



Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

2024 ANNUAL INSPECTION REPORT VERTICAL EXTENSION LANDFILL

MONROE POWER PLANT

Monroe, Michigan

Prepared by

Geosyntec 
consultants

Geosyntec Consultants of Michigan

3011 West Grand Blvd, Suite 2300
Detroit, MI 48202

CHE8242V

January 2025

TABLE OF CONTENTS

1. INTRODUCTION	1-1
1.1 Overview	1-1
1.2 Purpose	1-1
1.3 Report Organization	1-2
1.4 Terms of Reference	1-3
2. REVIEW OF AVAILABLE INFORMATION.....	2-1
3. FACILITY DESCRIPTION	3-1
3.1 Overall Site Description	3-1
3.2 Design.....	3-1
3.3 Construction	3-2
4. OBSERVATIONS FROM ANNUAL INSPECTION	4-1
5. INSTRUMENTATION MONITORING	5-1
5.1 Slope Inclinometers.....	5-1
5.2 Piezometers	5-1
5.3 Settlement Plates	5-2
6. CURRENT OPERATIONS.....	6-1
6.1 Operations Organization	6-1
6.2 Operation Activities	6-1
6.3 Run-On/Run-Off Control System Plan	6-1
6.4 Observations.....	6-2
7. EVALUATION OF OBSERVATIONS.....	7-1
8. CONCLUSIONS AND CERTIFICATION	8-1

LIST OF TABLES

Table 1: Available Information Reviewed for Annual Inspection

LIST OF FIGURES

Figure 1: Site Location

Figure 2: Landfill Layout

LIST OF APPENDICES

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

Appendix B 2024 Annual Inspection Forms and Photos

1. INTRODUCTION

1.1 Overview

This 2024 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants of Michigan, Inc. (Geosyntec) to provide the results of the annual inspection of the coal combustion residuals (CCR) vertical extension landfill (Landfill) 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) 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 Landfill is an "existing landfill" per 40 CFR 257.53 and must be inspected by a qualified professional engineer on a periodic basis, not to exceed one year.

The Landfill is constructed on top of fly ash that was previously deposited in the Monroe Ash Basin (Ash Basin) (Figure 1). The Ash Basin is a separate CCR surface impoundment 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 properties and Plum Creek. The combined Landfill and Ash Basin are considered the "Permitted Area".

Landfill Phase 1 construction began in August 2015. The Michigan Department of Environment, Great Lakes, and Energy (EGLE, formerly Michigan Department of Environmental Quality [MDEQ]), licensed the area for disposal via email communication on October 14, 2015, and CCR was placed in the unit beginning October 16, 2015. As of December 29, 2023, DTE ceased receipt of CCR within the Landfill.

1.2 Purpose

The objective of the inspection 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 257.84(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); and
- (ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

The purpose is accomplished through periodic visual inspection (and photo-documentation) of the Landfill, 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 Landfill. 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 257.84(b)(2)]:

- (i) Any changes in geometry of the structure since the previous annual inspection;
- (ii) The approximate volume of CCR contained in the unit at the time of the inspection;
- (iii) 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
- (iv) Any other change(s) which may have affected the stability or operation of the CCR unit 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 2024 inspection of the Landfill.
- Section 5 – Instrumentation Monitoring: provides information about the instrumentation monitoring of the Landfill.
- Section 6 – Current Operations: describes DTE's current operations.

- Section 7 – Evaluation of Observations: based on the inspection results, evaluates if the design, construction, operation, and maintenance of the Landfill 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 June 6, 2024, by Dr. Clinton Carlson, Ph.D., P.E., and Dr. Jorge Romaña Giraldo, Ph.D. of Geosyntec¹, with assistance from DTE staff.

This report was prepared by Dr. Carlson and Dr. Romaña Giraldo 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 ten years of experience with coal ash related projects. His resume is provided in Appendix A.

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 Inspection

Title	Prepared by	Date	Content
Post-Closure Plan	AECOM	October 17, 2016	Documenting how the plan will meet the CCR Rule. Plan remains unchanged.
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.
Location Restrictions Demonstration	TRC	September 2018	Provides details of location restrictions demonstration for the Landfill per the CCR Rule.
Run-on/Run-off Control System Plan for CCR Disposal Facility - Monroe Fly Ash Basin Vertical Extension, Existing Landfill	AECOM	October 15, 2021	Describes the run-on and run-off control features for the vertical extension. Documenting how the plan meets the CCR Rule. Provides a five-year update to the original plan submitted in October 2016.
Fugitive Dust Control Plan	DTE	November 9, 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.

Table 1: Available Information Reviewed for Annual Inspection

Title	Prepared by	Date	Content
Weekly Inspection Reports	DTE	May 2023 to November 2024	Qualified person inspections from May 2023 through November 2024.
Closure Plan	Burns & McDonnell	October 5, 2023	Documenting how the plan will meet the CCR Rule.
2023 Annual Inspection Report	Geosyntec	January 9, 2024	Provides the results of the 2023 annual inspection.
Notice of Intent to Close CCR Unit	DTE	January 25, 2024	DTE provided Notice of Intent to Close (NOI) for the DTE Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill. Completed pursuant to 40 CFR §257.102(g).
Annual Groundwater Monitoring Report	DTE	January 31, 2024	Summary of annual groundwater monitoring results for 2023 for the Monroe Ash Basin and Vertical Extension Landfill.
Annual Fugitive Dust Report	DTE	November 19, 2024	Annual report of dust control actions, any complaints, and corrective actions taken, if any. Completed pursuant to 40 CFR 257.80(c).
Instrumentation Monitoring and Maintenance Manual, Rev. E. - Draft	Geosyntec	December 2024	Provides details of operations, monitoring, action levels and items for the Landfill. Updated for changes in continuous monitoring system and operations at the Facility.

3. FACILITY DESCRIPTION

3.1 Overall Site Description

The facility includes a 79-acre vertical extension landfill (Landfill) and a 331-acre fly ash basin impoundment (Ash Basin) for a permitted area of 410 acres. The permitted area is in Section 16, Township 7 South, Range 9 East, of Monroe Township, Michigan shown in Figure 1. The Landfill is a coal ash landfill, and 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 entire Landfill, including the perimeter berms and swales, are located within the interior drainage area of the Ash Basin. Any potential sediments from erosion will be deposited in the Ash Basin. Any potential run-off will be managed under the NPDES permit for the Ash Basin.

The Landfill is designated as a 79-acre “dry” disposal area located on top of an area of the Ash Basin filled with CCR approximately to the originally planned final grade. The site investigation conducted in 2015 identified the fly ash below the Landfill to be approximately 50-feet-thick to an elevation of approximately 563 feet². The water level in the Ash Basin is maintained at or below an elevation of 609 feet.

The Landfill is licensed to receive bottom ash, fly ash, flue gas desulfurization (FGD) scrubber wastewater sludge (solidified with fly ash or bottom ash), synthetic gypsum, inert material, and any other waste allowed by the CCR Rule or obtained through specific regulatory approval. The Permit Modification Report, prepared by Golder & Associates (Golder) dated April 16, 2015, includes regulatory requests for placement of materials within the Landfill.

3.2 Design

The design was provided by Golder in the Permit Modification Report. The components of the Landfill include the following.

- Prepared subgrade consisting of in-situ sluiced fly ash and general fill.
- 30-inch-thick pore pressure relief layer, comprised of (from top to bottom):
 - 24-inch-thick layer of bottom ash or limestone aggregate;
 - Perforated collection pipes encased in a filter fabric (“sock”) within the 24-inch-thick bottom ash/limestone aggregate layer;

² Elevations in this AIR are reported in the National Geodetic Vertical Datum of 1929 (NGVD29).

- Separation geotextile made of non-woven, needle-punched geotextile; and
- 6-inch-thick embedment layer.
- Monitoring system consisting of 12 settlement plates, 13 vibrating wire piezometers, and six slope inclinometers.
- Perimeter berm.
- Perimeter collection swale.

3.3 Construction

Phase 1 of the Landfill is the western 11-acre portion shown in Figure 1. Construction of Phase 1 of the Landfill was certified by David List, P.E., of Golder on September 16, 2015; the certification is contained in the Phase 1 Construction Documentation Report. Record drawings of the construction were provided in Appendix B of the 2015 AIR.

Construction for Phase 2 of the Landfill, the remaining 68 acres shown in Figure 1, has been completed and the certification report was sent to EGLE in November 2017. EGLE provided approval on January 24, 2018, for CCR disposal. CCR material began being placed within Phase 2 of the Landfill in 2020.

As of December 29, 2023, DTE ceased receipt of CCR material within the Landfill. DTE provided a NOI to close the Landfill to EGLE on January 25, 2024. The total estimated volume of CCR in the Landfill above the geotextile separation embedment layer after ceasing receipt of CCR material is approximately 365,000 cubic yards (cy), based on data provided by DTE.

4. OBSERVATIONS FROM ANNUAL INSPECTION

Inspection results and photographs from the annual visual inspection are provided in Appendix B. The key observations from the inspection are summarized below.

1. The paved access road near the northwest corner of the Landfill (Photograph 1) and the reinforced concrete culvert beneath the paved access road (Photograph 2) were in good condition. The riprap around the inlet and outlet of the culvert had some vegetation but was generally in good condition with no signs of erosion. Minimal flow was observed through the culvert during the inspection.
2. Dense vegetation was observed within the perimeter swales along the north (Photographs 2, 3, 7, 8, 22, and 24), east (Photograph 9), south (Photographs 13, 14, 15, and 18), and west (Photograph 21) sides of the Landfill.
3. Minimal flow was observed in the perimeter swales around the Landfill (R1 through R4) during the inspection (R2 in Photograph 11, R4 in Photograph 14, and R3 in Photograph 18). The water level in the north perimeter swales (R1 and R2) was lower than the pore pressure relief pipe outlets and top of the culverts.
4. The perimeter berms along the north (Photographs 3, 7, 8, 22, and 24), east (Photograph 9), south (Photograph 13) and west (Photograph 21) sides of the Landfill were observed to have dense vegetation. There were no apparent signs of slope instability or erosion along the perimeter berms during the inspection.
5. Geosyntec attempted to locate the pore pressure relief pipe outlets and inspect the outlets for any flow or blockages (e.g., sediments, vegetation).
 - Geosyntec was only able to locate six pipe outlets due to the dense vegetation and water levels within the perimeter swales (Photographs 4, 14, and 18). The pipe outlets that were located were all on the north side of the Landfill.
 - Only one pore pressure relief pipe was observed to be actively flowing during the inspection, though the flow was minimal (Photograph 23). This pipe is located below Phase 1, where CCR material has been placed, and has historically been the only pipe with any observed flow. There was some algae growth within the outlet of this pipe (Photograph 23).
 - Minimal sediments and/or vegetation was observed in the pore pressure relief pipe outlets that could be located (Photograph 5).

6. The aggregate access road on the north side of the Landfill (Photograph 6) was in good condition with no ruts and minimal erosion.
7. The pore pressure relief layer constructed for Phase 2 of the Landfill was in good condition with minimal vegetation (Photograph 10).
8. The culvert at the southeast corner of the Landfill appeared to be in good condition (Photograph 11). Dense vegetation was observed within the perimeter swales (R2 and R4) adjacent to the culvert; however, the vegetation did not appear to impact the ability of the culvert to convey water to the Ash Basin. Minimal flow was observed through the culvert during the inspection.
9. The access road above the culvert at the southeast corner of the Landfill had vegetation and some small, woody vegetation (Photograph 12). There were no apparent signs of slope instability or erosion along the access road during the inspection.
10. Dataloggers (DL) 2 and 1 along the south side of the Landfill were surrounded by dense vegetation (Photograph 15). The vegetation had the potential to block the solar panels used to power the batteries at DL-2 and DL-1.
11. The instrument enclosures for DL-2 and DL-1 had significant moisture intrusion and ants (Photograph 16). The desiccant canisters within the enclosures were in poor condition.
12. The CCR placed within the Landfill appears to have been placed and stacked in accordance with generally accepted engineering practices (Photograph 17).
13. CCR placed within the southwest corner of the Landfill had eroded onto the crest of the perimeter berm (Photographs 19 and 20). It did not appear that the CCR material had eroded into perimeter swale R3 at the time of the inspection.
14. DL-4 and DL-3 were surrounded by some vegetation, but the solar panels did not appear to be blocked (Photograph 25). The instrument enclosures for DL-4 and DL-3 had significant moisture intrusion and the desiccant canisters were in poor condition (Photograph 25).

5. INSTRUMENTATION MONITORING

5.1 Slope Inclinometers

Six slope inclinometers (SIs) are present along the west and south sides of the Landfill perimeter. The SIs were constructed within the existing CCR material in the Monroe Ash Basin. The SIs are designated as FI-1 through FI-4, SI-9, and SI-10, as shown on Figure 2. Readings for the SIs are generally collected twice per month.

The measurements from the manual inclinometers since the 2023 annual inspection were less than approximately 1.2 inches of cumulative movement and less than 0.1 inches between each reading. These measurements are below the alert levels established for the manual inclinometers.

5.2 Piezometers

There are 13 piezometers (PZs) present below the Landfill pressure relief layer at the locations shown on Figure 2. PZs have been incorporated into the existing continuous monitoring system established for the Monroe Ash Basin. PZ readings are collected and automatically uploaded to the Cloud system and interpreted as part of the continuous monitoring system for the Monroe Ash Basin. Readings for the PZs are collected and reviewed at least every other week (minimum of twice per month).

PZ-04 went offline in June 2021. Connectivity could not be restored with PZ-04, so it was left in-place and decommissioned at the end of 2021. PZ-08 has continuously reported erroneous readings (i.e., water elevations greater than 800 feet) since October 2022. Geosyntec conducted a diagnostic test on PZ-08 in January 2023 and believes the instrument or wiring below the Landfill is faulty. PZ-06 has been reporting erroneous readings since March 2024, also believed to be due to a faulty instrument or wiring below the Landfill. PZ-07 and PZ-10 have not reported water levels to the online servers since September 2023. Geosyntec conducted a diagnostic test on these piezometers in May 2024, but could not identify an issue in the connection with the datalogger.

As a result of these issues with the instruments, wiring, and communication with online servers, there are currently eight piezometers below the Landfill that are actively reporting readings. Geosyntec has recommended no actions be taken to replace or repair the instrumentation equipment because the Landfill is no longer active and is in the process of being closed.

The measurements from the functioning PZs since the 2023 annual inspection were generally below the established alert level elevations (i.e., 0.5 feet above the bottom of the pore pressure relief layer or lower). The measured elevations are expected to continue to decrease as the Landfill and Ash Basin are closed.

5.3 Settlement Plates

There are 12 settlement plates (SPs) present within the footprint of the Landfill and along the northwestern perimeter as shown on Figure 2. The SPs are founded on the surface of the Landfill pressure relief layer and generally co-located with the PZs. Readings for the SPs are generally collected twice per month.

SP-04 and SP-06 were damaged by equipment in December 2023 and could not be repaired. Geosyntec has recommended no actions are taken to replace these SPs because the Landfill is no longer active and in the process of being closed.

The measurements from the functioning SPs since the 2023 annual inspection were less than 3 inches between each quarter, which is below the established alert level measurement.

6. CURRENT OPERATIONS

The Landfill has ceased receipt of CCR material and is in the process of being closed. There are no current operations. However, inspection, monitoring, and maintenance operations will still occur while the Landfill is being closed.

6.1 Operations Organization

The Landfill is operated by DTE. The responsible personnel include:

- Dan Casey – DTE Energy Supply, Plant Manager, Monroe Site Operations
- Jason Logan and Eric Molnar – 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. E and Operations Plan Drawings Rev. E (Geosyntec, 2024). The following were completed as 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.

Weekly inspections are completed and documented by qualified personnel. Personnel were initially trained in April 2015, and new inspectors have been trained by DTE personnel as they have been hired. Weekly inspections for the Landfill are conducted concurrently with the inspections for the Ash Basin.

6.3 Run-On/Run-Off Control System Plan

Run-on and run-off for the Landfill is controlled by the perimeter berms and swales, which had dense vegetation but appeared to be in satisfactory condition at the time of the visual inspection.

6.4 Observations

The activities specified in the Operations Plan Drawings appear to have been properly followed at the Landfill. The Annual Fugitive Dust Report from November 19, 2024, was reviewed. No citizen complaints were received and, as a result, no corrective actions were required. The weekly inspection reports through November 2024 were reviewed by Geosyntec. Eroded CCR material was observed on the crest of the perimeter berm near the southwest corner of the Landfill. Any potential sediments from erosion will be deposited in the Ash Basin.

7. EVALUATION OF OBSERVATIONS

The Landfill was not observed to have any existing structural weaknesses or potential safety concerns during the annual inspection. The design, construction, maintenance, and current operations of the Landfill are consistent with recognized and generally accepted good engineering standards, based on available information. The continuous monitoring system data from February 2016 through November 2024 were also reviewed by Geosyntec and did not indicate any structural weaknesses in the trends. Active operations at the Landfill have ceased as of December 2023.

Three maintenance conditions were identified during the annual inspection.

1. CCR placed within the Landfill had eroded onto the crest of the perimeter berm near the southwest corner. It did not appear the CCR material had eroded into the perimeter swale.
2. Dense vegetation was observed in all the perimeter swales and along all the perimeter berms. The dense vegetation within the perimeter swales makes it difficult to inspect these features; however, no apparent signs of slope instability or erosion were observed during the annual inspection and minimal flow was observed in all the perimeter swales.
3. Datalogger instrument enclosures DL-2 and DL-3 were surrounded by dense vegetation that could potentially block the solar panels used to power their batteries. This could also affect the ability of the instruments to communicate collected data to the online server. All the datalogger instrument enclosures had significant moisture intrusion and some (DL-2 and DL-3) had ants. The desiccant canisters within the instrument enclosures were in poor condition. These conditions could lead to the instrument components being damaged and no longer functioning properly. However, the electronic components within the datalogger instrument enclosures appeared to be functional during the visual inspection.

With the Landfill no longer operating and proceeding through closure by removal in accordance with the Closure Plan, the above referenced conditions will be addressed through implementation of closure. As noted in Section 5, some of the piezometers and settlement plates are no longer functional, and there are no plans to replace these instruments. However, maintenance on components of the instrumentation system that are functional will continue to be implemented through closure of the Landfill until such time that the instrumentation system is decommissioned. Geosyntec replaced the insect traps and desiccant canisters within the datalogger instrument enclosures in August 2024. The need for applying sealant around the instrument enclosures will be assessed during the 2025 annual inspection.

8. CONCLUSIONS AND CERTIFICATION

The design, construction, operation, and maintenance of the Landfill is consistent with recognized and generally accepted good engineering standards in accordance with the CCR Rule [40 CFR 257.84(b)(1)]. DTE ceased receipt of CCR material in the Landfill in December 2023, so there are no active operations at the Landfill. The 2024 annual visual inspection did not identify any structural instabilities or potential safety concerns. Geosyntec identified three maintenance conditions that are recommended to be addressed through closure of the Landfill, as detailed in Section 7.

Certified by:



A handwritten signature in cursive script that reads "Clinton Carlson".

Date January 9, 2025

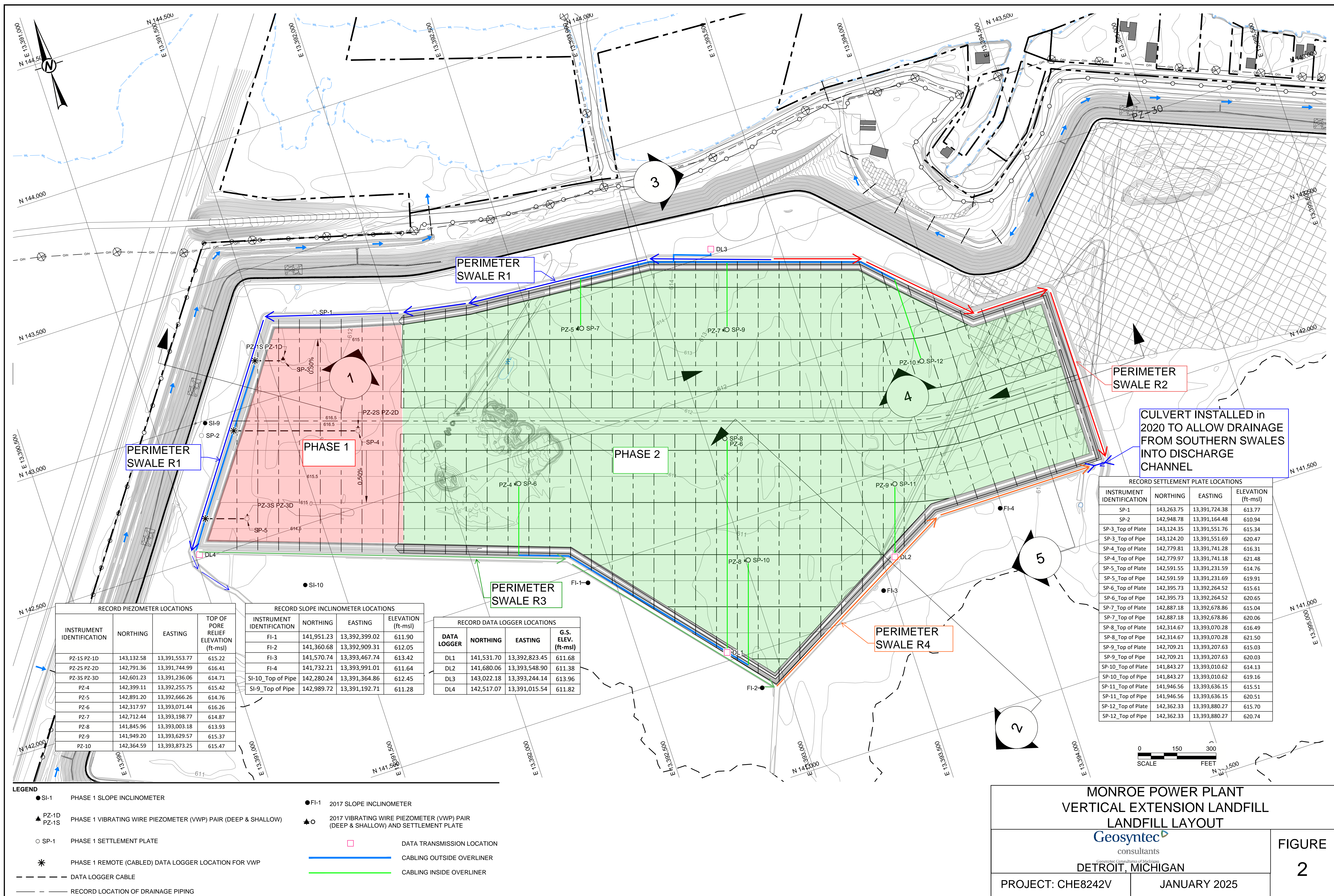
Clinton Carlson, Ph.D., P.E.

Michigan P.E. License Number 6201066842

Project Engineer



MONROE POWER PLANT VERTICAL EXTENSION LANDFILL SITE LOCATION		
 DETROIT, MICHIGAN		FIGURE 1
PROJECT: CHE8242V	JANUARY 2025	



APPENDIX A

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



Clinton P. Carlson, PhD, PE

Qualifications

Dr. Carlson is a geotechnical engineer with ten 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: IN, 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)

FERC Part 12D External Audits of Owner's Dam Safety Programs, Multiple Clients, MI and OH | The FERC regulations require dam owners periodically have an external consultant audit the Owner's Dam Safety Program (ODSP), which includes dam safety documents like the Dam Safety Surveillance and Monitoring Plan (DSSMP) and Emergency Action Plan (EAP). The City of Ann Arbor and American Municipal Power, Inc. contracted Geosyntec to perform the audits of the ODSP for their portfolio of dams (two and four, respectively) in 2024. Performed reviews of the dam safety documents, conducted interviews with dam safety personnel to evaluate their understanding of the dam safety program, observed site inspections conducted by personnel as part of the dam safety program, and prepared a report with the findings and conclusions on the content and implementation of the ODSP. Project manager in charge of the project financials and schedule and the point-of-contact with the owners. (Jan. 2024-Dec. 2024)

FERC Part 12D Periodic Inspections for Barton and Superior Dams, City of Ann Arbor, Ann Arbor, MI | The City of Ann Arbor owns and operates the Barton and Superior Hydroelectric Projects (Barton and Superior Dams) in Ann Arbor, Michigan. Barton and Superior Dams are used by the City of Ann Arbor for power generation and thus, are under regulation by the Federal Energy Regulatory Commission (FERC). FERC regulations require dam safety inspections are performed every five years by Independent Consultant (IC) Teams. Geosyntec served as the IC Team for the City of Ann Arbor for the Ninth FERC

Part 12D Periodic Inspections of Barton and Superior Dams performed in 2023. Served as the project manager and point-of-contact with the City of Ann Arbor on behalf of the IC Team. Member of the IC Team (geotechnical engineering support and field inspection team) that performed the document review, developed the Inspection Plans, prepared the Pre-Inspection Preparation Reports, performed the field inspections, and prepared the Periodic Inspection Reports. The Periodic Inspection Reports were completed and submitted to FERC before the December 2023 deadline. (Jan. 2023–Dec. 2023)

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).

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)

APPENDIX B
2024 Annual Inspection Forms and Photos

**Monroe Power Plant
Vertical Extension Landfill
2024 Annual Inspection Report**

Name of Landfill: Monroe Vertical Extension Landfill Qualified Professional Engineer: Clinton Carlson, PhD, PE
EGLE Landfill ID 397800 Date: 6/6/2024 Time: 9:00 am to 12:30 pm
Owner: DTE Electric Company Weather: 70s, Sunny
Operator: DTE Electric Company Precipitation (past week): 0.3 in.
Site Conditions: Dry with dense vegetation within the perimeter swales and on the perimeter berms

I. Landfill Condition

1. Describe operations in the landfill: Active operations of the Landfill ceased in December 2023. Historical operations are described for completeness. Bottom ash and flue gas desulfurization sludge (i.e., CCR) was placed in Phases 1 and 2 of the Landfill. The CCR appears to have been placed and stacked in accordance with generally accepted engineering practices (Photograph 16). The pore pressure relief layer placed at the bottom of the Landfill was in good condition where it could be observed (Photograph 10). The access roads on the north side of the Landfill were in good condition (Photographs 1, 6) along with the reinforced concrete culvert and the riprap around the inlet and outlet (Photograph 2). The culvert at the southeast corner of the Landfill appeared to be in good condition (Photograph 11). The southeast access road above the culvert had vegetation including some small, woody vegetation (Photograph 12).
2. Are any stormwater swales obstructed? Yes X No
If 'Yes', describe (type of debris, reason for obstruction, etc.) Dense vegetation was observed within the perimeter swales along all sides of the Landfill (Photographs 2, 3, 7, 8, 9, 13, 14, 15, 18, 21, 22, 24). Minimal flow was observed in the perimeter swales around the Landfill (Photographs 11, 14, 18). No apparent signs of erosion were observed during the inspection.
3. Are there indications of erosion on the landfill perimeter berm? Yes X No
If 'Yes', describe what type and its condition (rill, gully, dimensions, etc.) The perimeter berms along all sides of the Landfill were observed to have dense vegetation (Photographs 3, 7, 8, 9, 13, 21, 22, 24). There were no apparent signs of slope instability or erosion along the perimeter berms during the inspection.
4. Is run-off from the landfill surface contained by the perimeter ditch or Ash Basin? X Yes No
If 'No', describe where runoff flow is not contained. CCR placed within the Landfill had eroded onto the crest of the perimeter berm near the southwest corner of the Landfill (Photographs 19, 20).
5. Is run-on prevented from entering the landfill area? X Yes No
If 'No', describe where runoff flow is not contained. Run-on is prevented by perimeter swales and berms.
6. Is the underdrain collection system draining? X Yes No
Describe flow conditions. Only six pore pressure relief pipe outlets could be located due to the dense vegetation and water levels within the perimeter swales (Photographs 4, 14, 18). The pore pressure relief pipe outlets had minimal sediments or vegetation within the outlets (Photograph 5). Only one pore pressure relief pipe was observed to be actively flowing during the inspection, though flow was minimal (Photograph 23). This pipe is located below Phase 1 of the Landfill and has historically been the only pipe with any observed flow. There was also some algae growth within the outlet of this pipe (Photograph 23).

**Monroe Power Plant
Vertical Extension Landfill
2024 Annual Inspection Report**

Name of Landfill: Monroe Vertical Extension Landfill **Qualified Professional Engineer:** Clinton Carlson, PhD, PE
EGLE Landfill ID 397800 **Date:** 6/6/2024 **Time:** 9:00 am to 12:30 pm

7. Is there any unusual settlement causing "birdbaths"? ___ Yes X No
If 'Yes', describe. _____

8. Other observations around the landfill (changes since last inspection): ___ Yes X No
If 'Yes', describe. _____

II. Repairs, Maintenance, Action Items

1. Has any routine maintenance been conducted since the last inspection? X Yes ___ No
If 'Yes', describe. Diagnostic tests were conducted on some of the piezometers.

2. Have any repairs been made since the last inspection? ___ Yes X No
If 'Yes', describe. _____

3. Has this inspection identified any need for repair or maintenance? X Yes ___ No
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 two years, and "Not Urgent" for maintenance that can be conducted within five years.

Not Urgent - Regrade the CCR near the southwest corner of the Landfill to be within the perimeter berm.

Not Urgent - Mow the perimeter berms and clear vegetation within the perimeter swales around the dataloggers.

Not Urgent - Replace desiccant canisters and insect traps within the instrument enclosures and apply new sealant around the outside of the instrument enclosures. (Addressed by DTE August 2024)

The need for applying sealant around the instrument enclosures will be assessed during the 2025 inspection.

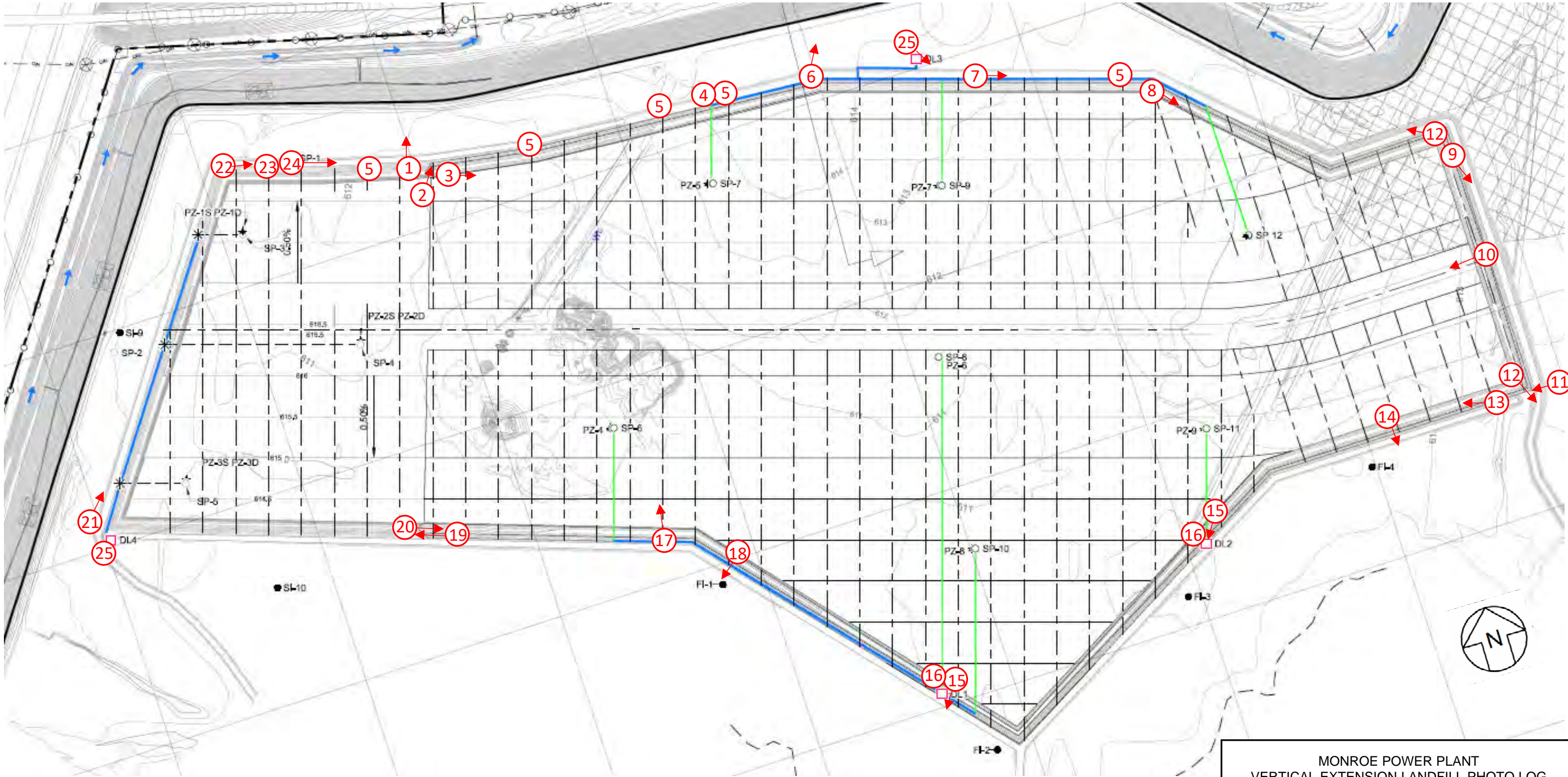
With the Landfill no longer operating and proceeding through closure by removal in accordance with the Closure Plan, the above reference conditions will be addressed through implementation of the closure.

4. Are the instruments for the continuous monitoring system intact and functioning? X Yes X No
If 'No', describe conditions of instrumentation. The slope inclinometers (SI), many of the piezometers (PZ), and many of the settlement plates (SP) are intact and functioning. PZ-04 was decommissioned in 2021. PZ-08 and PZ-06 have been reporting erroneous readings (i.e., water elevations greater than 800 feet) since October 2022 and March 2024, respectively. PZ-07 and PZ-10 have not reported water levels to the online servers since September 2023. SP-04 and SP-06 were damaged by equipment in December 2023 and could not be repaired. For the instruments that are not functioning, Geosyntec has recommended no actions are taken because the Landfill is no longer active and in the process of being closed.

III. Photography

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

	Location	Direction of Photo	Description
i.	SEE THE ATTACHED PHOTO LOG		
ii.			
iii.			
iv.			
v.			



← ①
DIRECTION
OF PHOTO PHOTO
NUMBER

MONROE POWER PLANT VERTICAL EXTENSION LANDFILL PHOTO LOG		
<div>Geosyntec<div>consultants</div><div>Geosyntec Consultants of Michigan</div></div> <div>DETROIT, MICHIGAN</div>		FIGURE B1
PROJECT: CHE8242V	JANUARY 2025	

DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 1

Date: 6/6/2024

Direction: North

Comments: The paved access road near the northwest corner of the Landfill was observed to be in good condition.



Photograph 2

Date: 6/6/2024

Direction: Northeast

Comments: The reinforced concrete culvert beneath the paved access road (culvert and riprap around the inlet and outlet) was generally in good condition. Some vegetation was observed in the riprap. Minimal flow was observed through the culvert and in the perimeter swale. Dense vegetation was observed within perimeter swale R1 along the north side.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 3

Date: 6/6/2024

Direction: East

Comments: Dense vegetation within the perimeter swale (R1) and on the perimeter berm along the north side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



Photograph 4

Date: 6/6/2024

Direction: -

Comments: Only six pore pressure relief pipe outlets were able to be located due to the dense vegetation and water levels within the perimeter swales. The water level in the north perimeter swales (R1 and R2) was lower than the pore pressure relief pipe outlets. (typical)



DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 5

Date: 6/6/2024

Direction: -

Comments: Minimal sediments or vegetation were observed in the pore pressure relief pipe outlets that could be located. (typical)



Photograph 6

Date: 6/6/2024

Direction: Northeast

Comments: The aggregate access road on the north side of the Landfill was in good condition with no ruts and minimal erosion.



DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 7

Date: 6/6/2024

Direction: Southeast

Comments: Dense vegetation within the perimeter swale (R2) and on the perimeter berm along the north side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



Photograph 8

Date: 6/6/2024

Direction: Southeast

Comments: Dense vegetation within the perimeter swale (R2) and on the perimeter berm along the north side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 9

Date: 6/6/2024

Direction: Southeast

Comments: Dense vegetation within the perimeter swale (R2) and on the perimeter berm along the east side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



Photograph 10

Date: 6/6/2024

Direction: West

Comments: The pore pressure relief layer constructed for Phase 2 of the Landfill was in good condition with minimal vegetation.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 11

Date: 6/6/2024

Direction: -

Comments: The culvert at the southeast corner of the Landfill was in good condition. Dense vegetation was observed within the perimeter swales adjacent to the culvert; however, the vegetation did not appear to impact the ability of the culvert to convey water to the Ash Basin. Minimal flow was observed through the culvert during the inspection.



Photograph 12

Date: 6/6/2024

Direction: South

Comments: The access road above the culvert at the southeast corner of the Landfill had vegetation and some small, woody vegetation. No apparent signs of slope instability or erosion were observed along the access road.



DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 13

Date: 6/6/2024

Direction: West

Comments: Dense vegetation within the perimeter swale (R4) and on the perimeter berm along the south side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



Photograph 14

Date: 6/6/2024

Direction: South

Comments: Dense vegetation within the perimeter swale (R4) along the south side of the Landfill was observed. Minimal flow was observed in perimeter swale R4.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 15

Date: 6/6/2024

Direction: South

Comments: Dataloggers 1 (DL-1) and 2 (DL-2) were surrounded by dense vegetation. The vegetation had the potential to block the solar panels used to power the batteries for DL-1 and DL-2. (DL-2 shown)



Photograph 16

Date: 6/6/2024

Direction: -

Comments: The instrument enclosures for DL-1 and DL-2 had significant moisture intrusion and ants. The desiccant canisters within the enclosures were in poor condition. (DL-2 shown)



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 17

Date: 6/6/2024

Direction: North

Comments: The CCR placed within the Landfill appears to have been placed and stacked in accordance with generally accepted engineering practices.



Photograph 18

Date: 6/6/2024

Direction: Southwest

Comments: Dense vegetation within the perimeter swale (R3) along the south side of the Landfill was observed. Minimal flow was observed in perimeter swale R3.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 19

Date: 6/6/2024

Direction: West

Comments: There was a location near the southwest corner where the CCR placed within the Landfill had eroded onto the crest of the perimeter berm. It did not appear that the CCR material had eroded into perimeter swale R3 at the time of the inspection.



Photograph 20

Date: 6/6/2024

Direction: East

Comments: There was a location near the southwest corner where the CCR placed within the Landfill had eroded onto the crest of the perimeter berm. It did not appear that the CCR material had eroded into perimeter swale R3 at the time of the inspection.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 21

Date: 6/6/2024

Direction: North

Comments: Dense vegetation within the perimeter swale (R1) and on the perimeter berm along the west side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



Photograph 22

Date: 6/6/2024

Direction: East

Comments: Dense vegetation within the perimeter swale (R1) and on the perimeter berm along the north side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 23

Date: 6/6/2024

Direction: -

Comments: Only one pore pressure relief pipe was observed to be actively flowing during the inspection, though the flow was minimal. The pipe is located below Phase 1 of the Landfill, where CCR material has been placed, and has historically been the only pipe with any observed flow. There was some algae growth within the outlet of this pipe.



Photograph 24

Date: 6/6/2024

Direction: East

Comments: Dense vegetation within the perimeter swale (R1) and on the perimeter berm along the north side of the Landfill were observed. No apparent signs of slope instability or erosion along the perimeter berm were observed.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill

Site Location: Monroe, MI

Photograph 25

Date: 6/6/2024

Direction: -

Comments: DL-3 and DL-4 were surrounded by some vegetation, but the solar panels did not appear to be blocked. The instrument enclosures had significant moisture intrusion and the desiccant canisters were in poor condition. (DL-3 shown)



Photograph

Date:

Direction:

Comments: