Erickson Power Station Forebay, Retention Basin, and Clear Water Pond Closure Work Plan

for Compliance with the Part 115 Solid Waste Management

Delta Township, Michigan

Lansing Board of Water & Light

January 6, 2023

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1.0 Introduction and Purpose

This closure work plan has been prepared to request agreement from the Michigan Department of Environment, Great Lakes and Energy (EGLE) with Lansing Board of Water & Light (BWL) in regards to closure of the Forebay, Retention Basin, and Clear Water Pond (CWP) at its Erickson Power Station (Erickson, Facility, Site) located in Delta Township, Michigan. The facility is located at 3725 South Canal Road, Eaton County, Michigan and contains a single coal-fired generator capable of producing 165 megawatts of electricity (Figure 1). Coal Combustion Residuals (CCR) generated at Erickson are stored in dewatering tanks (hydro-bins) and three active CCR impoundments: the Forebay, Retention Basin, and CWP (Figure 2).

Specifically, these impoundments are “existing CCR surface impoundments” which will be closed by removal of CCR in accordance with self-implementing requirements of the CCR Resource Conservation and Recovery Act (RCRA) Rule (40 CFR §257 Subpart D) (“CCR RCRA Rule”). This document provides a general description of the following:

- plans for removal of waste
- multiple lines of evidence to document waste removal including the basis for an objective waste removal standard to address potential long-term sources of groundwater impacts
- schedule for implementing the work
- performance monitoring after waste removal in accordance with the CCR RCRA Rule

BWL plans to initiate construction work for closure of the Forebay, Retention Basin, and CWP by January 1, 2023; however, dewatering could be initiated sooner and therefore activities may be initiated sooner.

1.1 Facility Background

Erickson Power Station was constructed starting in 1970, was completed in 1973, and is scheduled to close by December 31, 2022. Erickson Power Station contains a single coal-fired steam turbine/generator capable of producing 165 megawatts of electricity.

Beginning in 1970, fly ash and bottom ash were sluiced from the plant to a 33-acre impoundment. In 1976, fly ash was diverted to a dry system and sold as byproduct to the cement industry, and only bottom ash was sent to the impoundment. Water flowed to the CWP before returning to the plant for use. The 33-acre impoundment was physically closed in 2014 (CCR was removed from the impoundment and disposed off-site) and the Forebay and Retention Basin were installed within its footprint, leaving a 28-acre inactive area currently described as the Former Impoundment on Figure 2. Currently, bottom ash from the coal-fired boiler is sluiced from the plant to dewatering tanks (hydro-bins). The dewatered bottom ash is trucked to a sanitary landfill and the decant water is hydraulically fed through the Forebay, Retention Basin, and then to the CWP to allow the minimal remaining CCR particles to settle out before returning to the plant via the CWP Pump House for reuse. Fly ash is handled dry and collected in on-site silos. In addition to the flow from the hydro-bins, the CCR impoundments also receive non-CCR wastewater, including flows from the coal pile runoff sump and plant sumps.

The interior embankments and floors of both the Forebay and Retention Basin are lined with a layer of geosynthetic clay overlain with a 40-mil thick flexible polyvinylchloride membrane liner (FML). Each FML is protected with geofabric and a 6- to 12-inch layer of sand. The tops of the embankments that are subject to wave action are protected with an additional layer of geofabric and 6 to 12 inches of stone riprap (MD&E, 2018). The tops of the interior embankments of the CWP are protected with approximately 6 inches of stone riprap. The CWP is lined with compacted clay. There are no regulated outfalls associated with the impoundment system. In addition to the three active CCR impoundments (Forebay, Retention Basin, and CWP), the Site is bordered by Lake Delta on the southwest side (Figure 2). The description of impoundment construction timing is provided in the History of Construction report (HDR, 2020).

The CWP was constructed to provide a storage basin for water prior to recycling it back to Erickson Power Station via the Pump House located on the northwest corner of CWP. During normal operating conditions, the water flows between the station, the impoundments, the CWP, and back to the station. Due to the age of the CWP, less historical documentation exists for the liner construction of the CWP. According to the Location Restriction Report, the CWP is “lined with compacted clay” (MD&E, 2018). From 2009 through 2014, the ash was removed from the 33-acre impoundment, and a new system (including the construction of the Forebay and Retention Basin) was installed. The Forebay and Retention Basin were installed within the footprint of the excavated 33-acre former impoundment and cover approximately 5-acres, leaving the former impoundment with a surface area of 28-acres.

Water discharged from Erickson Power Station flows directly to the Forebay and enters through three influent pipes: 1) a 10-inch main extending from the plant sump within Erickson Power Station, 2) a 10-inch main from the Hydro-Bins, and 3) a 6-inch main extending from the Coal-Pile Run-Off Pump House. Water then flows from northeast to southwest across the Forebay where water exits through three 24-inch diameter effluent pipes at the southwest corner of the Forebay, which serve as the spillway for the Forebay passes through the dike separating the Forebay and Retention Basin and enters the Retention Basin. Water then flows from northeast to southwest across the Retention Basin where water exits through a 72-inch diameter pre-cast concrete overflow riser pipe at the south corner of the Retention Basin, which serves as the spillway for the Retention Basin. At the bottom of the riser pipe structure lies a 36-inch diameter corrugated plastic pipe (CPP) pipe that directs flow to the CWP. Water is pumped from the CWP back to the plant for reuse.

Figure 1. General Location

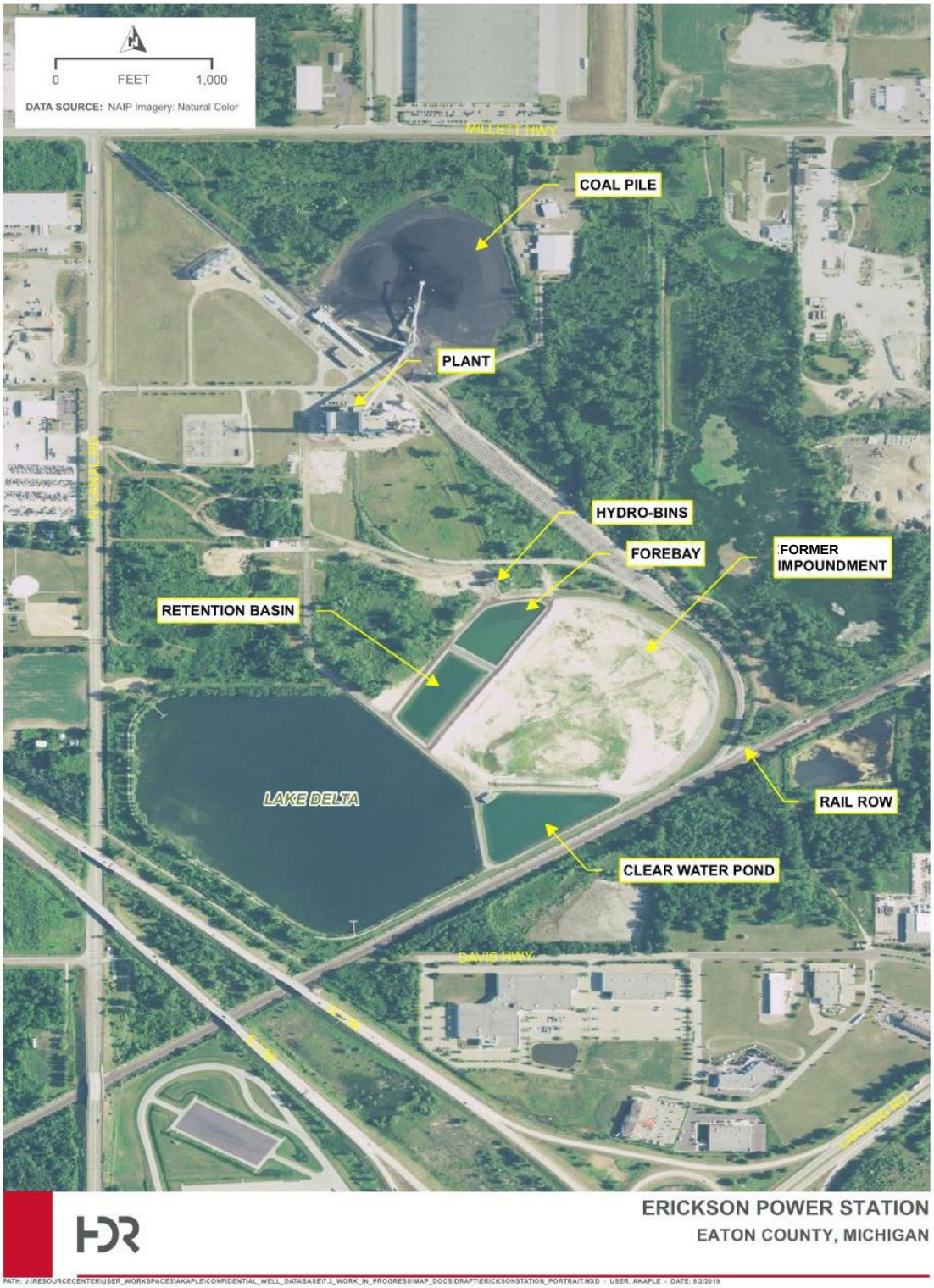


Figure 2. Erickson Facilities Map

1.2 Regulatory Background

The BWL has identified the Forebay, Retention Basin, and CWP at Erickson as "existing CCR surface impoundments" under the CCR RCRA Rule, as they are directly receiving and storing commingled CCR and low volume miscellaneous wastewaters as of the effective date (October 19, 2015) of the CCR RCRA Rule. As such, there are specific criteria and schedules under the CCR RCRA Rule to conduct closure. On November 30, 2020, BWL submitted a Demonstration to the Environmental Protection Agency (EPA) in order to obtain approval of an alternative date to initiate closure in accordance with 40 CFR, Part §257.103(f)(1) (85 FR 53561, August 28, 2020). The Alternative Closure Requirements of the CCR Rule at 40 CFR §257.103(f)(1) (Holistic Approach to Closure Part A, August 28, 2020) (Final Rule) allowed an owner or operator the ability to request a deadline extension for an existing CCR surface impoundment to continue to receive CCR if the owner or operator certifies that the waste streams must continue to be managed in the CCR unit because it is infeasible to complete the measures necessary to obtain alternative disposal capacity by the current Final Rule deadline (April 11, 2021). The owner may request the exact amount of time necessary to complete the measures to obtain alternate capacity (completed no later than October 15, 2023). Thus, BWL submitted the extension request to the EPA Administrator to continue to operate the CCR impoundments until approximately May 25, 2023 based on the timeline for preliminary design and construction of a CCR water treatment system and new non-CCR impoundment. On January 11, 2022, BWL received an Interim Decision from the EPA that the Demonstration provided by BWL was incomplete and proposed that the deadline for the CCR surface impoundment system to cease receiving waste would be 135 days after EPA's final decision in this matter after the close of the comment period (February 23, 2022). BWL provided comments back to the EPA within the comment period including requirements for the Erickson plant to remain in operation through December 31, 2022. Therefore, BWL is proceeding under this new accelerated closure schedule to close the plant by December 31, 2022 and cease waste to the impoundments on or before that date. That date was selected as the first possible plant closure date that would also allow for impoundment cleanout (CCR removal and verification documentation) on or before October 17, 2023.

The three impoundments are not licensed as units for waste disposal under the Michigan Natural Resources and Environmental Protection Act (NREPA) Part 115, though BWL submitted application materials and associated Hydrogeologic Monitoring Plan (HMP) to EGLE. Due to the groundwater isolation distance and impoundment liner design, EGLE has not licensed the CCR impoundments at Erickson. However, in the meantime, BWL has been operating, monitoring, and reporting to EGLE as if the impoundments were licensed. Therefore, in following, BWL submits this Closure Work Plan to request agreement from EGLE with BWL's plan to close the three CCR impoundments at Erickson. BWL will provide to EGLE a separate Coal Pile Closure Work Plan for review that will address the Coal Pile at Erickson; however, that facility is not under a similar regulatory deadline for closure as are the CCR.

2.0 Closure by Removal of CCR

BWL intends to close the Forebay, Retention Basin, and CWP by removal of CCR in accordance with self-implementing requirements under the CCR Rule. Upon approval of the

Closure Work Plan, BWL intends for this document to serve as an agreement with EGLE on applicable elements of its self-implementing plan to achieve closure in accordance with Part 115 and the CCR Rule. Documentation and certifications necessary under the CCR Rule will be provided to EGLE and documents will be posted to the CCR Rule Compliance public website. As part of closure self-implementation, the EPA required an initial closure plan for existing CCR surface impoundments, which has been completed (NTH, 2019).

The Forebay, Retention Basin, and CWP will be closed by removal of visible CCR and liner material plus a one-foot over-excavation below the liner. This plan is consistent with the as-built designs of the Forebay and Retention Basin, and with the design and visible CCR for the CWP. The Forebay, Retention Basin, and CWP will be closed in compliance with the CCR Rule using a phased approach that will include: 1) physical removal of CCR for purposes of removing regulated waste and sources of potential long-term groundwater contamination, and 2) demonstrate the concentrations of constituents of concern do not exceed groundwater protection standards established pursuant to §257.95(h)c and Part 115. This closure compliance monitoring is described in Section 5.0.

The CCR impoundments will be closed by first dewatering, followed by CCR, liner, and over-excavation material removal. Additionally, shallow groundwater dewatering will occur at the west end of the Retention Basin (adjacent to Lake Delta). A well point system with a 5-ft screened interval at El. 870 ft to El. 865 ft will be installed to low the anticipated ground water level to prevent potential seepage in this area. This system was supported by the analyses presented in Appendix A.

Ash removal will occur in several passes. The CCR and a portion of the sand will be removed in the first pass, then the remaining sand and liner material will be removed in the second pass, followed by the 1-foot over excavation in the final pass across the ponds. The excavated materials will be transported to Granger Landfill in Lansing, Michigan, or similar, for ultimate disposal. This is the same process that was completed when the Former Impoundment was closed in 2014. The surface water and ash pore dewatered water will be discharged into Lake Delta under the conditions of an existing National Pollutant Discharge Elimination System (NPDES) permit through EGLE.

Because the three CCR impoundments are enclosed within embankments, the extents of the impoundments are well defined horizontally. The horizontal excavation limits of CCR in the Forebay, Retention Basin, and CWP will extend to the embankments. These interior berms/embankments that separate the individual impoundments will remain. The existing conditions, excavation, and cross sections are provided as Figures 4-7. The lateral extent of the Forebay, Retention Basin, and CWP excavation limits is shown on Figure 5. After excavation the impoundments will hold stormwater that falls in them and therefore the one foot of excavation into the impoundment walls/embankments will not likely diminish the geotechnical adequacy to hold the stormwater. A seepage and slope stability analysis was completed to support this assumption and the results have been included as Appendix A.

Following a site visit between BWL and EPA in April 2022, the EPA recommended that certain structural stability items were implemented prior to and during the closure activities of its CCR

units. BWL reviewed and responded to the items recommended by the EPA. A summary of those items is presented below:

- *EPA Recommendation: Continue to properly maintain the embankments including frequent mowing to maintain the vegetation at approximately 6 inches and ensure the vegetation is adequate to prevent erosion from surface water run-on/runoff and wave action.*
    - *BWL Response: BWL will continue to conduct inspections and maintain the embankments until such time the impoundment closure contractor begins work, which is anticipated to occur early 2023. The contractor is required to remove CCR on the embankments and will maintain vegetation where appropriate.*
- *EPA Recommendation: Establish a robust monitoring plan for each pond to be completed at least weekly during normal conditions throughout closure until the Clear Water and Retention Ponds have completed CCR removal activities. Monitoring should focus on noticeable changes to the berm and have a contingency plan for any indication of seeps, cracks, or movement in the embankments.*
    - *BWL Response: A monitoring plan for all embankments will be established and implemented by the contractor and onsite BWL Owners Engineer (HDR Inc.).*
- *EPA Recommendation: Conduct weekly inspections of the buried service lines in the embankment between the CCR units and Lake Delta as well as the emergency overflow pipe in the Clear Water Pound from the inlet to the outfall to ensure they are structurally intact and are not subject to leaks that may be detrimental to the integrity of the embankments or safe discharge through the spillway. The interior of the pipes and submerged pipes were not observed and should be inspected internally via a remotely operated vehicle (ROV). Internal inspection of the Emergency Overflow Pipe should be prioritized. Where pipes are not readily accessible, inspections should be able to be carried out using remotely operated vehicles or similar inspection methods.*
    - *BWL Response: The Lake Delta Transfer Structure pipe will be inspected as the pond is dewatered and monitored for leaks/seepage once accessible. The pipe will be cleaned out and plugged with concrete prior to installation of a buttress. The overflow pipe in the Clear Water Pond will not have water on either side of the embankment after dewatering therefore instability is not of concern.*
- *EPA Recommendation: Repair the erosion noted in past inspections around the Clear Water Pond. Please provide us details on measures you will take to undertake this repair.*
    - *BWL Response: The area of erosion in the Clear Water Pond is within the design excavation footprint. This area will be removed during excavation.*

- *EPA Recommendation: During dewatering, the drawdown rates should not exceed one foot per week for the Clear Water Pond.*
    - *BWL Response: A slope stability analysis was performed for the Clear Water Pond embankment adjacent to Lake Delta (as well as for the Retention Basin adjacent to Lake Delta) and the factor of safety calculated for the Rapid Drawdown condition exceeded the minimum factor of safety required in accordance with USACE Engineering Manual 1110-2-1913.*
- *EPA Recommendation: Once the ponds are permanently dewatered and as soon as practical during the CCR removal process, a compacted soil buttress should be installed on the interior slopes of the separation berm between Lake Delta and the Clear Water Pond as well as the Retention Basin. The buttress should be installed at the toe of the slope and be sized to contribute the equivalent buttressing force that the water retained during normal operations imparted. The buttress should be designed and sealed by a qualified civil/geotechnical engineer.*
    - *BWL Response: After completion of the CCR removal and approval of removal verification by EGLE, the impoundments have been designed for a "Phase II" infill using material from the interior embankments of the impoundments that are no longer needed. The material from the interior embankments will be taken and graded into the footprint of the three impoundments. This final condition (i.e., Phase II) of the impoundments will have material placed up to El 876 adjacent to the interior toe of the Retention Basin and Clear Water Pond embankments adjacent to Lake Delta. Therefore, 5-feet of clay material will be placed where there was approximately 10-feet of water when the ponds are full providing a buttressing effect. Additionally, the embankment of the Retention Basin was designed with a shelf which will remain in place in the final condition.*

As described previously, the excavation depth design was based on a one-foot over-excavation below the as-built liner elevation of each impoundment. Therefore, excavation will continue to the elevations/design in Figure 5. The excavation design elevation of the Forebay and Retention Basin is 869 to 871 feet above geodetic datum (agd) and the CWP is 871 feet agd. Proposed excavation design and cross sections are provided in Figure 6 and Figure 7 – Forebay, Retention Basin, and CWP Excavation Plan. BWL does not plan to backfill the ponds once the CCR is removed.

This design results in approximately 7,020 cubic yards of CCR at the Forebay, 4,950 cubic yards of CCR at the Retention Basin, and 12,300 cubic yards of CCR at the CWP. This is a total of 24,270 cubic yards of CCR removal. There will be an addition 15,710 cubic yards of liner and over-excavation native material removed.

Piping between impoundments and associated equipment abandonment and CCR removal is under evaluation and will be included in contractor scope. BWL intends to disconnect the transfer structure connected to the CWP. The CWP will be dewatered and associated ash in the pipe will be removed.

The groundwater elevation measured in wells immediately around the impoundments shows that the bottom of the Retention Basin, Clear Water Pond and Former Impoundment are below the water table. However, this may reflect some mounding around the impoundments, which will subside after the surface water is decanted from each impoundment. Further, in 2012-2014 when BWL closed the clay-lined Former Impoundment, no groundwater dewatering was required beyond the dewatering sumps within the footprint of the impoundment (e.g., no dewatering wells nor well points, not horizontal well points were needed). Therefore, impoundment dewatering is anticipated to be performed through pumping surface water and use of sumps with pumps to dewater the ash pore water from the impoundments and discharge into Lake Delta under the conditions of an NPDES permit through EGLE. Ash will be loaded into trucks for hauling and ultimate disposal at Granger Landfill, or similar landfill determined by the Contractor. When the ash is accepted at the landfill, the ash will have to pass the paint filter test for moisture. Therefore, BWL will review that the ash is dewatered sufficiently prior to truck loading. Should in-pond sumps not sufficiently dewater the ash pore water, other potential methods may be applied by the contractor, including but not limited to:

- Physical drainage of the ash by directing the dewatered water into sumps, and pumping the sump water to Lake Delta.
- Mixing the ash with dry soil and/or cement (if allowed by the landfill).
- Use of glycol heaters in the winter to dry the ash and melt the frozen pore.

BWL has spoken with potential Contractors, and it is their intention to accomplish the project without placement of the ash outside of the three CCR impoundment footprints. Dewatering planning and execution will be specified by the Contractor.

3.0 Ash Characterization

Analysis of the bottom ash, collected from the hydrobin in March 2022, are provided in **Appendix B.** In addition, on September 9, 2022 BWL collected three samples of 100% ash from the bottom of the Forebay with a long-reach retractable sample pole. These three samples were submitted to Merit Laboratory for analysis and analyses are provided in **Appendix B**. In addition, Figure 3 provides a photograph of the ash from the floor of the Forebay.

BWL intends to collect three samples of 100% ash from the bottom of the Retention Basin with a long-reach retractable sample pole, and three samples from the CWP. The ash will be analyzed for the same parameters as the prior ash samples in Appendix B. This will result in a total of nine ash characterization samples. The ash analytical data will be used for development of the microscopy CCR concentration graphs, described in Section 4.5. Particle size analysis will also be completed on nine samples, three from each CCR impoundment. Particle size data will be used to ensure that the ash will be visible in the microscope during verification and particle size is not intended to be used for verification. The results of the ash analytical and particle size data will be submitted once completed under separate cover.

Figure 3. Ash collected from the floor of the Forebay

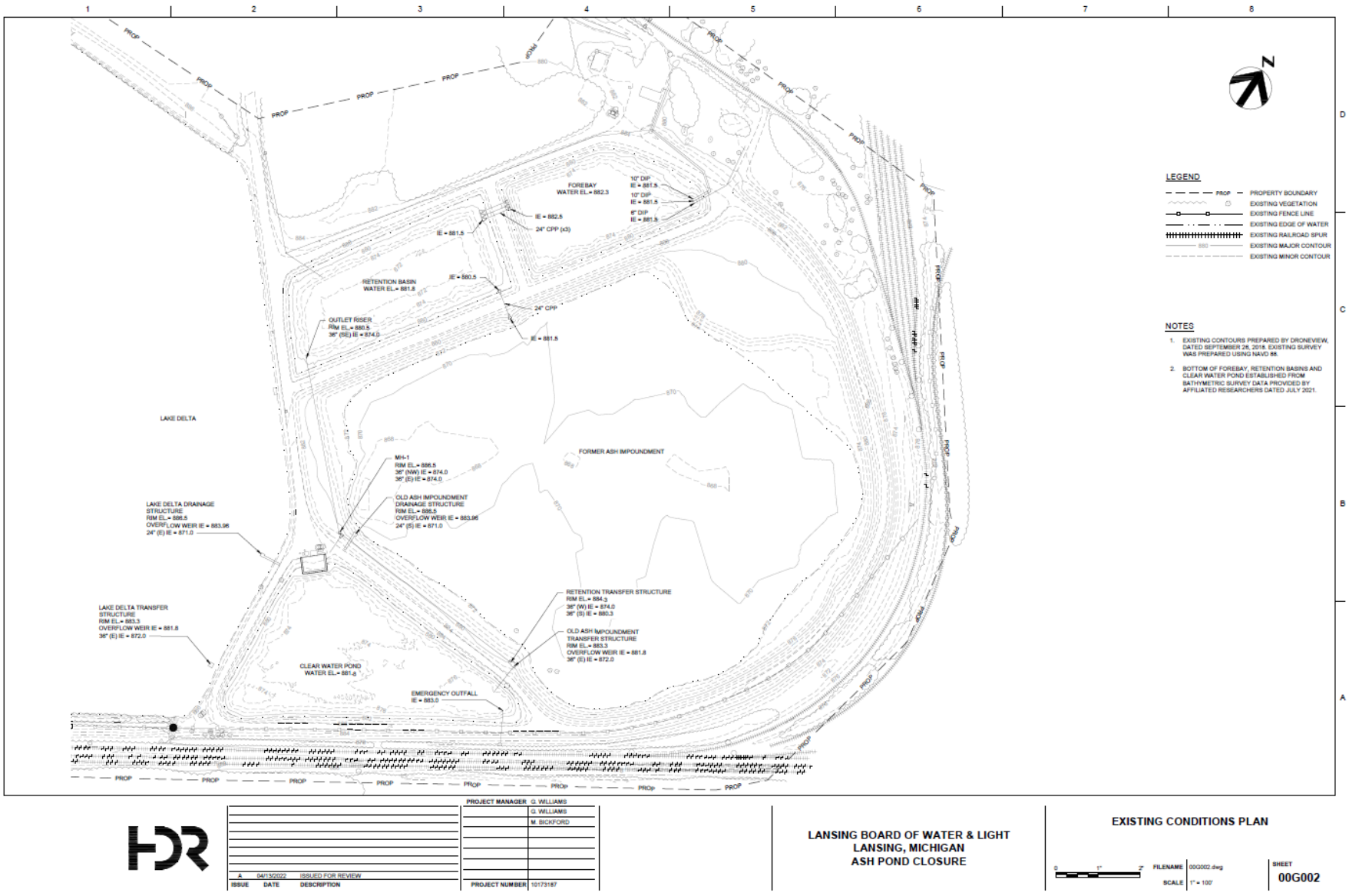


Figure 4. Existing Conditions Plan

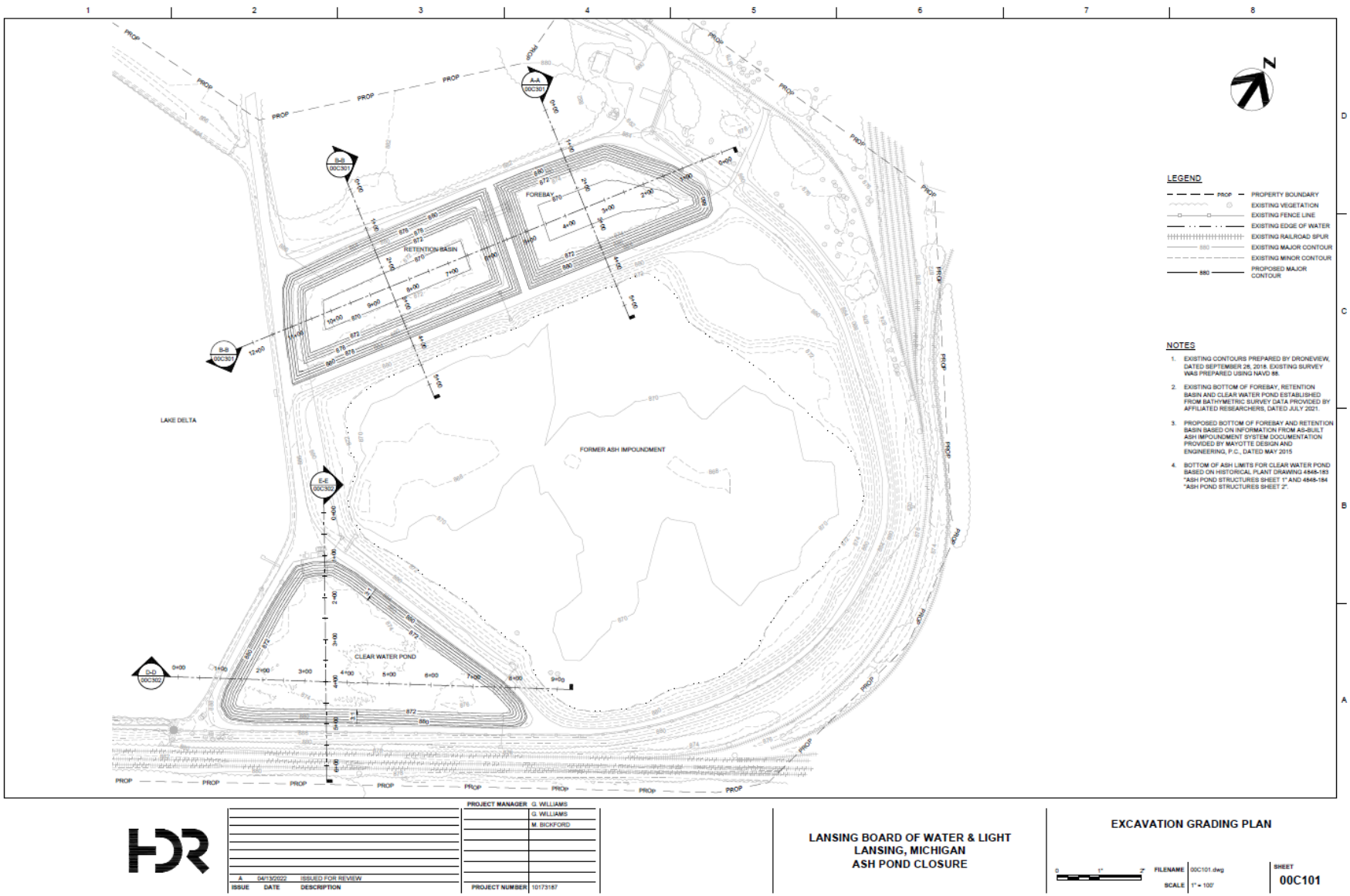


Figure 5. Excavation Grading Plan

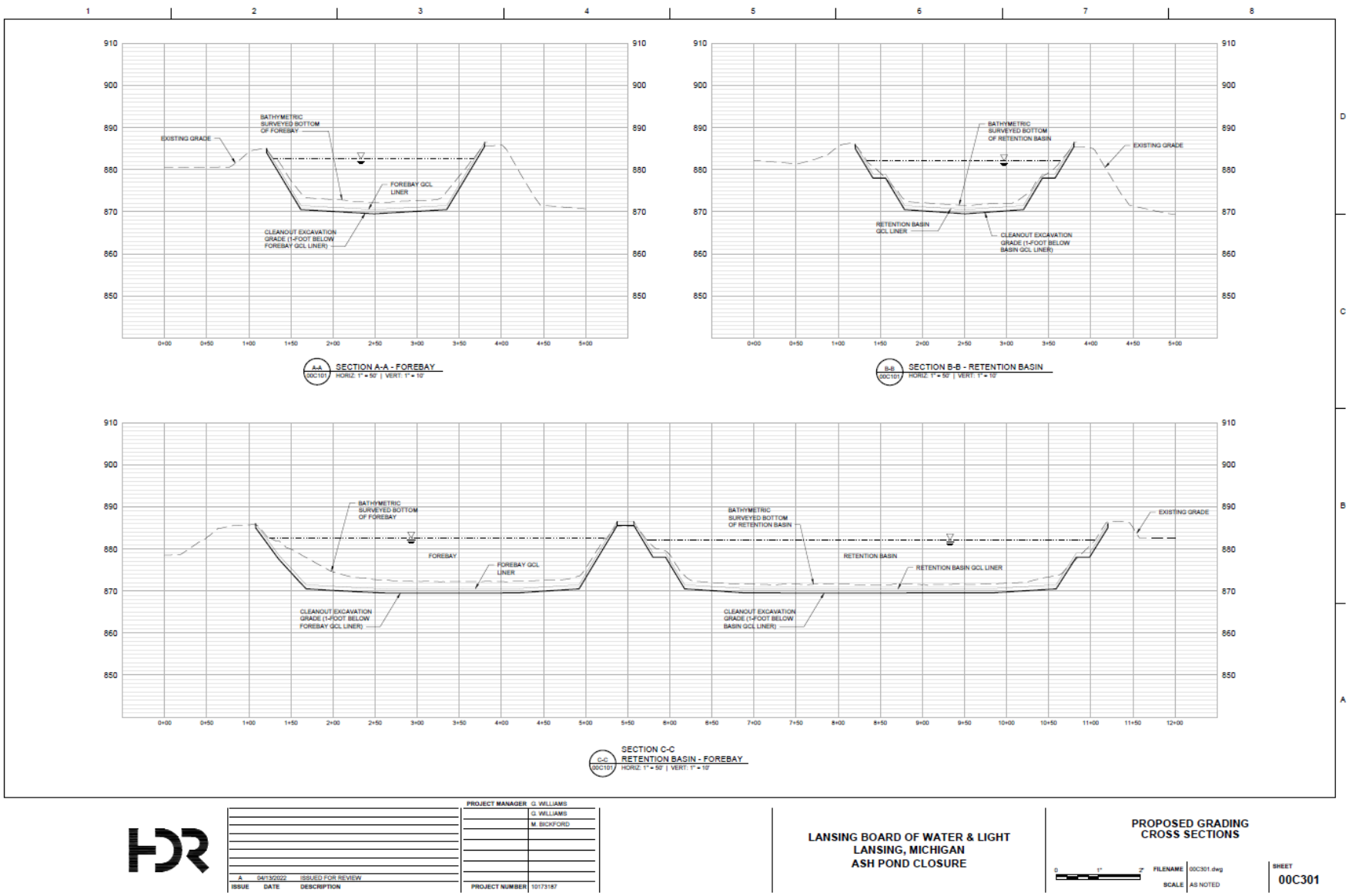


Figure 6. Cross-Sections - Forebay and Retention Basin

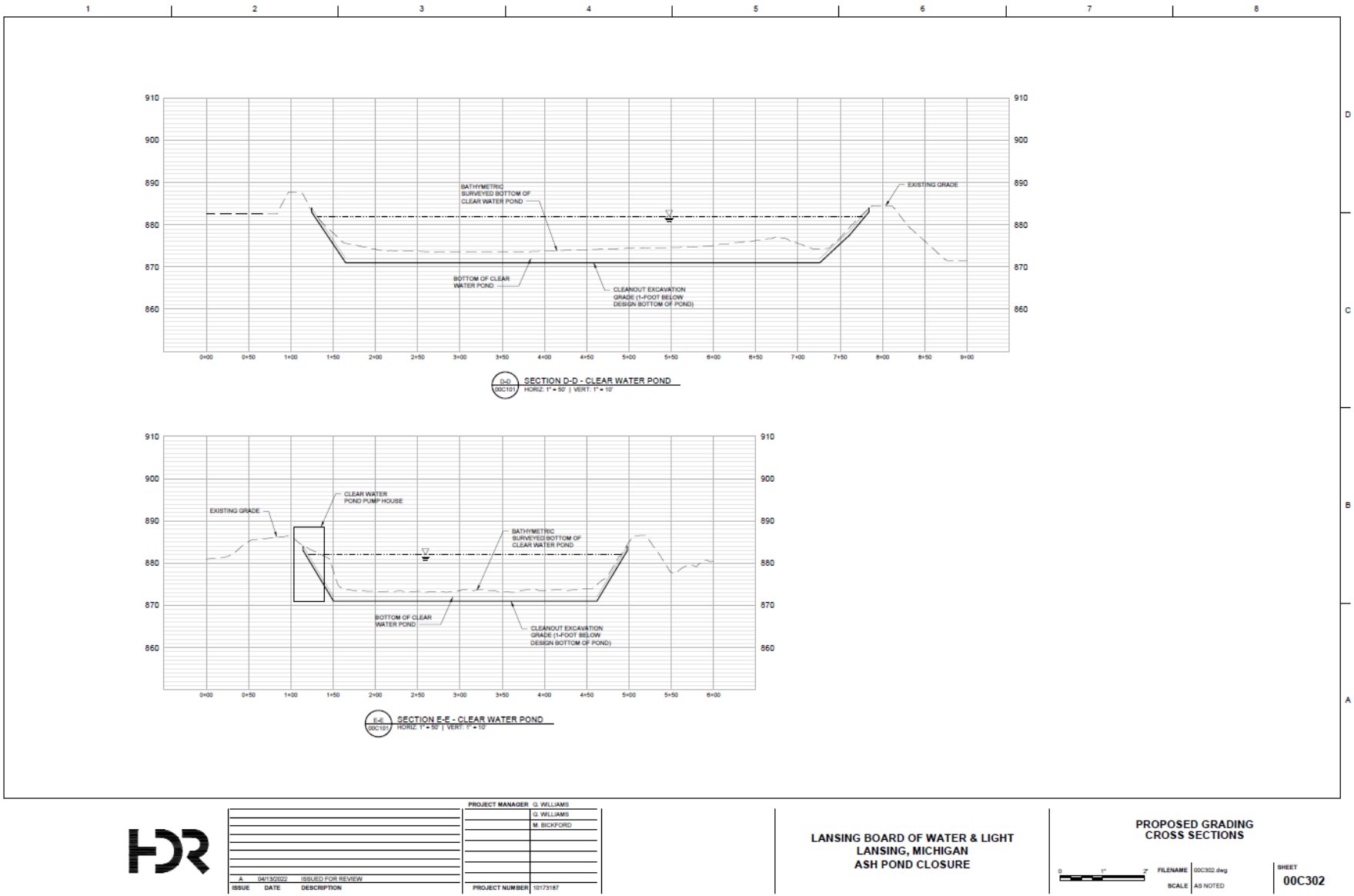


Figure 7. Cross-Sections - Clear Water Pond

4.0 Waste Removal Verification Documentation

Verification of CCR removal will be documented based on the following lines of evidence:

1. First line of evidence – visual verification of CCR removal by a Michigan Professional Engineer. The certification will indicate visible CCR material has been removed.
2. Second line of evidence – comparison of surveyed excavation termination grades to design elevations included herein that are based upon known engineering record elevations (as-built drawings) of impoundment liner elevations in the Forebay and the Retention Basin. The CWP base elevation engineering records are less accurate; however, the surveyed final grades will still be compared to the design as added evidence of impoundment cleanout.
3. Third line of evidence – photographic documentation including photographs of CCR removal progression and photographs of excavated areas at random grid nodes.
4. Fourth line of evidence – exposed native material sampling and analysis at random grid nodes to confirm CCR removal.
    a. Exposed native material soil samples at the bottom of the Forebay, Retention Basin, and CWP will be sampled and analyzed to demonstrate soils meet Part 201 Cleanup Criteria or site-specific background soil concentrations.
    b. An alternative to the analytical approach, if needed, will be to use microscopic quantification of CCR content to confirm CCR removal.

These multiple lines of evidence approach provide a predictable and reliable means to objectively measure concentrations of CCR based on physical sample properties.

4.1 Visual Verification – First Line of Evidence

The first line of evidence to assess CCR removal activities will be for a Michigan licensed Professional Engineer to visually observe the excavation work and inspect the impoundment excavation base and sides to certify that CCR material was removed. Excavated areas that do not meet the CCR removal objective based on visual inspections will be excavated further until the CCR removal objective outlined in this closure plan is met.

4.2 Documentation of Excavation Grades – Second Line of Evidence

The second line of evidence to assess CCR removal activities will be to confirm that excavations are performed to at least the elevation established in the designs herein. The elevation of the base of CCR and liner was established based on engineering records, specifically as-built designs, of the Forebay and Retention Basin (MD&E, 2014). The engineering records for the CWP are not available; however, bathymetry studies and prior historic information from the site was used to develop the pond geometry (NTH 2019). Once the Contractor confirms the excavations have met the horizontal and vertical limits shown in Figure 5, a survey will be performed to confirm the desired closure elevation or design grade. The BWL

surveyor will provide HDR a .csv file with topography of excavation area at grid nodes and break lines. HDR will compare elevations points to closure topography and provide acceptance/refusal of elevation of area to be inspected in the field. Excavated areas that do not meet the design grade will be excavated further until the design grade is met.

4.3 Photographic Documentation – Third Line of Evidence

Consistent with EGLE guidance, Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (S3TM), a 50-foot grid will be established across the excavation area for assessment (Figure 8). According to the S3TM guidance, the impoundments are considered medium-sized areas. The grid nodes to be sampled will be selected using a random number generator (randomly generated using the Microsoft Excel RANDARRAY function). Photographic documentation will be completed on 50 percent of the nodes followed by hand sampling and laboratory analysis at 50 percent of the photographed nodes. The excavation surface will be inspected visually to identify residual CCR materials that are present on the exposed surface of the excavation. If CCR is still visible, additional material will be removed. When no visible signs of CCR are observed, photographs and written descriptions will be taken at 50 percent of the grid nodes to document the material left in place. The photography procedure will be standardized such that it includes the following elements:

- Photographs will be taken of the general area-wide excavation
- Photographs will be performed at 50% of grid nodes.
    - BWL's surveyor will provide HDR field assistance in locating nodes using on-site survey grade GPS.
    - Photographs will be taken at each selected node with 12" x 12" frame indicating surficial soil area.
    - Whiteboard will be present in photo and will document: Site Name/Project identification (ID), Date, Time, and Node ID.
    - Photographs will be taken from a standardized height (approximately 2.5 feet)
    - The camera will be positioned directly over the excavated surfaced facing downwards with as little tilt as possible.
    - Photographs will have a pixel resolution of 4608 x 3456 (i.e., 15.9 megapixels).

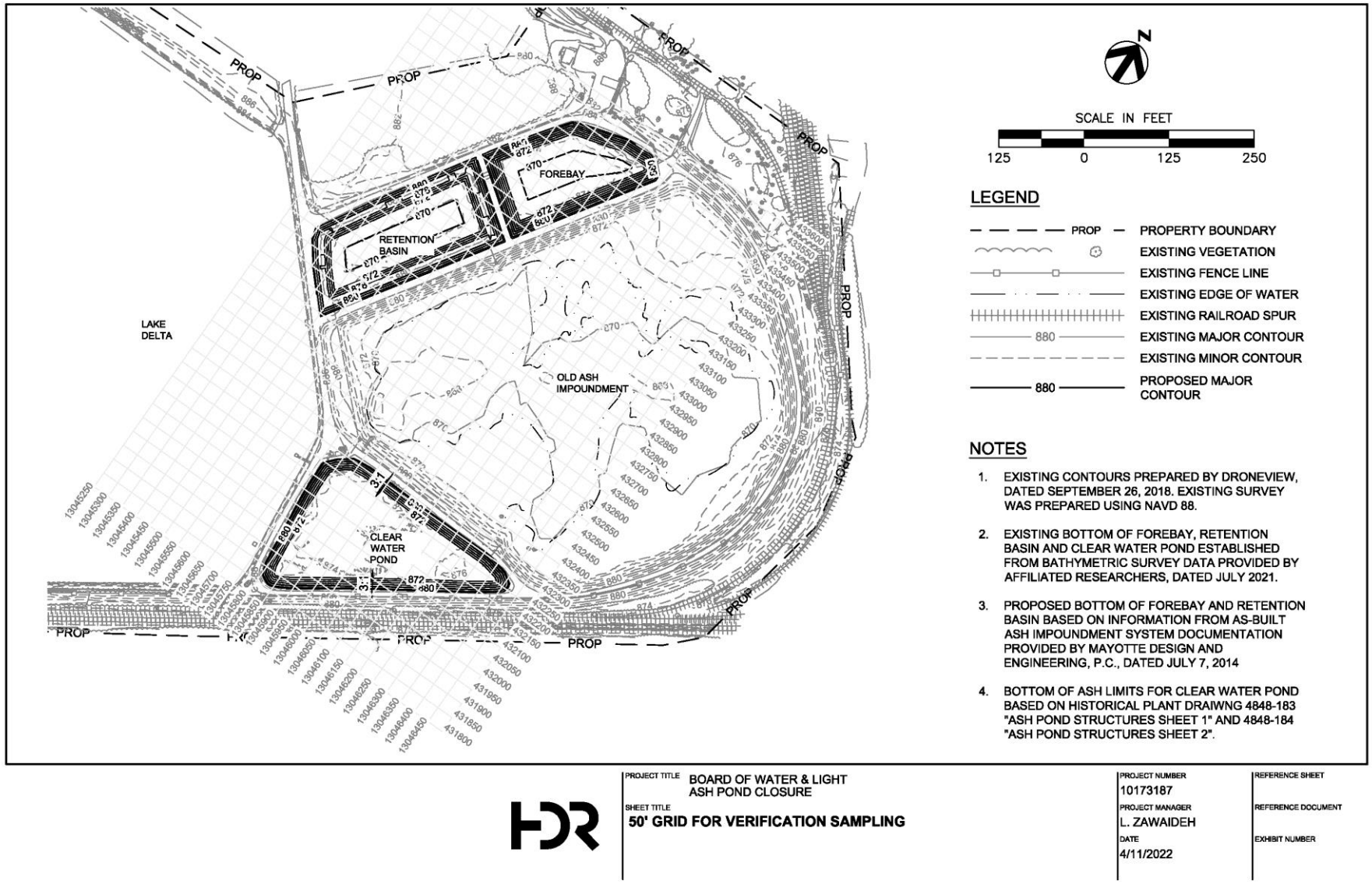


Figure 8. 50-foot Grid for Verification Sampling

4.4 Soil Sampling and Analysis Confirmation – Fourth Line of Evidence

Soil sampling and laboratory analysis will be utilized to confirm the CCR removal objective was met as a quantifiable line of evidence. According to the S3TM guidance, the impoundments are considered medium-sized areas and therefore statistical sampling strategies are recommended. Sampling will be performed at 25% of the photographed nodes (this is 25% of the total nodes per S3TM). This will result in greater than nine samples in each of the three CCR impoundments. The locations will be randomly generated using the Microsoft Excel *RANDARRAY* function.

At these nodes, a 4-ounce glass jar of soil will be collected and submitted to a laboratory for analysis. The sample will be sent to the laboratory for total metals analysis to measure the concentration of metals in surficial soil samples to verify CCR removal. These sample results will be analyzed for and compared to the Michigan Cleanup Criteria Requirements for Response Activity (Part 201 Generic Cleanup Criteria and Screening Levels) (Table 1). However, some constituents of interest (COIs) may exceed the cleanup criteria naturally in the soils. BWL performed a site-specific background soil study to develop site-specific concentrations as cleanup standards, as described below.

4.4.1 Background Soil Sampling

A total of eight (8) borings were completed to collect background soils at Erickson from locations without potential for impact from activities at the plant. A total of 35 soil samples were collected for laboratory analysis from surface to 26 feet below ground surface to determine background soil concentrations. Samples were collected from each soil type encountered in the borings (clay, clay with sand and gravel, sand and sand and gravel, and sandstone). HDR conducted a statistical analysis of the background samples to calculate reference background concentration levels for each material type. The reference background concentration levels are referred to as background threshold values (BTVs). The statistical method used to produce the BTVs for each COI for each material type is the upper prediction limit (UPL). The background soil sampling and BTV calculation is described in the HDR Erickson Background Soil Study Memorandum will be submitted under separate cover. Preliminary feedback on the Background Soil Study Memorandum has been received from EGLE requiring additional background soil sampling, analysis, and statistical analysis. BWL has developed and submitted a Background Soil Collection Amendment Work Plan for the second round of sample collection for EGLE comment prior to implementation. The Background Soil Collection Amendment Work Plan and subsequent Background Soil Report will be under separate cover from this Closure Work Plan so as to not delay the Closure Work Plan approval.

4.4.2 Verification Sampling Procedure

Sampling notes should include the following:

- Weather conditions: rainfall, temperature, and wind direction
- Ongoing activities that may influence or disrupt sampling efforts
- Sample collection date and time
- Variance from the sample map and explanation

- Photo log and photo taken from each sample site
- Soil description at each sample site (soil color and texture and additional characteristics to distinguish from other samples if not the same clay material)

The collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Either stainless steel or plastic trowel will be used to collect the sample. Plastic utensils are acceptable because sampling is not being conducted for volatiles and semi volatile compounds. Samples will be collected according to the following procedures:

1. Using a new plastic trowel or nitrile gloves, remove the over-burden or over-lying surface material to approximately 2 inches below the surface.
2. From 2 inches below the surface to 12 inches below the surface, accumulate an adequate volume of soil to fill two 4-ounce glass jars of soil.
3. A GPS point will be collected form each sample location.

It is critical that both the sample bottle identification and sample times match exactly the sample name and collection time written on both the field notes and the chain of custody.

Samples will be stored in a cooler, though ice is not necessary. The coolers from the field will be delivered to the lab. The Chain of Custody form should be completed in the field as the sampling progresses and signed upon transfer of custody at the laboratory. Chain of custody procedures comprise the following elements: (1) maintaining custody of samples, and (2) documentation of the requested analysis. To document chain of custody, an accurate record must be maintained to trace the possession of each sample from the moment of collection through analysis and reporting. The field chain of custody record is used to record the custody of the samples collected and maintained by investigators. Sample sets will be accompanied by a chain of custody record, which also serves as a sample logging mechanism for the laboratory sample custodian.

4.4.3 Sample Analysis

Parameters to be analyzed are shown in Table 1. These parameters include the constituents required for confirmatory soil sampling by the CCR Rule (Appendices III and IV of CCR Part §257), plus parameters required by EGLE for CCR monitoring under the Part 115 licensure.

Table 1. List of parameters and methods for soil confirmation analysis	
Antimony - Method 6020A	Fluoride - Method 9056
Arsenic - Method 6020A	Iron - Method E300.0
Barium - Method 6020A	Lead - Method 6010C
Beryllium - Method 6020A	Lithium - 6020A
Boron - Method 6020A	Mercury- Method 7471B
Cadmium - Method 6020A	Molybdenum - Method 6020A
Chromium - Method 6020A	Nickel - Method 6020A
Chromium III - Method 7196A	Selenium - Method 6020A
Chromium VI - Method 7196A	Silver - Method 6020A
Cobalt - Method 6020A	Thallium - Method 6020A
Copper - Method 6020A	Vanadium - Method 6020A
Radium 226 by Method 903.1	Zinc - Method 6020A
	Radium 228 by Gamma

4.4.4 Confirmation Soil Screening

The confirmatory soil samples from each of the three (3) impoundments will be pooled to develop a statistical 95 percent Upper Confidence Limit (UCL) for each constituent for each impoundment. The UCL will be compared to concentrations for Nonresidential Soil Part 201 Generic Cleanup Criteria and Screening Levels for Nonresidential Drinking Water Protection Criteria (Table 2). If there are exceedances of the Part 201 screening, confirmatory UCL concentrations will be compared to the site specific BTVs associated with the same texture as the confirmation soil (e.g., sand or clay). If confirmatory UCL concentrations are equal to or lower than the BTVs, then the CCR impoundment will be considered passing verification and no further action will be required.

Where the sample points have indicated that the entire area exceeds the cleanup, the individual sample concentrations will be evaluated and “hot spots” identified. The nodes adjacent to the sampled nodes that are causing the exceedance will be sampled, and this process repeated until the "hot spots" requiring removal have been defined. The radius of excavation around the contaminated sample point(s) is equal to the grid interval (GI=r). Excavation depth is to the deepest point of contamination or to the depth where acceptable levels are anticipated. After excavation, the impacted point(s) must be resampled at their new elevations to verify that the area meets the selected cleanup criteria. If continued contamination is detected, the excavation format is repeated until a satisfactory result is obtained. Alternatively, microscopy may be used to verify CCR removal as described in Section 4.5.

Table 2. Soil screening levels			
Constituent	**Part 201 Cleanup Standard (ug/kg)**	**Constituent**	**Part 201 Cleanup Standard (ug/kg)**
Antimony	4,300	Iron	6,000
Arsenic	4,600	Lead	7.00E+05
Barium	1.30E+06	Lithium	7,000
Beryllium	51,000	Mercury	1,700
Boron	10,000	Molybdenum	4,200
Cadmium	6,000	Nickel	1.00E+05
Chromium III	1.0E+09	Selenium	4,000
Chromium VI	30,000	Silver	13,000
Cobalt	2,000	Thallium	2,300
Copper	5.80E+06	Vanadium	9.90E+05
Fluoride	40,000	Zinc	5.00E+06
Constituent	**EPA Soil PRGs - Worker Composite (pCi/g)**	**Constituent**	**EPA Soil PRGs - Worker Composite (pCi/g)**
Radium 226	3.1	Radium 228	7.5

4.5 Field Microscopic Quantification of CCR Content – *Fourth Line of Evidence Alternative*

Should there be nodes where the soil analytical data is not meeting the cleanup standard and the presence of CCR is in question, due to organics in the material or clays on the particles blocking the ability to well identify the particles under the microscope, the sample will be sent to the laboratory for total metals analysis to measure the concentration of metals in surficial soil samples to verify CCR removal. Field microscopic quantification of CCR content will be utilized to confirm the CCR removal objective was met as an alternative line of physical evidence. The procedure was developed from other CCR projects with approved and successfully implemented closure plans in Michigan. The method includes the use of a wet sieve due to anticipation of clays on the particles, potentially coating or visually blocking the ability to identify the particles under the microscope. The microscopy procedure will be standardized such that it includes the following elements:

a. Sample will be collected at sample node using a shovel and placed in sealed plastic bag. The sample will be split between an archived sample and analysis sample after reduction.
    i. Field Sample Size: 12” x 12” x 6” (L x W x H)
b. Sample will be dried in an oven overnight at 100 °F.
c. After drying, sample will be hand-sieved in general accordance with sieving procedures of ASTM D1140 (the term general accordance is used because the ASTM calls for drying at 230 degrees after wet sieve and we prefer a lower temperature drying to avoid scorching material).

d. Sample will be weighed in grams.
e. Sample will be placed in bucket, thoroughly covered in water, and inundated for 10 minutes.
f. Sample will be stirred to agitate fines to bring to suspension.
g. Bucket will be decanted through wash #200 sieve to remove fines. Process will be repeated until wash water is clear.
h. Remaining water will be decanted over wash #200 sieve.
i. Remaining sample will be placed in container and dried in an oven overnight at 100 °F.
j. Sample weight will be recorded after drying.
k. Representative sample will be placed in clean container for microscopic testing.
l. Three representative portions from the processed sample will be analyzed for CCR materials under a Trinocular Microscope (7X-45X zoom magnification) to estimate the visual quantification percent of CCR compared to a Visual Estimate Chart. Microscopy samples will be photographed under the microscope, which will be available during verification reporting.
m. Archive Samples
    i. The dried/sieved sample that was analyzed will be bagged and stored in a container (container will be designated for each site visit) with following ID information:
        1. Site Name/Project ID
        2. Date
        3. Node ID
    ii. Sample will be stored at site at location determined by BWL.

To determine what is considered passing or failing the microscopy, a site-specific threshold for CCR removal was selected as a ratio of CCR and native soil that would reduce the concentrations of the mixed materials to less than the respective non-residential drinking water protection criteria for soil. To do this, background soils were collected and analyzed. Additional background soil sample collection is proposed in the Background Soil Collection Amendment Work Plan, which is provided to EGLE for review and comment. Soils will be analyzed for all of the parameters in Table 1. The range and average concentrations from these samples will represent 100% native material concentrations and will be graphed with the range and average concentrations from 100% CCR samples, which will result from three samples collected from nine samples of ash collected in the bottom of the Forebay, retention Basin, and CWP. These concentrations will be compared to the EGLE Nonresidential Soil Part 201 Generic Cleanup Criteria and Screening Levels for Nonresidential Drinking Water Protection Criteria (Table 2) to determine which constituents could be used as indicators of potential groundwater impacts. The site-specific threshold for CCR removal will be a %CCR/%native that would have concentrations less than the respective criteria for soil. This selected percent CCR will be documented in a follow-up memorandum to EGLE providing the analytical results and site-specific microscopy threshold.

5.0 Former Impoundment Potential Release Area

The Former Impoundment and CWP were the ash waste impoundments from 1970 through 2012. Between 2012 and 2015, BWL completed a very large cleanout of the Impoundment and redesign of the system that includes a new ash removal and flow system that does not include the Former Impoundment as part of the CCR accumulation design. The Former Impoundment, under the current configuration, is not designed to hold an accumulation of CCR. The CWP is currently considered a CCR impoundment, and contains ash, because when the Former Impoundment was cleaned out in 2012-2015, the ash was not removed from the CWP. There is occasional overflow of water from the Retention Basin to the Former Impoundment, which is clear water and has already been through three stages of ash removal before flows go to the Former Impoundment (Hydrobins, settling in the Forebay, and settling in the Retention Basin). Sampling performed on this overflow had a total suspended solid concentration of 4 milligrams per liter and a sample from 2020 for Visual Estimate analysis from 2020 that there was <1% coal ash in the water sample. These analyses demonstrate the overflow from the Retention Basin the Former Impoundment has a de minimis amount of ash. However, EGLE has stated this overlay could be considered a release, and is therefore requiring ash removal, if present in the Former Impoundment and associated verification.

If the Former Impoundment has CCR in it as a result of a release from the CCR impoundment outfall it would most likely be near the outfall. BWL will dewater the Former Impoundment in a 50-foot radius around the outfall from the water line, and a Michigan Licensed Professional Engineer will perform visual inspection of the dewatered area, including photographs of the area. If there is no visual CCR in that area BWL will document this finding as part of the closure verification reporting and BWL will consider this potential release area finished. If CCR is observed in the 50-foot radius, the surface of the location where it was observed will be scraped or shovel removed and disposed of offsite like the CCR from the CCR impoundments. If CCR is observed and removed in this area, BWL will increase the dewatered area to a 250-foot radius from the outfall and water line and perform a similar exercise of visual examination with photographs. If no additional CCR is observed in the 250-foot radius area, the release cleanup would be considered finished. If CCR is observed and cleaned out from this area, a similar step-out will be performed at another 200 feet and continue in this manner. BWL will perform the CCR removal verification in the Former Impoundment, if necessary, via visual observation and will take photographs following the same method as Section 4.3. These findings will be reported to EGLE in the closure verification report, which will be stamped by a Michigan Professional Engineer.

6.0 Schedule

General Order of Events for CCR Removal	Preliminary Schedule
BWL Finalize Contractor Bid Package	October 14, 2022
Contractors Bids Due to BWL	November 11, 2022
Award and complete Contractor Contracts	December 27, 2022
Cease Waste to Impoundments	No later than December 31, 2022
Dewater Former Impoundment and prepare Former Impoundment as work area	January 2023*
Decant surface water from Forebay	January 2023*
Excavate Forebay and ash dewatering	February-April 2023*
Decant surface water from Retention Basin	February 2023*
Excavate Retention Basin and ash dewatering	March-April 2023*
Decant surface water from Clear Water Pond	March 2023*
Excavate Clear Water Pond and ash dewatering	April-May 2023*
Deliver ash to Landfill, as dewatered, continuous	February – September 2023*

*Exact dates dependent on contractor schedule

7.0 Post-Excavation Monitoring

After removal of the CCR, BWL will work to demonstrate the concentrations of Appendix IV constituents of concern do not exceed groundwater protection standards established pursuant to §257.95(h) and Part 115. The current CCR groundwater monitoring system for Erickson Forebay, Retention Basin, and CWP consists of 17 monitoring wells. This monitoring well network is anticipated to be used to determine compliance with groundwater protection standards and achievement with the standard of clean closure pursuant to 40 CFR §257.102(c) and the HMP. If the groundwater-based standards cannot be achieved following removal and

verification that CCR has been removed, then the necessary technical requirements are in place to implement additional corrective actions, if necessary.

8.0 Summary

The intent of this closure work plan is to communicate and achieve agreement with the EGLE on BWL's plans to self-implement closure by removal of CCR from the Forebay, Retention Basin, and CWP at Erickson.

9.0 References

HDR, 2020. History of Construction, Erickson Power Station Clear Water Pond, June 12, 2020.

HDR, 2020a. History of Construction, Erickson Power Station Forebay and Retention Basin, August 10, 2020.

Mayotte Design & Engineering (MD&E), 2014. As-Built Ash Impoundment System plans dated July 7, 2014.

NTH, 2019. Closure Plan CCR Surface Impoundment System Erickson Power Station. August 16, 2019.

Appendix A

Seepage and Slope Stability Memo

Memo

Date: Thursday, September 29, 2022

Project: Erickson Power Station Forebay, Retention Basin, and Clear Water Pond Closure

Prepared for: Lansing Board of Water & Light
Erickson Power Station
3725 South Canal Road
Lansing, Michigan 48917

From:

Iman Shafii, Ph.D., P.E.
Geotechnical Engineer

Bryce Burkett, P.E.
Senior Geotechnical Project Manager

STATE OF MICHIGAN
TERRY
BRYCE
BURKETT
ENGINEER
No.
6201066757
LICENSED PROFESSIONAL ENGINEER

29 Sep 2022

Subject: Retention Basin and Clear Water Pond Seepage and Stability Analyses

1. Introduction

Erickson Power Station is scheduled to close as part of the Lansing Board of Water & Light's (BWL) move to cleaner energy sources. Historically, fly ash and bottom ash resulting from the coal combustion process were mixed with water to form a slurry and pumped from the plant to the historical 33-acre Former Impoundment. From the Former Impoundment, the water then flowed hydraulically to the Clear Water Pond. The Forebay and Retention Basin were constructed as part of a new impoundment system from 2009 through 2014 when the Former Impoundment was closed. Figure 1 shows an aerial view of the current impoundment configuration.

Figure 1. Google Earth Image of Impoundment System

HDR Michigan, Inc. (HDR) is assisting BWL with assessing the stability of the embankments of the Retention Basin and Clear Water Pond adjacent to Lake Delta during the proposed dewatering activities as part of the impoundment closure program.

As part of this project, two cross-sections were selected along the embankment of Retention Basin and Clear Water Pond adjacent to Lake Delta for the slope stability and seepage analyses:

- Section A-A: Retention Basin
- Section B-B: Clear Water Pond

The proposed cross-sections and their locations in relation to Retention Basin, Clear Water Pond, and Lake Delta are presented in Attachment A.

The current project will excavate to a final cleanout excavation grade of El. 869 feet and El. 871 feet for the Retention Basin and Clear Water Pond, respectively.

The procedures and results of the seepage and slope stability analyses are presented in this memorandum report. Note that the dimensions shown are based on the Retention Basin and Clear Water Pond designs as of the date of this memo.

2. Soil Information Used for Seepage/Stability Analysis

The undrained and drained parameters are selected for each soil stratum based on the laboratory and field test data collected during previous field explorations, previous geotechnical studies, and our experience with similar projects and subsurface conditions. Historical soil boring data performed by others and recent monitoring well logs (MW-1, MW-4, and MW-11) installed by HDR in the vicinity of Clear Water Pond and Retention Basin were also used to determine the soil stratigraphy presented herein. The existing geotechnical data used in the

development of subsurface parameters for the seepage and stability analyses are included in Attachment E.

The stratigraphy used in our analyses, along with the short-term and long-term parameters selected for each stratum, are summarized in Table 1 and Table 2 for Retention Basin and Clear Water Pond, respectively.

Table 1: Soil Stratigraphy and Strength Parameters Used for Retention Basin

Stratum/ Material	Bottom Elevation (feet)	Total Unit Weight (pcf)	Undrained (short-term)		Drained (long-term)	
			Cohesion, c (psf)	Friction Angle, ϕ (˚)	Effective Cohesion, c' (psf)	Effective Friction Angle, ϕ' (˚)
Embankment Fill	871	120	1,000	--	200	28
Sandy Clay 1	870	125	750	--	75	18
Sandy Silt	869	125	--	28	--	28
Sandy Clay 1	865.5	125	750	--	75	18
Sandy Silt	865	125	--	28	--	28
Sandy Clay 1	864	125	750	--	75	18
Sandy Silt	863	125	--	28	--	28
Sandy Clay 2	856	125	1,500	--	150	18
Sand with Silt	830	125	--	40	--	40

Table 2: Soil Stratigraphy and Strength Parameters Used for Clear Water Pond

Stratum/ Material	Bottom Elevation (feet)	Total Unit Weight (pcf)	Undrained (short-term)		Drained (long-term)	
			Cohesion, c (psf)	Friction Angle, ϕ (˚)	Effective Cohesion, c' (psf)	Effective Friction Angle, ϕ' (˚)
Embankment Fill	872	120	1,000	--	200	28
Silty Sand	855	115	--	26 to 35	--	26 to 35
Clayey Sand	830	120	--	35	--	35

3. Seepage Analyses

Two-dimensional embankment seepage analyses were performed using SEEP/W (2021) at two aforementioned sections for the Retention Basin and Clear Water Pond. The sections were selected for the seepage and stability analysis because they represented the critical sections along the embankment adjacent to Lake Delta. Water level on the upstream side of the embankment (i.e., Lake Delta) was assumed at El. 883 feet. It should be noted that throughout the project duration, the water surface of Lake Delta will be monitored and not allowed to reach above El. 882.5 feet.

The primary objectives for performing the seepage analyses were to:

- estimate hydraulic gradients, specifically exit gradients through downstream upper stratum.
- calculate steady-state phreatic levels and pore pressures within the embankment and foundation soils for specified design water levels for use in slope stability analyses.

The seepage analyses were completed for steady-state flow conditions, with no consideration of storm surge duration, as required in *EM 1110-2-1913* (United States Army Corps of Engineers 2000). Saturated flow conditions were evaluated for each soil type. The results of the seepage analysis are shown in Table 3, with output results provided in Attachment B. It should be noted that the seepage analyses at Section B-B for the Clear Water Pond include two sections: the first section includes just the Clear Water Pond embankment, and the second section includes the Lake Delta Transfer Structure extending through the embankment.

Table 3: Results of Seepage Analysis

Seepage Analysis Section	Upstream Water Level	Gradient Across Protected Side Blanket	Gradient Factor of Safety	Meet Criteria Factor of Safety of 2.0?
Section A-A Retention Basin	El. 883 ft	2.6	0.35	No
Section A-A Retention Basin with Groundwater Pumping Wells	El. 883 ft	0.34	2.7	Yes
Section B-B Clear Water Pond	El. 883 ft	0.32	2.6	Yes
Section B-B Clear Water Pond with Transfer Structure	El. 883 ft	0.45	2.1	Yes

In conclusion, the seepage analyses of the three models analyzed indicate that:

- At Retention Basin, the upward gradient and heave potential at the toe of the embankment did not meet the minimum required factor of safety; therefore, consideration should be given to installing a well point system below the embankment crest separating the Retention Basin from Lake Delta. The intent of the well point system is to lower the seepage line to at least 3-ft below the excavation design elevation and therefore mitigate the effects of upward gradient and heave potential at the interior embankment toe adjacent to Lake Delta. The two-dimensional seepage analysis assumed a well point with a 5-ft screened installed at El. 870 ft to El. 765 ft which resulted in an adequate factor of safety at Retention Basin.
- At Clear Water Pond, the minimum required factor of safety is achieved.

4. Slope Stability Analysis Methodology

We performed slope stability analyses using *Slope/W* by *GeoStudio 2021 R2*. We used Spencer's method that uses two-dimensional limit equilibrium analysis to determine the factor of

safety for the slope. The computed factor of safety is the ratio of the forces resisting movement to the forces driving movement.

The assumptions used in our analyses are summarized below:

1. A vehicle surcharge of 250 psf was applied across the embankment crest width.
2. Water level is assumed at El. 883 feet in Lake Delta.
3. The SEEP/W models developed for the seepage analysis were used as a base model for development of the SLOPE/W models. The phreatic surface for steady-state seepage was imported directly from the SEEP/W model.
4. Rapid drawdown analyses were performed assuming a water level drop from El. 883 feet to El. 870 feet in the Retention Basin and to El. 871 feet in the Clear Water Pond.
5. Slopes maintain their geometries as our analyses did not consider the effects of scour or erosion.
6. Slope stability analyses were limited to static forces. We did not evaluate the effects of dynamic forces from waves, currents, and other hydrodynamic forces.
7. For the cross-section analyzed in the Clear Water Pond, a conservative assumption of 5-feet of embankment fill material is over-excavated beyond the design cleanout excavation grade to account for potentially contaminated surficial soil along the embankment slope.

5. Factors of Safety

The United States Army Corps of Engineers (USACE) has recommended minimum factors of safety for the proposed dredged slopes to be in in accordance with those outlined in *EM 1110-2-1913: Design and Construction of Levees*. A summary of the recommended minimum factors of safety for the given condition is summarized in Table 4.

Table 4: USACE Minimum Required Factors of Safety for Slope Stability

Condition	Minimum Factor of Safety
End of Construction (short-term)	1.3
Steady Seepage (long-term)	1.4
Rapid Drawdown	1.0 – 1.2

6. Results of Stability Analyses

The stability of the proposed slopes along the selected sections for Retention Basin and Clear Water Pond was assessed. The two locations were selected based on geometric configurations and subsurface conditions that varied at the cross-sections analyzed. The *Slope/W* outputs for the cross-sections analyzed for short-term (undrained), long-term (drained), and rapid drawdown conditions are presented in Attachments C and D for Retention Basin and Clear Water Pond, respectively. The calculated factors of safety from the stability analyses performed are summarized in Table 5.

Table 5: Calculated Factors of Safety from Stability Analyses

Anchorage Bason No.	Station	Design Excavation Elevation (ft)	Condition	Minimum Required Factor of Safety	Minimum Factor of Safety Calculated in *Slope/W*
Retention Basin	A-A	870	Short-Term	1.30	2.35
			Long-Term	1.40	1.47
			Rapid Drawdown	1.0 – 1.2	1.41
Clear Water Pond	B-B	871	Short-Term	1.30	1.83
			Long-Term	1.40	1.52
			Rapid Drawdown	1.0 – 1.2	1.28

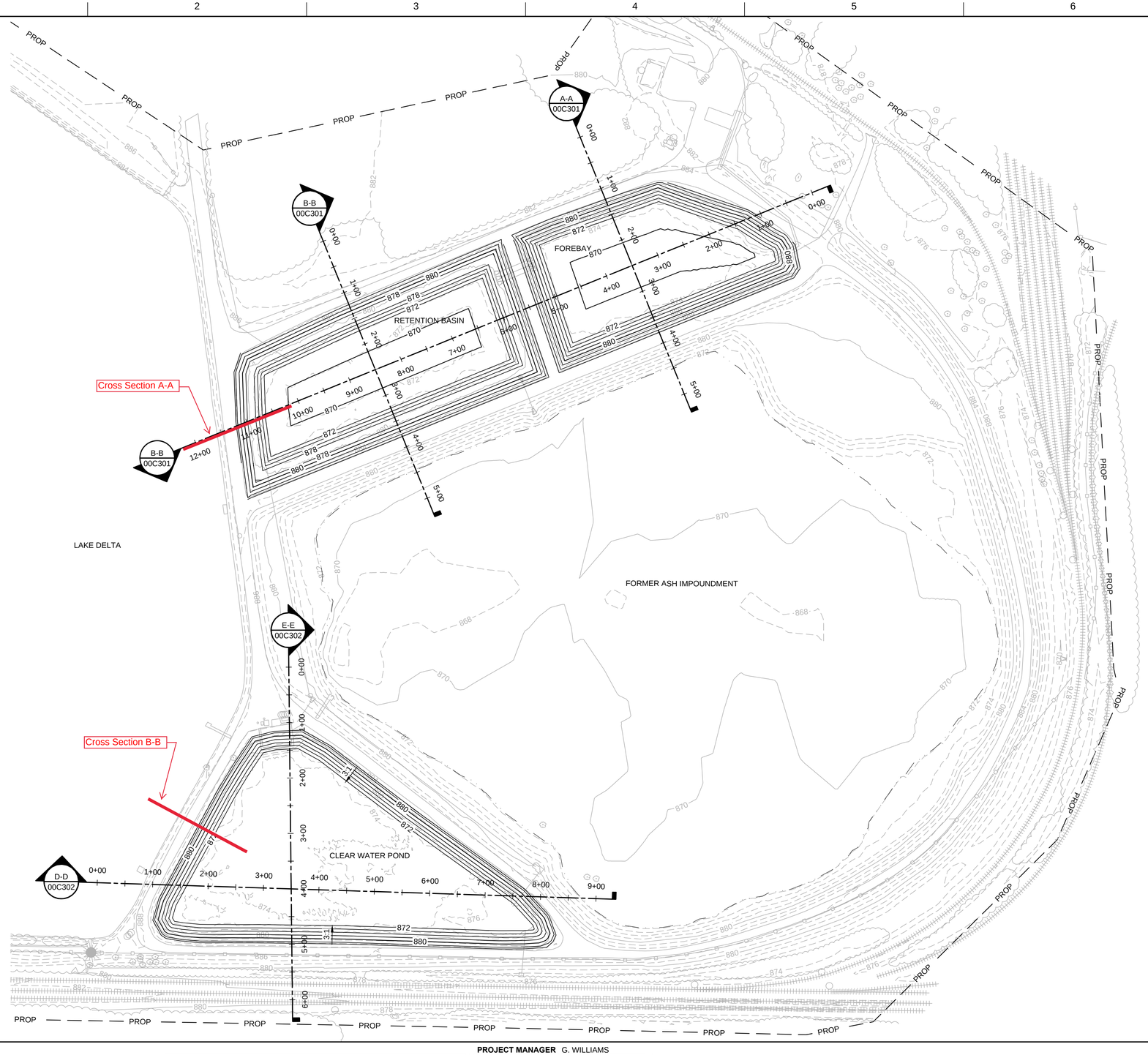
Based on our global and slope stability analyses using the anticipated geometries, the proposed slopes for Retention Basin and Clear Water Pond will be adequate to obtain the minimum USACE required factor of safety for global stability during the dewatering and excavation activities.

7. Summary of Analyses

- Representative cross-sections were selected for proposed slopes at Retention Basin and Clear Water to perform seepage and slope stability analyses to assess the potential effects of the impoundment excavation activities.
- For the Retention Basin, based on our seepage and stability analyses using the anticipated geometries, the proposed slopes at Section A-A are adequate to obtain the minimum factor of safety for global stability; however, the factor of safety for seepage is not adequate; therefore, consideration should be given to installing a well point system below the embankment crest separating the Retention Basin from Lake Delta. The intent of the well point system is to lower the seepage line to at least 3-ft below the excavation design elevation and therefore mitigate the effects of upward gradient and heave potential at the interior embankment toe adjacent to Lake Delta. The two-dimensional seepage analysis assumed a well point with a 5-ft screened installed at El. 870 ft to El. 765 ft which resulted in an adequate factor of safety at Retention Basin.
- For the Clear Water Pond, based on our seepage and stability analyses using the anticipated geometries, the proposed slopes at Section B-B are adequate to obtain the minimum factor of safety for seepage and global stability during dewatering and excavation.

Attachments:
Attachment A: Plan View and Cross-Sections
Attachment B: SEEP/W Output
Attachment C: SLOPE/W Output for Retention Basin
Attachment D: SLOPE/W Output for Clear Water Pond
Attachment E: Existing Geotechnical Data

Attachment A
Plan View and Cross-Sections



N

LEGEND

- PROP — PROPERTY BOUNDARY
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING EDGE OF WATER
- EXISTING RAILROAD SPUR
- 880 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 880 — PROPOSED MAJOR CONTOUR

NOTES

1. EXISTING CONTOURS PREPARED BY DRONEVIEW, DATED SEPTEMBER 26, 2018. EXISTING SURVEY WAS PREPARED USING NAVD 88.
2. EXISTING BOTTOM OF FOREBAY, RETENTION BASIN AND CLEAR WATER POND ESTABLISHED FROM BATHYMETRIC SURVEY DATA PROVIDED BY AFFILIATED RESEARCHERS, DATED JULY 2021.
3. PROPOSED BOTTOM OF FOREBAY AND RETENTION BASIN BASED ON INFORMATION FROM AS-BUILT ASH IMPOUNDMENT SYSTEM DOCUMENTATION PROVIDED BY MAYOTTE DESIGN AND ENGINEERING, P.C., DATED MAY 2015
4. BOTTOM OF ASH LIMITS FOR CLEAR WATER POND BASED ON HISTORICAL PLANT DRAWING 4848-183 "ASH POND STRUCTURES SHEET 1" AND 4848-184 "ASH POND STRUCTURES SHEET 2".

ISSUE	DATE	DESCRIPTION
A	04/13/2022	ISSUED FOR REVIEW

PROJECT MANAGER	G. WILLIAMS
	G. WILLIAMS
	M. BICKFORD
PROJECT NUMBER	10173187

LANSING BOARD OF WATER & LIGHT
LANSING, MICHIGAN
ASH POND CLOSURE

EXCAVATION GRADING PLAN

0 1" 2"

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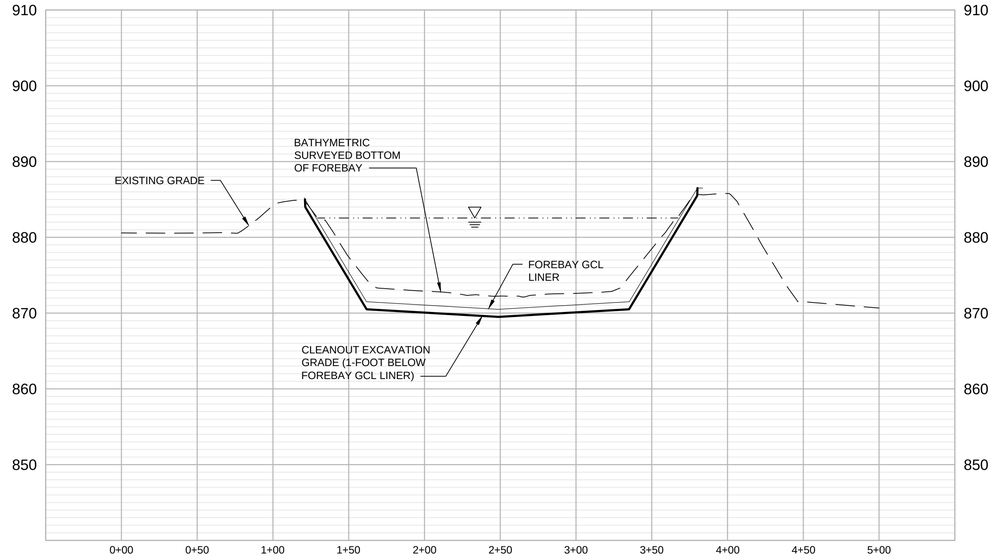
SCALE	1" = 100'

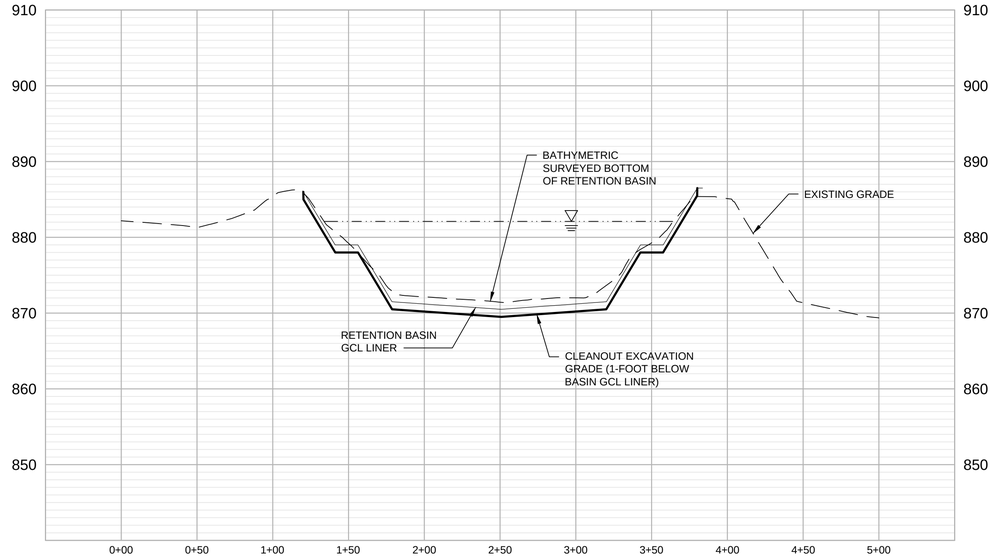
SHEET **00C102**



A-A
00C101

SECTION A-A - FOREBAY

HORIZ: 1" = 50' | VERT: 1" = 10'



B-B
00C101

SECTION B-B - RETENTION BASIN

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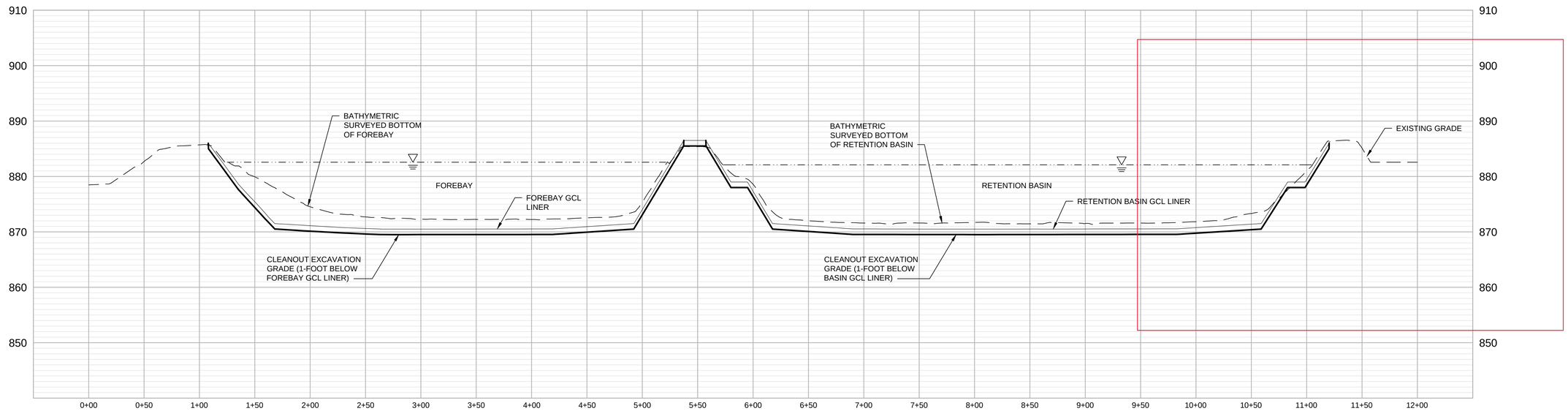


C-C
00C101

SECTION C-C
RETENTION BASIN - FOREBAY

HORIZ: 1" = 50' | VERT: 1" = 10'

ISSUE	DATE	DESCRIPTION
A	04/13/2022	ISSUED FOR REVIEW

PROJECT MANAGER	G. WILLIAMS
	G. WILLIAMS
	M. BICKFORD
PROJECT NUMBER	10173187

LANSING BOARD OF WATER & LIGHT
LANSING, MICHIGAN
ASH POND CLOSURE

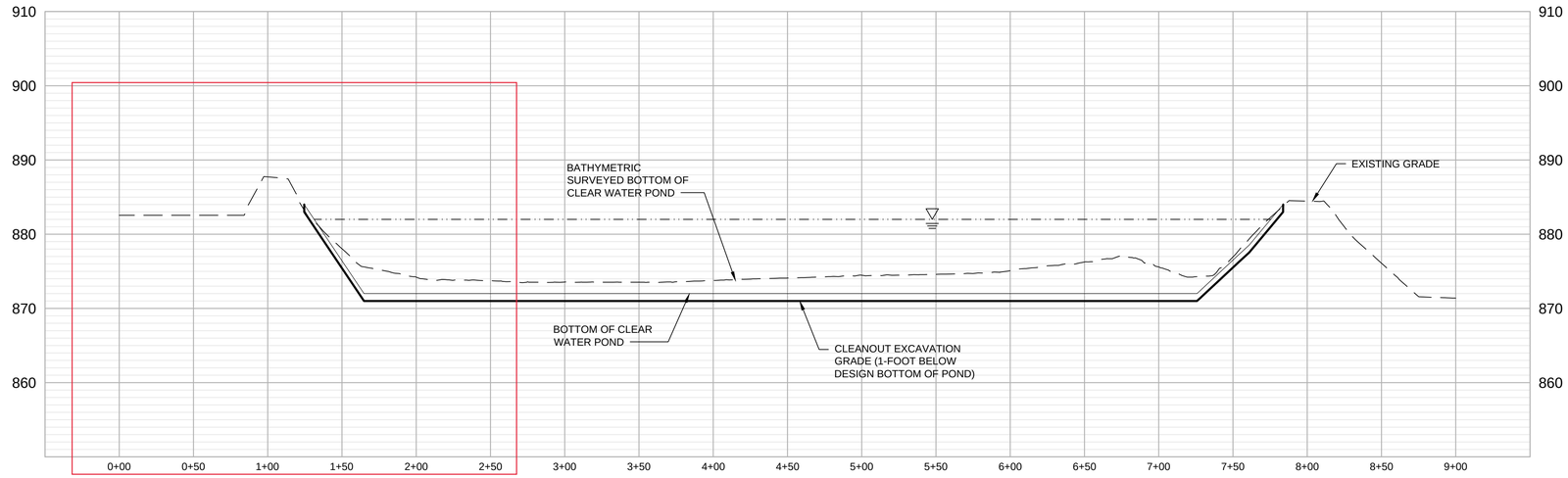
PROPOSED GRADING CROSS SECTIONS

0 1" 2"

FILENAME 00C301.dwg
SCALE AS NOTED

SHEET
00C301

c:\pwworking\ccmr\a01\d2855892\00C301.dwg, Layout1, 5/18/2022 8:26:21 AM, MBICKFORD



D-D
00C101

SECTION D-D - CLEAR WATER POND

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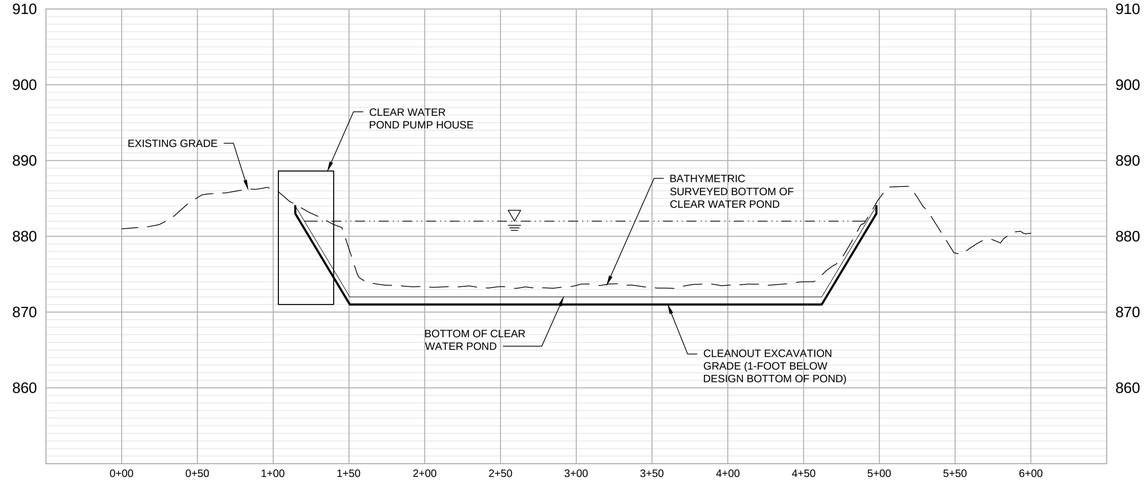


E-E
00C101

SECTION E-E - CLEAR WATER POND

HORIZ: 1" = 50' | VERT: 1" = 10'

ISSUE	DATE	DESCRIPTION
A	04/13/2022	ISSUED FOR REVIEW

PROJECT MANAGER	G. WILLIAMS
	G. WILLIAMS
	M. BICKFORD
PROJECT NUMBER	10173187

LANSING BOARD OF WATER & LIGHT
LANSING, MICHIGAN
ASH POND CLOSURE

PROPOSED GRADING CROSS SECTIONS

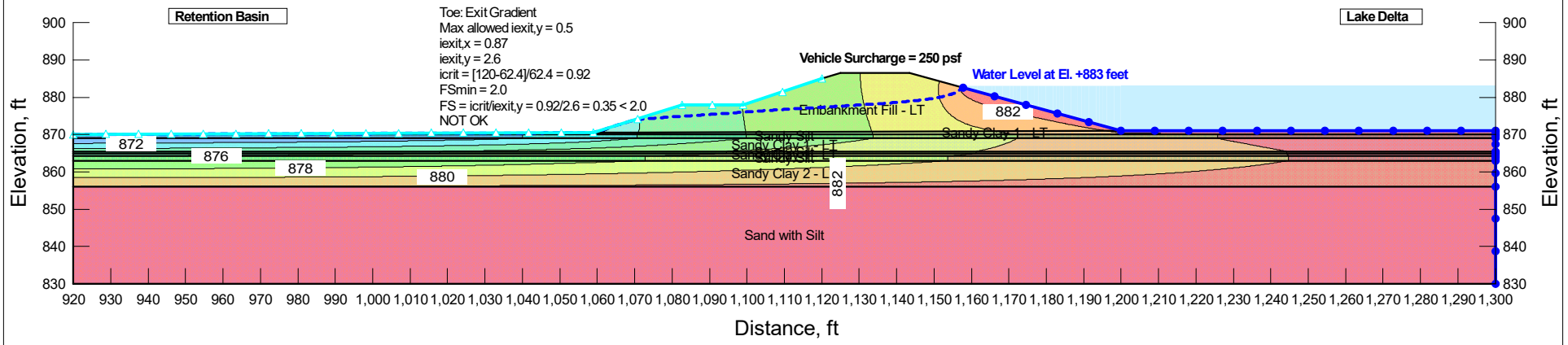
0 1" 2"

FILENAME	00C302.dwg
SCALE	AS NOTED

SHEET **00C302**

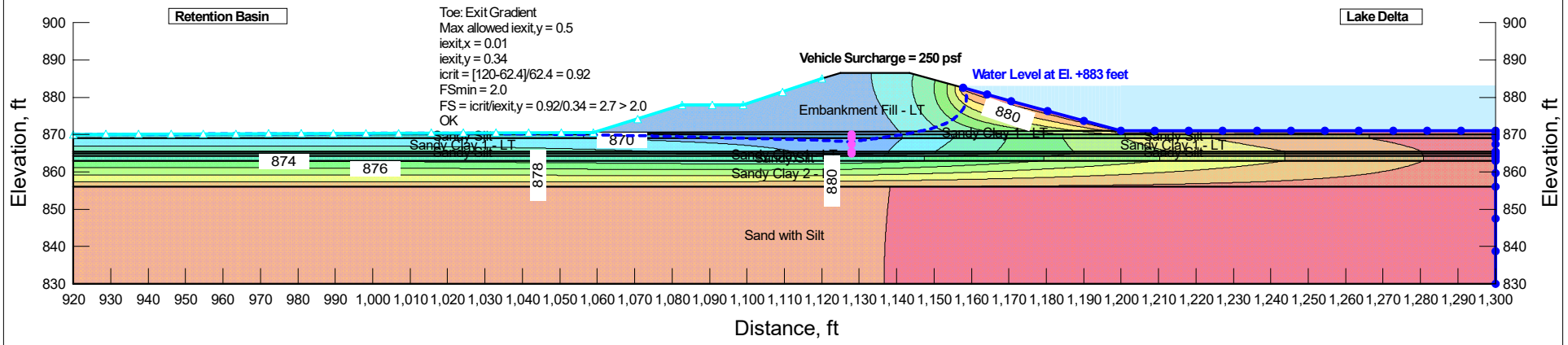
Attachment B
SEEP/W Output

Color	Name	Material Model	Sat Kx (ft/sec)	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Embankment Fill - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sand with Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Sandy Clay 1 - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sandy Clay 2 - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sandy Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07



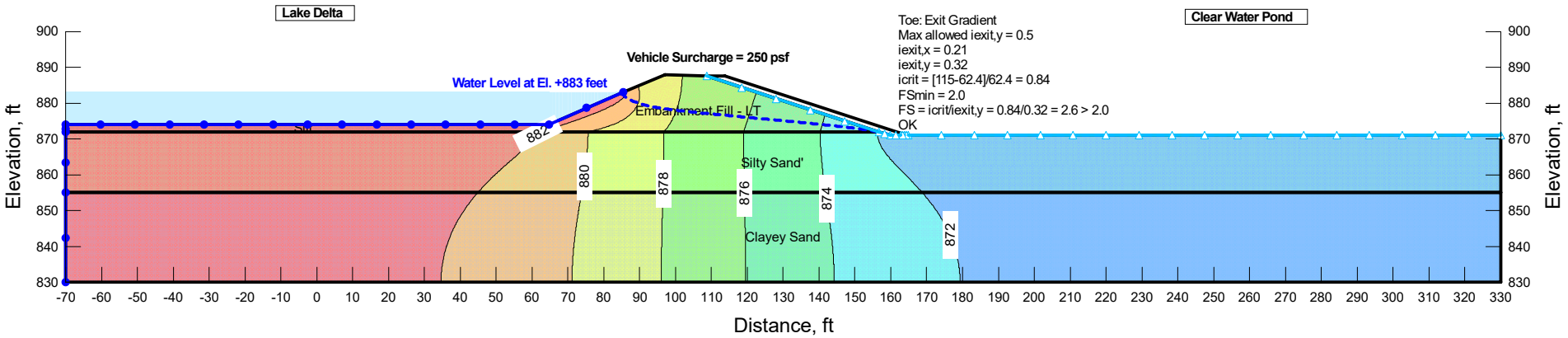
Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Retention Basin, Section A-A
Project Location: Lansing, Michigan

Color	Name	Material Model	Sat Kx (ft/sec)	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Embankment Fill - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sand with Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Sandy Clay 1 - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sandy Clay 2 - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sandy Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07



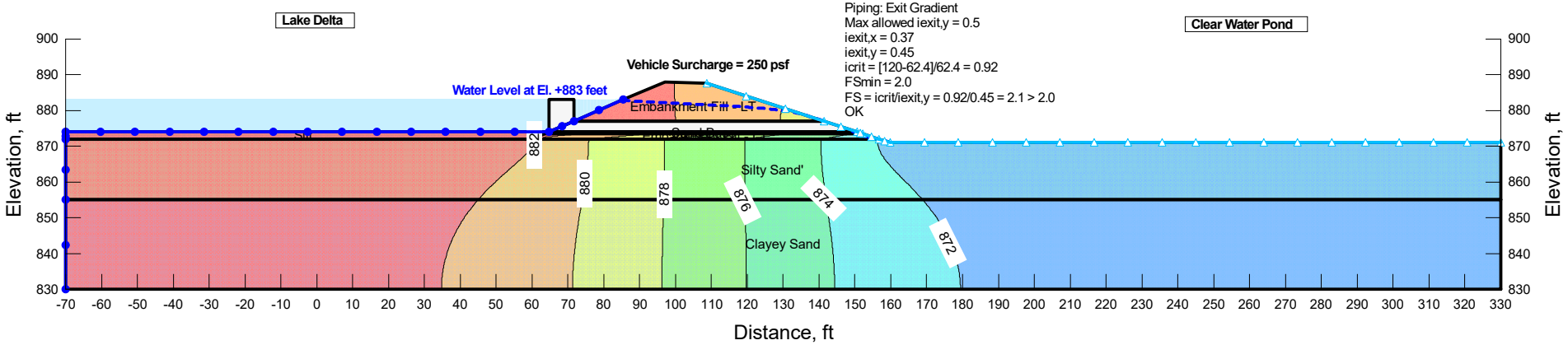
Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Retention Basin, Section A-A with Groundwater Pumping Well
Project Location: Lansing, Michigan

Color	Name	Material Model	Sat Kx (ft/sec)	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Clayey Sand	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Embankment Fill - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Silty Sand'	Saturated Only	6.56e-05	1	0	0	4.79e-07



Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Clear Water Pond, Section B-B
Project Location: Lansing, Michigan

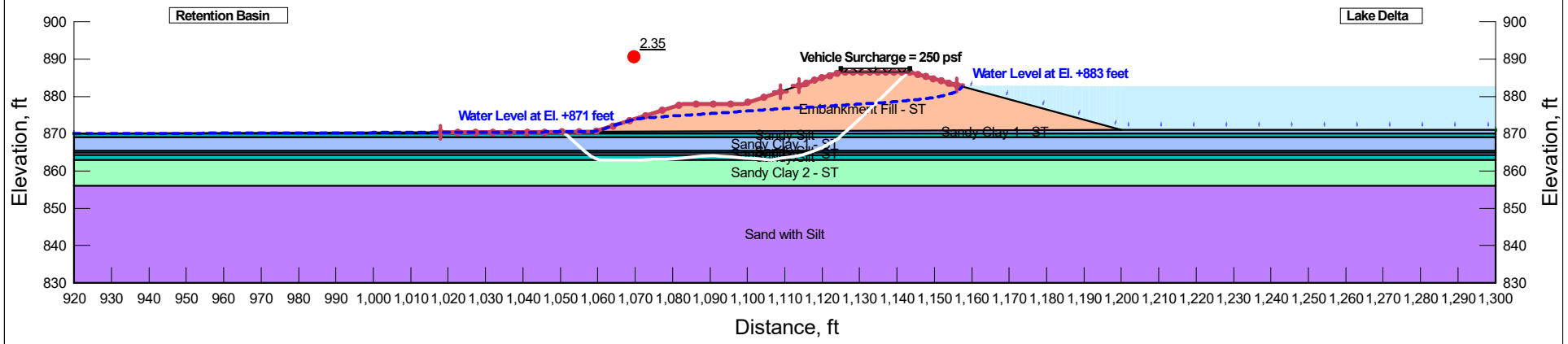
Color	Name	Material Model	Sat Kx (ft/sec)	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Clayey Sand	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Embankment Fill - LT	Saturated Only	3.3e-08	1	0	0	4.79e-07
	Sand Base	Saturated Only	0.01	0.5	0	0	4.79e-07
	Silt	Saturated Only	6.56e-05	1	0	0	4.79e-07
	Silty Sand'	Saturated Only	6.56e-05	1	0	0	4.79e-07



Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Clear Water Pond, Section B-B with Transfer Structure
Project Location: Lansing, Michigan

Attachment C
SLOPE/W Output for Retention Basin

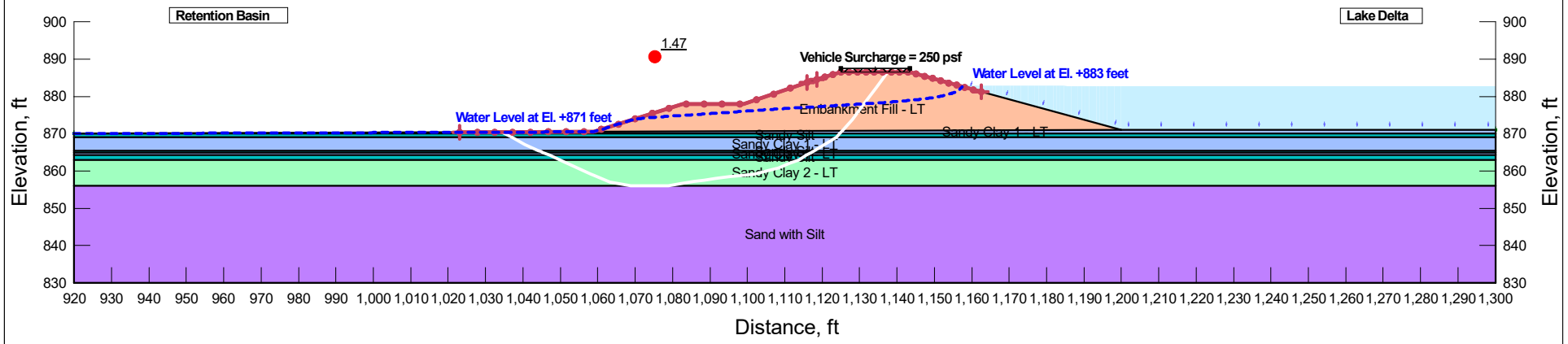
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion (psf)
	Embankment Fill - ST	120			1,000
	Sand with Silt	125	0	40	
	Sandy Clay 1 - ST	125			750
	Sandy Clay 2 - ST	125			1,500
	Sandy Silt	125	0	28	



File Name: Retention Basin.gsz
Method of Analysis: Spencer
Case Analyzed: Short-Term
Minimum FS: 2.35

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Retention Basin, Section A-A
Project Location: Lansing, Michigan

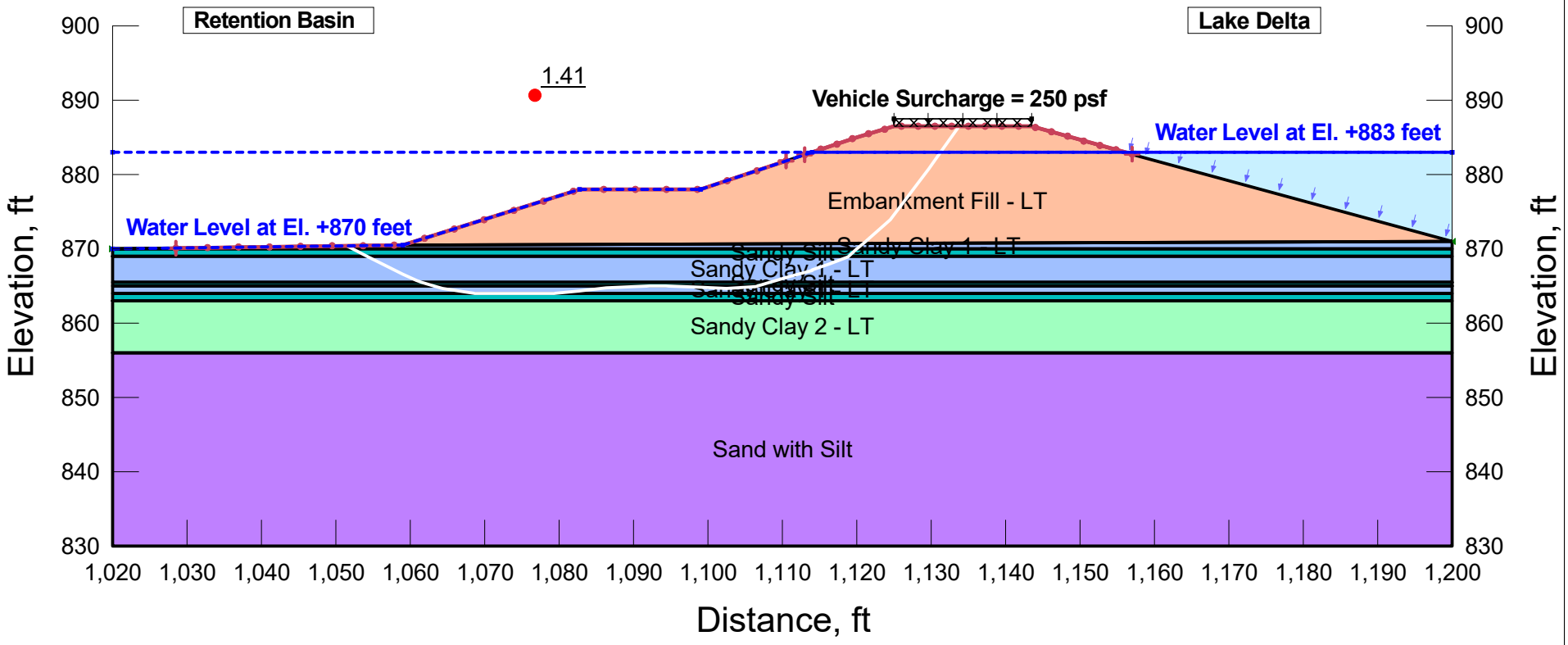
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Embankment Fill - LT	120	200	28
	Sand with Silt	125	0	40
	Sandy Clay 1 - LT	125	75	18
	Sandy Clay 2 - LT	125	150	18
	Sandy Silt	125	0	28



File Name: Retention Basin.gsz
Method of Analysis: Spencer
Case Analyzed: Long-Term
Minimum FS: 1.47

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Retention Basin, Section A-A
Project Location: Lansing, Michigan

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Embankment Fill - LT	120	200	28	1,000	0
	Sand with Silt	125	0	40	0	40
	Sandy Clay 1 - LT	125	75	18	750	0
	Sandy Clay 2 - LT	125	150	18	1,500	0
	Sandy Silt	125	0	28	0	28

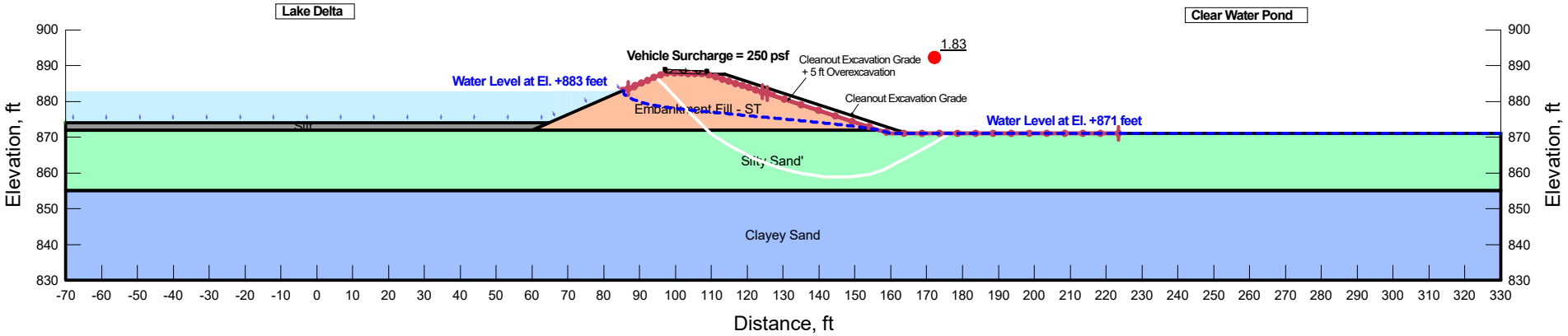


File Name: Retention Basin.gsz
Method of Analysis: Spencer
Case Analyzed: Rapid Drawdown
Minimum FS: 1.41

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Retention Basin, Section A-A
Project Location: Lansing, Michigan

Attachment D
SLOPE/W Output for Clear Water Pond

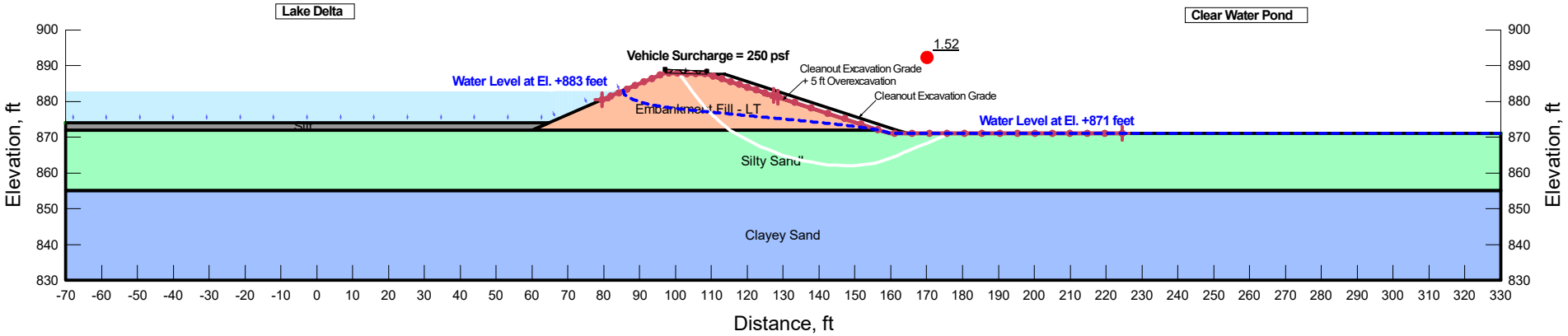
Color	Name	Unit Weight (pcf)	Cohesion (psf)	Effective Cohesion (psf)	Phi Fn	Effective Friction Angle (°)
	Clayey Sand	120		0		35
	Embankment Fill - ST	120	1,000			
	Silt	110		0		26
	Silty Sand'	115		0	loose silt/sand foundation	



File Name: Clear Water Pond.gsz
Method of Analysis: Spencer
Case Analyzed: Short-Term w/ 5-ft CCR
Minimum FS: 1.83

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Clear Water Pond, Section B-B
Project Location: Lansing, Michigan

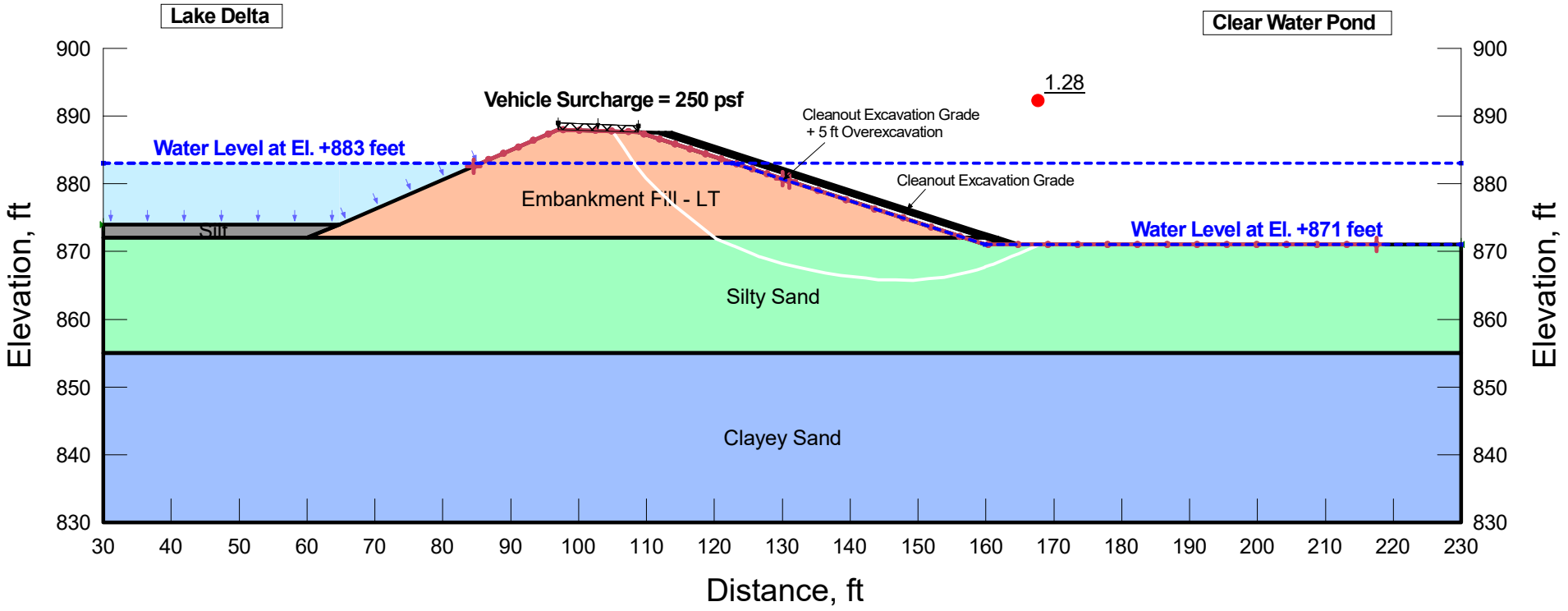
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Phi Fn	Effective Friction Angle (°)
	Clayey Sand	120	0		35
	Embankment Fill - LT	120	200		28
	Silt	110	0		26
	Silty Sand'	115	0	loose silt/sand foundation	



File Name: Clear Water Pond.gsz
Method of Analysis: Spencer
Case Analyzed: Long-Term w/ 5-ft CCR
Minimum FS: 1.52

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Clear Water Pond, Section B-B
Project Location: Lansing, Michigan

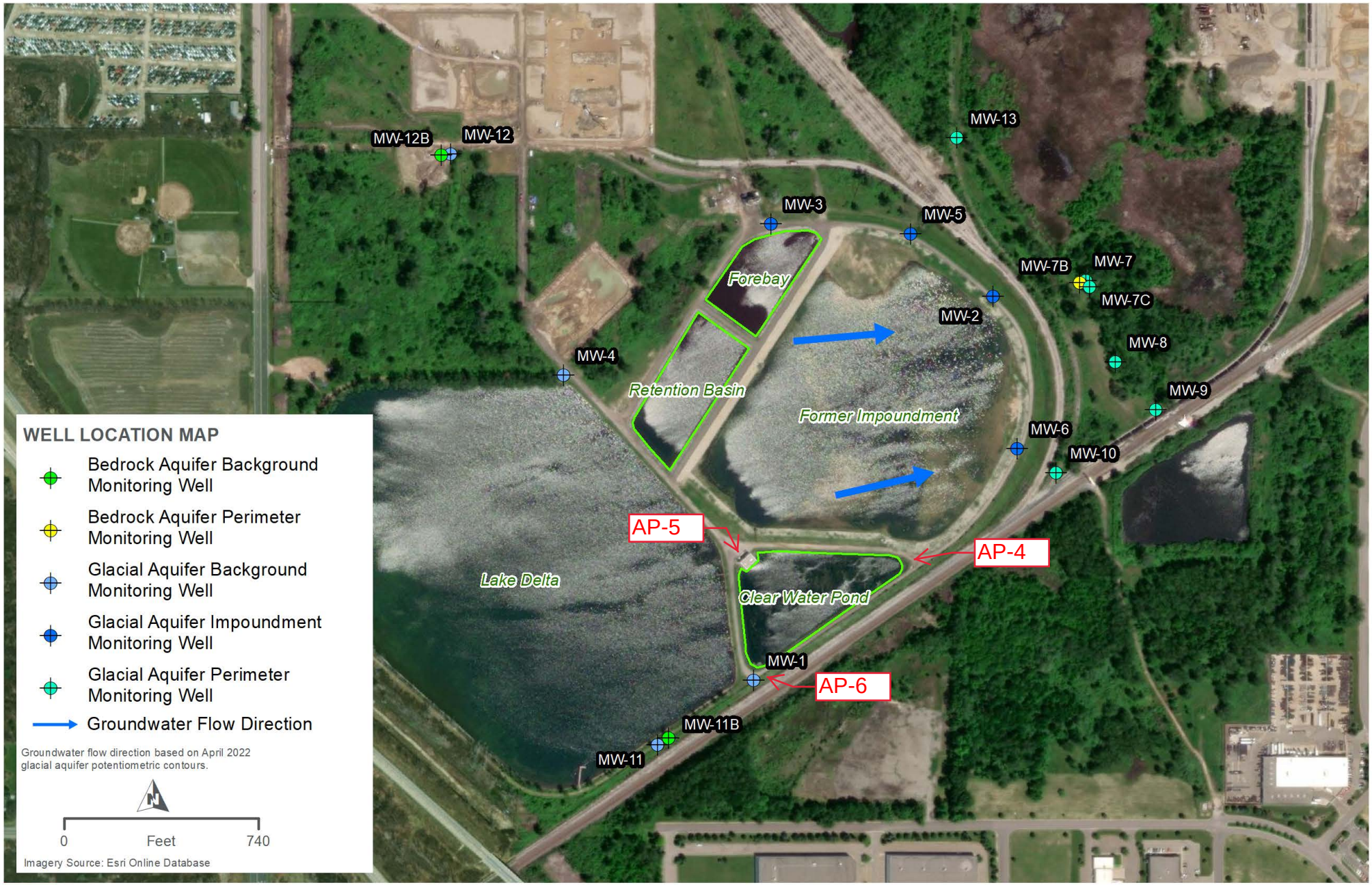
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clayey Sand	120	0	35	0	35
	Embankment Fill - LT	120	200	28	1,000	0
	Silt	110	0	26	0	26
	Silty Sand	115	0	28	0	28



File Name: Clear Water Pond.gsz
Method of Analysis: Spencer
Case Analyzed: Rapid Drawdown w/ 5-ft CCR
Minimum FS: 1.28

Project Name: Structural Stability and Safety Factor Assessment
Client: Lansing Board of Water & Light
Analysis: Clear Water Pond, Section B-B
Project Location: Lansing, Michigan

Attachment E
Existing Geotechnical Data



HDR

ERICKSON POWER STATION

EATON COUNTY, MI

MW-1

CLIENT Lansing Board of Water & Light
PROJECT NAME Erickson Power Station
PROJECT NUMBER 10173187
PROJECT LOCATION Erickson Power Station, Lansing, MI
DATE STARTED 10/15/19 11:00 **COMPLETED** 10/15/19 12:30
GROUND ELEVATION 885.97 ft MSL **HOLE DIAMETER** 7"
DRILLING CONTRACTOR SME **DRILLER** Rudy Musulin
GROUND WATER LEVELS:
DRILLING METHOD HSA **EQUIPMENT** Track-Mounted CME 55
▽ **AT TIME OF DRILLING** 17.50 ft / Elev 868.47 ft
LOGGED BY Emily Munoz **CHECKED BY**
▼ **75 HRS AFTER DRILLING** 11.85 ft / Elev 874.12 ft

NOTES Sample ID prefix LBWL-MW1-. Driller recorded blow counts on SME logs.

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SANDY LEAN CLAY WITH GRAVEL, (CL) brown (10YR 5/3), dry, stiff, low plasticity	SS	100	7-7-7-9 (14)		
		SANDY LEAN CLAY WITH GRAVEL, (CL) yellowish brown (10YR 5/4), dry, medium stiff, mottled, low plasticity	SS	100	8-9-10-14 (19)		
5			SS	100	5-6-7-9 (13)		
			SS	100	6-7-8-7 (15)		
10			SS	100	5-5-5-6 (10)		
		SANDY LEAN CLAY WITH GRAVEL, (CL) yellowish brown (10YR 5/4), moist, medium stiff, mottled, low plasticity	SS	100	3-3-3-4 (6)		
			SS	33	2-2-3-4 (5)		
15			SS	100	5-6-7-9 (13)		
		SANDY LEAN CLAY, (CL) very dark gray (2.5Y 3/1), moist, stiff, low plasticity					
		CLAYEY SAND, (SC) dark greenish gray (10GY 4/1), poorly graded, fine grained, moist, medium dense, iron oxide staining	SS	75	6-7-9-12 (16)		
		CLAYEY SAND, (SC) dark greenish gray (10GY 4/1), poorly graded, fine grained, wet, medium dense, iron oxide staining	SS	75	8-10-10-12 (20)		
20		POORLY GRADED SAND WITH CLAY, (SP) gray (5Y 5/1), fine to medium grained, wet, medium dense	SS	75	6-7-9-10 (16)		
			SS	100	5-8-8-9 (16)		
		CLAYEY SAND, (SC) gray (5Y 5/1), poorly graded, fine grained, wet, medium dense	SS	25	5-5-6-8 (11)		
25							
		LEAN CLAY WITH SAND, SILTY, (CL) gray (5Y 5/1), fine grained, wet, soft, low plasticity	SS	100	3-4-5-6 (9)		
			SS	100	5-5-6-7 (11)		
30							
		FAT CLAY, (CH) gray (5Y 5/1), wet, stiff, medium plasticity					
		LEAN CLAY WITH SAND, SILTY, (CL) gray (5Y 5/1), fine to medium grained, wet, soft, low plasticity	SS	75	5-6-7-9 (13)		

Bottom of borehole at 32.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

MW-4

CLIENT Lansing Board of Water & Light
PROJECT NAME Erickson Power Station
PROJECT NUMBER 10173187
PROJECT LOCATION Erickson Power Station, Lansing, MI
DATE STARTED 01/06/20 10:09 **COMPLETED** 01/06/20 11:05
GROUND ELEVATION 885.23 ft MSL **HOLE DIAMETER** 8"
DRILLING CONTRACTOR SME **DRILLER** Derek Blackburn
GROUND WATER LEVELS:
DRILLING METHOD HSA **EQUIPMENT** Truck-Mounted CME 55
AT TIME OF DRILLING 13.00 ft / Elev 872.23 ft
LOGGED BY Emily Munoz **CHECKED BY**
94.3 HRS AFTER DRILLING 11.51 ft / Elev 873.72 ft
NOTES

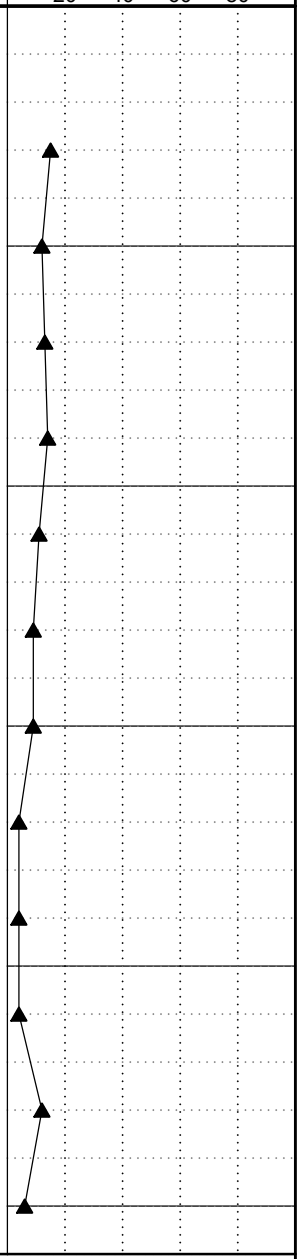
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		LEAN CLAY, SILTY, (CL) very dark brown (7.5YR 2.5/2), moist, soft, low plasticity, fine sand						
		LEAN CLAY, SILTY, (CL) brown (10YR 4/3), moist, soft, low plasticity						
5		LEAN CLAY, SILTY, (CL) dark brown (7.5YR 3/2), moist, soft, low plasticity, fine sand						
		LEAN CLAY, SILTY, (CL) brown with dark brown (10YR 5/3), moist, medium stiff, mottled, low plasticity, fine sand, fine gravel						
		LEAN CLAY, SILTY, (CL) dark yellowish brown with dark grayish brown (10YR 4/6), moist, soft, mottled, low plasticity, fine sand, fine gravel						
10		LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), moist, soft, medium plasticity, fine sand, fine gravel						
		LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), wet, soft, medium plasticity, fine sand, fine gravel						
15		WELL GRADED SAND WITH GRAVEL, (SW) brown (10YR 4/3), fine to coarse grained, wet, loose						
		LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), wet, stiff, medium plasticity, fine sand, fine gravel						
		CLAYEY SAND, (SP) yellowish brown (10YR 5/4), fine grained, wet, loose, fine gravel						
		LEAN CLAY, (CL) brown (7.5YR 4/2), wet, medium stiff, low plasticity, fine sand, fine gravel						
20		CLAYEY SAND, (SP) brown (7.5YR 5/2), fine to coarse grained, wet, loose, fine gravel						
		CLAYEY SAND, (SP) brown (7.5YR 5/2), fine grained, wet, loose						
		LEAN CLAY, (CL) brown (7.5YR 5/2), wet, soft, low plasticity, fine sand	GB					
		POORLY GRADED SAND, (SP) dark gray (7.5YR 4/1), coarse grained, wet, loose, fine gravel						
25		LEAN CLAY, (CL) gray (7.5YR 5/1), moist, stiff, low plasticity, fine sand, fine gravel						
		LEAN CLAY, (CL) brown (7.5YR 5/2), wet, stiff, low plasticity, fine sand						
		LEAN CLAY, SANDY, (CL) dark gray to black (7.5YR 4/1), wet, medium stiff, low plasticity						

Bottom of borehole at 28.0 feet.

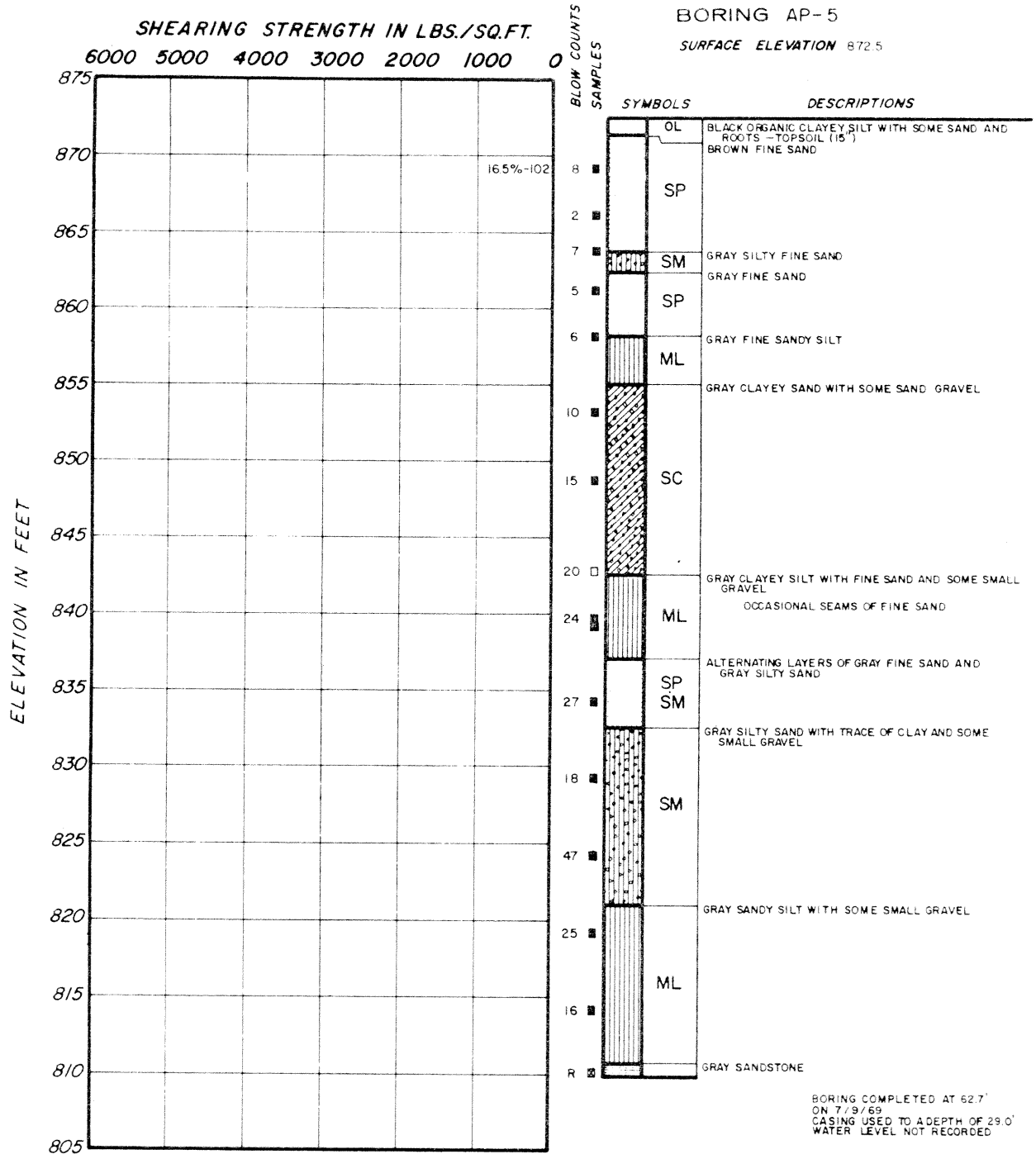
MW-11

CLIENT Lansing Board of Water & Light
PROJECT NAME Erickson Power Station
PROJECT NUMBER 10173187
PROJECT LOCATION Erickson Power Station, Lansing, MI
DATE STARTED 02/17/22 12:00 **COMPLETED** 02/17/22 14:00
GROUND ELEVATION 885.77 ft MSL **HOLE DIAMETER** 6"
DRILLING CONTRACTOR SME **DRILLER** Rudy Musulin
GROUND WATER LEVELS:
DRILLING METHOD HSA **EQUIPMENT** Track-Mounted CME 55
▽ **AT TIME OF DRILLING** 22.50 ft / Elev 863.27 ft Driller Observed
LOGGED BY Tanten Buszka **CHECKED BY**
AFTER DRILLING ---
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0	POORLY GRADED SAND WITH CLAY, (SC-SM) light brown (7.5YR 4/3), poorly graded, fine to medium grained, dry, fill fill					
	POORLY GRADED SAND WITH SILT AND GRAVEL, (SP-SC) dark brown (7.5YR 4/3), poorly graded, fine grained, dry	SS	100	3-6-9-15 (15)		
5	LEAN CLAY WITH SAND, (SP-SC) brown (7.5YR 4/3), fine to medium grained, dry	SS	100	8-6-6-4 (12)		
		SS	100	4-6-7-10 (13)		
10		SS	42	8-7-7-6 (14)		
		SS	8	4-5-6-10 (11)		
		SS	100	4-5-4-7 (9)		
15	CLAYEY SAND, (SC) very dark brown (7.5YR 2.5/2), poorly graded, fine grained, moist LEAN CLAY WITH SAND, (SP-SC) brown (7.5YR 4/3), fine to medium grained, moist	SS	100	6-5-4-4 (9)		
	FAT CLAY WITH GRAVEL, (CH) gray (7.5YR 6/1), medium to coarse grained, moist POORLY GRADED SAND, (SP) gray (7.5YR 6/1), poorly graded, coarse grained, moist	SS	100	4-2-2-4 (4)		
	FAT CLAY WITH SAND, (CH) gray (7.5YR 6/1), fine grained, moist	SS	92	2-2-2-2 (4)		
20		SS	100	2-2-2-6 (4)		
	▽ POORLY GRADED SAND WITH GRAVEL, (SP) gray (7.5YR 5/1), poorly graded, fine to coarse grained, saturated	SS	54	3-5-7-7 (12)		
25		SS	0	3-3-3-3 (6)		
	SANDY SILT, (ML) brown (7.5YR 4/3), fine grained, saturated SANDSTONE, highly weathered, massive, light grayish blue, coarse, soft, [Saginaw] Sample structure unknown due to geoprobe hammer					



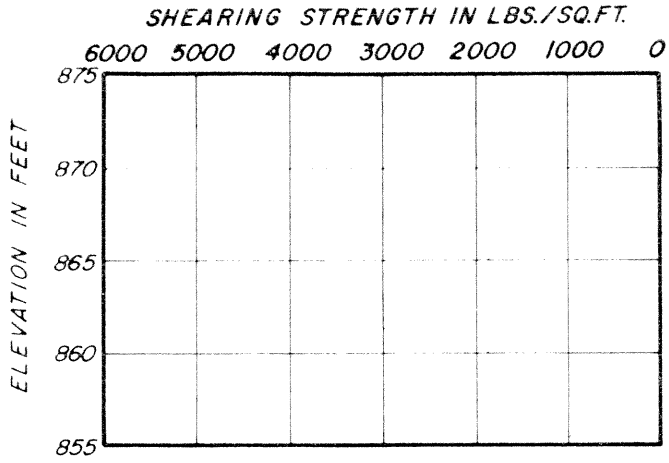
Bottom of borehole at 26.0 feet.



LOG OF BORINGS

DAMES & MOORE

PLATE A-IV

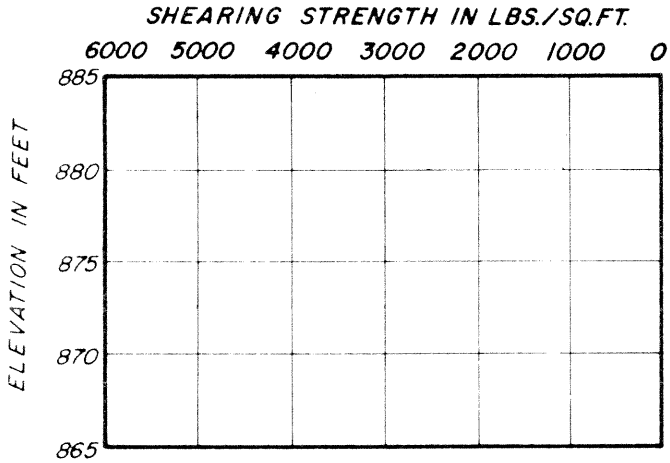


BORING AP-6

SURFACE ELEVATION 872.6

BLOW COUNTS / SAMPLES	SYMBOLS	DESCRIPTIONS
	OL	BLACK ORGANIC CLAYEY SILT WITH ROOTS - TOPSOIL (9")
3	CL	MOTTLED BROWN AND GRAY SANDY CLAY WITH SOME ROOTS
		ROOTS GRADING OUT SEEPAGE WATER ENCOUNTERED AT 3'-6"
2	ML	GRAY CLAYEY SILT WITH ORGANIC MATTER
4	ML	GRAY FINE SANDY SILT
6		
11	SC	GRAY CLAYEY FINE SAND WITH SOME SMALL GRAVEL

BORING COMPLETED AT 15.0'
ON 7/9/69
NO CASING USED
WATER LEVEL NOT RECORDED



BORING AP-7

SURFACE ELEVATION 882.6

BLOW COUNTS / SAMPLES	SYMBOLS	DESCRIPTIONS
	ML	DARK BROWN CLAYEY SILT WITH ROOTS - TOPSOIL (9")
4	CL	MOTTLED BROWN AND GRAY SANDY CLAY
		SEEPAGE WATER ENCOUNTERED AT 3'-1"
11	SM	MOTTLED BROWN AND GRAY SILTY SAND WITH TRACE OF CLAY
19	SP	BROWN FINE TO MEDIUM SAND
		GRAY SANDY CLAY WITH SOME SMALL GRAVEL
13	CL	
		GRAY CLAYEY SILT WITH FINE SAND
9	ML	

BORING COMPLETED AT 15.0'
ON 7/11/69
NO CASING USED
WATER LEVEL NOT RECORDED

LOG OF BORINGS

DAMES & MOORE

PLATE A-1W

FALLING HEAD PERMEABILITY
ASTM D5084

PROJECT INFORMATION

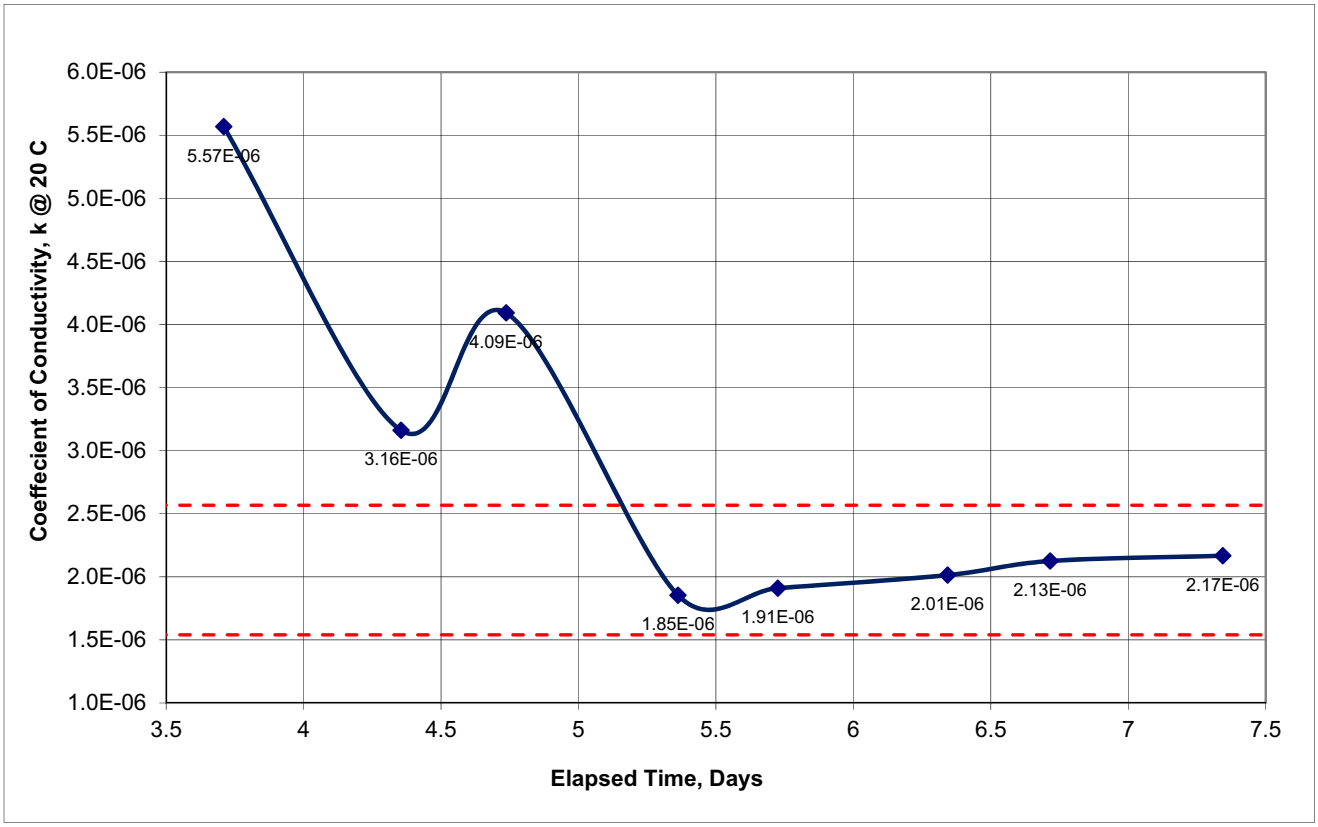
Project:	LBWL Erickson MW Install	Project Number:		082753.00	
Location:	Lansing, MI	Date Started:	January 20, 2020	Permeameter Cell Number	9
		Engineer:	CS	Sample #:	20-745-S3

SAMPLE IDENTIFICATION

Sample Location	Type of Sample	Description
MW4	Bulk sample, compacted to 80% of proctor density	Brown CLAY

TEST CONDITIONS

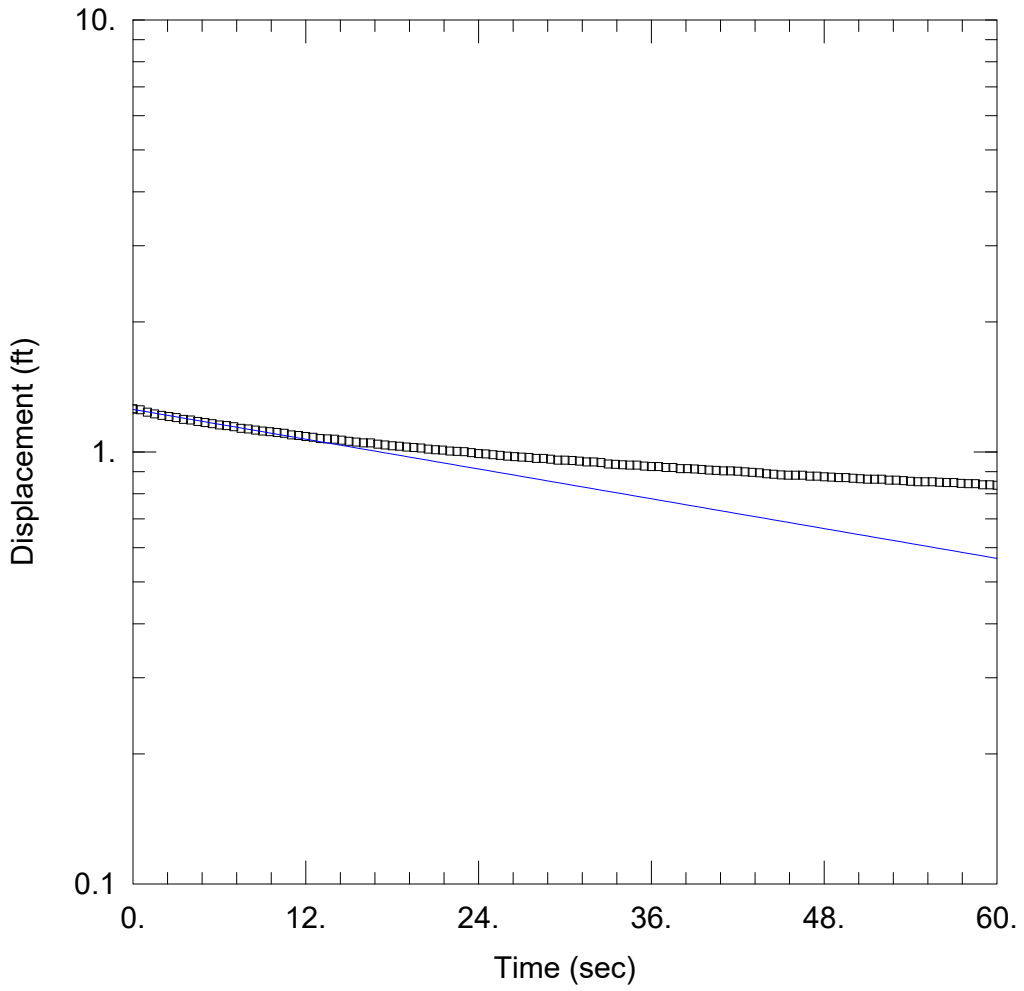
Initial Head Height (inches)	Permeant Liquid	Initial Stone & Reservoir Water Conditions
33.3	Tap Water	Moist Stones with 5 psi confining pressure



	Initial	Final
Water Content, w%	11.2	17.5
Wet Unit Weight	108.7	114.8
Dry Unit Weight	97.7	97.7

Coefficient of Conductivity, k@20C, cm/sec
Average of last 4 test cycles
0.0000259466
2.6E-05

Test Conditions	
Cell Pressure (psi):	45
Back Pressure (psi):	40.0
B-value:	0.99
Consol. stress (psi):	5.0
Hydraulic Gradient:	7.8
Pressure Head (psi):	0.5
Start temperature (ºC):	77.0
End temperature (ºC):	77.0



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: HDR, Inc.
Client: LBWL
Location: Erickson Station
Test Well: MW-1
Test Date: 10/18/2019

AQUIFER DATA

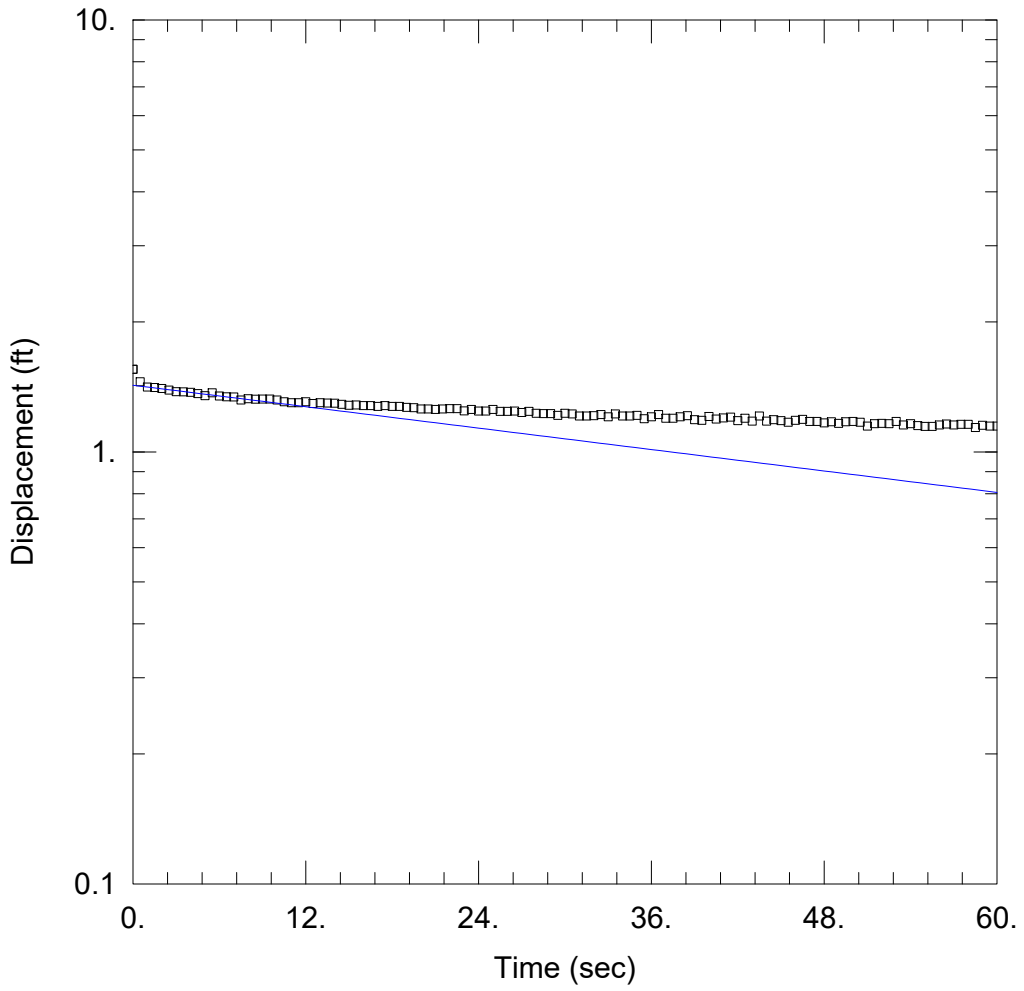
Saturated Thickness: 20.15 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 1.257 ft
Total Well Penetration Depth: 24.51 ft
Casing Radius: 0.17 ft
Static Water Column Height: 20.15 ft
Screen Length: 18. ft
Well Radius: 0.17 ft

SOLUTION

Aquifer Model: Unconfined
K = 0.001223 cm/sec
Solution Method: Bouwer-Rice
y0 = 1.254 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: HDR, Inc.
Client: LBWL
Location: Erickson Station
Test Well: MW-1
Test Date: 10/18/2019

AQUIFER DATA

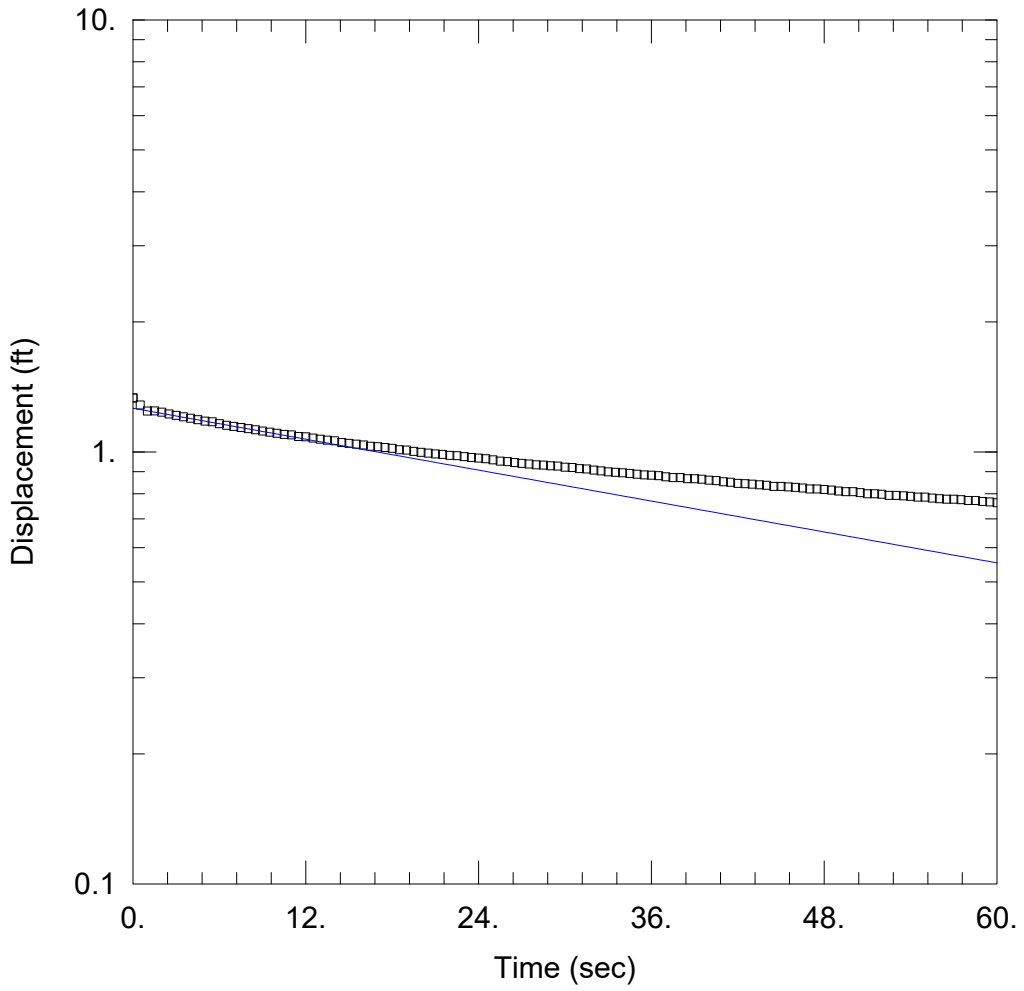
Saturated Thickness: 20.15 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 1.554 ft
Total Well Penetration Depth: 24.51 ft
Casing Radius: 0.17 ft
Static Water Column Height: 20.15 ft
Screen Length: 18. ft
Well Radius: 0.17 ft

SOLUTION

Aquifer Model: Unconfined
K = 0.0008793 cm/sec
Solution Method: Bouwer-Rice
y0 = 1.426 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: HDR, Inc.
Client: LBWL
Location: Erickson Station
Test Well: MW-1
Test Date: 10/18/2019

AQUIFER DATA

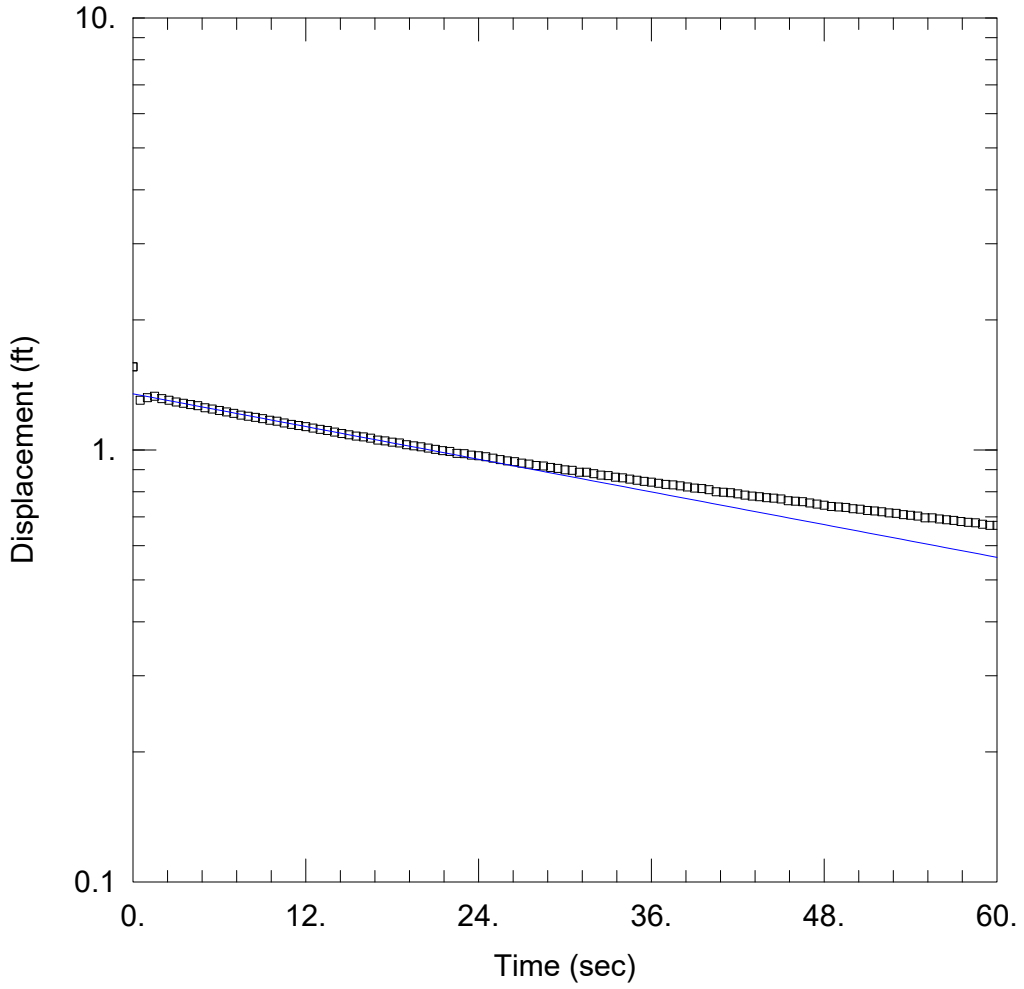
Saturated Thickness: 20.15 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 1.333 ft
Total Well Penetration Depth: 24.51 ft
Casing Radius: 0.17 ft
Static Water Column Height: 20.15 ft
Screen Length: 18. ft
Well Radius: 0.17 ft

SOLUTION

Aquifer Model: Unconfined
K = 0.001269 cm/sec
Solution Method: Bouwer-Rice
y0 = 1.262 ft



MW-4 FALLING HEAD TEST #1

PROJECT INFORMATION

Company: HDR, Inc.
Client: LBWL
Location: Erickson Station, Lansing, MI
Test Date: 01/10/2020

AQUIFER DATA

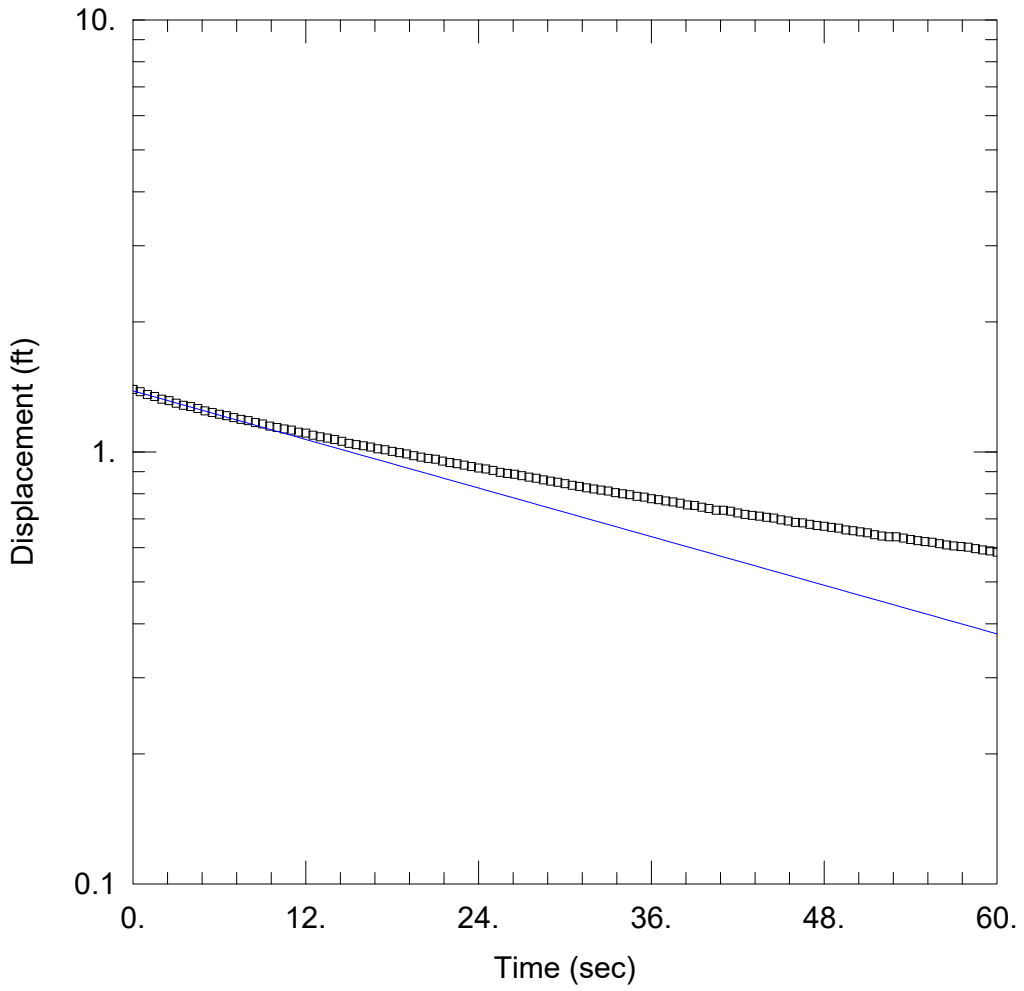
Saturated Thickness: 15.99 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-4)

Initial Displacement: 1.557 ft
Total Well Penetration Depth: 15.99 ft
Casing Radius: 0.083 ft
Static Water Column Height: 15.99 ft
Screen Length: 12. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.35

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.002316 cm/sec
y0 = 1.348 ft



MW-4 RISING HEAD TEST #1

PROJECT INFORMATION

Company: HDR, Inc.
Client: LBWL
Location: Erickson Station, Lansing, MI
Test Date: 01/10/2020

AQUIFER DATA

Saturated Thickness: 15.99 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-4)

Initial Displacement: 1.395 ft
Total Well Penetration Depth: 15.99 ft
Casing Radius: 0.083 ft
Static Water Column Height: 15.99 ft
Screen Length: 12. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.35

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003444 cm/sec
y0 = 1.385 ft

Appendix B

Ash Analytical Data

Lansing Board of Water and Light
Environmental Services Laboratory (MI00079)
1232 Haco Dr.
Lansing, Michigan 48901

15 September 2022

BWL - Erickson Station

Attn: Cheryl Louden

3725 S. Canal

Lansing, MI 48917

Project: Erickson Closure Verification

Dear Cheryl Louden,

Enclosed is a copy of the laboratory report for the following work order(s) received by Lansing Board of Water and Light Environmental Services Laboratory:

Work Order	Received	Account Number
L209189	9/8/2022 1:37:00PM	

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Caporale

Jennifer Caporale, Supervisor

Analytical Laboratory Report

Report ID: S40124.01(01)
Generated on 09/14/2022

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S40124.01-S40124.03
Project: Erickson Closure Verification
Collected Date(s): 09/09/2022
Submitted Date/Time: 09/09/2022 12:25
Sampled by: Bryce/Molly
P.O. #:

Table of Contents

Maya Murshak
Technical Director

Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.
Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2540B	Standard Method 2540 B 2015
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7196A	SW 846 Method 7196A Revision 1 July 1992/SW 846 Method 3060A Revision 1 December 1996
SW7471B	SW 846 Method 7471B Revision 2 February 2007

Sample Summary (3 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S40124.01	Forebay Ash A	Sludge	09/09/22 10:45
S40124.02	Forebay Ash B	Sludge	09/09/22 10:47
S40124.03	Forebay Ash C	Sludge	09/09/22 10:48

Analytical Laboratory Report

Lab Sample ID: S40124.01
Sample Tag: Forebay Ash A
Collected Date/Time: 09/09/2022 10:45
Matrix: Sludge
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	8oz Glass	None	Yes	24.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/12/22 09:45	JRH	
Mercury Digestion	Completed	SW7471B	09/13/22 12:28	CTV	

Inorganics

Method: E300.0, Run Date: 09/14/22 07:55, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	325	232	3.7	mg/kg	232	16887-00-6	
Fluoride (Undistilled)*	Not detected	46	6.0	mg/kg	232	16984-48-8	
Sulfate*	Not detected	232	14	mg/kg	232	14808-79-8	

Method: SM2540B, Run Date: 09/12/22 15:41, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	22	1	1	%	1		

Method: SW7196A, Run Date: 09/14/22 11:35, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 09/14/22 16:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	52.3	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 09/12/22 12:58, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	1.0	0.12	mg/kg	668	7440-36-0	
Arsenic	16.8	0.20	0.022	mg/kg	668	7440-38-2	
Barium	2,690	1.0	0.016	mg/kg	668	7440-39-3	
Beryllium	1.50	0.20	0.033	mg/kg	668	7440-41-7	
Boron	150	2.0	0.60	mg/kg	668	7440-42-8	
Cadmium	2.61	0.20	0.021	mg/kg	668	7440-43-9	
Chromium	52.3	0.50	0.027	mg/kg	668	7440-47-3	
Cobalt	8.63	0.50	0.022	mg/kg	668	7440-48-4	
Copper	151	0.50	0.042	mg/kg	668	7440-50-8	
Iron	15,400	2.0	0.14	mg/kg	668	7439-89-6	
Lead	15.0	0.30	0.015	mg/kg	668	7439-92-1	
Lithium	22.8	0.20	0.12	mg/kg	668	7439-93-2	
Molybdenum	2.61	1.0	0.032	mg/kg	668	7439-98-7	
Nickel	22.1	0.50	0.051	mg/kg	668	7440-02-0	
Selenium	1.76	1.0	0.28	mg/kg	668	7782-49-2	
Silver	Not detected	0.20	0.011	mg/kg	668	7440-22-4	
Thallium	0.97	0.20	0.013	mg/kg	668	7440-28-0	

Lab Sample ID: S40124.01 (continued)

Sample Tag: Forebay Ash A

Method: SW6020A, Run Date: 09/12/22 12:58, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	118	0.50	0.023	mg/kg	668	7440-62-2	
Zinc	88.2	1.0	0.13	mg/kg	668	7440-66-6	

Method: SW6020A, Run Date: 09/12/22 15:25, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	88,400	50	2.4	mg/kg	668	7440-70-2	
Magnesium	16,600	50	0.14	mg/kg	668	7439-95-4	
Potassium	720	50	1.6	mg/kg	668	7440-09-7	
Sodium	2,860	50	0.73	mg/kg	668	7440-23-5	

Method: SW7471B, Run Date: 09/13/22 13:38, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0029	mg/kg	150	7439-97-6	

Analytical Laboratory Report

Lab Sample ID: S40124.02
Sample Tag: Forebay Ash B
Collected Date/Time: 09/09/2022 10:47
Matrix: Sludge
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	8oz Glass	None	Yes	24.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/12/22 09:45	JRH	
Mercury Digestion	Completed	SW7471B	09/13/22 12:28	CTV	

Inorganics

Method: E300.0, Run Date: 09/14/22 08:08, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	467	316	5.0	mg/kg	316	16887-00-6	
Fluoride (Undistilled)*	Not detected	63	8.2	mg/kg	316	16984-48-8	
Sulfate*	543	316	19	mg/kg	316	14808-79-8	

Method: SM2540B, Run Date: 09/12/22 15:41, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	18	1	1	%	1		

Method: SW7196A, Run Date: 09/14/22 12:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 09/14/22 16:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	61.2	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 09/12/22 13:06, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	1.0	0.13	mg/kg	747	7440-36-0	
Arsenic	17.9	0.20	0.025	mg/kg	747	7440-38-2	
Barium	1,980	1.0	0.018	mg/kg	747	7440-39-3	
Beryllium	1.20	0.20	0.037	mg/kg	747	7440-41-7	
Boron	125	2.0	0.67	mg/kg	747	7440-42-8	
Cadmium	1.57	0.20	0.024	mg/kg	747	7440-43-9	
Chromium	61.2	0.50	0.030	mg/kg	747	7440-47-3	
Cobalt	7.69	0.50	0.025	mg/kg	747	7440-48-4	
Copper	153	0.50	0.046	mg/kg	747	7440-50-8	
Iron	13,000	2.0	0.16	mg/kg	747	7439-89-6	
Lead	14.6	0.30	0.016	mg/kg	747	7439-92-1	
Lithium	23.9	0.20	0.14	mg/kg	747	7439-93-2	
Molybdenum	3.40	1.0	0.036	mg/kg	747	7439-98-7	
Nickel	20.2	0.50	0.057	mg/kg	747	7440-02-0	
Selenium	1.86	1.0	0.31	mg/kg	747	7782-49-2	
Silver	Not detected	0.20	0.012	mg/kg	747	7440-22-4	
Thallium	0.58	0.20	0.014	mg/kg	747	7440-28-0	

Lab Sample ID: S40124.02 (continued)

Sample Tag: Forebay Ash B

Method: SW6020A, Run Date: 09/12/22 13:06, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	111	0.50	0.026	mg/kg	747	7440-62-2	
Zinc	78.7	1.0	0.14	mg/kg	747	7440-66-6	

Method: SW6020A, Run Date: 09/12/22 15:26, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	69,600	50	2.7	mg/kg	747	7440-70-2	
Magnesium	21,300	50	0.16	mg/kg	747	7439-95-4	
Potassium	627	50	1.8	mg/kg	747	7440-09-7	
Sodium	2,550	50	0.81	mg/kg	747	7440-23-5	

Method: SW7471B, Run Date: 09/13/22 13:41, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0037	mg/kg	190	7439-97-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S40124.03
Sample Tag: Forebay Ash C
Collected Date/Time: 09/09/2022 10:48
Matrix: Sludge
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	8oz Glass	None	Yes	24.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/12/22 09:45	JRH	
Mercury Digestion	Completed	SW7471B	09/13/22 12:28	CTV	

Inorganics

Method: E300.0, Run Date: 09/14/22 08:21, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	432	288	4.6	mg/kg	288	16887-00-6	
Fluoride (Undistilled)*	Not detected	58	7.5	mg/kg	288	16984-48-8	
Sulfate*	357	288	17	mg/kg	288	14808-79-8	

Method: SM2540B, Run Date: 09/12/22 15:41, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	19	1	1	%	1		

Method: SW7196A, Run Date: 09/14/22 12:05, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 09/14/22 16:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	62.8	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 09/12/22 13:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	1.0	0.12	mg/kg	684	7440-36-0	
Arsenic	20.6	0.20	0.023	mg/kg	684	7440-38-2	
Barium	1,840	1.0	0.016	mg/kg	684	7440-39-3	
Beryllium	1.07	0.20	0.034	mg/kg	684	7440-41-7	
Boron	123	2.0	0.62	mg/kg	684	7440-42-8	
Cadmium	2.18	0.20	0.022	mg/kg	684	7440-43-9	
Chromium	62.8	0.50	0.028	mg/kg	684	7440-47-3	
Cobalt	7.37	0.50	0.023	mg/kg	684	7440-48-4	
Copper	138	0.50	0.043	mg/kg	684	7440-50-8	
Iron	12,000	2.0	0.15	mg/kg	684	7439-89-6	
Lead	13.4	0.30	0.015	mg/kg	684	7439-92-1	
Lithium	26.1	0.20	0.13	mg/kg	684	7439-93-2	
Molybdenum	3.18	1.0	0.033	mg/kg	684	7439-98-7	
Nickel	20.0	0.50	0.052	mg/kg	684	7440-02-0	
Selenium	1.93	1.0	0.29	mg/kg	684	7782-49-2	
Silver	Not detected	0.20	0.011	mg/kg	684	7440-22-4	
Thallium	0.66	0.20	0.013	mg/kg	684	7440-28-0	

Lab Sample ID: S40124.03 (continued)

Sample Tag: Forebay Ash C

Method: SW6020A, Run Date: 09/12/22 13:12, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	116	0.50	0.024	mg/kg	684	7440-62-2	
Zinc	75.4	1.0	0.13	mg/kg	684	7440-66-6	

Method: SW6020A, Run Date: 09/12/22 15:27, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	90,600	50	2.5	mg/kg	684	7440-70-2	
Magnesium	24,400	50	0.15	mg/kg	684	7439-95-4	
Potassium	549	50	1.6	mg/kg	684	7440-09-7	
Sodium	2,060	50	0.75	mg/kg	684	7440-23-5	

Method: SW7471B, Run Date: 09/13/22 13:45, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0031	mg/kg	163	7439-97-6	

Merit Laboratories Login Checklist

Lab Set ID: S40124
Client: BWL01 (Board of Water & Light)
Project: Erickson Closure Verification
Submitted: 09/09/2022 12:25 Login User: BJB

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☐ No	☒ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 24.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water & Light
ADDRESS: PO Box 13007
CITY: Lansing | STATE: MI | ZIP CODE: 48901
PHONE NO.: 517-702-6372 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: | STATE: | ZIP CODE:
PHONE NO.: | E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson Closure Verification
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Bryce / Molly
TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP
DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions: L209189

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Chloride, Fluoride, Sulfate	Total Solids	Chromium VI	Mercury	Metals (see attached list)
40124.01	9-9-22	1045	Forebay Ash A	SL	1	/											
.02	9-9-22	1047	Forebay Ash B	SL	1	/											
.03	9-9-22	1048	Forebay Ash C	SL	1	/											

RELINQUISHED BY: SIGNATURE/ORGANIZATION ☐ Sampler DATE 9/9/22 TIME 12:35
RECEIVED BY: SIGNATURE/ORGANIZATION DATE 9/9/22 TIME 1235
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 24.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Lansing Board of Water and Light
Environmental Services Laboratory (MI00079)
1232 Haco Dr.
Lansing, Michigan 48901

13 April 2022

BWL - Industrial Health & Safety

Attn: Jeremy Ruckle

830 E. Hazel; Environmental & Safety

Lansing, MI 48901

Project: Coal/Fly Ash and Bottom Ash

Dear Jeremy Ruckle,

Enclosed is a copy of the laboratory report for the following work order(s) received by Lansing Board of Water and Light Environmental Services Laboratory:

Work Order	Received	Account Number
L203065	3/15/2022 2:48:00PM	40624 10021

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Caporale

Jennifer Caporale, Supervisor

Fibertec
environmental
services

Thursday, March 31, 2022

Fibertec Project Number:	A07481
Project Identification:	Erickson Fly/Bottom Ash /
Submittal Date:	03/17/2022

Ms. Jennifer Caporale
Lansing Board of Water and Light - Env. Svcs Lab
830 E. Hazel
Lansing, MI 48901

Dear Ms. Caporale,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

Please note that the Ash sample's was subcontracted Mineral Labs. These results will be sent in a supplemental email when available.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

By Sue Ricketts at 12:34 PM, Mar 31, 2022

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Lansing Board of Water and Light - Env. Svcs Lab**	Sample Description:	**Erickson Bottom Ash Composite**	Chain of Custody:	**177817**
Client Project Name:	**Erickson Fly/Bottom Ash**	Sample No:		Collect Date:	**09/24/21**
Client Project No:	**NA**	Sample Matrix:	**Soil/Solid**	Collect Time:	**NA**

Sample Comments: **Soil results have been calculated and reported on a dry weight basis unless otherwise noted.**

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Ash: Appearance (Subcontract) **Aliquot ID: A07481-009** **Matrix: Soil/Solid**
Method: Subcontractor (Misc.) **Description: Erickson Bottom Ash Composite**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Subcontractor Analysis	**complete**		complete	NA	1.0	NA	NA	03/23/22	NA	ML

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits

Exception Summary:

Analysis Locations:

All analyses performed in Holt.

NELAP ACCREDITED TNI LABORATORY

Accreditation Number(s):

T104704518-19-8 (TX)

MINERAL LABS INC.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

PJLA Testing

ISO/IEC 17025:2017 Accreditation #96073

COMPANY REQUESTING ANALYSIS:		
FIBERTEC ENVIRONMENTAL SERV 1914 HOLLOWAY DRIVE HOLT, MI 48842	Date Analyzed:	3/23/2022
	Lab No. 4968	12007208
	Sampled By/Type:	CUSTOMER

Sample ID: MAIL IN PROJECT #A07481
ERICKSON FLY ASH
COMPOSITE SAMPLE

PROXIMATE ANALYSIS	As Received	Dry Basis
% Moisture (D3302/D3173)	XXXXX	
% Ash (D3174)	98.46	99.23
% Volatile (D3175)	XXXXX	XXXXX
% Fixed Carbon (Calculated)	XXXXX	XXXXX
B.T.U (D5865/D5864)	XXXXX	XXXXX
M.A.F.B.T.U. (Calculated)	XXXXX	
% Sulfur (D4239)	XXXXX	XXXXX
SO_2 lbs./mm Btu	XXXXX	
Ash lbs./mm Btu	XXXXX	

ULTIMATE ANALYSIS (ASTM D5373)	As Received	Dry Basis
Moisture	XXXXX	
Carbon	XXXXX	<1.00
Hydrogen	XXXXX	XXXXX
Nitrogen	XXXXX	<0.20
Sulfur	XXXXX	XXXXX
Ash	XXXXX	XXXXX
Oxygen (diff.)	XXXXX	XXXXX

SULFUR FORMS (ASTM D2492)	As Received	Dry Basis
% Pyritic Sulfur	XXXXX	XXXXX
% Sulfate Sulfur	XXXXX	XXXXX
% Organic Sulfur	XXXXX	XXXXX
% Total Sulfur	XXXXX	XXXXX

MINERAL ANALYSIS (ASTM D4326)		% Wt. Ignited Basis
Silicon dioxide	SiO_2	31.20
Aluminum oxide	Al_2O_3	3.67
Titanium dioxide	TiO_2	1.34
Iron oxide	Fe_2O_3	3.64
Calcium oxide	CaO	22.39
Magnesium oxide	MgO	26.49
Potassium oxide	K_2O	1.73
Sodium oxide	Na_2O	4.57
Sulfur trioxide	SO_3	1.02
Phosphorus pentoxide	P_2O_5	0.59
Strontium oxide	SrO	0.91
Barium oxide	BaO	0.42
Manganese oxide	MnO	0.02
Undetermined		2.01

FUSION TEMPERATURE OF ASH (D1857)	Reducing (°F)	Oxidizing (F)
Initial Temp.	2000	XXXXX
Softening Temp. H=W	2045	XXXXX
Hemispherical Temp. H=1/2 W	2100	XXXXX
Fluid Temp	2170	XXXXX

T-250 Temp. of Ash	2000

Base/Acid Ratio	1.6245
Fouling Factor	7.4240
Slagging Factor	XXXXX

Arsenic (As) ppm(ASTM D6357)	12.96
Chlorine (Cl) ppm(ASTM D8247)	50
Mercury (Hg) ppm(ASTM D6722)	0.710
pH(SW9045D)	11.80
Selenium (Se)(ASTM D6357)	8.11
Loss On Ignition (LOI)(ASTM D7348)	0.77
% Total Sulfate (SO4)(ASTM D4326)	1.78
Particle Size Distribution	Attached

WATER SOLUBLE ALKALIES (Reported in %)	
K_2O	
Na_2O	

Submitted By: Charlotte Matthews

Sample Preparation by ASTM D2013 and ASTM D5198

MINERAL LABS INC.

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Fax (606) 349-6102

PJLA Testing

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Certificate of Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007208**
Sample by: CUSTOMER

Site ID: **MAIL IN PROJECT #A07481 ERICKSON FLY ASH COMPOSITE SAMPLE**

Parameter	*Result*	*Units*	*Method*
Amorphous Silica	57.20	%	
Crystalline Silica	42.80	%	
Specific Gravity	0.2890		ASTM D240
Appearance	Gray Ash		
Solubility in Water	Non Soluble		
Reactivity in Water	Non Reactive		

***Reported on as determined ash basis**
****Reported on a dry whole material basis**
***Taken on Site**
***NDP=No Data Provided**
***CLT=Client**
***ND=Not Detected**

The analyses above are reported to the best of my knowledge and belief.

Approved By: Sharlonda Matthews

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Certificate of Analysis

Screen Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007208 4968**
Sample by: CUSTOMER
Sample type:

Site ID: **MAIL IN PROJECT #A07481**
ERICKSON FLY ASH
COMPOSITE SAMPLE

+100M	6.73	%
100M X 200M	10.93	%
200M X 325M	10.53	%
325M X 0	71.81	%
	100.00	%

Submitted By: *Jamie Minix*

MINERAL LABS INC.

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Fax (606) 349-6102

PJLA Testing

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Trace Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007208 4968**
Sample by: **CUSTOMER**

Site ID: ***MAIL IN PROJECT #A07481 ERICKSON FLY ASH COMPOSITE SAMPLE***

Parameter	Result	MDL	Units	Method
Antimony(Sb)	<0.01	0.01	mg/kg	ASTM D6357
Arsenic(As)	12.96	0.01	mg/kg	ASTM D6357
Barium(Ba)	6467	0.01	mg/kg	ASTM D6357
*Beryllium(Be)	2.09	0.01	mg/kg	ASTM D6357
Boron(B)	569	0.01	mg/kg	ASTM D6357
Bromine(Br)	<5	5	mg/kg	ASTM D8247
*Cadmium(Cd)	0.43	0.01	mg/kg	ASTM D6357
Chlorine(Cl)	50	5	mg/kg	ASTM D8247
Chromium(Cr)	91.30	0.01	mg/kg	ASTM D6357
*Copper(Cu)	142.70	0.01	mg/kg	ASTM D6357
*Lead(Pb)	62.73	0.01	mg/kg	ASTM D6357
Lithium(Li)	43.71	0.01	mg/kg	ASTM D6357
*Manganese(Mn)	246.80	0.01	mg/kg	ASTM D6357
Mercury(Hg)	0.710	0.01	mg/kg	ASTM D6722
*Nickel(Ni)	61.04	0.01	mg/kg	ASTM D6357
Selenium(Se)	8.11	0.01	mg/kg	ASTM D6357
Silver(Ag)	<0.01	0.01	mg/kg	ASTM D6357
Strontium(Sr)	13110	0.01	mg/kg	ASTM D6357
*Vanadium(V)	208.80	0.01	mg/kg	ASTM D6357
*Zinc(Zn)	135.40	0.01	mg/kg	ASTM D6357

Report in Milligrams/kilogram (ppm) on a dry whole coal basis.

Submitted By: Sharlonda Matthews

Sharlonda Matthews *Environmental Manager*

MINERAL LABS INC.

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Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

PJLA Testing

ISO/IEC 17025:2017 Accreditation #96073

COMPANY REQUESTING ANALYSIS:		
FIBERTEC ENVIRONMENTAL SERV 1914 HOLLOWAY DRIVE HOLT, MI 48842	Date Analyzed:	3/23/2022
	Lab No. 4968	12007207
	Sampled By/Type:	CUSTOMER

Sample ID: MAIL IN PROJECT #A07481
ERICKSON BOTTOM ASH
COMPOSITE SAMPLE

PROXIMATE ANALYSIS	As Received	Dry Basis
% Moisture (D3302/D3173)	XXXXX	
% Ash (D3174)	80.84	99.40
% Volatile (D3175)	XXXXX	XXXXX
% Fixed Carbon (Calculated)	XXXXX	XXXXX
B.T.U (D5865/D5864)	XXXXX	XXXXX
M.A.F.B.T.U. (Calculated)	XXXXX	
% Sulfur (D4239)	XXXXX	XXXXX
SO_2 lbs./mm Btu	XXXXX	
Ash lbs./mm Btu	XXXXX	

ULTIMATE ANALYSIS (ASTM D5373)	As Received	Dry Basis
Moisture	XXXXX	
Carbon	XXXXX	<1.00
Hydrogen	XXXXX	XXXXX
Nitrogen	XXXXX	<0.20
Sulfur	XXXXX	XXXXX
Ash	XXXXX	XXXXX
Oxygen (diff.)	XXXXX	XXXXX

SULFUR FORMS (ASTM D2492)	As Received	Dry Basis
% Pyritic Sulfur	XXXXX	XXXXX
% Sulfate Sulfur	XXXXX	XXXXX
% Organic Sulfur	XXXXX	XXXXX
% Total Sulfur	XXXXX	XXXXX

MINERAL ANALYSIS (ASTM D4326)		% Wt. Ignited Basis
Silicon dioxide	SiO_2	29.76
Aluminum oxide	Al_2O_3	3.76
Titanium dioxide	TiO_2	1.16
Iron oxide	Fe_2O_3	3.59
Calcium oxide	CaO	19.00
Magnesium oxide	MgO	20.80
Potassium oxide	K_2O	15.83
Sodium oxide	Na_2O	2.47
Sulfur trioxide	SO_3	0.05
Phosphorus pentoxide	P_2O_5	0.41
Strontium oxide	SrO	0.76
Barium oxide	BaO	0.40
Manganese oxide	MnO	0.02
Undetermined		1.99

FUSION TEMPERATURE OF ASH (D1857)	Reducing (°F)	Oxidizing (F)
Initial Temp.	2055	XXXXX
Softening Temp. H=W	2110	XXXXX
Hemispherical Temp. H=1/2 W	2170	XXXXX
Fluid Temp	2230	XXXXX

T-250 Temp. of Ash	2000

Base/Acid Ratio	1.7789
Fouling Factor	4.3939
Slagging Factor	XXXXX

Arsenic (As) ppm(ASTM D6357)	2.98
Chlorine (Cl) ppm(ASTM D8247)	29
Mercury (Hg) ppm(ASTM D6722)	0.010
pH (Standard Units)	11.30
Selenium (Se) ppm(ASTM D6357)	8.11
Loss On Ignition (LOI)(ASTM D7348)	0.60
% Total Sulfate (SO4)(ASTM D4326)	0.08
Particle Size Distribution	Attached

WATER SOLUBLE ALKALIES (Reported in %)	
K_2O	
Na_2O	

Submitted By: Charlotte Matthews

Sample Preparation by ASTM D2013 and ASTM D5198

MINERAL LABS INC.

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Fax (606) 349-6102

PJLA Testing

ISO/IEC 17025:2017 Accreditation #96073

Certificate of Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007207**
Sample by: CUSTOMER

Site ID: **MAIL IN PROJECT #A07481 ERICKSON BOTTOM ASH COMPOSITE SAMPLE**

Parameter	*Result*	*Units*	*Method*
Amorphous Silica	65.2	%	
Crystalline Silica	34.8	%	
Specific Gravity	0.452		ASTM D240
Appearance	Gray Ash		
Solubility in Water	Non Soluble		
Reactivity in Water	Non Reactive		

***Reported on as determined ash basis**
****Reported on a dry whole material basis**
***Taken on Site**
***NDP=No Data Provided**
***CLT=Client**
***ND=Not Detected**

The analyses above are reported to the best of my knowledge and belief.

Approved By: Sharlonda Matthews

MINERAL LABS INC.

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Screen Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007207 4968**
Sample by: CUSTOMER
Sample type:

Site ID: **MAIL IN PROJECT #A07481 ERICKSON BOTTOM ASH COMPOSITE SAMPLE**

+1"	0.00	%
1" X 3/4"	0.00	%
3/4" X 100M	78.93	%
100M X 200M	12.96	%
200M X 325M	4.73	%
325M X 0	3.38	%
	100.00	%

Submitted By: *Jamie Minix*

MINERAL LABS INC.

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Salyersville, KY 41465
Phone (606) 349-6145
Fax (606) 349-6102

PJLA Testing

ISO/IEC 17025:2017 Accreditation #96073

Trace Analysis

FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
HOLT, MI 48842

Date/Time Collected: **3/23/2022**
Date/Time Received: **3/23/2022**
Lab Number: **012007207 4968**
Sample by: **CUSTOMER**

Site ID: ***MAIL IN PROJECT #A07481 ERICKSON BOTTOM ASH COMPOSITE SAMPLE***

Parameter	Result	MDL	Units	Method
Antimony(Sb)	<0.01	0.01	mg/kg	ASTM D6357
Arsenic(As)	2.98	0.01	mg/kg	ASTM D6357
Barium(Ba)	6967	0.01	mg/kg	ASTM D6357
*Beryllium(Be)	3.21	0.01	mg/kg	ASTM D6357
Boron(B)	344	0.01	mg/kg	ASTM D6357
Bromine(Br)	<5	5	mg/kg	ASTM D8247
*Cadmium(Cd)	0.36	0.01	mg/kg	ASTM D6357
Chlorine(Cl)	29	5	mg/kg	ASTM D8247
Chromium(Cr)	454.90	0.01	mg/kg	ASTM D6357
*Copper(Cu)	133.50	0.01	mg/kg	ASTM D6357
*Lead(Pb)	51.04	0.01	mg/kg	ASTM D6357
Lithium(Li)	39.11	0.01	mg/kg	ASTM D6357
*Manganese(Mn)	297.50	0.01	mg/kg	ASTM D6357
Mercury(Hg)	0.010	0.01	mg/kg	ASTM D6722
*Nickel(Ni)	242.60	0.01	mg/kg	ASTM D6357
Selenium(Se)	4.13	0.01	mg/kg	ASTM D6357
Silver(Ag)	<0.01	0.01	mg/kg	ASTM D6357
Strontium(Sr)	12540	0.01	mg/kg	ASTM D6357
*Vanadium(V)	191.50	0.01	mg/kg	ASTM D6357
*Zinc(Zn)	78.17	0.01	mg/kg	ASTM D6357

Report in Milligrams/kilogram (ppm) on a dry whole coal basis.

Submitted By: Sharlonda Matthews

Sharlonda Matthews *Environmental Manager*

Fibertec environmental services

Analytical Laboratory
1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0388
email: lab@fibertec.us

8660 S. Mackinaw Trail
Cadillac, MI 49601
Phone: 231 775 8368
Fax: 231 775 8584

Industrial Hygiene Services, Inc.
1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0382
email: asbestos@fibertecihs.com

Geoprobe
11766 E. Grand River Rd.
Brighton, MI 48116
Phone: 810 220 3300
Fax: 810 220 3311

Chain of Custody # **177817**
PAGE 1 of 1

Client Name: Lansing Board of Water & Light
Contact Person: Jennifer Caporale
Project Name/ Number: Erickson Fly/Bottom Ash
Email distribution list: Environmental_Laboratory@BWL.com
Quote# BWL102220-Erickson Project 2021
Purchase Order# 4500144049

Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS	PARAMETERS: See Quote: BWL102220-Erickson Ash Project 2021	HOLD SAMPLE
9/24/21	N/A	L203065-01	Erickson Bottom Ash	S	1	X	
10/11/21	0800		-02 Fly Ash				
9/28/21	N/A		-03 Bottom Ash				
9/24/21	0900		-04 Fly Ash				
10/2/21	N/A		-05 Bottom Ash				
2/25/22	0700		-06 Fly Ash				
10/18/21	N/A		-07 Bottom Ash				
3/11/22	0700	↓	-08 Fly Ash	↓	↓	↓	

Matrix Code: S Soil; A Air; O Oil; P Wipe; GW Ground Water; SW Surface Water; WW Waste Water; X Other: Specify

Deliverables: Level 2; Level 3; Level 4; EDD

Remarks:

Received By Lab
MAR 17 2022
Initials: CT

Comments:

Sampled/Relinquished By:	Date/ Time 3.17.22 1313	Received By:
Relinquished By:	Date/ Time	Received By:
Relinquished By:	Date/ Time	Received By Laboratory:

Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY

_____1 bus. day _____2 bus. days _____3 bus. days _____4 bus. days

X 5-7 bus. days (standard) Other (specify time/date requirement): _____

LAB USE ONLY

Fibertec project number: A07481

Temperature upon receipt at Lab: 20.5°C

Please see back for terms and conditions

Hometown People. Hometown Power.

CHAIN OF CUSTODY

Environmental Laboratory
1232 Haco Drive
Lansing
Michigan, 48910

Phone: (517)702-6372

Lab Work Order Number L203007

Client Name	Project Name
BWL - Environmental Services	BWL SDWA-CC-Plants
Client Contact	**Project Number**
Angie Goodman	(none)
Address	**Project Description**
1232 Haco Dr.	SDWA-CC Compliance
City	**PO Number**
Lansing	40615 10005
State/Zip	**Shipped By**
MI, 48901	
Phone / **Fax**	**Tracking Number**
(517) 702-7059	
Sampler	
Marc Wahrer, Steven Adams	

Requested Analyses

Preservation Code	Cl-IC:: SO4
a	

Requested Turn Around

Rush requests subject to additional charge.

Rush requests subject to lab approval.

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	a	Sample Comments
Dye Tap TP001 - Dye Tap WSSN 3760	03/31/2022	09:54	G	DW	1	1	
Wise Tap TP002 - Wise Tap WSSN 3760	03/31/2022	10:00	G	DW	1	1	

Relinquished By	Date/Time	Received By	Date/Time
	3/31/2022 13:40	Kelly Gleason	3/31/2022 13:40
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Comments

Cooler Numbers and Temperatures
e0229 at 5 ºC::e0230 at 4.5 ºC

Matrix Codes: DW=Drinking Water

Preserv. Codes: a=None