 30, 2018 (40 CFR Parts 257 and 261), August 28, 2020 (Part A Rule), and November 12, 2020 (Part B Rule). Under the CCR Rule, the Ash Basin is an "existing surface impoundment" per 40 CFR 257.53 and must be inspected by a qualified professional engineer on a periodic basis, not to exceed one year. The annual inspection is also required as part of the Inspection, Monitoring, and Maintenance (IMM) program for the Ash Basin.

The Ash Basin is located about one mile southwest of the Monroe Power Plant near Monroe, Michigan, and is bounded on the east by Lake Erie and the Plant discharge canal, on the west by Interstate Highway 75 (I-75), on the south by an agricultural field, and on the north by residential property and Plum Creek (see Figure 1).

1.2 Purpose

Inspection, monitoring, and maintenance (IMM) of the Ash Basin and embankment are performed by DTE pursuant to the combined monitoring and maintenance program described in the IMM program (MONPP – 1301 – Rev. D) and the CCR Rule. The objective of the inspections that are part of the IMM program is to detect indications of instability in time to allow planning, design, and implementation of appropriate mitigation measures. The purpose of the inspection under the CCR Rule [40 CFR 257.83(b)(1)] is:

> "…to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards."

The inspection must, at a minimum, include:

(i) A review of the available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of an inspection by a qualified person, and results of previous annual inspections);

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit; and

(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.

The purpose is accomplished through periodic visual inspection (and photo-documentation) of the Ash Basin, review of the previous inspection, review of instrumentation monitoring data, and discussions with site personnel about the history of the site and general operations at the Ash Basin. Observations from the visual inspection, document and instrumentation data review, and discussions are summarized in an inspection report. The inspection report addresses the following under the CCR Rule [40 CFR 257.83(b)(2)]:

(i) Any changes in geometry of the impounding structure since the previous annual inspection;

(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;

(iii) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;

(iv) The storage capacity of the impounding structure at the time of the inspection;

(v) The approximate volume of the impounded water and CCR at the time of the inspection;

(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures; and

(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 - Review of Available Information: summarizes various historical documents that were reviewed as part of this inspection.
- Section 3 - Facility Description: provides information about the facility.
- Section 4 - Observations from Annual Inspection: summarizes visual observations recorded during the 2022 inspection of the Ash Basin.

- Section 5 - Instrumentation Monitoring and Bathymetric Survey: provides information about the instrumentation monitoring and bathymetry survey of the Ash Basin.

- Section 6 - Current Operations and Maintenance Activities: describes DTE's current operations and maintenance activities performed since the inspection conducted as part of the 2021 Structural Stability Assessment.

- Section 7 - Evaluation of Observations: based on the inspection results, evaluated if the design, construction, operation, and maintenance of the Ash Basin are consistent with recognized and generally accepted good engineering standards.

- Section 8 - Conclusions: provides the overall conclusions of the annual inspection and certification of the AIR.

1.4 Terms of Reference

The annual visual inspection was performed on April 6, 2022, by Dr. Clinton Carlson, Ph.D., P.E of Geosyntec[1], with assistance from DTE staff.

The weekly inspections and monitoring of inclinometers are performed by DTE's qualified person[2].

This report was prepared by Dr. Carlson and reviewed by Mr. John Seymour, P.E. of Geosyntec.

[1] Clinton Carlson, Ph.D., P.E., is the qualified professional engineer per the requirements of §257.53 of the CCR Rule. He has eight years of experience with coal ash related projects. His resume is provided in Appendix B.

[2] Qualified person means a person or persons trained to recognize specific appearances of structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit by visual observation and, if applicable, to monitor instrumentation.

2. REVIEW OF AVAILABLE INFORMATION

Geosyntec reviewed the following documents for the annual inspection. These documents are summarized in the table below.

Table 1: Available Information Reviewed for Annual Insepction

Title	Prepared by	Date	Content
Monroe Fly Ash Disposal Basin Technical Report	DTE	1977	Design, construction and operational information.
Closure Plan	Geosyntec	October 2016	Documenting how the plan will meet the CCR Rule.
Post-Closure Plan	Geosyntec	October 2016	Documenting how the plan will meet the CCR Rule.
Inspection, Monitoring and Maintenance Manual, Rev. D.	Geosyntec	November 2021	Provides details of operations, monitoring, action levels and items for the Ash Basin.
Safety Factor Assessment	Geosyntec	October 15, 2021	Safety factor assessment per the CCR Rule. Provides a five-year update to the original assessment performed in 2016.
Structural Stability Assessment	Geosyntec	October 15, 2021	Structural stability assessment per the CCR Rule. Provides a five-year update to the original assessment performed in 2016.
Hydrologic and Hydraulic Capacity Assessment	Geosyntec	October 15, 2021	Hydraulic capacity assessment per the CCR Rule. Provides a five-year update to the original assessment performed in 2016.
Hazard Potential Assessment	Geosyntec	October 15, 2021	An assessment of the hazard potential of the Ash Basin per the CCR Rule. Includes a dam breach analysis.
Fill Plan Alternatives – Rev. B	Geosyntec	April 22, 2015	Pros and cons of various fill plan alternatives for the remaining life of the ash basin.

Table 1 (continued)

Title	Prepared by	Date	Content
Potential Failure Mode Analysis Results – Rev. 3	Geosyntec	January 2015	Results of potential failure mode analysis for the Monroe Power Plant. Reassessed certain potential failure modes based on changes in operational procedures prior to the analysis.
Emergency Action Plan	DTE	August 2020	Provides the emergency action plan to safeguard lives and reduce the potential for damage to public resources and private property per the CCR Rule 40 CFR 257.73.
Monroe Emergency Action Plan Meeting	DTE	October 29, 2021	Documentation of annual meeting for emergency preparedness table-top study of the Monroe Power Plant. Completed pursuant to 40 CFR 257.73(a)(3)(i)(E).
Geotechnical Site Characterization Report	Geosyntec	September 2012	Summary of data from various site investigation studies conducted around the perimeter of the embankment.
2009 Construction Completion Report	Geosyntec	March 8, 2010	Construction information for the 2009 construction.
2010 Construction Completion Report	Geosyntec	May 4, 2011	Construction information for the 2010 construction.
2012 Construction Completion Report	Geosyntec	November 30, 2012	Construction information for the 2012 construction.
2013 Construction Completion Report	Geosyntec	December 13, 2013	Construction information for the 2013 construction.
Weekly Inspection Reports	DTE	2021-2022	Qualified person inspections from May 2021 through April 2022.
2020 Annual Inspection Report	Geosyntec	January 9, 2021	Provides the results of the 2020 annual inspection.

Table 1 (continued)

Title	Prepared by	Date	Content
Overliner Construction, Phase 1- Construction Quality Assurance Report	Golder	September 16, 2015	Construction completion document.
Fugitive Dust Control Plan	DTE	November 8, 2021	Presents fugitive dust control measures. Added operating license information, updated process for the inactive bottom ash impoundment, and further defined activities for assessing and monitoring effectiveness of dust control measures.
Annual Fugitive Dust Report	DTE	November 2021	Annual report of dust control actions, any complaints, and corrective actions taken, if any. Completed pursuant to 40 CFR 257.80(c).
Groundwater Monitoring System Summary Report	TRC	October 2017	Information on groundwater monitoring system components and details for the Monroe Ash Basin and Vertical Extension Landfill.
Groundwater Statistical Evaluation Plan	TRC	October 2017	Basis for statistical evaluation for groundwater monitoring events for the Monroe Ash Basin and Vertical Extension Landfill.
Annual Groundwater Monitoring Report	TRC	January 31, 2022	Summary of annual groundwater monitoring results for 2021 for the Monroe Ash Basin and Vertical Extension Landfill
Location Restrictions Demonstration	TRC	October 2018	Provides details of location restrictions demonstration for the Ash Basin per CCR Rule.
Bathymetric Survey	DTE	2022	Bathymetry survey of the ash basin.

3. FACILITY DESCRIPTION

The permitted area for the site is in Section 16, Township 7 South, Range 9 East, of Monroe Township, Michigan. The facility includes the 331-acre Ash Basin and a 79-acre vertical extension landfill (Landfill) for a total permitted area of 410 acres. The Ash Basin is a coal ash surface impoundment under Michigan Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994, Operating License No. 9579. The Landfill is a coal ash landfill located within the northwest drainage area of the Ash Basin, including the Landfill perimeter berms and swales.

The Ash Basin was constructed in the early 1970s as a 410-acre basin to impound sluiced ash. The Ash Basin includes a 3.5-mile-long embankment constructed of on-site fine grained (clayey) soils that were excavated from within the footprint of the Ash Basin. Ash and water are pumped to the Ash Basin from the Monroe Power Plant using four active, above grade steel and high-density polyethylene pipes. After treatment within the Ash Basin, water flows out from the Ash Basin through a discharge structure in accordance with the facility National Pollutant Discharge Elimination System (NPDES) permit #MI0001848.

4. OBSERVATIONS FROM ANNUAL INSPECTION

The annual visual inspection and DTE's weekly inspections included the embankment crest, exterior slopes of the embankment, ash discharge points within the Ash Basin, stormwater features, discharge structure and canal, and pipes on the embankment. Inspection results and photographs from the annual visual inspection are provided in Appendix A. The key visual observations from the annual inspection are summarized below.

1. A crack/slough was observed on the perimeter embankment slope near approximate Station 12+00 (see Photographs 4 through 7). The crack was approximately 6-inches wide, 12-inches deep, and 100-feet long. The crack was initially identified by DTE personnel in March 2022 and staked. Geosyntec inspected the crack shortly after it was identified by DTE. Geosyntec did not observe any significant changes in the crack at the time of the visual inspection or in adjacent instrumentation monitoring.

2. A gouge in the perimeter embankment slope was observed near approximate Station 88+00 (see Photograph 23). The gouge was approximately 6-inches wide and 12-inches deep and appeared to be from construction equipment.

3. The SmartDitch® features on the midslopes (corrugated high-density polyethylene [HDPE] channels used to manage stormwater) were inspected. The following observations were made.

    a. Erosion was observed at many of the SmartDitch outlets into the riprap downchutes (see Photograph 8). Up to approximately one foot of riprap appeared to have eroded in some locations.

    b. Vegetation was observed within the SmartDitches at multiple locations (see Photograph 13). The vegetation did not affect the functionality of the SmartDitches to conduct sufficient stormwater flow.

    c. The covered HDPE pipes connecting portions of the SmartDitches were observed to have some sediments and vegetation (see Photograph 11). The sediments and vegetation did not impede sufficient flow through the pipes.

    d. One of the inspection ports for the covered HDPE pipe near approximate Station 143+00 was missing a cover (see Photograph 30).

    e. The covered HDPE pipes were in good condition (see Photograph 12).

4. Many of the riprap downchutes had noticeable erosion of riprap near the SmartDitch outlets and within the downchutes (see Photograph 9). Vegetation was also observed in some of

the riprap downchutes. These conditions do not currently affect the functionality of the downchutes to sufficiently convey stormwater.

5. Small Autumn Olive shrubs (see Photograph 1) were observed on portions of the perimeter embankment slopes in the northeast (approximate Stations 0+00 to 15+00), northwest (approximate Stations 55+00 to 65+00), and east (approximate Stations 150+00 to 160+00) (see Photograph 3).

6. Bentonite and sand repairs had been made to cracks that formed near approximate Stations 65+00 (see Photograph 19) and 78+00 (see Photographs 21 and 22). DTE personnel indicated the cracks formed during construction of the asphalt road. The repairs were in good condition and no indications of additional movement were observed at these locations during the visual inspection.

7. An asphalt road was constructed on the crest of the embankment for access to the Vertical Extension Landfill (see Photograph 20). The asphalt road extends from approximate Station 110+00 to approximate Station 65+00. As noted above, cracks along the perimeter embankment slope developed in a couple locations adjacent to the asphalt road. As part of the asphalt road construction, stormwater features were added at the toe of the embankment slope between approximate Stations 105+00 and 110+00 (see Photographs 24 and 25). The asphalt road and associated stormwater features appeared to be in good condition.

8. An HDPE pipe was observed near approximate Station 67+00 under the asphalt road within the Vertical Extension Landfill (see Photograph 20). DTE personnel indicated they had tried to identify the extent of the pipe via an remote-operated vehicle inspection and ground penetrating survey. These inspections identified the pipe was filled with ash and water and could only locate approximately 50 feet of the pipe. The HDPE pipe was capped.

9. Small, mossy areas were observed at a couple locations on the northeastern perimeter embankment slopes (see Photograph 10). No water was observed flowing out of these areas at the time of the inspection.

10. A prior wet area filled with gravel near approximate Stations 175+00 to 177+00 was inspected and not observed to be wet (see Photograph 33).

11. Sluice lines 5 (northern side of Ash Basin) (see Photograph 15) and 1, 3, and 6 (southern side of Ash Basin) (see Photographs 26 through 28) were inspected. The outlets of the sluice lines were near open water after repositioning lines 1, 3, and 6 since the last annual inspection. Line 5 and two of lines 1, 3, and 6 were actively sluicing ash into the Ash Basin at the time of the inspection. Access to the sluice lines was inspected and in good condition

(see Photograph 14). No breaks or leaks were observed in the sluice lines along the embankment.

12. The perimeter road atop the perimeter berm was in good condition with minimal rutting (see Photograph 16). Access roads to the perimeter road atop the perimeter berm were also inspected and observed to be in good condition with no erosion rills (see Photograph 32).

13. The low point in the perimeter embankment near approximate Station 165+00 used in case of emergency overflow was in good condition (see Photograph 31).

14. The perimeter swales and pump house (including the access road) were inspected and in good condition (see Photograph 29).

15. The pool level within the Ash Basin at the time of the inspection was approximately 608.4 feet, which is less than the maximum operating pool level of 609.0 feet.

16. The discharge structure was inspected. No damage was detected in the gates, stop logs, or concrete (see Photographs 34 and 36) and no obstructions were observed in the gates and discharge pipes (see Photograph 35). No signs of distress were observed in the slope between the inlet and outlet and no turbidity was observed in the outflow (see Photograph 37).

17. The end of the discharge canal into Plum Creek was inspected. The silt curtain upstream of the weir and the weir ere in working condition (see Photographs 17 and 18). The water flowing out of the weir was clear.

5. INSTRUMENTATION MONITORING AND BATHYMETRY SURVEY RESULTS

5.1 Slope Inclinometers

5.1.1 Background and Overview

Ten automated slope inclinometers (SIs) have been installed along the Ash Basin perimeter embankment. The purpose of the SIs is to provide continuous measurements of any outward movements of the perimeter embankment. The SIs were installed in late 2015 to replace the decommissioned manual SIs and baseline readings were taken on January 1, 2016. The SIs were installed from the crest of the embankment to depths of approximately 45 to 50 feet below the crest.

The SI measurements provide values of horizontal displacement at discrete depths (at 1.6-foot intervals) in two orthogonal directions (A-axis and B-axis). Plots of horizontal displacement versus depth are generated that provide a vertical profile of the horizontal displacement experienced by the SI at the time of the reading. The orientation of the A-axis and B-axis are unique to each SI. Displacements in the positive A-axis correspond to an outward displacement of the embankment from the Ash Basin approximately perpendicular to the embankment. The B-axis is oriented parallel to the perimeter embankment.

5.1.2 Displacements

The horizontal displacements at select depths are summarized below for the readings at the time of the annual inspection (April 2022).

5.1.2.1 *Station 11+50 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.52 inches at five feet below ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.13 inches at 18 feet below ground surface.

5.1.2.2 *Station 34+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.20 inches at 25 feet below ground surface.
- B-axis direction

- Maximum cumulative displacement magnitude and direction: +0.21 inches at two feet below ground surface.

5.1.2.3 *Station 56+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.17 inches at six feet below ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.38 inches at six feet below ground surface.

5.1.2.4 *Station 65+50 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.03 inches 29 feet below the ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.27 inches 29 feet below the ground surface.

5.1.2.5 *Station 77+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.23 inches at six feet below ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.12 inches at six feet below ground surface.

5.1.2.6 *Station 118+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.92 inches at six feet below ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.24 inches at ten feet below ground surface.

5.1.2.7 *Station 133+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +2.72 inches at five feet below the ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.41 inches at 20 feet below ground surface.

5.1.2.8 *Station 142+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.16 inches at six feet below the ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.19 inches at 16 feet below the ground surface.

5.1.2.9 *Station 162+50 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +1.80 inches at six feet below the ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.17 inches at 12 feet below the ground surface.

5.1.2.10 *Station 178+00 Slope Inclinometer*

- A-axis direction
  - Maximum cumulative displacement magnitude and direction: +0.29 inches at six feet below the ground surface.
- B-axis direction
  - Maximum cumulative displacement magnitude and direction: -0.16 inches at six feet below the ground surface.

5.2 Bathymetric Survey Results

The bathymetric survey of the Ash Basin was performed by DTE survey crew in November 2022. The following were observed or estimated based on the survey results.

1. Water level at the time of survey was at elevation 608.3 feet[3], which is lower than the maximum operation water level of 609 feet.

2. Approximately 85 percent of the Ash Basin footprint is filled with ash above the water level.

3. The maximum water depth is approximately 36 feet. The top of ash at this location is at approximate elevation 572.3 feet.

4. The maximum ash thickness is approximately 50 feet, measured from the top of ash at approximate elevation 613 feet to the bottom of the Ash Basin, which is at approximate elevation 563.4 feet. The minimum thickness of ash is approximately 9 feet.

5. At the time of the bathymetry measurements:

    a. the remaining storage capacity of the Ash Basin is approximately 1.9 million cy.

    b. approximately 27.5 million cy of ash is deposited in the Ash Basin.

    c. approximately 393 million gallons of water is impounded in the Ash Basin.

[3] Elevations in this AIR are reported in the National Geodetic Vertical Datum of 1929 (NGVD29).

6. CURRENT OPERATIONS AND MAINTENANCE ACTIVITIES

6.1 Operations Organization

The Ash Basin is operated by DTE. The responsible personnel include:

- Michael Dunlap – DTE Energy Supply, Ash Manager, Monroe Site Operations
- Stefanie Ledesma, Elise Ciak, and Gerald Chilson – DTE Environmental Management and Safety (EM&S), Monroe Power Plant

6.2 Operation Activities

Operation details are provided in the Inspection, Monitoring, and Maintenance Manual (IMMM) Rev. D. and Operations Plan Drawings Rev. D. (Geosyntec, 2021). In addition, the following are currently required by the CCR Rule.

- Weekly inspections by a qualified person.
- Dust control in accordance with the Fugitive Dust Control Plan.
- Annual Fugitive Dust Control Report.
- Annual Groundwater Monitoring and Corrective Action Report.

6.3 Maintenance Activities Since Previous Annual Inspection

The following maintenance activities were performed in addition to general site maintenance between the 2021 and 2022 inspections (see Section 4 for additional details). Additional maintenance activities completed after the visual inspection are discussed in Section 7.

1. An asphalt road was constructed on the crest of the perimeter berm along with stormwater features at the toe of the perimeter berm.
2. Bentonite and sand repairs were made to the perimeter embankment slopes near approximate Stations 65+00 and 78+00.
3. Sluice lines 1, 3, and 6 were repositioned to move the outlets closer to open water within the Ash Basin.

7. EVALUATION OF OBSERVATIONS

The Ash Basin was not observed to have any existing structural weaknesses or conditions that would disrupt the overall operation and/or safety of the Ash Basin.

- The crack/slough observed on the perimeter embankment slope near approximate Station 12+00 was believed to be the result of the freezing and thawing cycle of the surficial soils as no movements were observed in the adjacent instrumentation monitoring. Therefore, the crack was judged not to be indicative of an existing structural weakness in the perimeter embankment.

- The gouge in the perimeter embankment slope observed near approximate Station 88+00 was likely from construction equipment as no other cracks were observed in the area. Therefore, the crack was judged not to be indicative of an existing structural weakness.

- The HDPE pipe observed near approximate Station 67+00 under the asphalt road was likely used for previous operations and abandoned in-place. Geosyntec does not believe the pipe represents an existing structural weakness or has the potential to develop into a structural weakness that would affect the operation and safety of the Ash Basin. The pipe has been capped and can be left in-place.

- The maximum cumulative displacement observed at the inclinometers is 2.72 inches at Station 133+00. There is no evidence of movement of the perimeter embankment at the monitored locations that would suggest global instabilities of the perimeter embankments.

No observed conditions at the Ash Basin have the potential to develop into structural weaknesses or conditions that would disrupt the overall operation and/or safety.

There are multiple conditions identified during the 2022 annual inspection that should be addressed in accordance with the IMMM. Many of the conditions were addressed by DTE after the visual inspection. For the conditions that have not been addressed, recommendations are provided by Geosyntec.

Conditions Addressed

1. The crack/slough on the embankment slope near approximate Station 12+00 was repaired in accordance with the IMMM to prevent further surficial movements and cracks. Minimal change in the extent of the crack was observed between the initial inspection by Geosyntec and the annual inspection and no other cracks were observed in this area so a bentonite and sand mix was used to backfill and repair the crack in accordance with the IMMM repairs for ground cracks. If additional movements or cracks are observed prior to the 2023 annual

inspection, then repairs should be made to the northern embankment slopes in accordance with the IMMM repairs for surficial sloughing.

2. The gouge in the perimeter embankment slope near approximate Station 88+00 was repaired to prevent further surficial movements and cracks. A bentonite and sand mix was used to backfill and repair the gouge.

3. Small Autumn Olive shrubs were observed on portions of the perimeter embankment slopes. Chemical sprays were applied to the embankment slopes with Autumn Olive shrubs to kill the shrubs and prevent future growth.

4. Bentonite and sand backfill repairs were made to cracks that formed near approximate Stations 65+00 and 78+00 were in good condition at the time of the inspection but should continue to be monitored. DTE has continued to monitor these repairs during weekly inspections.

5. Small, mossy areas and a prior wet area filled with gravel near approximate Stations 175+00 to 177+00 were not wet at the time of inspection but should continue to be monitored. DTE has continued to monitor these repairs during weekly inspections.

Conditions to be Addressed

1. The SmartDitches had multiple conditions that should be addressed in accordance with the IMMM.

    a. Erosion was observed at many of the SmartDitch outlets into the riprap downchutes. The eroded riprap around the outlets should be replaced.

    b. Vegetation was observed within the SmartDitches at multiple locations. This vegetation should be cleared out of the SmartDitches.

    c. One of the inspection ports for the covered HDPE pipe near approximate Station 143+00 was missing a cover. The cover should be replaced.

2. Many of the riprap downchutes had noticeable erosion of riprap near the SmartDitch outlets and within the downchutes. Vegetation was also observed in some of the riprap downchutes. These conditions did not appear to affect the functionality of the features, but the eroded riprap should be replaced and the vegetation should be cleared.

8. CONCLUSIONS AND CERTIFICATION

The Ash Basin is operated and maintained with generally accepted good engineering practices. The 2022 annual visual inspection did not identify any existing structural weaknesses or conditions that are disrupting the operation and safety of the Ash Basin or conditions that could develop into structural weaknesses in the future. Geosyntec identified a number of conditions that require maintenance in accordance with the IMMM as detailed in Section 7. Many of these maintenance items were completed by DTE after the visual inspection as detailed in Section 7. Recommendations to address the remaining maintenance items are provided in Section 7 for DTE's consideration.

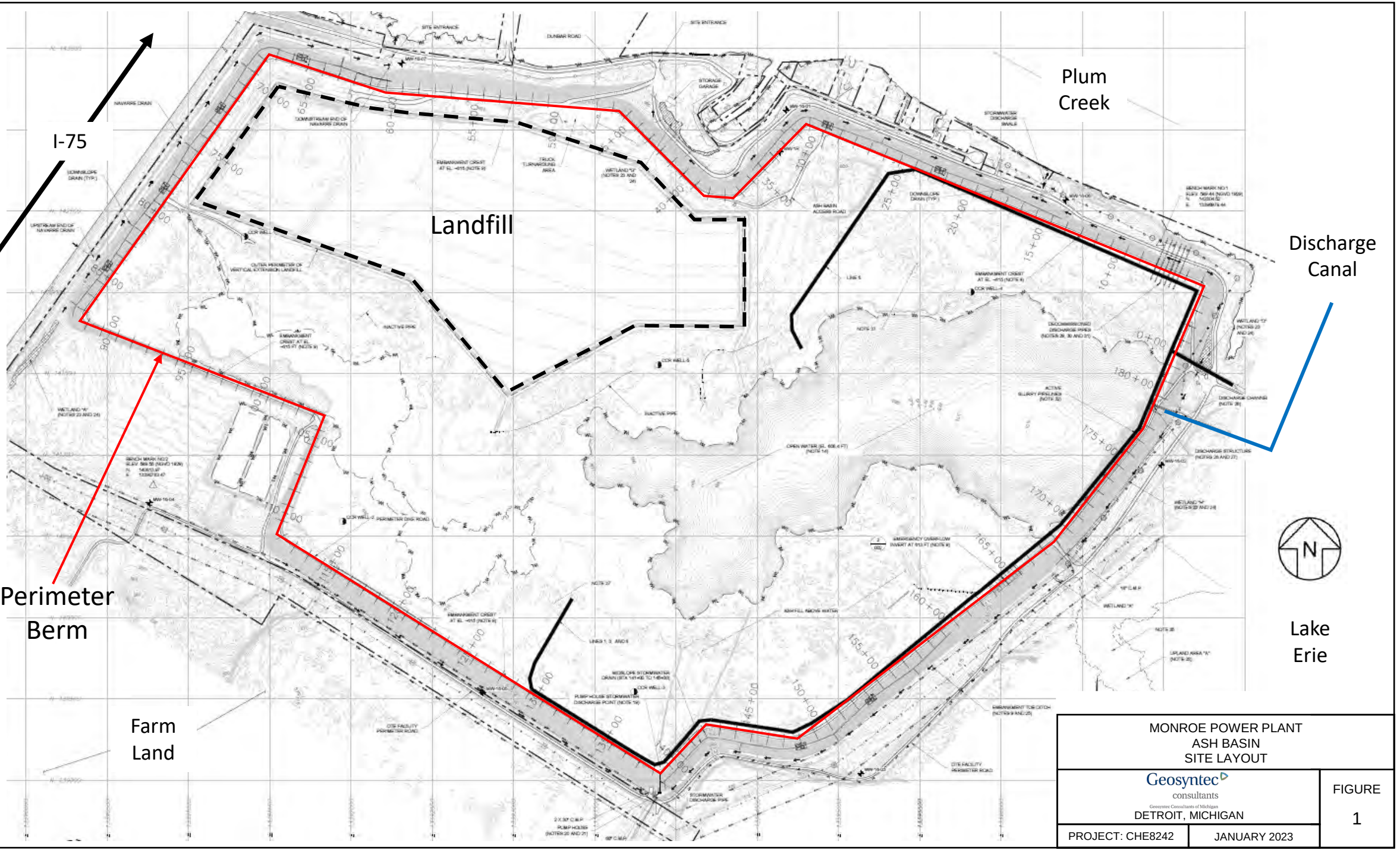
Certified by:

Date January 9, 2023

Clinton Carlson, Ph.D., P.E.

Michigan License Number 6201066842

Project Engineer



MONROE POWER PLANT
ASH BASIN
SITE LAYOUT

Geosyntec consultants
Geosyntec Consultants of Michigan
DETROIT, MICHIGAN

FIGURE 1

PROJECT: CHE8242

JANUARY 2023

APPENDIX A

2022 Annual Inspection Forms and Photos

Monroe Power Plant
Ash Basin
2022 Annual Inspection Report

Name of Surface Impoundment: Monroe Power Plant Ash Basin
Surface Impoundment ID Number:
Owner: DTE Electric Company
Operator: DTE Electric Company
Site Conditions: Some moist areas from rain

Qualified Engineer: Clinton Carlson, PhD, PE
Date: 4/6/2022 **Time:** 1030 am to 4 pm
Weather: Slight Rain, 50s, Cloudy
Precipitation (since previous weekly inspection): 0.1 in.

I. Crest

1. Were there any indications of existing or potential structural weaknesses (ruts, holes, erosion, cracking, slides, depressions, undesired vegetation etc.)? Provide approximate size and location of any structural weaknesses. Yes ____ No X

The crest of the perimeter embankment and the road were in good condition with minimal rutting (Photograph 16). The low point of the crest used in case of emergency overflow was in good condition (Photograph 31). Aggregate access roads were in good condition (Photograph 32).

An HDPE pipe was observed near approximate Sta 67+00 within the Vertical Extension Landfill (Photograph 20). The HDPE pipe was likely left in-place from previous operations.

2. Were there any significant changes since the last inspection Yes X No ____

An asphalt road was constructed on the crest for access to the Vertical Extension Landfill (Photograph 20). The asphalt road extends from approximate Sta 110+00 to Sta 65+00. The asphalt road and access to the crest were in good condition (Photographs 20, 24, and 25).

II. Embankment Slopes

1. Were there any indications of existing or potential structural weaknesses on the embankment slopes (ruts, holes, erosion, cracking, sloughs, depressions, bulges, undesired vegetation etc.)? Provide approximate size and location of any structural weaknesses. Yes ____ No X

Overall, the embankment slopes had no indications of existing structural weaknesses (Photograph 2). There were a couple conditions that require maintenance in accordance with the IMMM Rev. D. DTE addressed these conditions after the visual inspection.

- A crack/slough was observed near approximate Sta 12+00. The crack was approximately 6-in. wide, 12-in. deep, and 100-ft long (Photographs 4 - 7). The crack/slough did not affect the global slope stability in the existing condition.
- Small Autumn Olive shrubs (Photograph 1) were observed on the slopes from Sta 0+00 to 15+00, Sta 55+00 to 65+00, and Sta 150+00 to 160+00 (Photograph 3).
- A gouge from construction equipment on the slope near approximate Sta 88+00. The gouge was approximately 6-in. wide and 12-in. deep (Photograph 23).

2. Were there any visible wet areas on the embankment slopes? Yes ____ No X

No visible wet areas were observed on the slopes. There were a couple small, mossy areas on the northern slopes (Photograph 10), though no water was observed during the inspection. A prior wet area filled with gravel near approximate Sta 175+00 to 177+00 was inspected and not observed to be wet (Photograph 33).

3. Were there any significant changes since the last inspection? Yes X No ____

Bentonite-sand backfill repairs were made to cracks observed near approximate Sta 65+00 (Photograph 19) and approximate Sta 78+00 (Photographs 21 and 22). The repairs were in good condition at the time of the inspection. DTE has continued to monitor these repairs during weekly inspections.

III. Surface Impoundment Conditions

1. Were the sluice lines to the surface impoundment flowing freely to open water? If 'No' describe obstructions. Yes X No ____

Lines 1, 3, 5, and 6 were inspected; the outlets were near open water (Photographs 15, 26, 27, and 28). Line 5 and two of lines 1, 3, and 6 were actively sluicing ash into the Ash Basin at the time of the inspection. Access to the sluice lines also appeared to be in good condition (Photograph 14).

2. What was the water level in the surface impoundment at the time of the inspection?
Pool Level at Time of Inspection 608.4 ft / NGVD29 Maximum Pool Level / Datum 609.0 ft / NGVD29

3. Was there an excessive amount of CCR above the water surface that could lead to overtopping of the perimeter berm? Yes ____ No X

There is CCR above the water level within the Ash Basin; however, sluice lines 1, 3, 5, and 6 discharge near open water. Therefore, overtopping is considered unlikely.

4. Were there any significant changes since the last inspection? Yes ____ No X

There were no no significant changes since the last inspection. However, sluice lines 1, 3, and 6 were repositioned to have active lines closer to open water.

IV. Stormwater Feature Conditions

1. Were there any indications of existing or potential conditions (erosion, impediments, etc.) that could affect the function of the stormwater features or the stability of the embankments? Provide approximate size and location of any conditions. Yes X No ____

There were a couple conditions that required maintenance to avoid affecting the functionality of the stormwater features.

- The SmartDitches on the midslopes were filled with vegetation in many locations (Photograph 13) and have noticeable erosion around the outlets to the riprap downchutes (Photograph 8); however, the overall function of the SmartDitches to sufficiently convey stormwater was not affected by these conditions.
- The riprap downchutes had observed erosion around the SmartDitch outlets and within the chutes and vegetation within the chutes (Photograph 9).
- There was one inspection port for the covered HDPE pipe near approximate Sta 143+00 that was missing a cover (Photograph 30).

The covered HDPE pipes connecting SmartDitch portions had some sediments and vegetation (Photograph 11) but were in good condition and functioning properly (Photograph 12). The perimeter swales and pump house (including access road) were observed to be in good condition (Photograph 29).

2. Were there any significant changes since the last inspection? Yes X No ____

For the new asphalt road, stormwater features were added at the toe of the embankment between approximate Sta 105+00 and 110+00 (Photographs 24 and 25). The stormwater features were in good condition.

Monroe Power Plant
Ash Basin
2022 Annual Inspection Report

V. Discharge Structure and Canal

1. Are there any cracks or breaks in concrete or steel parts or obstructions to discharge at the discharge structure? If 'Yes' report the location and severity. Yes ____ No X

No damage was detected in the gates, stop logs, or concrete at the discharge structure (Photographs 34 and 36).

No obstructions were observed in the gates and discharge pipes (Photograph 35).

2. Are there signs of slope distress or seepage on the slope between the inlet and outlet structures or turbidity in the outflow? Yes ____ No X

No signs of distress were observed in the slope between the inlet and outlet and no turbidity was observed in the outflow (Photograph 37).

3. Is the weir at the exit of the discharge canal in working condition? If 'No', describe any issues. Yes X No ____

The silt curtain upstream of the weir and the weir were in working condition (Photographs 17 and 18). The water flowing out of the weir was clear.

VI. Slurry Piping

1. Were there any breaks or leaks in the sluice lines along the embankment? If 'Yes' describe the line #, location, severity, etc. Yes ____ No X

VII. Repairs, Maintenance, Action Items

2. Has this inspection identified any need for repair or maintenance? If 'Yes', describe and state the urgency of maintenance. "Urgent" for maintenance that should be conducted as soon as possible, "Moderate" for maintenance that should be conducted within three months, and "Not Urgent" for maintenance that can be conducted in a year. Yes X No ____

Moderate - Backfill crack/slough observed on slope near approximate Sta 12+00 with bentonite-sand mix. (**Addressed by DTE after inspection**)

Moderate - Backfill gouge observed on slope near approximate Sta 88+00 with bentonite-sand mix. (**Addressed by DTE after inspection**)

Moderate - Replace the cover of the inspection port for the covered HDPE pipe near approximate Sta 143+00. (**Addressed by DTE after inspection**)

Not Urgent - Replace eroded riprap around the SmartDitch outlets to the downchutes and within the downchutes.

Not Urgent - Clear vegetation from within the riprap downchutes.

Not Urgent - Clear vegetation from within the SmartDitches.

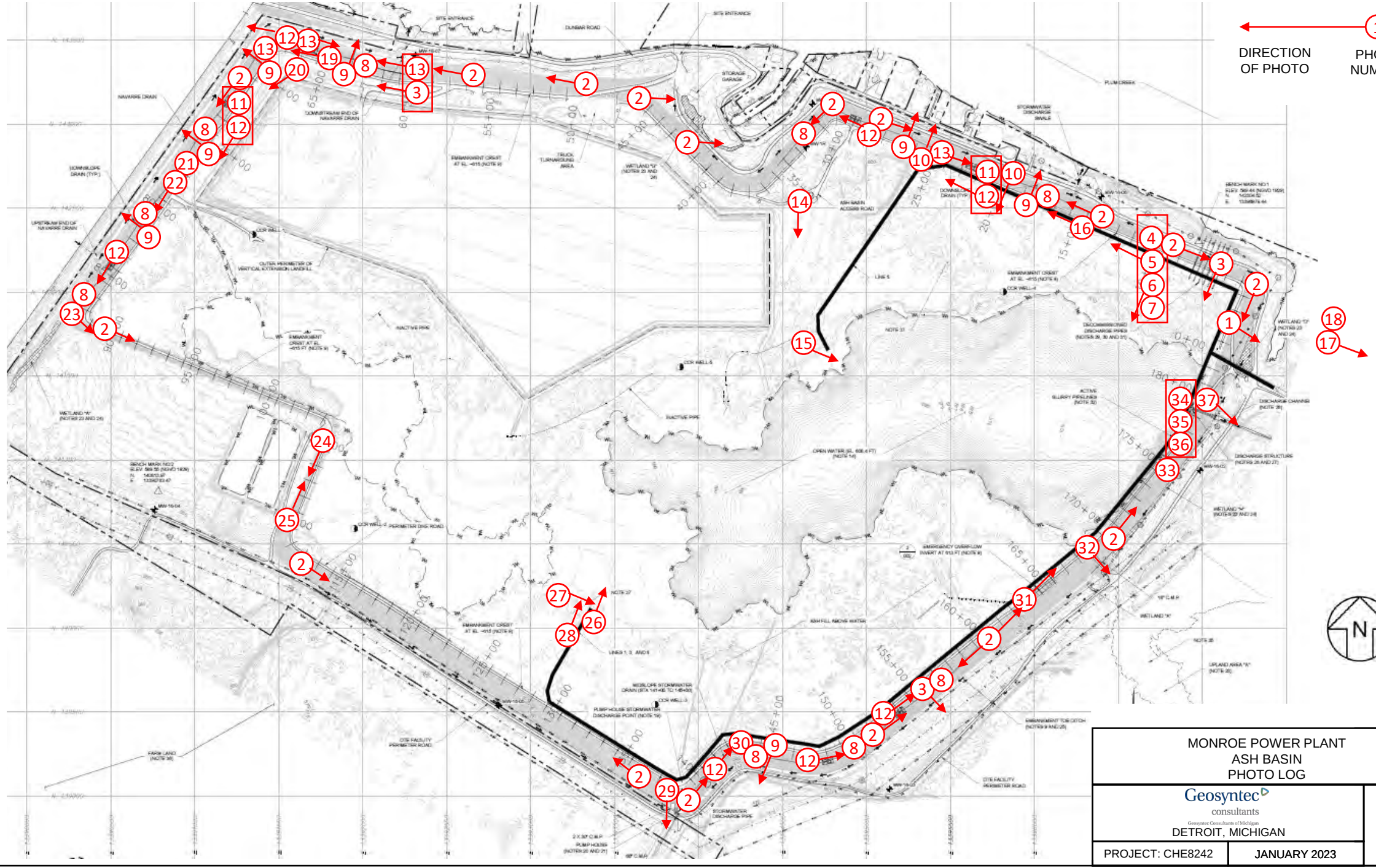
Not Urgent - Apply chemical spray to remove Autumn Olive shrubs. (**Addressed by DTE after inspection**)

Additional details provided in the Annual Inspection Report.

VIII. Photography

Photographs can be taken of notable features. List of photographs:

	Location	Direction of Photo	Description
1	SEE ATTACHED PHOTO LOG.		
2			
3			
4			
5			
6			
7			
8			
9			
10			



MONROE POWER PLANT
ASH BASIN
PHOTO LOG

Geosyntec consultants
Geosyntec Consultants of Michigan
DETROIT, MICHIGAN

FIGURE
A1

PROJECT: CHE8242

JANUARY 2023

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 1

Date: 4/6/2022

Direction: Southeast

Comments: Example of Autumn Olive shrub observed at some locations on the Ash Basin perimeter berm. Chemical sprays were applied to the embankment slopes after the visual inspection to kill the shrubs and prevent future growth.

Photograph 2

Date: 4/6/2022

Direction: Multiple

Comments: Example of observed slopes in good condition. Good vegetation and no cracks or settlement were observed.

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 3 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Autumn Olive shrubs were observed on the perimeter berms in certain locations. Chemical sprays were applied to the embankment slopes after the visual inspection to kill the shrubs and prevent future growth.	
Photograph 4 **Date:** 4/6/2022 **Direction:** **Comments:** Crack/Slough observed on the perimeter berm near approximate Station 12+00. Crack was approximately 6-in. wide and 12-in. deep. A bentonite-sand mix was used to backfill and repair the crack after the visual inspection.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 5 **Date:** 4/6/2022 **Direction:** Northwest **Comments:** Crack/Slough observed on the perimeter berm near approximate Station 12+00. A bentonite-sand mix was used to backfill and repair the crack after the visual inspection.	
Photograph 6 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** Crack/Slough observed on the perimeter berm near approximate Station 12+00. Crack was approximately 100 feet long. A bentonite-sand mix was used to backfill and repair the crack after the visual inspection.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 7 **Date:** 4/6/2022 **Direction:** **Comments:** Crack/Slough observed on the perimeter berm near approximate Station 12+00. A bentonite-sand mix was used to backfill and repair the crack after the visual inspection.	
Photograph 8 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Erosion was observed at many of the SmartDitch outlets into the riprap downchutes. Erosion was significant at certain locations. Eroded riprap should be replaced.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 9 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Erosion of riprap and vegetation were observed in many of the riprap downchutes. Eroded riprap should be replaced and vegetation should be cleared.	
Photograph 10 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Small, mossy areas were observed at a couple locations on the northeastern perimeter berm. No seepage was observed at the time of inspection. DTE has continued to monitor these areas during weekly inspections.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 11 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Covered HDPE pipes connecting portions of SmartDitches were observed to have some sediments and vegetation. Sediments and vegetation did not impede sufficient flow within the pipes.	
Photograph 12 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** The covered HDPE pipes used to connect portions of SmartDitches were in good condition.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 13 **Date:** 4/6/2022 **Direction:** Multiple **Comments:** Vegetation was observed within the SmartDitch drainage features at multiple locations. The vegetation did not affect the functionality of the SmartDitch to sufficiently convey stormwater.	
Photograph 14 **Date:** 4/6/2022 **Direction:** South **Comments:** The access road to sluice line 5 had some rutting but was in good condition.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 15 **Date:** 4/6/2022 **Direction:** Southeast **Comments:** Sluice line 5 was actively sluicing ash to the Ash Basin at the time of the inspection. No obstructions were observed in sluice line 5.	
Photograph 16 **Date:** 4/6/2022 **Direction:** Northwest **Comments:** The perimeter road atop the perimeter berm was in good condition with minimal rutting.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 17 **Date:** 4/6/2022 **Direction:** Southeast **Comments:** Silt curtain at the end of the discharge canal was functioning properly.	
Photograph 18 **Date:** 4/6/2022 **Direction:** **Comments:** The weir at the end of the discharge canal was functioning properly. Water flowing out of the discharge canal was clear.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 19 **Date:** 4/6/2022 **Direction:** West **Comments:** Bentonite and sand backfill repair made to a crack observed near approximate Station 65+00. No additional movement was observed at the time of the inspection. DTE has continued to monitor the repairs during the weekly inspections.	
Photograph 20 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** New asphalt access road for the Vertical Extension Landfill. An HDPE pipe was observed to extend under the new road. The source and extent of the pipe was not identified during the inspection. The pipe was capped.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 21 **Date:** 4/6/2022 **Direction:** **Comments:** Bentonite and sand backfill repair made to a crack observed near approximate Station 78+00. No additional movement was observed at the time of the inspection. DTE has continued to monitor the repairs during the weekly inspections.	
Photograph 22 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** Bentonite and sand backfill repair made to a crack observed near approximate Station 78+00. No additional movement was observed at the time of the inspection. DTE has continued to monitor the repairs during the weekly inspections.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 23 **Date:** 4/6/2022 **Direction:** Southeast **Comments:** Gouge observed in the perimeter berm near approximate Station 88+00. Gouge was approximately 6-inches wide and 12-inches deep and appeared to be from construction equipment. A bentonite-sand mix was used to backfill and repair the crack after the visual inspection.	
Photograph 24 **Date:** 4/6/2022 **Direction:** South **Comments:** Site entrance for new asphalt access road for Vertical Extension Landfill. Stormwater swale and features were in good condition.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 25

Date: 4/6/2022

Direction: North

Comments: Access to perimeter road on crest for new asphalt access road for Vertical Extension Landfill. Stormwater swale and features and slope were in good condition.

Photograph 26

Date: 4/6/2022

Direction: North

Comments: No obstructions were observed in sluice lines 1, 3, and 6. Two of these sluice lines were actively sluicing ash to the Ash Basin at the time of the inspection.

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 27 **Date:** 4/6/2022 **Direction:** East **Comments:** No obstructions were observed in sluice lines 1, 3, and 6. Two of these sluice lines were actively sluicing ash to the Ash Basin at the time of the inspection.	
Photograph 28 **Date:** 4/6/2022 **Direction:** North **Comments:** No obstructions were observed in sluice lines 1, 3, and 6. Two of these sluice lines were actively sluicing ash to the Ash Basin at the time of the inspection.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 29

Date: 4/6/2022

Direction: South

Comments: Pump house for perimeter swales and access were in good condition.

Photograph 30

Date: 4/6/2022

Direction:

Comments: One of the inspection ports for the covered HDPE pipe near approximate Station 143+00 was missing a cover. The cover should be replaced.

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 31

Date: 4/6/2022

Direction: Northeast

Comments: The low point in the perimeter berm used in case of emergency overflow was in good condition.

Photograph 32

Date: 4/6/2022

Direction: Southeast

Comments: The access road to the perimeter berm near approximate Station 168+00 were in good condition with no observed erosion rills.

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 33 **Date:** 4/6/2022 **Direction:** **Comments:** A prior wet spot filled with gravel on the perimeter berm near approximate Stations 175+00 to 177+00 was observed during the inspection. No wet spots were observed. DTE has continued to monitor the repairs during the weekly inspections.	
Photograph 34 **Date:** 4/6/2022 **Direction:** **Comments:** Gates for discharge structure appeared to be working properly.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 35 **Date:** 4/6/2022 **Direction:** **Comments:** Sluice gates and discharge pipes for discharge structure were not obstructed.	
Photograph 36 **Date:** 4/6/2022 **Direction:** **Comments:** No damage was observed on the emergency stoplogs.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Ash Basin | **Site Location:** Monroe, MI

Photograph 37

Date: 4/6/2022

Direction: Southeast

Comments: Exit from discharge structure to discharge canal was not obstructed. No slope disturbances were observed.

APPENDIX B

Resume of Clinton Carlson, Ph.D., P.E.
(Qualified Professional Engineer)

Clinton P. Carlson, PhD, PE

Qualifications

Dr. Carlson is a geotechnical engineer with eight years of experience on projects related to design and remediation of landfills and coal combustion residual impoundments, dam safety, and geotechnical instrumentation. He is a Project Engineer with Geosyntec and part of the firm's dams and levees practice area. His work has included managerial responsibilities for project budgets and schedules and has primarily supported federal and power clients for both small and large projects. Clinton has managed and supported projects for risk assessments, slope stability analyses, and instrumentation for landfills and dams.

Specialties

Landfill and CCR Design and Remediation
Dam Safety
Geotechnical Instrumentation

Education

PhD, Civil Engineering, University of Michigan, Ann Arbor, MI, 2014
MSE, Civil Engineering, University of Michigan, Ann Arbor, MI, 2010
BSE, Civil & Environmental Engineering, University of Michigan, Ann Arbor, MI, 2009

Licenses/Certifications

Professional Engineer: MI

Relevant Project Experience

Annual Inspections of CCR Units, Confidential Client, Southeast Michigan | Inspections of CCR units are conducted annually as part of the CCR Rule to identify any site conditions that pose a concern to the safe operation and stability of the CCR units. Project manager in charge of financials and engineer in charge of performing annual inspections for three CCR units for a client in Southeast Michigan. Prepared inspection reports to summarize observed conditions at the three CCR units. Interacted with client representatives to discuss necessary actions to address potential concerns. (Mar. 2022–Present)

Monitoring and Maintenance for CCR Units, Confidential Client, Southeast Michigan | Project manager in charge of financials and engineer in charge of overseeing inspections, monitoring, and maintenance of geotechnical instrumentation system of two CCR units for a client in Southeast Michigan. The geotechnical instrumentation system included multiple monitoring wells, settlement plates, vibrating wire piezometers, manual inclinometers, and ShapeArray inclinometers. Instrumentation data were evaluated to identify near real-time concerns for the safe operation and stability of the CCR units. Provided monthly summary reports to the client representatives and met with them to discuss the monitoring data on a bi-monthly basis. Conducted site inspections of observed conditions posing concerns for the safe operation and stability of the CCR units on at the request of the client. (Mar. 2022–Present)

Landfill Stability Evaluation, Confidential Client, Southeast US | Contacted by the client to evaluate an instability at an existing landfill including the implementation of instruments to measure and evaluate progression of instability. Project manager in charge of financials and engineer in charge of developing instrumentation plan and evaluating measurements of instrumentation. Conventional surveying stakes and an automated monitoring total station were implemented to measure progression of instability. Evaluation of measurements was used to inform the client on progression of instability and provide recommendations for implementation of mitigation measures. Weekly summary reports of instrumentation measurements were provided to the client while implementing mitigation measures. Additional support was provided to the client in discussions with the state regulator. The monitoring systems were also utilized to provide additional safety measures during the staged temporary removal of a buttress berm in order to tie-in liner systems for new landfill cells to the existing liner system. Monitoring data are currently summarized in monthly reports and provided to the client. (Aug. 2019–Present)

Landfill Design Projects for Power Company, Confidential Client, Southeast US | Engineer in charge of coordinating and performing the geotechnical analyses for the permitting and closure of multiple sites for a power company. Geotechnical analyses performed for the sites included subsurface investigation and geotechnical material properties interpretation, slope stability analyses (including veneer and liner

stability), settlement calculations for liner and cover systems, and hydrologic evaluations for liner and cover systems. The computer programs Slide and HELP were used to perform the slope stability analyses and hydrologic evaluations, respectively. (June 2015–Present)

Portsmouth Gaseous Diffusion Plant On-Site Waste Disposal Facility, Fluor-BWXT Portsmouth, Piketon, OH | The Department of Energy's Portsmouth On-Site Waste Disposal Facility is being constructed for the disposal of on-site hazardous waste materials. Engineer that aided geotechnical analyses for the design and construction of the facility. Geotechnical analyses performed during the design phase included slope stability analyses (including veneer and liner stability), settlement calculations for liner and cover systems under variable loads, and foundation design for leachate conveyance systems. During construction, performed slope stability analyses for excavation conditions and geo-structural calculations and reinforcement detailing for reinforced concrete valve houses constructed as part of a leachate transmission system and a footing for an interim transfer ramp. The computer program Slide was used to perform the slope stability analyses. (Apr. 2015–Present)

Inspections and Mitigation for CCR Landfill, Confidential Client, Southeast Michigan | Probabilistic slope stability analyses for a CCR landfill in Southeast Michigan identified unsatisfactory conditions for existing slopes that required mitigation measures. Project manager in charge of project financials and schedule and engineer in charge of developing inspection and construction plans to mitigate unsatisfactory conditions. Developed an inspection plan to identify indicators of slope instabilities and allow for safe operation conditions. The inspection plan was carried out by site personnel prior to and during construction and supported by Geosyntec. Developed a construction plan to regrade the slopes and mitigate the unsatisfactory conditions. Performed site inspections and met with client representatives and contractors during construction to verify safe working conditions and satisfactory slope conditions were achieved. (Feb. 2022–May 2022).

Probabilistic Slope Stability Assessment for CCR Landfill, Confidential Client, Southeast Michigan | Previous site inspections identified potentially unstable slopes at a CCR landfill in Southeast Michigan, so probabilistic slope stability analyses were performed to evaluate the reliability of the slope conditions given limited site information. Engineer that aided in review of probabilistic slope stability analyses and slope stability assessment report. Recommendations were developed and provided to the client to address unsatisfactory conditions for existing slopes identified in the probabilistic site response analyses. (Nov. 2021–May 2022).

Review of Slope Stability Analyses and Dewatering Plan, Confidential Client, Southeast Michigan | Contacted by client to review slope stability analyses performed by another consultant for a landfill of concern and provide comments to the client. Project manager in charge of reviewing analyses, project budget and schedule, and meeting with the client. Based on comments and meeting with the client, Geosyntec was asked to review a dewatering plan developed for the landfill and provide comments. Met with client and discussed the dewatering plan developed by the other consultant. (Nov. 2021–Apr. 2022)

Quantitative Risk Assessment for Dam in Southeast US, Confidential Client, Southeast US | The project further refines estimates of risk developed from previous potential failure mode analyses and semi-quantitative risk analyses performed for an embankment dam and its primary and auxiliary spillways located in the Southeastern U.S. Project manager in charge of financials and schedule for the Quantitative Risk Assessment (QRA) of the dam. The main objectives of the QRA are to estimate the risk, in terms of annual failure probabilities and downstream consequences, for seismic, internal erosion, and spillway hydrologic failure modes and the uncertainties associated with the risks. Actively participated in the expert elicitation process to develop risk models and meetings with the client to present the models and results of the QRA. Prepared calculation packages and reports summarizing the methods used in the QRA and the results for the client. Aided in the ground motion selection, internal erosion evaluation, and evaluation of the erodibility of the embankment soils. (May 2018–Apr. 2022)

Field Investigation of Primary Spillway for Dam in Southeast US, Confidential Client, Southeast US | Field engineer for oversight of a visual inspection and investigation of the foundation of the primary spillway slabs and control structure for a dam in the Southeast U.S. Observations from the field investigation were used to inform a QRA performed for the dam and its spillways. The visual inspection

was performed to identify vertical offsets and gaps in the joints between the slabs of the primary spillway. A field investigation consisting of shallow cores through the concrete slabs of the spillway and deep borings into competent rock below the control structure was performed to evaluate the foundation materials of the primary spillway and the presence of voids. (Jan. 2021–May 2021)

Landfill Stability Evaluation, Confidential Client, Southeast US | Contacted by the client to evaluate an instability at an existing landfill including the root cause of the instability. Project manager in charge of financials and engineer in charge of coordinating and performing slope stability analyses. Slope stability analyses were performed to evaluate the root cause of the instability and mitigation measures required to stabilize the landfill. Results of the analyses were used to support the client in discussions with the state regulator and advise the client on a path forward for stabilizing the landfill. A facility-wide stability plan was also developed based on the stability of the landfill for the existing conditions and the final planned conditions. Analyses were also performed for a staged temporary removal of a buttress berm in order to tie-in liner systems for new landfill cells to the existing liner system. Aiding in ongoing annual landfill stability assessments. (Aug. 2019–Dec. 2020)

Onondaga Lake Geotechnical Monitoring, Honeywell, Syracuse, NY | Contaminated sediments were dredged from Onondaga Lake and consolidated within geotextile tubes at an off-site landfill as part of a Superfund project. Geotechnical instrumentation systems were implemented to monitor (i) a sheetpile wall around a portion of the Lake dredged for remediation and (ii) a landfill closure comprised of geotextile tubes filled with sediments dredged from the Lake. Manager in charge of financials and engineer in charge of monitoring the instrumentation data. The monitoring systems included manual and automated inclinometers, settlement cells, vibrating wire piezometers, and surface monitoring points. (Feb. 2015–Oct. 2018)

Stability and Internal Erosion Assessment of Clear Creek Dam and Beaver Creek Dam, Tennessee Valley Authority, Bristol, TN and VA | Static and seismic stability of two earthen embankment dams in the twin cities of Bristol, TN and VA, Clear Creek Dam (BTC) and Beaver Creek Dam (BTB), were assessed along with the internal erosion for potential failure modes identified in the Potential Failure Mode Analyses (PFMA). Engineer in charge of seismic site response analyses and internal erosion evaluations for two earthen embankment dams. Performed seismic response analyses and used the results to perform the liquefaction potential evaluation. The seismic response analysis was performed using the computer program Strata. Internal erosion evaluations were performed for the critical potential failure modes identified by the project team for each dam. (Mar. 2017–Sept. 2017)

Onondaga Lake Capping and SCA Design, Honeywell, Syracuse, NY | Contaminated sediments were dredged from Onondaga Lake and consolidated within geotextile tubes at an off-site landfill as part of a Superfund project. Engineer that aided in slope stability analyses and hydrologic evaluations for: (i) a sheetpile wall around a portion of the lake dredged for remediation and (ii) a landfill closure comprised of geotextile tubes filled with sediments dredged from the lake. Stability analyses for the sheetpile wall included the internal stability (i.e., overturning and bending) of the sheetpile wall adjacent to the dredged lakebed and the global stability of the wall under the loading of an adjacent railroad line. The stability analyses of the landfill closure included the veneer stability of the liner and cover systems and the internal, interface, and global stability of the stacked geotextile tubes. The computer programs ShoringSuite, Slide, and HELP were used to perform the internal stability analyses for the sheetpile wall, global stability analyses of the wall and landfill closure, and the hydrologic evaluations, respectively. (Feb. 2015–May 2016)