Closure Plan for Existing CCR Surface Impoundments – Amendment No. 3

Ash Seal Pond
Main Ash Pond
Economizer Ash Pond
Upper Ash Pond

Burlington Generating Station
4282 Sullivan Slough Road
Burlington, Iowa 52601

Prepared for:

Interstate Power and Light Company
4282 Sullivan Slough Road
Burlington, Iowa 52601

SCS ENGINEERS

25219168.00 | June 30, 2023

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PE CERTIFICATION

I, Eric J. Nelson, hereby certify the following:

- This Closure Plan meets the requirements of 40 CFR 257.102(b).
- The final cover system described in this Closure Plan meets the design requirements in 40 CFR 257.102(d)(3).

The Closure Plan was prepared by me or under my direct supervision, and I am a duly licensed Professional Engineer under the laws of the State of Iowa.

June 30, 2023

(signature) (date)

Eric J. Nelson

(printed or typed name)

License number 23136

My license renewal date is December 31, 2024.

Pages or sheets covered by this seal:

Closure Plan for Existing CCR Surface Impoundments –

Amendment No. 3 (all pages)

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1.0 INTRODUCTION AND PROJECT SUMMARY

On behalf of Interstate Power and Light Company (IPL), SCS Engineers (SCS) has prepared Amendment No. 3 to the Closure Plan for the coal combustion residual (CCR) units at the Burlington Generating Station (BGS) as required by 40 CFR 257.102(b).

40 CFR 257.102(b) *"Written closure Plan – (1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section."*

The BGS facility includes four existing unlined CCR surface impoundments that are subject to the requirements of 40 CFR 257.102 and are included in this closure plan. The CCR units include:

- Ash Seal Pond
- Upper Ash Pond
- Economizer Ash Pond
- Main Ash Pond

Figure 1 shows the site location. **Figure 2** shows the site layout and location of the four CCR surface impoundments. Additional information on each CCR surface impoundment is provided in **Sections 1.1** through **1.4**.

IPL is required to close all four of the existing unlined CCR units listed above to meet the requirements of 40 CFR 257.101(a). IPL will close the CCR surface impoundments using a hybrid approach that includes a combination of CCR removal, consolidation within the CCR surface impoundment limits, and in-place closure with a cap. CCR will be capped with a final cover system that meets the requirements of 40 CFR 257.102.

IPL ended coal-fired operations at BGS on December 31, 2021, and continues to operate the boiler with natural gas. Since coal-fired operations ended, discharges of new CCR waste to the CCR units from coal-fired operations including bottom ash, economizer ash, and sluice water have ceased. Discharges of non-CCR waste streams to the CCR units ceased on December 5, 2022. IPL communicated its plans to manage ongoing and anticipated non-CCR waste streams from BGS and demonstrated that the criteria in 40 CFR 257.103(f)(2) were met in its November 24, 2020 Application for Site-Specific Alternative Deadline to Initiate Closure of CCR Surface Impoundments (SCS 2020). The U.S. Environmental Protection Agency (U.S. EPA) has determined that the Application is complete and that the April 11, 2021 deadline to cease receipt of waste in the CCR units is tolled. U.S. EPA has not taken additional action on the November 2020 demonstration as of the date this amendment was issued. IPL has pursued the actions identified in the November 2020 demonstration with some changes described in Amendment No. 2 to the Closure Plan issued on December 8, 2022.

The purpose of this Amendment No. 3 is to update the plan based on conditions encountered during preparations for closure.

1.1 ASH SEAL POND

The Ash Seal Pond is located south of the plant and adjacent to the Main Ash Pond (**Figure 2**). The Ash Seal Pond was constructed as the original primary ash settling pond at BGS. Under certain

operational circumstances, water containing CCR could be temporarily redirected from the Main Ash Pond into the Ash Seal Pond. This temporarily redirected discharge stopped with the end of coal-fired operations in 2021. The surface impoundment is approximately 6.5 acres in size.

1.2 UPPER ASH POND

The Upper Ash Pond is located west of the plant and north of the Main Ash Pond. The Upper Ash Pond receives water from the Main Ash Pond and the Economizer Ash Pond. The Upper Ash Pond originally spanned approximately 28 acres, but with the Economizer Ash Pond constructed within the limits, it reduced the Upper Ash Pond area to approximately 15 acres. The Upper Ash Pond discharges to the Lower Pond, a non-CCR surface impoundment, which then discharges to the Mississippi River in accordance with conditions and limits defined in a National Pollutant Discharge Elimination System (NPDES) Individual Permit 2900101 issued by the Iowa Department of Natural Resources (IDNR).

1.3 ECONOMIZER ASH POND

The Economizer Ash Pond is located within the original footprint of the Upper Ash Pond and located north of the Main Ash Pond and northwest of the plant. The surface impoundment was constructed on top of the existing CCR in the Upper Ash Pond to receive the following waste streams:

- Sluiced economizer ash
- Low-volume flows from:
  - Water treatment sumps
  - Storm water vault
  - Oil-water separator effluent (via the storm water vault)
  - Various storm drains throughout the plant (via the storm water vault)

IPL is no longer producing economizer ash, and the low-volume flows described above have been diverted away from the Economizer Ash Pond. The Economizer Ash Pond continues to receive CCR waste consolidated from other on-site units, as described below. The Economizer Ash Pond also drains to the Upper Ash Pond. The surface impoundment is approximately 13 acres in total area but only has a small area of impounded water (approximately 0.4 acres).

1.4 MAIN ASH POND

The Main Ash Pond is located west of the Ash Seal Pond and southwest of the plant. The impoundment was dredged regularly, and bottom ash was stockpiled within the footprint of the surface impoundment to dewater. The bottom ash was periodically shipped off site for beneficial reuse as a feedstock in the production of cement. A hydrated fly ash stockpile was also located within the limits of the Main Ash Pond. The hydrated fly ash aggregate is managed under the tradename “Pozzostone” and was removed from the stockpile and the Main Ash Pond on occasion for beneficial use projects, as appropriate, under approvals obtained from the IDNR. The pond previously received the following operational waste streams:

- Sluiced bottom ash
- Ash seal system water
- Low-volume wastewater from the plant

Discharges of the waste streams listed above ended in 2021 when IPL stopped coal-fired operations at BGS. The Main Ash Pond continues to receive CCR waste consolidated from other on-site units, as

described below. The Main Ash Pond outfall discharges to the Upper Ash Pond and is approximately 20 acres in size.

2.0 CLOSURE PLAN

40 CFR 257.102(b)(1)(i) *"A narrative description of how the CCR unit will be closed in accordance with this section."*

The CCR surface impoundments at BGS will be closed by a combination of CCR removal, consolidation within the CCR surface impoundment limits, and in-place closure with a cap. The Ash Seal Pond and Upper Ash Pond will be closed by removing accumulated CCR from the units within the areas identified on **Figure 3**. CCR from the Ash Seal Pond and Upper Ash Pond excavations will be consolidated and capped, along with CCR remaining in place within the Main Ash Pond and the Economizer Ash Pond. Areas within the Ash Seal Pond where CCR cannot be removed will be capped. Areas where CCR will be capped are shown on **Figure 3**. Additional details describing the CCR unit closures are provided below.

2.1 ASH SEAL POND

The Ash Seal Pond will be closed by removing a majority of the CCR. Some limited CCR will be left in place to preserve the integrity of adjacent plant infrastructure. Remaining CCR will be covered with a final cover system in accordance with the performance standards of 40 CFR 257.102(d). The volume of CCR that will remain is conservatively estimated at less than 3 percent of the Ash Seal Pond excavation volume based on the Ash Seal Pond final cover area. CCR that is removed will be relocated to the on-site closure areas and capped. The final cover system is discussed further in **Section 4.0**.

CCR in the Ash Seal Pond will be dewatered prior to and during excavation activities. Current plans include the following dewatering methods:

- Decanting of legacy wastewater and accumulated storm water by surface pumping. This water will be discharged to adjacent surface waters via the existing pond system under the existing individual NPDES permit for BGS.

- Pumping free water and contact water (i.e., precipitation that contacts CCR) from sumps excavated within the CCR. Ditches will be excavated within the CCR to drain free water and contact water to the sumps. This water will be discharged to adjacent surface waters via the existing pond system or a temporary/supplemental wastewater treatment system under the existing individual NPDES permit for BGS.

- Pumping groundwater from a series of dewatering wells installed around the perimeter of the unit. Groundwater dewatering will depressurize the underlying aquifer and minimize groundwater intrusion into the excavation during CCR removal and initial backfilling. Groundwater will be discharged to adjacent surface waters under IDNR NPDES General Permit #9 (GP9) for Dewatering Activities and Residential Geothermal Discharges.

CCR will be excavated and moisture conditioned prior to placement in a closure area located within the footprint of the existing CCR units on site. CCR moisture conditioning is required to reduce the moisture content of the CCR so it can be placed and compacted in the closure area. CCR placed in the closure areas will be compacted such that it can support additional fill material and create a stable and suitable subgrade for the final cover system. Moisture conditioning methods may include:

- Thin spreading and disking
- Temporarily stockpiling or windrowing
- Mixing high-moisture material with dry material
- Application of amendments such as Portland cement or lime

Existing wastewater infrastructure within the Ash Seal Pond will be decommissioned and removed to facilitate CCR excavation. Existing overhead electric transmission infrastructure within the Ash Seal Pond limits will be preserved and protected during CCR removal activities. IPL and the closure contractor will coordinate with the owner of the transmission facilities to maintain their function during closure construction. Adjacent generating station infrastructure, including the plant's condenser discharge pipe to the west of the Ash Seal Pond, a rail spur to the east, and a plant access road to the north will also be preserved and protected during CCR removal activities. In order to preserve and protect adjacent generating station infrastructure, some CCR will remain in place and a cap will be constructed over the remaining CCR. The final cover system is discussed further in Section 4.0.

Once CCR removal is completed, the Ash Seal Pond will be backfilled with imported soil and restored with vegetation. A culvert will be installed through the southern embankment to drain surface water from the former CCR unit area.

2.2 UPPER ASH POND

The Upper Ash Pond will be closed by removing CCR in accordance with 40 CFR 257.102(c). Accumulated CCR will be relocated to the on-site closure areas and capped. If CCR is encountered that cannot be removed, CCR will be covered with a final cover system in accordance with the performance standards of 40 CFR 257.102(d). The final cover system is discussed further in Section 4.0.

CCR in the Upper Ash Pond will be dewatered prior to and during excavation activities as described in Section 2.1. The Upper Ash Pond continued to receive low-volume wastewater discharges until new wastewater infrastructure was permitted and constructed in October 2022. The existing wastewater conveyance system discharged wastewater from an existing vault/lift station to a surface channel running across the Economizer Ash Pond area to the Upper Ash Pond. The new wastewater infrastructure includes a forcemain installed from the existing vault/lift station to the Lower Pond, a non-CCR surface impoundment, which bypasses the Economizer Ash Pond and Upper Ash Pond. Now that new wastewater infrastructure is installed and discharges to the Upper Ash Pond have ceased, closure will commence and CCR removal can be completed.

Initial CCR removal in the Upper Ash Pond will take place along the north and west perimeter of the Economizer Ash Pond where a berm buttress will be constructed to stabilize the Economizer Ash Pond closure area. CCR in this area will be removed in short sections approximately 50 to 100 feet long and approximately 50 to 100 feet wide. Precipitation that comes into contact with CCR will be diverted away from the berm buttress construction area to facilitate CCR removal. Once CCR, observed CCR-impacted soils, and unsuitable subgrade soil is removed from the berm buttress area, the berm buttress will be constructed of compacted clay. The berm buttress will stabilize the slopes of the Economizer Ash Pond closure area and isolate CCR placed within this closure area from the future storm water pond that will be developed in the former Upper Ash Pond area once CCR removal and restoration is complete. The clay berm buttress will also isolate CCR in the Economizer Ash Pond closure area from adjacent areas of the 100-year floodplain.

CCR, CCR-impacted soil, and unsuitable clay berm buttress subgrade soil will be moisture conditioned and placed in a closure area as described in Section 2.1.

Once CCR removal is completed, the Upper Ash Pond area will be restored as a storm water pond. The existing Upper Ash Pond outfall structure will be repurposed and serve as the outfall for the new pond.

2.3 ECONOMIZER ASH POND

The Economizer Ash Pond will be closed by leaving CCR in place under a final cover system in accordance with the performance standards of 40 CFR 257.102(d). The final cover system is discussed further in Section 3.0.

Prior to closure, a geotechnical monitoring system consisting of vibrating wire piezometers (VWPs) will be installed to monitor pore water pressures in the Economizer Ash Pond CCR during filling and final cover construction. Baseline pore pressure readings from the VWPs prior to dewatering, excavation, and filling in the Economizer Ash Pond area will be compared to regularly measured pore pressures. Significant changes in pore pressures or pore water elevations exceeding those analyzed for slope stability may require changes to dewatering, excavation, or filling activities to maintain stability.

The Economizer Ash Pond will be drained and stabilized in accordance with 40 CFR 257.102(d)(2). Upon the end of coal-fired operations at BGS, the Economizer Ash Pond was a small open water area on top of a CCR mound within the Upper Ash Pond (Figure 2). Upon the end of coal-fired operations at BGS, the small open water area of the Economizer Ash Pond no longer received wastewater discharges from BGS operations and is dry; however, coal and coal-impacted soil from the decommissioning of the former coal yard area was placed in the Economizer Ash Pond. CCR from the Upper Ash Pond, berm buttress area, and Ash Seal Pond has and will continue to be consolidated into the Economizer Ash Pond prior to closure. A storm water and process water channel are located along the south side of the CCR mound in the Economizer Ash Pond area (HHS, 2018). Storm water and process water were discharged to this channel until the new storm water/wastewater infrastructure described in Section 2.2 was completed in October 2022. The channel will be drained and abandoned as it is incorporated into the Economizer Ash Pond closure area and capped.

Precipitation that results in the accumulation of storm water and contact water prior to and during closure construction will be managed as described in Section 2.1. The Economizer Ash Pond area is also within the influence of the groundwater dewatering wells installed around the perimeter of the Upper Ash Pond. Five of the groundwater dewatering wells are installed between the Upper Ash Pond and the Economizer Ash Pond. Groundwater dewatering will depressurize the underlying aquifer and CCR deposits that are hydraulically connected to it. Reduced head, or pore pressure, in the aquifer and CCR will help dewater and stabilize the CCR present in the berm buttress area of the Economizer Ash Pond before CCR is excavated and fill is placed for the berm buttress. Groundwater extracted during dewatering system operation will be managed as described in Section 2.1.

In addition to the ongoing management of any accumulated storm water and contact water during closure construction, the existing Economizer Ash Pond area slopes will be modified by grading them to be no steeper than 25 percent, or 4 horizontal:1 vertical (4H:1V). The slopes will be flattened to further stabilize the Economizer Ash Pond closure area to receive fill and the final cover system. The berm buttress described in Section 2.2 will be constructed to provide stability for filling to develop planned final cover subgrades and final cover construction.

The moisture conditioning and compaction of fill and CCR placed in the Economizer Ash Pond closure area will be completed as described in Section 2.1. Fill will be placed in lifts of 12 inches or less and compacted before the next lift is placed. Filling will not occur in areas of standing water or where the subgrade is unsuitable as determined by proof rolling or the observation of the fill surface at the time of compaction. Subgrade improvements will be made where needed.

Once fill and CCR placement in the Economizer Ash Pond closure area is complete, the final cover system will be constructed over the remaining CCR and the cover restored with vegetation. Slopes and final grades may vary if settlement occurs in the fill material during material placement and grading, or if the estimated fill material volumes are different than what is estimated. Final grades will be designed to provide flexibility to accommodate these changes. Side slopes will be able to be flattened or steepened, but will not be steepened in excess of 4H:1V or flattened to less than 2 percent (outside the drainage swales). Storm water runoff from the final cover will be managed via a system of diversion berms and downslope flumes to prevent erosion and the ponding of water on the final cover.

2.4 MAIN ASH POND

The Main Ash Pond will be closed by leaving CCR in place under a final cover system in accordance with the performance standards of 40 CFR 257.102(d). The final cover system is discussed further in Section 3.0.

Like the Economizer Ash Pond, a geotechnical monitoring system consisting of VWPs will be installed to monitor pore water pressures in the Main Ash Pond CCR during filling and final cover construction. Pore pressures at the Main Ash Pond VWPs will be monitored regularly and compared to baseline pore pressure readings from the VWPs prior to the addition of fill as described in Section 2.3. Significant changes in pore pressures or pore water elevations exceeding those analyzed for slope stability may require changes to dewatering, excavation, or filling activities to maintain stability.

The Main Ash Pond will be drained and stabilized in accordance with 40 CFR 257.102(d)(2). Upon the end of coal-fired operations at BGS, the Main Ash Pond no longer received significant wastewater discharges from BGS operations; however, coal and coal-impacted soil from the decommissioning of the former coal yard area was placed in the Main Ash Pond. CCR from the Ash Seal Pond has, and will continue to be, consolidated into the Main Ash Pond prior to closure. Legacy wastewater, storm water/contact water, and groundwater in the Main Ash Pond closure area will be managed as described in Section 2.1. The Main Ash Pond area is also within the influence of the groundwater dewatering wells installed around the perimeter of the Ash Seal Pond. Groundwater dewatering will depressurize the underlying aquifer and CCR deposits that are hydraulically connected to it. Although not critical to the stability of the Main Ash Pond closure, reduced head, or pore pressure, in the aquifer and CCR will improve the stability of the CCR present in the Main Ash Pond closure area before the placement of fill and the final cover system.

The moisture conditioning and compaction of fill and CCR placed in the Main Ash Pond closure area will be completed as described in Section 2.1. Fill will be placed in lifts of 12 inches or less and compacted before the next lift is placed. Filling will not occur in areas of standing water or where the subgrade is unsuitable as determined by proof rolling or the observation of the fill surface at the time of compaction. Subgrade improvements will be made where needed.

Filling and grading in the Main Ash Pond closure area will accommodate the electrical transmission structures located within the closure area. Once fill and CCR placement in the Main Ash Pond closure area is complete, the final cover system will be constructed over the remaining CCR and the cover

restored with vegetation. Slopes and final grades may vary if settlement occurs in the fill material during material placement and grading, or if the estimated fill material volumes are different than what is estimated. Final grades will be designed to provide flexibility to accommodate these changes. Side slopes will be able to be flattened or steepened, but will not be steepened in excess of 4H:1V or flattened to less than 2 percent (outside the drainage swales). Storm water runoff from the final cover will be managed via a system of diversion berms and downslope flumes to prevent erosion and the ponding of water on the final cover.

3.0 CLOSURE BY REMOVAL

40 CFR 257.102(b)(1)(ii). *"If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section."*

"(c) Closure by removal of CCR. An owner or operator may elect to close a CCR unit by removing and decontaminating all areas affected by releases from the CCR unit. CCR removal and decontamination of the CCR unit are complete when constituent concentrations throughout the CCR unit and any areas affected by releases from the CCR unit have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standard established pursuant to 257.95(h) for constituents listed in appendix IV to this part."

As described in Section 2.2, the Upper Ash Pond will be closed by removal of CCR. These impoundments will be dewatered as described in Section 2.2 with CCR excavated, placed in one of the two closure areas, moisture conditioned, compacted, and capped.

In accordance with 40 CFR 257.102(c), the limits of CCR and underlying CCR-impacted soil excavation will be based on field observations and site conditions mutually reviewed and agreed upon by IPL, the closure contractor, and the professional engineer that will certify the closure of the CCR units or their representatives. The closure will be considered complete when all CCR has been removed and groundwater monitoring concentrations in monitoring wells installed at the downgradient boundary of the Upper Ash Pond do not exceed groundwater protection standards established pursuant to 40 CFR 257.95(h).

4.0 FINAL COVER SYSTEM AND PERFORMANCE

40 CFR 257.102(b)(1)(iii). *"If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section."*

"(d) Closure performance standard when leaving CCR in place.

(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:

(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;"

To the maximum extent feasible, the combination of CCR removal and closure in place under a final cover system will meet this requirement:

- CCR removal eliminates post-closure infiltration into CCR as well as releases of CCR, leachate, and contaminated run-off in and from the Ash Seal Pond and Upper Ash Pond.

- Backfilling the Ash Seal Pond and constructing the berm buttress in the Upper Ash Pond adjacent to the Economizer Ash Pond closure area following CCR removal will control and minimize post-closure infiltration.

- The final cover system over the Economizer Ash Pond, Main Ash Pond, and areas where CCR remains in the Ash Seal Pond, along with the run-off management features included in the closure design, will control and minimize post-closure infiltration to the maximum extent feasible. Controlling and minimizing post-closure infiltration of precipitation with the final cover will also minimize releases of leachate to the maximum extent feasible.

- A maintained final cover system will eliminate releases of CCR and contaminated run-off to the maximum extent feasible.

(ii) Preclude the probability of future impoundment of water, sediment, or slurry;

The final cover system is designed to prevent the future impoundment of water, sediment, and slurry:

- Closure areas are designed with slopes to drain storm water from the final cover and prevent ponding.
  - Final grades designed with 2 percent minimum slopes, with the exception of drainage swales.
  - Drainage swales designed with target slopes of 0.5 percent, with localized minimum slopes of 0.25 percent.
  - Final cover storm water diversion berms designed with target slopes of 1.5 to 3 percent.

- Drainage features are designed to accommodate a 25-year, 24-hour storm event and safely pass the peak flow from a 100-year, 24-hour storm event.

- Closure area final cover elevations are above or isolated from the 100-year flood elevation physically (e.g., berm buttress) or with engineering controls (e.g., backflow preventing flap gate valves).

(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;

The filling to create the proposed final grades and the final cover system for the two closure areas were designed to provide slope stability and prevent sloughing or movement during the closure and post-closure care period. The stability of the closure areas and final cover system were assessed using global circular and global non-circular slip surface failure analyses. As designed, the closure areas exhibit acceptable slope

stability safety factors during construction, over long-term post-closure conditions, and key seismic conditions.

In addition to designing the closure with consideration of global stability, measures included in the closure design to provide for major slope stability include:

- Establishing geotechnical monitoring requirements:
  - Instrumenting the closure areas with VWPs prior to filling.
  - Establishing pore pressure change "triggers" to identify potential piezometric conditions during construction/filling that could create an unstable condition.
  - Requiring pore pressure monitoring with the VWPs during fill placement in the closure areas.

- Establishing dewatering requirements.

- Establishing fill placement requirements:
  - Dewatering procedures.
  - Stabilization of fill subgrades.
  - Moisture conditioning.
  - Fill lift placement and compaction.
  - Grading and compaction verification prior to final cover construction.

- Construction of the berm buttress at the Economizer Ash Pond closure area as described in **Sections 2.2** and **2.3**.

(iv) Minimize the need for further maintenance of the CCR unit; and

Maintenance of the final cover will be minimized by the establishment of vegetative cover and the erosion control systems. Maintenance of the vegetated soil cover is minimized by the use of design cover slopes no steeper than 4H:1V, which are accessible for mowing. The final cover drainage design also minimizes erosion, thus final cover maintenance, by shortening the storm water runoff flow lengths using diversion berms to capture and direct runoff off the final cover. Where possible and appropriate, low-maintenance seed mixes are used to establish vegetation on final cover areas.

The dewatering and fill placement requirements described above will also reduce future maintenance. These requirements promote the consolidation of closure area fill and the underlying CCR during closure construction. This will minimize post-closure and differential settlement that could require final cover system repairs.

(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices."

Execution of this approach (planned closure by excavating and consolidating CCR into the Main Ash Pond and Economizer Ash Pond closure areas under a final cover) will be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices. The approach will require approximately 17 months and is currently scheduled for completion by October 17, 2023. This approach will require the shortest amount of time compared to other alternatives, with the exception of closing all CCR units in place under a final cover system (no consolidation).

"(2) Drainage and stabilization of CCR surface impoundments. The owner or operator of a CCR surface impoundment or any lateral expansion of a CCR surface impoundment must meet the requirements of paragraphs (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section."

(i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.

The processes established for the dewatering of the CCR surface impoundments and the design requirements incorporated for major slope stability provide that the closure will meet the requirements of 40 CFR 257.102(d)(2)(i). The process of dewatering the CCR surface impoundments is described in **Sections 2.1** through **2.4**. The process of preparing the closure areas to receive fill is described in **Sections 2.3** and **2.4**.

(ii) Remaining wastes must be stabilized sufficiently to support the final cover system.

The processes established for preparing the closure areas to receive the final cover system and the design requirements incorporated for major slope stability provide that the closure will meet the requirements of 40 CFR 257.102(d)(2)(ii). The process of preparing the CCR surface impoundments for final cover is described in **Sections 2.3** and **2.4.** The process includes proof-rolling the finished final cover subgrade prior to the installation of the infiltration layer soils. The requirements for stabilizing the remaining CCR are detailed in a Construction Quality Assurance (CQA) Plan that has been reviewed and approved as part of a state permit for closing the CCR units at BGS.

"(3) Final cover system"

The final cover system (**Figure 2**) for the two CCR surface impoundment closure areas will include the following, at a minimum, from the bottom up:

- Eighteen-inch-thick soil infiltration layer (compacted low-permeability soil).
- Six-inch-thick vegetative soil layer.

This final cover will meet the minimum requirements of 40 CFR 257.102(d)(3)(i)(A) through (D) as follows:

- Per 257.102(d)(3)(i)(A), the final cover system will include an 18-inch compacted low-permeability soil layer. The soil identified for construction of the final cover system infiltration layer has a permeability of 6.41×10^{-9} to 4.73×10^{-8} centimeters per second (cm/sec) based on remolded hydraulic conductivity tests completed in a laboratory. The permeability of the proposed final cover system is less than the permeability of the natural subsoils in the proposed closure areas. Natural subsoils in the closure areas have saturated hydraulic conductivity values ranging from 5.4×10^{-4} to 9.0×10^{-4} cm/sec based on data published by the United States Department of Agriculture (USDA) in the Natural Resource Conservation Service soil survey of Des Moines County, Iowa. There is no liner system present in any of the surface impoundments.

- Per 257.102(d)(3)(i)(B), the cover system includes an 18-inch thick compacted low-permeability soil infiltration layer. As described above, the soil identified for infiltration layer construction has a sufficiently low permeability to minimize infiltration

once placed and compacted. The thickness of the infiltration layer will be documented during construction to verify that it meets the requirements of this subpart.

- Per 257.102(d)(3)(i)(C), erosion of the final cover system will be minimized with a vegetative soil layer with a minimum of 6 inches of un-compacted rooting zone (topsoil) material. The final cover system erosion layer will be constructed with topsoil suitable for establishing and maintaining vegetation. The thickness of the topsoil layer will be documented during construction to verify that it meets the requirements of this subpart.

- Per 257.102(d)(3)(i)(D), the design of the final cover system minimizes disruptions to the final cover system by addressing potential settling and subsidence through the dewatering, fill placement, fill compaction, and subgrade verification processes described above. The final cover system is also designed with minimum and maximum slopes that will accommodate potential settlement and minimize disruptions to the cover.

  Calculations evaluating the time rate of consolidation settlement in the Main Ash Pond and Economizer Ash Pond closure areas indicate that most of the consolidation settlement will occur during closure activities with only minimal settlement following final cover construction. This means that post-closure settlement is expected to be minimal and can be addressed with maintenance of the cover if it occurs.

In accordance with a state-approved CQA Plan, all final cover materials will be placed in lifts, compacted, and moisture conditioned where required, and tested to confirm they meet the required specifications. The construction will be overseen and documented by a licensed professional engineer. Final cover soil layers will be checked for thickness. All areas will be restored after final cover is placed. Vegetation will be monitored and maintained throughout the post-closure period. Additional details on the methods and procedures used to install the final cover are provided below.

Prior to the installation of the final cover, the final cover subgrade consisting of CCR and fill material to be capped will be proof rolled with rubber-tired equipment to verify the subgrade is capable of supporting the construction of the final cover. The final cover subgrade will be surveyed on a minimum 100-foot grid pattern and at key locations. Key locations include breaks in grade, toes of slopes, midpoints, and tops of side slopes. Survey data will be used to document the thickness of the infiltration layer.

The uniformity of the excavated soil used to construct the infiltration layer will be observed during construction. Soil placement will be monitored for segregation and removal of unsuitable material and for changes in soil type, color, texture, and moisture content. Unsuitable materials such as stones larger than 4 inches in the longest dimension, boulders, cobbles, and organic material will be segregated and removed.

The infiltration layer will be constructed in lift heights no greater than 6 inches after compaction using footed compaction equipment having feet at least as long as the loose lift height. Each lift of soil will be sufficiently compacted to provide soil that is completely remolded. The soil used to construct the infiltration layer will be moisture-conditioned by the addition of water where dry or by discing and air drying where wet to promote effective bonding of lifts and achieve the required compaction and permeability.

The infiltration layer will be sampled and tested to document that the construction has been conducted in a manner to achieve a uniform, homogeneous soil mass meeting the permeability required by 40 CFR 257.102(d)(3)(i)(A):

- Field density and moisture content tests will be performed per ASTM D6938 on a 100-foot grid pattern for each 1-foot thickness of infiltration layer soil placed. The grid pattern will be offset on alternate lifts. In confined areas where compaction equipment is hindered or hand compaction is necessary, a minimum of two field density and moisture content tests will be performed for each 1-foot thickness of low permeability soil placed. Acceptance criteria for field density will require soil compaction to a minimum of 90 percent of the Modified Proctor (ASTM D1557) maximum dry density, or a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density. Moisture content requirements will be at least 2 percent wet of optimum if using the Modified Proctor, and at least wet of optimum if using the Standard Proctor. The acceptable range will be based on Proctor moisture-density relationships and compaction versus permeability relationships.

- Routine laboratory testing of the infiltration layer will be performed on samples from the soil borrow area/stockpile and on in-place soil samples collected during construction. Samples for determining in-place properties will be collected by pushing Shelby tubes. Soil characteristics will be determined from representative samples and from Shelby tube samples.

  Representative (grab) samples will be obtained on the basis of three criteria. First, an initial sample will be obtained from the infiltration layer soil borrow source/stockpile and analyzed prior to construction. This will confirm soil characteristics and provide an initial maximum dry density and optimum moisture content for field moisture/density testing. Second, routine samples will be obtained for every 5,000 cubic yards placed. Third, in the event that changes in physical appearance or soil characteristics are observed, a sample will be obtained and analyzed. The maximum dry density and optimum moisture content values used for compaction testing may be adjusted during the course of cover construction based on the results of the above sampling. The representative soil samples will be tested in a laboratory for the following:

  - Moisture-density relationship using Modified/Standard Proctor compaction by ASTM D1557 or D698.
  - Atterberg limits by ASTM D4318.
  - Grain-size analysis (sieve and hydrometer) by ASTM D6913 and D7928.

  One undisturbed sample will be taken for each acre or less for every 1-foot thickness of infiltration layer soil placed and will be tested in a laboratory for the following:

  - Moisture content and dry density by ASTM D2216 and D7263.
  - Atterberg limits by ASTM D4318.
  - Grain-size analysis (sieve and hydrometer) by ASTM D6913 and D7928.

  One of every three undisturbed samples will also be analyzed for hydraulic conductivity by ASTM D5084 or SW 846 EPA Method 9100.

The top of the infiltration layer will be surveyed on the same 100-foot grid pattern and at key locations surveyed for the final cover subgrade. The infiltration layer thickness will be determined at

surveyed locations with a minimum acceptable cover thickness tolerance of +0.1 foot, measured vertically.

The erosion layer will be constructed of topsoil salvaged from stripped areas with existing topsoil, if appropriate, or imported from off site. Topsoil for the erosion layer will be placed, graded, and surveyed with minimal compaction and in a manner that minimizes loss due to erosion. The topsoil for the erosion layer will be prepared prior to seeding to provide a suitable seedbed. The topsoil will be seeded, fertilized, and mulched to maximize the germination and viability of the seed and minimize the seed loss due to erosion.

The following will be observed and documented for the erosion layer:

- The source(s) and uniformity of topsoil used.
- Topsoil quality to minimize inorganic soil not compatible with the establishment of vegetation.
- Preparation of the seed bed and seeding method.
- Fertilizing, seeding, and mulching in a timely manner.
- Fertilizer placement in accordance with the topsoil fertility testing recommendations, including type of fertilizer and rate of placement.
- Seed type and rate of placement.
- Mulch type and method of placement.

Representative grab samples will be obtained from the proposed topsoil source(s) prior to delivery of the material. The source sampling frequency will be dependent on the apparent uniformity of the source. Samples of topsoil will be tested in a laboratory for the following:

- Grain-size analysis (sieve and hydrometer) by ASTM D6913 and D7928.
- pH by ASTM D4972.
- Organic content by ASTM D2974.

The finished erosion layer will be surveyed on a 100-foot grid pattern and at key locations using the same points surveyed for the top of the infiltration layer. Erosion layer thickness will be determined at surveyed locations with a minimum acceptable erosion layer thickness tolerance of +0.1 foot, measured vertically.

5.0 MAXIMUM INVENTORY OF CCR

40 CFR 257.102(b)(1)(iv). *"An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit."*

The estimated maximum inventory of CCR ever on site in the impoundments, over the active life of the impoundments, is approximately 1,319,065 cubic yards (cy). This is the estimated volume of CCR currently present in the surface impoundments. The following are the estimated CCR volumes for each impoundment:

- Ash Seal Pond – approximately 108,800 cy
- Main Ash Pond – approximately 487,100 cy
- Economizer Ash Pond – approximately 535,400 cy
- Upper Ash Pond – approximately 187,800 cy

These estimates are based on in-place surveys, borings, and material test data obtained during geotechnical investigations of the CCR surface impoundments conducted in 2019 and 2020.

6.0 LARGEST AREA OF CCR UNIT REQUIRING FINAL COVER

40 CFR 257.102(b)(1)(v). *"An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life."*

The largest area ever requiring final cover at BGS is approximately 55 acres. This maximum area is based on the following pre-closure pond surface areas:

- Ash Seal Pond – approximately 6.5 acres
- Main Ash Pond – approximately 20 acres
- Economizer Ash Pond – approximately 13 acres
- Upper Ash Pond – approximately 15 acres

The surface impoundments are delineated by the berms and access roads.

IPL has elected to consolidate CCR during the closure of the surface impoundments at BGS, which will significantly reduce the CCR unit area requiring final cover. The current closure plan includes the construction of approximately 38 acres of final cover, a 30 percent reduction in the largest area ever requiring final cover at BGS.

7.0 SCHEDULE OF SEQUENTIAL CLOSURE ACTIVITIES

40 CFR 257.102(b)(1)(vi). *"A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed."*

The schedule for closure of the four surface impoundments is provided in Appendix A.

8.0 COMPLETION OF CLOSURE ACTIVITIES

40 CFR 257.102(f)(1). *"Except as provided for in paragraph (f)(2) of this section, the owner or operator must complete closure of the CCR unit:*

(i) For existing and new CCR landfills and any lateral expansion of a CCR landfill, within six months of commencing closure activities."

This does not apply to any of the four surface impoundments.

(ii) "For existing and new CCR impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities."

Closure of the four units is expected to be completed by October 17, 2023.

40 CFR 257.102(f)(3). *"Upon completion, the owner or operator of the CCR unit must obtain a certification from a qualified professional engineer verifying that closure has been completed in accordance with the closure plan specified in paragraph (b) of this section and the requirements of this section."*

A qualified professional engineer will oversee CCR removal and final cover construction. The engineer will verify CCR removal, verify final cover materials and methods, and oversee material testing. At the end of construction, the engineer will provide a report summarizing and documenting construction and will certify compliance with the requirements.

9.0 REFERENCES

40 CFR Part 257, Subtitle D – Environmental Protection Agency Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities.

Hard Hat Services, 2018, CCR Surface Impoundment History of Construction, Burlington Generating Station, Interstate Power and Light Company, March 6, 2018, Revision 1.

Sargent & Lundy, 2016, Closure Plan for Existing CCR Surface Impoundments, Burlington Generating Station, Interstate Power and Light Company, July 18, 2016.

United States Department of Agriculture (USDA) Soil Conservation Service, 1983, Soil Survey of Des Moines County Iowa, May 1983.

United States Department of Agriculture (USDA) Natural Resource Conservation Service, 2022, Web Soil Survey Area: Des Moines County Iowa, Version 27, September 2, 2022.

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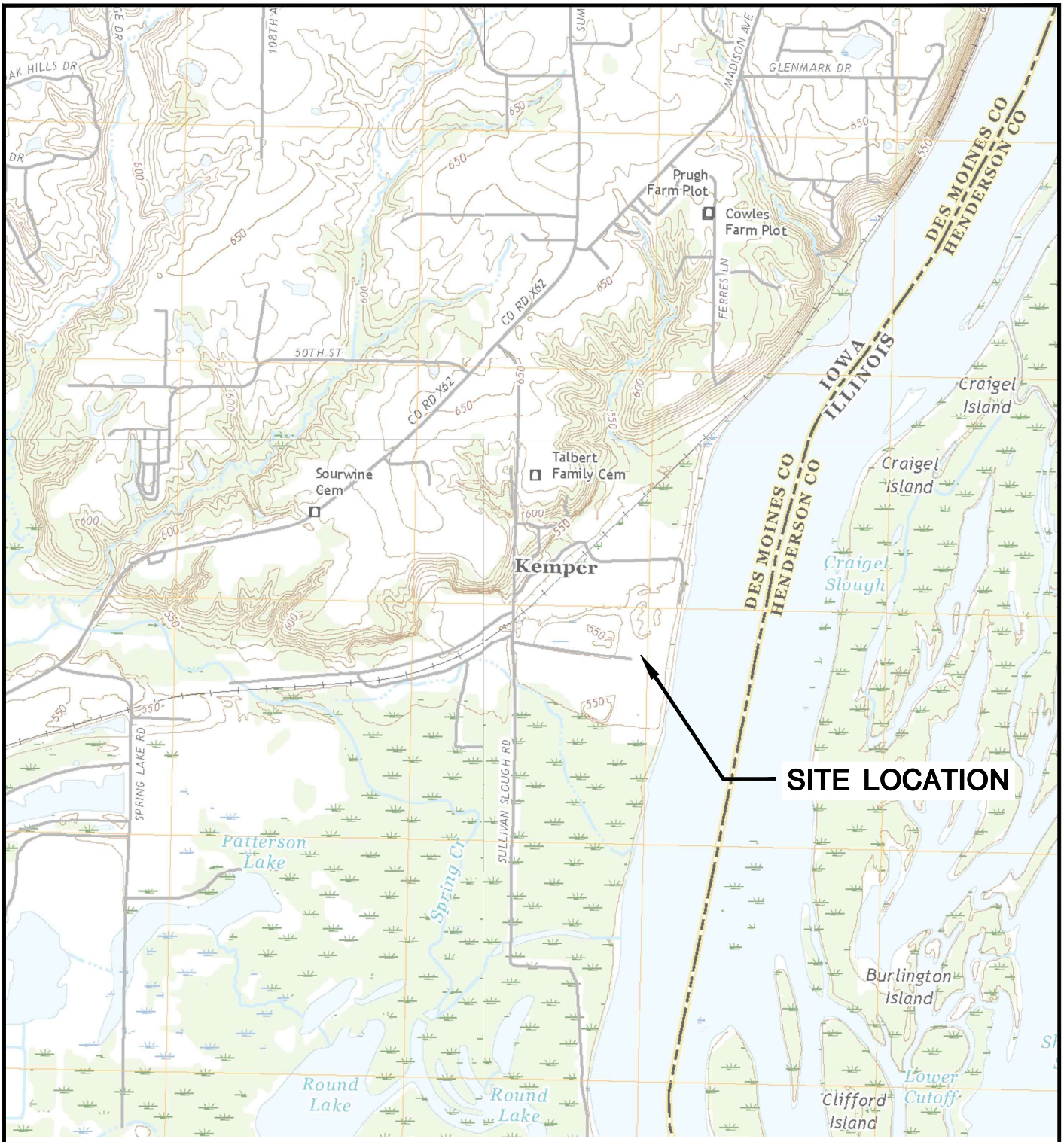
Figures



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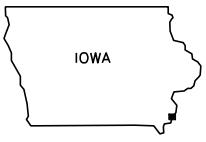
LOMAX QUADRANGLE
ILLINOIS / IOWA–DES MOINES CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'



CLIENT	INTERSTATE POWER AND LIGHT 4282 SULLIVAN SLOUGH ROAD BURLINGTON, IOWA 52601	SITE	BURLINGTON GENERATING STATION 4282 SULLIVAN SLOUGH RD BURLINGTON, IA 52601

SITE LOCATION MAP

PROJECT NO.	25219168.00	DRAWN BY:	RJG
DRAWN:	09/09/19	CHECKED BY:	PG
REVISED:	09/28/19	APPROVED BY:	EJN 12/8/2022

ENGINEER

SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

FIGURE
1

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LEGEND

- EXISTING CCR RULE MONITORING WELL
- EXISTING CCR RULE PIEZOMETER
- CCR UNITS

NOTES:

1. MONITORING WELLS MW-303 THROUGH MW-308 WERE INSTALLED BY CASCADE DRILLING, LLP. UNDER THE SUPERVISION OF SCS ENGINEERS ON DECEMBER 15-17, 2015.
2. MONITORING WELLS MW-301, MW-302, AND MW-309 THROUGH MW-311 WERE INSTALLED BY DIRECT PUSH ANALYTICAL SERVICES CORP. UNDER THE SUPERVISION OF SCS ENGINEERS FROM FEBRUARY 29, 2016 TO MARCH 1, 2016.
3. MONITORING WELLS MW-312 AND MW-313 WERE INSTALLED BY ROBERTS ENVIRONMENTAL DRILLING IN MAY 2019.
4. 2018 AERIAL PHOTOGRAPH SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA FSA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.

N

300 0 300

SCALE: 1" = 300'

PROJECT NO.	25219168.00	DRAWN BY:	RJG/KP
DRAWN:	11/14/2019	CHECKED BY:	RJG
REVISED:	10/25/2022	APPROVED BY:	EJN 12/8/2022

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: INTERSTATE POWER AND LIGHT
4282 SULLIVAN SLOUGH ROAD
BURLINGTON, IOWA 52601

SITE: INTERSTATE POWER AND LIGHT
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

SITE PLAN

FIGURE 2

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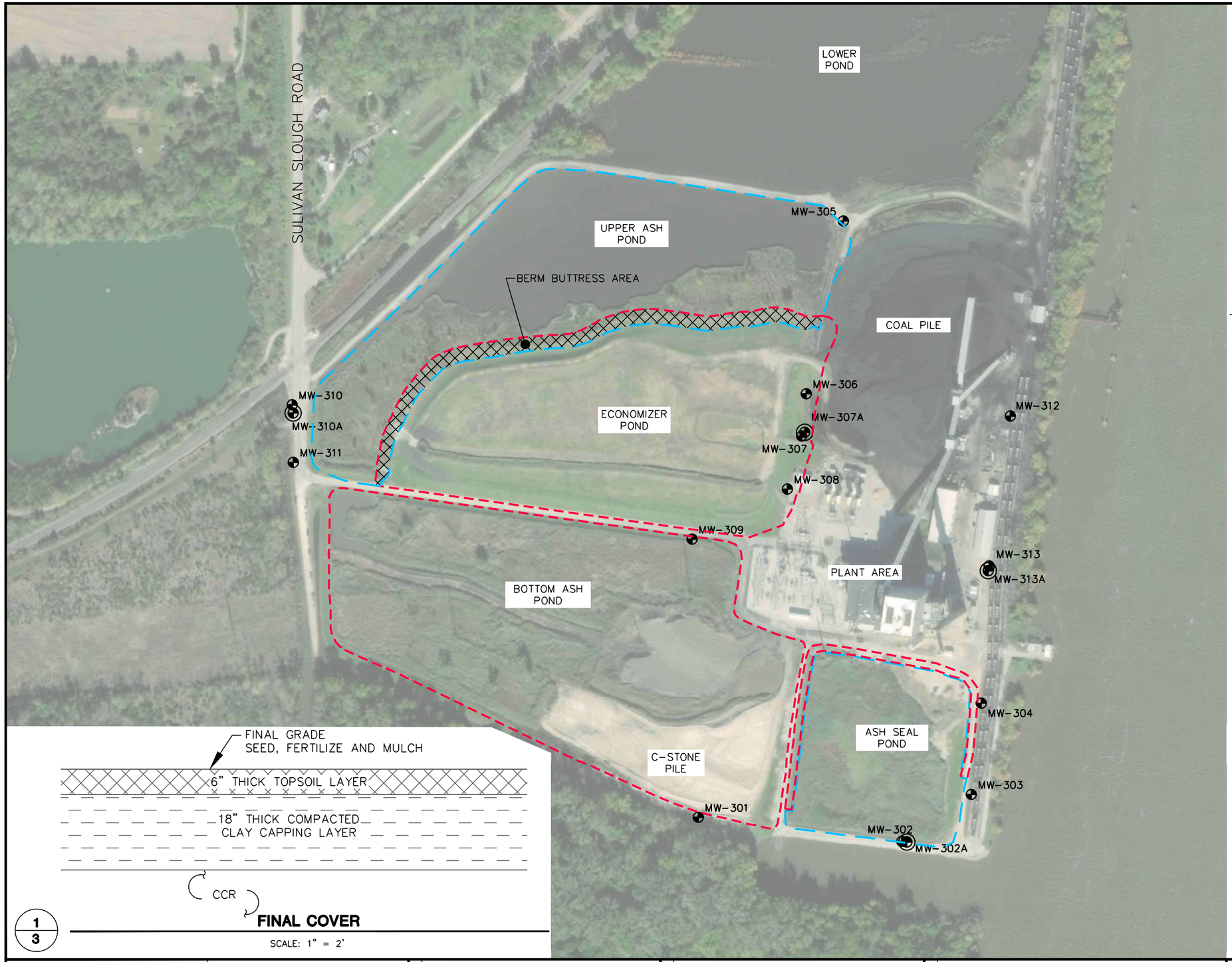

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FINAL COVER

SCALE: 1" = 2'

LEGEND

- EXISTING CCR RULE MONITORING WELL
- EXISTING CCR RULE PIEZOMETER
- CCR REMOVAL AREAS
- FINAL COVER AREAS

NOTES:

1. MONITORING WELLS MW-303 THROUGH MW-308 WERE INSTALLED BY CASCADE DRILLING, LLP. UNDER THE SUPERVISION OF SCS ENGINEERS ON DECEMBER 15-17, 2015.
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4. 2018 AERIAL PHOTOGRAPH SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA FSA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.

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300 0 300

SCALE: 1" = 300'

PROJECT NO.	25219168.00	DRAWN BY:	RJG/KP
DRAWN:	11/14/2019	CHECKED BY:	RJG
REVISED:	05/09/2023	APPROVED BY:	EJN 6/30/2023

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: INTERSTATE POWER AND LIGHT
4282 SULLIVAN SLOUGH ROAD
BURLINGTON, IOWA 52601

SITE: INTERSTATE POWER AND LIGHT
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

CLOSURE AREAS

FIGURE 3

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Appendix A

Closure Schedule

Estimated Pond Closure Schedule
Burlington Generating Station
Interstate Power and Light Company

ID	Task Name	Duration	Start	Finish
1	Planning/Engineering	355 days	Mon 1/4/21	Fri 5/13/22
2	RFP Level (60%) Engineering/Design	74 days	Mon 1/4/21	Thu 4/15/21
3	Contractor Design Review	107 days	Wed 8/4/21	Thu 12/30/21
4	Field/Pilot Testing	68 days	Wed 8/18/21	Fri 11/19/21
5	Issued for Permit (IFP) Engineering/Design	58 days	Mon 11/15/2	Wed 2/2/22
6	Issued for Construction (IFC) Engineering/Design	72 days	Thu 2/3/22	Fri 5/13/22
7	Procurement	347 days	Wed 12/2/20	Thu 3/31/22
8	Initial Request for Information (RFI)	40 days	Wed 12/2/20	Tue 1/26/21
9	Initial Construction Request for Proposal (RFP)	73 days	Fri 4/16/21	Tue 7/27/21
10	Ash Seal Pond Closure Procurement	45 days	Mon 3/1/21	Fri 4/30/21
11	Remaining CCR Surface Impoundment Closure Procurement	181 days	Thu 7/22/21	Thu 3/31/22
12	Permitting	448 days	Mon 3/15/21	Wed 11/30/22
13	State/Federal Joint Application and Amendments	300 days	Mon 3/15/21	Fri 5/6/22
14	Local Flood Plain Permit	18 days	Mon 5/9/22	Wed 6/1/22
15	State/Local Erosion Control Permit and SWPPP Amendments	258 days	Fri 4/16/21	Tue 4/12/22
16	Wastewater Construction Permit	25 days	Wed 3/9/22	Tue 4/12/22
17	Local Right-of-Way Permit	22 days	Mon 4/18/22	Tue 5/17/22
18	Groundwater Dewatering Well Permits	29 days	Mon 5/2/22	Thu 6/9/22
19	Groundwater Dewatering Discharge Permits	141 days	Wed 5/18/22	Wed 11/30/22
20	State Sanitary Disposal Project Permit	231 days	Fri 12/31/21	Fri 11/18/22
21	Closure Construction	418 days	Thu 3/31/22	Mon 11/6/23
22	Civil/Sitework	418 days	Thu 3/31/22	Mon 11/6/23
23	Wastewater Updates and Commissioning	155 days	Mon 8/29/22	Fri 3/31/23
24	Coal Yard and Coal Yard Runoff Basin Decommissioning	286 days	Fri 6/24/22	Fri 7/28/23
25	Dewatering System Installation and Commissioning	99 days	Tue 6/21/22	Fri 11/4/22
26	Ash Seal Pond Preparation and Closure	277 days	Tue 6/21/22	Wed 7/12/23
27	Upper Ash Pond Preparation and Closure	277 days	Mon 6/27/22	Tue 7/18/23
28	Main Ash Pond Preparation and Closure	291 days	Tue 6/21/22	Tue 8/1/23
29	Economizer Pond Preparation and Closure	340 days	Wed 6/15/22	Tue 10/3/23