



## Location Restrictions Certification Report

*Units 1&2 and Unit 3 East and West Surface Impoundments*

Pursuant to:

40 CFR 257.60  
40 CFR 257.61  
40 CFR 257.62  
40 CFR 257.63  
40 CFR 257.64

Submitted to:

**Grand Haven Board of Light and Power - J.B. Sims Generating Facility**

17000 Eaton Drive  
Grand Haven, Michigan 49417

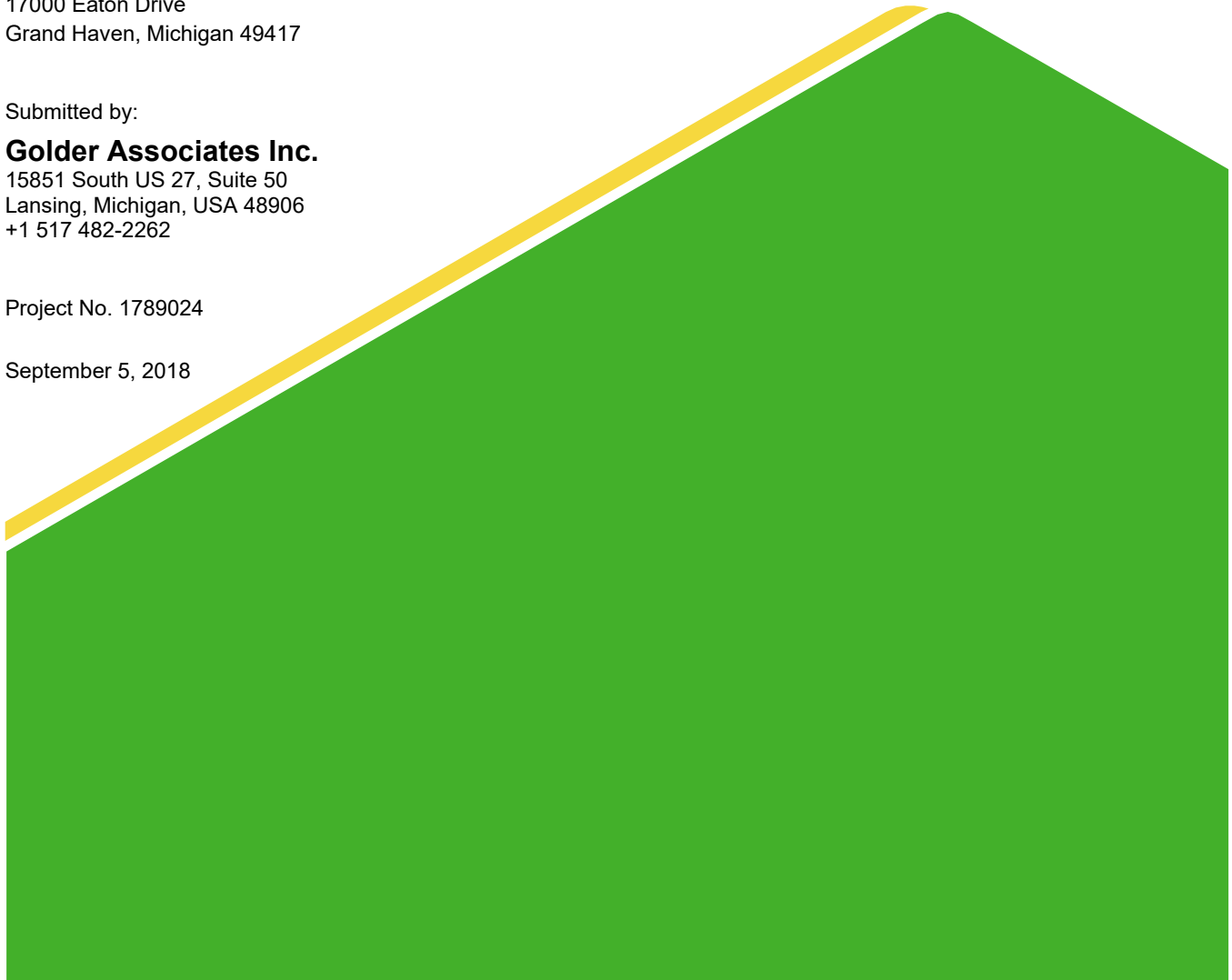
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Project No. 1789024

September 5, 2018



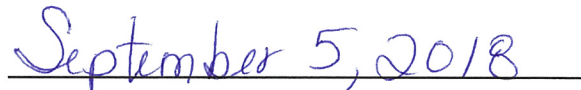
## CERTIFICATION

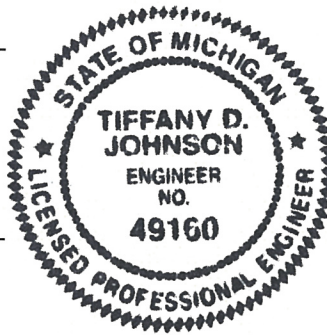
### Professional Engineer Certification Statement [40 CFR 257.60-64(b)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section 257.60 through 64 (40 CFR Part 257.60-64), I attest that this Location Restrictions Certification Report is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.60-64.

Golder Associates Inc.

  
Signature

  
Date of Report Certification



Tiffany D. Johnson, P.E.

Name

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Professional Engineer Certification Number

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## 1.0 INTRODUCTION

### 1.1 Background

The Grand Haven Board of Light and Power (GHBLP) J.B. Sims Generating Station (JBSGS) is a coal-fired power plant located in Grand Haven, Michigan, on Harbor Island, see Figure 1, attached. The station has two main coal combustion residual (CCR) units including Units 1 and 2 Ash Ponds and the Unit 3 East and West Bottom Ash Ponds. The Units 1 and 2 Ash Ponds are no longer active but are not closed in accordance with the 40 CFR Part 257 rules. The Unit 3 East and West Bottom Ash Ponds are active and used to store bottom ash from the JBSGS. The surface impoundments are located at the northern end of the JBSGS property between the power plant to the south and Grand Haven Island City Park to the north. Bottom ash is sluiced to the Unit 3 Ponds where it is allowed to settle. The Unit 3 East and West Bottom Ash Ponds are operated in a cyclic manner with one pond actively receiving ash and other waste streams while the other pond is dewatered and cleaned of accumulated bottom ash.

#### 1.1.1 Units 1 and 2 Ash Ponds

The Units 1 and 2 Ash Ponds are located northeast of the station and are separated by a haul road, see Figure 2. Both ponds are incised, with no surrounding berm elevated above the ground surface. The ponds have approximate surface areas of 0.3 and 0.9 acres, respectively. The Unit 2 Pond includes a small projection to the northwest that is currently separated from the main pond by dry ground. Both ponds are inactive and have no inflow from the station or outflow to local surface water. No active inlet or outlet structures are currently present. There are currently no construction records available for the Units 1 and 2 Inactive Ash Ponds.

#### 1.1.2 Unit 3 East and West Bottom Ash Ponds

The Unit 3 East and West Bottom Ash Ponds are located adjacent to each other and are formed by earthen embankments or ring dikes with a common embankment between them, see Figure 2. The impoundment areas range from 175 to 190 feet long by 71 to 80 feet wide with an approximate surface area of 0.2 and 0.3 acres for the east and west ponds, respectively. The ponds were designed by Black & Veatch in 1981 and are constructed with compacted clay embankments with three horizontal to one vertical (3H:1V) exterior slopes and 2H:1V interior slopes with an approximately 10 feet wide crest. The embankments are not regulated as dams by the Michigan Dam Safety office.

Both ponds were constructed with 3 feet of  $3 \times 10^{-7}$  centimeters per second (cm/sec) clay over the floor and are approximately 9 feet deep. The design bottom elevation of the ponds is Elevation (EI) 585 feet (NGVD 29 datum and site benchmarks) and the current crest elevation ranges from 591.2 to 592.7 feet. Based on discussions with GHBLP personnel, normal operating conditions maintain a pond elevation of approximately EI 588 to 590 feet (1.2 to 4.7 feet of freeboard). The estimated storage capacity of each pond (with two feet of freeboard) is approximately 68,000 and 77,000 cubic feet for the east and west ponds, respectively.

Bottom ash is excavated from these ponds via crane or excavator and transported off-site. Periodically, GHBLP relines the ash ponds with clay to replace the clay liner that is removed during pond cleaning.

### 1.2 Purpose

The purpose of this Location Restriction Report is to provide a basis for the certification required by 40 CFR Part 257 Subpart D, Location Restrictions. Topics addressed in the Location Restrictions section are summarized as follows.

- §257.60 Placement above the uppermost aquifer

- §257.61 Wetlands
- §257.62 Fault areas
- §257.63 Seismic impact zones
- §257.64 Unstable areas

## 2.0 LOCATION RESTRICTIONS

The following sections outline the GHBLP's ("owner") requirements as presented in 40 CFR 257 Subpart D, Location Restrictions section.

### 2.1 Placement Above the Uppermost Aquifer [40 CFR 257.60]

Per 40 CFR 257.60(a): "New and existing CCR surface impoundments must be constructed with a base no less than 5 feet above the upper limit of the uppermost aquifer. If this spacing is not met, the owner must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations. For an existing CCR surface impoundment, the owner must complete the demonstration no later than October 17, 2018, as per 40 CFR 257.60(c)(1). The owner is considered to have completed the demonstration required by this section when the demonstration is placed in the facility's operating record, as required by 40 CFR 257.60(c)(3)."

#### Units 1 and 2 Ash Ponds:

In the 2016 subsurface investigation conducted by Environmental Resources Management (ERM) (ERM, 2016), two soil borings were advanced within the current bounds of the Units 1 and 2 Ash Ponds each to a depth of 10 feet below ground surface (bgs). Clay was not encountered in the borings. Soil types encountered included predominantly ash, sands, and silts. Depth to water encountered in the borings ranged from the surface of the Units 1 and 2 Ash Ponds, to approximately 4 feet below the bottom of the Units 1 and 2 Ash Ponds (ERM, 2016). Although a groundwater map has not been developed for the Units 1 and 2 Ash Pond area, these ponds are incised, and the borings drilled in and around the ponds (ERM, 2016) indicate that the separation distance between the top of uppermost aquifer and the bottom of the ponds does not satisfy the requirements set forth in 40 CFR 257.60(a).

#### Unit 3 East and West Bottom Ash Ponds:

GHBLP has been collecting groundwater data from monitoring wells at the GHBLP surrounding the ponds since March 2017 (ERM, 2017 and Golder, 2017). The most recent data was collected from monitoring wells in October 2017. The data indicated the maximum groundwater elevation was approximately 581.5 feet (adjusted to the site benchmarks). The pond bottom elevations are approximately 585 feet based on a groundwater contour map developed by ERM and interpreted by Golder (ERM, 2017 and Golder, 2018). This yields a separation distance of approximately 3.5 feet above the uppermost aquifer to the bottom of the Unit 3 East and West Bottom Ash Ponds. This separation distance does not satisfy the requirements set forth in 40 CFR 257.60(a).

### 2.2 Wetlands [40 CFR 257.61]

A wetland is defined under 40 CFR 232.2 as an area inundated or saturated by surface or groundwater for a time period sufficient to support significant vegetation adapted for life in saturated soil conditions.

Per 40 CFR 257.61(a): "Existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in 40 CFR 232.2, unless the owner demonstrates that the CCR unit meets requirements outlined in paragraphs (a)(1) through (5) of 40 CFR 257.61. The owner has completed the demonstration required by 40 CFR 257.61(a) when the demonstration is placed in the facility's operating record as required by 40 CFR 257.105(e)."

Wetland areas and hydric soils surround JBSGS as evidenced by the National Wetlands Inventory (NWI) data (NWI, 2018) and the Michigan Department of Environmental Quality's database "GeoWebFace" (MDEQ, 2018). The Units 1 and 2 Ash Ponds are classified in the NWI as "PEM1C – Freshwater Emergent Wetlands". However, the Unit 3

East and West Bottom Ash Ponds are not located in a wetland area as delineated in the NWI mapping (NWI, 2018 and MDEQ, 2018).

A partial wetland delineation was performed by Lakeshore Environmental, Inc. (LEI) at the JBSGS in 2017 (LEI, 2017). The delineation determined groundwater monitoring wells could be installed in upland areas that are not considered wetlands without a permit from the MDEQ. The partial wetland delineation also provided documentation of the wetland borders on the site. The Units 1 and 2 Ponds were included in the wetland boundary, the Unit 3 East and West Pond locations were not assessed in the partial wetland delineation.

### 2.3 Fault Areas [40 CFR 257.62]

Per 40 CFR 257.62(a): “Existing and new CCR surface impoundments must not be located within 200 feet of the outermost damage zone of a Holocene (10,000 years before present) fault absent a demonstration that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the CCR unit. For an existing CCR surface impoundment, the owner must complete the demonstration no later than October 17, 2018, per 40 CFR 257.62(c)(1). The owner has completed the demonstration required by 40 CFR 257.62(a) when the demonstration is placed in the facility's operating record as required by 40 CFR 257.62(c)(3).”

Golder performed a desktop review of United States Geological Survey (USGS) U.S. Quaternary Faults and Folds Database. According to the USGS, the Unit 1, 2, and 3 surface impoundments are not located within 200 feet of the outermost damage zone of a Holocene fault (USGS, 2018).

### 2.4 Seismic Impact Zones [40 CFR 257.63]

Per 40 CFR 257.63(a): “CCR surface impoundments must not be located in seismic impact zones unless the owner demonstrates that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site. For an existing CCR surface impoundment, the owner must complete the demonstration no later than October 17, 2018, per 40 CFR Part 257.63(c)(1). The owner has completed the demonstration required by 40 CFR Part 257.63(a) when the demonstration is placed in the facility's operating record as required by 40 CFR Part 257.63(c)(3).”

As per 40 CFR 257.63, a seismic impact zone pertains to an area having a 2 percent (%) or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years.

The largest earthquake identified near JBSGS occurred in 2015 with an epicenter located approximately 70 miles south east of the site, having a moment magnitude of 4.2 (USGS, 2018). The USGS reports peak horizontal ground acceleration (PGA) at JBSGS to be approximately 0.04 g with a 2% probability of exceedance in 50 years (USGS, 2018). Based on these findings, the Unit 1, 2, and 3 surface impoundments are not located within a seismic impact zone as defined by 40 CFR 257.63.

### 2.5 Unstable Areas [40 CFR 257.64]

Per 40 CFR 257.64(a): An existing or new CCR surface impoundment must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the unit will not be disrupted. For an existing CCR surface impoundment, the owner must complete the demonstration no later than October 17, 2018, per 40 CFR 257.64(d)(1). The owner has completed the

demonstration required by 40 CFR 257.64(a) when the demonstration is placed in the facility's operating record as required by 40 CFR 257.64(d)(3).

Steep-slopes and poor soils are susceptible to mass movement and slope failures. Golder performed a desktop review of USGS data and previous geotechnical investigations of the JBSGS, to determine if the surface impoundments are located within areas characterized as unstable.

Golder determined from the USGS and MDEQ "GeoWebFace" desktop review (USGS, 2018) (MDEQ, 2018), that the JBSGS is not located within the following:

- A critical dune area;
- an area of karst terrain; or
- an area previously developed for oil or gas drilling or other mineral deposit mining.

#### **Soils Underlying the Units 1 and 2 Ash Ponds:**

In the 2016 subsurface investigation conducted by ERM (ERM, 2016), two soil borings were advanced within the current bounds of the Units 1 and 2 Ash Ponds each to a depth of 10 feet bgs. Clay was not encountered in the borings. Soil types encountered included predominantly ash, sands, and silts. These ponds are incised and are not expected to be susceptible to unstable ground or areas.

#### **Soils Underlying the Unit 3 East and West Bottom Ash Ponds:**

Soils & Structures reported both Unit 3 surface impoundments were constructed with clay bottoms approximately 7 feet in thickness, with shear strength ranging from 710 to 2900 pounds per square foot (psf) (Soils & Structures, 2014). Beneath the clay liner, a natural, fine to medium-grained sand layer with a thickness of 4 feet to 12 feet was reported. Liquefaction analyses indicate settlement of the impoundments would be less than 0.1 inches for a design earthquake with ground acceleration of 8.5% of gravity (Soils & Structures, 2014). Slope stability calculations suggest the critical path of slope movement is along the face of the downstream slope, the factor of safety for the critical path was calculated to be 4.0, exceeding the minimum safety factor of 2.0 typically used for slope design (Soils & Structures, 2014).

### 3.0 CONCLUSION AND SUMMARY

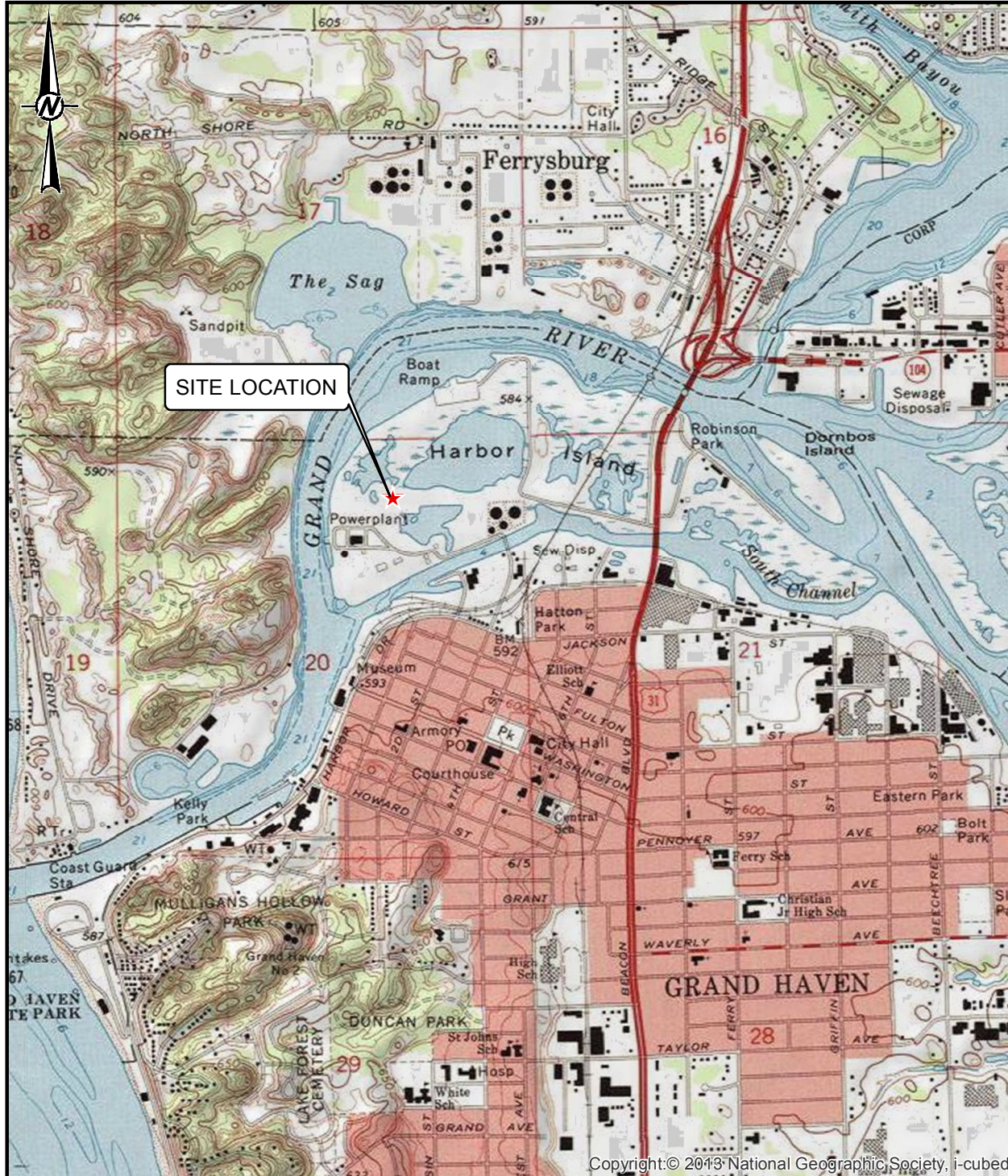
This report has been prepared in general accordance with normally accepted civil engineering practices to fulfill the Resource Conservation and Recovery Act (RCRA) reporting requirements in accordance with 40 CFR 257.60-257.64. Based on the review of the available information provided by GHBLP, the J.B. Sims Generating Station fully complies with the outlined location restrictions in 40 CFR 257.62-257.64. However, the Units 1, 2, and 3 surface impoundments do not meet the requirements for location restrictions for 40 CFR 257.60-257.61 for the uppermost aquifer and wetland restrictions.

On July 17, 2018 the Environmental Protection Agency revised 40 CFR Part 257. The revision extends the deadline by which the operator of a CCR impoundment must bring the impoundment into compliance or certify that CCR operations will cease. Under the new revision, the GHBLP J.B. Sims Generating Station must be compliant with 40 CFR 257.60 – 257.64, or certify that CCR operations will cease, by no later than October 2020. The GHBLP Board has certified that CCR operations will cease in June 2020, thus no further action is required by GHBLP to pursue compliance with 40 CFR 257.60-257.61 and the alternate closure provisions apply.

This report must be placed in the facility's operating record in accordance with 40 CFR 257.105(f) and must be made available on the facility's publicly accessible internet site in accordance with 40 CFR 257.107(f).

## 4.0 REFERENCES

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CLIENT  
GRAND HAVEN BOARD OF LIGHT AND POWER  
HARBOR ISLAND DRIVE  
GRAND HAVEN, MI

PROJECT  
CCR RULE COMPLIANCE

TITLE  
SITE LOCATION MAP

CONSULTANT



YYYY-MM-DD 2017-03-20

PREPARED JJS

DESIGN JJS

REVIEW DML

APPROVED TDJ

PROJECT No.  
1789024

CONTROL  
1775461A000-GIS.mxd

Rev.  
0

FIGURE  
1



**REFERENCE(S)**

Service Layer Credits: Source: ESRI, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

**CLIENT**

GRAND HAVEN BOARD OF LIGHT AND POWER  
HARBOR ISLAND DRIVE  
GRAND HAVEN, MI

**CONSULTANT**



YYYY-MM-DD 2017-03-20

DESIGNED JJS

PREPARED JJS

REVIEWED DML

APPROVED TDJ

**PROJECT**

CCR RULE COMPLIANCE

**TITLE**

OVERALL SITE PLAN

PROJECT NO.  
1789024

CONTROL

REV.

FIGURE  
2



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