Karn Lined Impoundment Location Restriction Certification Report

# D.E. KARN GENERATING FACILITY

# KARN LINED IMPOUNDMENT LOCATION RESTRICTION CERTIFICATION REPORT

## Essexville, Michigan

**Pursuant to:**

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

**Submitted To:** Consumers Energy Company
1945 W. Parnall Road
Jackson, Michigan 49201

**Submitted By:** Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, Michigan 48906

**June 2018** **1781451**

Golder Associates

# 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 257.60-64 (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

June 4, 2018

Date of Report Certification

Matthew Wachholz, PE

Name

6201047513

Professional Engineer Certification Number

# Table of Contents

## 1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) ("CCR RCRA Rule") to regulate the solid waste management of CCR generated at electric utilities. Sections 257.60-64 of the CCR RCRA Rule require the owner or operator of a new CCR surface impoundment to document that the unit was designed to meet the location restriction criteria outlined therein. According to Sections 257.60(b), 257.61(b), 257.62(b), 257.63(b), and 257.64(c), the documentation must be certified accurate by a qualified professional engineer in the State of Michigan. Prior to first receipt of waste, the documentation must be placed in the facility's operating record and posted to the publicly available website per Sections 257.60(c), 257.61(c), 257.62(c), 257.63(c) and 257.64(d).

Golder Associates Inc. (Golder) is submitting this report to certify that the Karn Lined Impoundment was constructed in a location that meets criteria outlined in 40 CFR 257.60-64 at the Consumers Energy Company (CEC) D.E. Karn Generating Facility (DE Karn) in Essexville, Michigan.

## 2.0 PLACEMENT ABOVE THE UPPERMOST AQUIFER [40 CFR 257.60]

Section 257.60 of the CCR RCRA Rule requires that new CCR surface impoundments be constructed with a base that is located no less than five feet above the upper limit of the uppermost aquifer or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations.

Normal fluctuations in groundwater elevations are most strongly influenced by the surface water elevation of the Saginaw River and Saginaw Bay and by the localized groundwater mound created by the National Pollutant Discharge Elimination System (NPDES) permitted flow into the existing bottom ash pond. Based on the transition of the NPDES flow from the existing pond to a new lined structure, this mound is expected to quickly return to equilibrium with the adjacent surface water features (i.e., Saginaw Bay and Saginaw River). Groundwater elevation is measured in numerous monitoring wells and piezometers surrounding the impoundment. This monitoring network will be used to verify the intermittent nature of the groundwater mound once the new Karn Lined Impoundment is put into service.

The groundwater table of the uppermost aquifer has been measured at an average elevation of approximately 580 feet (North American Vertical Datum of 1988, NAVD88) as evaluated in the Annual Groundwater Monitoring Report (TRC, 2018) which was posted to the publicly available website in January 2018. This elevation correlates well to the Lake Huron Ordinary High Water Elevation established by U.S. Army Corps of Engineers of 581.5-ft International Great Lakes Datum (IGLD85) which translates to 581.4-ft NAVD88. The Great Lakes Environmental Research Laboratory (GLERL) record from 1918 to present indicates an all-time record high water level of 582.24-ft NAVD88 and Lake-Wide Period Record Average of 578.69-ft NAVD88 also yielding a reasonable elevation boundary of 580-ft NAVD88 for the uppermost aquifer. The Karn Lined Impoundment has been constructed with a base at an elevation of 592 feet (NAVD88), 12 feet above the uppermost aquifer satisfying the requirements of Section 257.60.

In addition to being located greater than five feet above the uppermost aquifer, the Karn Lined Impoundment has been designed with an alternative composite liner system to meet criteria outlined in Section 257.70(c) of the CCR RCRA Rule. As part of the requirements in Section 257.70(c), an equivalency calculation was completed and certified in March 2018 and posted on the publicly available website (Golder, 2018a).

## 3.0 WETLANDS [40 CFR 257.61]

Section 257.61 of the CCR RCRA Rule requires that new CCR surface impoundments not be located in wetlands, as defined in 40 CFR Section 232.2. The following sources were utilized, in part, to determine if the location of the Karn Lined Impoundment is located within a wetland area:

- National Wetland Inventory (NWI) Mapper managed by the U.S. Fish and Wildlife Service (USFWS)
- Michigan Department of Environmental Quality (MDEQ) Wetlands Map Viewer produced by overlaying data from the NWI, Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), U.S. Department of Agriculture, and Natural Resource Conservation Service

According to the NWI Mapper, the location of the Karn Lined Impoundment is not currently mapped as a wetland. The construction of the new CCR unit is designed for a portion of the site that is comprised of gravel and CCR, cleared of vegetation, and historically utilized as a parking and staging area for the facility. Visual evaluation of the location of the Karn Lined Impoundment indicates that it does not appear to exhibit the characteristics of a wetland (wetland hydrology, hydric soils, or predominance of wetland plant species) as documented in the D.E. Karn Lined Impoundment Technical Memorandum (Golder, 2018b).

## 4.0 FAULT AREAS [40 CFR 257.62]

Section 257.62 requires that new CCR units not be located within 200 feet of the outermost damage zone of a fault that has had displacement in Holocene time (approximately 12,000 years ago to present day). According to the U.S. Geological Survey's (USGS) U.S. Quaternary Faults and Folds Database (USGS, 2014), the fault zone nearest to the Karn Lined Impoundment with documented displacement in Holocene time is the New Madrid Seismic Zone. While active fault zones are not expressed at the surface, movement along these faults have caused seismic activity in the region for the past 4,500 years.

According to the Missouri Department of Natural Resources, the New Madrid Seismic Zone is primarily located in southeastern Missouri, northeast Arkansas, western Tennessee, western Kentucky, and southern Illinois. The Karn Lined Impoundment is approximately 500 miles northeast of the New Madrid Seismic Zone, satisfying the requirements of Section 257.62.

## 5.0 SEISMIC IMPACT ZONES [40 CFR 257.63]

Section 257.63 requires that new CCR units not be located in seismic impact zones, defined in Section 257.53 as an area having two percent or greater probability that the maximum expected horizontal ground acceleration will exceed 0.10g in 50 years. Data published in 2014 from the USGS indicates that the area that the Karn Lined Impoundment occupies has an annual frequency of exceedance of $4.99\times10^{-5}$ for an earthquake with a maximum expected horizontal ground acceleration of 0.10g, which corresponds to a probability of exceedance of 0.25 percent in 50 years and a return period of 20,000 years.

Since the probability of exceedance is less than two percent in 50 years for a maximum expected horizontal ground acceleration of 0.10g, the Karn Lined Impoundment is not located in a seismic impact zone, satisfying the requirements of Section 257.63.

## 6.0 UNSTABLE AREAS [40 CFR 257.64]

Section 257.64 requires that new CCR units not be located in unstable areas. As outlined in Section 257.64(b), the following must be considered when determining whether an area is unstable:

- On-site or local soil conditions that may result in significant differential settling
- On-site or local geologic or geomorphologic features
- On-site or local human-made features or events (both surface and subsurface)

Previous geotechnical investigations performed by Golder in and around the footprint of the Karn Lined Impoundment indicate the on-site soils are comprised of alluvial and lacustrine deposits of silty sand and sandy clay. As discussed in Section 3.0, the area has been previously developed and used as parking and a staging area for the facility; therefore, the on-site soils have experienced settlement due to previous loading. Additionally, infrastructure associated with the Karn Lined Impoundment (e.g., piping and support trestle foundation) will be constructed on or within compacted fill to further limit settlement.

A settlement analysis was performed using soil properties provided in Golder's D.E. Karn Bottom Ash Handling System Geotechnical Recommendations Report (Golder, 2017). Results of the settlement analysis verify that the on-site soil conditions do not result in significant differential settlement.

A slope stability analysis was performed as part of the design for the Karn Lined Impoundment (Golder, 2018c). Soil conditions observed during the geotechnical investigations were incorporated into the analysis to account for on-site geologic features. There are no geomorphologic features that affect the stability of the impoundment, as the site is bounded to the north by Saginaw Bay and to the west by the Saginaw River. Various scenarios were modeled including maximum storage volume within the impoundment, elevated water table due to a 100-year storm event, seismic loading, and loading due to maintenance traffic on access roads to evaluate the effect of natural and human-made events. Results of the stability analysis indicate that the Karn Lined Impoundment slopes are stable.

The results of the geotechnical investigation, the settlement analysis and the slope stability analysis, indicate the Karn Lined Impoundment is not located in an unstable area, satisfying the requirements of Section 257.64.

## 7.0 CONCLUSION AND SUMMARY

Golder has determined that the Karn Lined Impoundment meets the location restrictions outlined in 40 CFR 257.60-64. Prior to first receipt of waste, this report must be placed in the facility's operating record in accordance with Section 257.105(e) and must be made available on the facility's publicly accessible internet site in accordance with Section 257.107(e).

Sincerely,

**GOLDER ASSOCIATES INC.**

Megan Jehring
Staff Geotechnical Engineer

Jolene Traut
Project Geologist

Brain Huebner
Senior Ecologist

Matt Wachholz, P.E.
Senior Engineer

## 8.0 REFERENCES

TRC Companies, Inc. (TRC), 2018. Annual Groundwater Monitoring Report.

Golder Associates Inc. 2017. D.E. Karn Bottom Ash Handling System Geotechnical Recommendations Report.

Golder Associates Inc. (Golder) 2018a. D.E. Karn Generating Facility Bottom Ash Lined Impoundment Liner System Design Certification Report.

Golder Associates Inc. (Golder) 2018b. D.E. Karn Lined Impoundment Wetland Assessment Technical Memorandum.

Golder Associates Inc. (Golder) 2018c. D.E. Karn Bottom Ash Handling System Design Report.

Michigan Department of Environmental Quality. 2018. Michigan Resource Inventory System Wetlands Map Viewer. Accessed January 18, 2018.

Great Lakes Environmental Research Laboratory (GLERL). 2018. Great Lakes Water Level Dashboard. Accessed June 1, 2018.

U.S. Army Corps of Engineers. 2018. Great Lakes Water Levels. Accessed June 1, 2018.

U.S. Environmental Protection Agency. 2015. Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 40 CFR Part 257. Effective Date October 19, 2015.

U.S. Fish and Wildlife Service. 2018. National Wetland Inventory Mapper. Accessed January 26, 2018.

U.S. Geological Survey (USGS). 2014. U.S. Quaternary Faults and Folds Database.

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.


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Golder Associates

**Engineering Earth's Development, Preserving Earth's Integrity**

# TECHNICAL MEMORANDUM

| | | | |
|---|---|---|---|
| **Date:** | June 5, 2018 | **Project No.:** | 1781451 |
| **To:** | George McKenzie | **Company:** | Consumers Energy Company |
| **From:** | Golder Associates, Inc. – Brian Huebner | | |
| **cc:** | Brad Runkel (CEC)<br>Harold Register (CEC)<br>Jeff Piaskowski (Golder) | **Email:** | George.MckenzieII@cmsenergy.com |

**RE: RCRA LOCATION RESTRICTON ASSESSMENT**
**D.E. KARN BOTTOM ASH LINED IMPOUNDMENT**
**WETLAND ASSESSMENT**
**ESSEXVILLE, MICHIGAN**

As requested by Consumers Energy Company (CEC), Golder Associates Inc. (Golder) completed a desktop and field assessment of wetlands for the referenced project; hereafter referred to as the Site. The Site is comprised of an area about 1.1 acres in size located adjacent to an existing bottom ash impoundment on CEC D.E. Karn (DEK) property located in Essexville, Michigan (Figures 1, 2, and 3) and is commonly referred to by CEC as the new bottom ash lined impoundment.

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) ("CCR RCRA Rule") to regulate the solid waste management of CCR generated at electric utilities. Section 257.61 of the CCR RCRA Rule requires that new CCR surface impoundments must not be located in wetlands, as defined in 40 CFR Section 232.2. The purpose of Golder's assessment was to determine the presence of wetlands within the footprint of the propose bottom ash impoundment.

## METHODS

### Desktop Review

Prior to performing the field assessment, Golder reviewed publicly-available information from the following sources to evaluate potential wetland areas and the Site layout and historical use.

- National Wetlands Inventory (NWI) Map (Figure 1)
- Michigan Department of Environmental (MDEQ) Wetland Map (Figure 2)
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey (Figure 3)
- Aerial Imagery (Figures 1 and 3 and viewed online)

### Field Assessment

Golder personnel visited the Site on March 23, 2018 to assess the potential presence of wetlands on the Site. The wetland assessment was completed by applying criteria provided in the *1987 US Army Corps of Engineers (USACE) Wetland Delineation Manual* and *Regional Supplement: Northcentral and Northeast*

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*Region* (USACE 1987, USACE 2011). The assessment was conducted prior to the growing season. Golder is of the opinion that conditions on the Site were conducive to performing the scope of work for its intended purpose.

# RESULTS

## Desktop Review

The NWI map (Figure 1) does not indicate the presence of wetlands on the Site. The MDEQ wetland map (Figure 2) indicated that the Site is located in an area mapped as wetlands. The MDEQ and NWI information was compiled using information at coarse spatial scales from sources typically based on remote sensing techniques. It is not unusual for the results of fieldwork to identify areas with conditions different from those depicted by the NWI or MDEQ maps.

The NRCS soil survey (Figure 3) indicated the presence of two soil map units on the Site. Map units are composed of one or more components or soil types. Table 1 presents a summary of soil map units on the Site and the NRCS hydric rating, which indicates the percentage of a respective map unit that may meet the criteria for hydric soils as determined by the National Technical Committee on Hydric Soils (NTCHS). A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

**Table 1: NRCS Soil Types Mapped on the Site**

| Soil Series Map Unit | Soil Series Map Unit Symbol | Hydric Rating (%) |
|---|---|---|
| Slickens | SKN | 0 |
| Dumps | 56 | 0 |

None of these soil types are classified as hydric soils by the NTCH. The NRCS Soil Surveys are compiled using information at coarse spatial scales, including sources typically based on remote sensing techniques. It is not unusual for the results of fieldwork to identify areas with conditions different from those depicted by the NRCS soil survey.

Aerial imagery showed that the land surface on the Site has been has been develped and used as part of the DEK facility operations since at least 1998. The majority of the Site has been graded and apparently maintained as parking and staging areas for vehicles and equipent since at least 1998. Aerial imagery did not indicate the presence of readily-visible wetlands on the Site. Potential wetlands were noted in apparent drainage ditches near but beyond the north and south limits of the Site. Wetlands are often visible as relatively darkened areas and/or areas characterized by distinct changes in vegetation colors or patterns. Online aerial imagery showed the predominant land use on and in the immediate vicinity of the Site has not changed appreciably since at least April, 2011.

## Field Assessment

At the time of the Site visit, the Site consisted of land that had been historically filled, graded, and paved with compacted sand and gravel. It was being used by CEC as a parking and staging area for vehicles and equipment used at the facility. There were no areas on Site which exhibited a predominance of wetland characteristics (no visual indicators of wetland hydrology, no predominance of wetland vegetation, and no hydric soils). The Site is bordered by ditches on the north side and parts of the south side. The ditches were constructed as part of the on-site stormwater management and treatment system as required by the facilities National Pollutant Discharge Elimination System (NPDES) permit. There appeared to be wetlands in the bottom of the ditches that were incidentally created as a result of the regular occurrence of water in

the ditches. Photographs depicting typical conditions at the Site during the visit are included as Attachment A.

## REGULATORY GUIDANCE

Since 1984, the federal government has authorized the State of Michigan to administer the Clean Water Act Section 404 program within its borders, regulating impacts to wetlands and waters of the US (WOUS). The following exceptions are areas where the federal government, specifically the US Army Corps of Engineers (USACE), maintains jurisdiction within the state. In these areas, a separate permit must be received from both the USACE and the MDEQ. USACE jurisdiction over these waters is maintained under Section 10 of the federal Rivers and Harbors Act of 1899:

- Traditionally navigable waters
  - Great Lake
  - Connecting channels
  - Waters connect to the Great Lake where navigational conditions are maintained
- Wetlands directly adjacent to these waters

The Site is located in an area in which the USACE maintains jurisdiction over wetlands.

The State of Michigan regulates wetlands under Michigan's Natural Resources and Environmental Protection Act (NREPA), Part 303: Wetlands Protection based on their location and surface connectivity to inland lakes, ponds, streams, and rivers.

**Based on current Site conditions and provisions of Section 404 and Part 303, Golder is of the opinion that there are no wetlands on the Site and the Site meets the location restrictions outlined in 40 CFR 257.61.**

The above regulatory guidance is to be used for general planning purposes only. The USACE and/or MDEQ have final discretion regarding the determination, delineation, and regulatory status of wetlands and water resources on the Site. If confirmation of the presence and regulatory status of wetlands on the Site is desired, Golder can coordinate with the MDEQ to conduct a Level 3 Wetland Identification through the MDEQ Wetland Identification Program (WIP). This process will produce an agency confirmation of wetland presence, regulatory status, location, size, and type that can aid subsequent agency review of related permit applications (if required). The above opinion applies only to the regulatory status and need for permits specific to the issue of wetlands regulated under the CWA and/or NREPA. Other permits and approvals may be required for various Site development, improvement, or modification activities.

## CLOSING

Golder's evaluation was performed in general accordance with accepted procedures in conducting desktop reviews and wetland assessments. Golder's conclusion reflects our professional opinion based on conditions present at the time of the evaluation. No warranties, implied or expressed, are made. Golder is pleased to be of service to CEC.

**Figures:**

| | |
|---|---|
| Figure 1 | NWI Map |
| Figure 2 | MDEQ Wetland Map |
| Figure 3 | NCRS Soil Map |

## Attachments:

Attachment A Site Photographs

## References:

Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

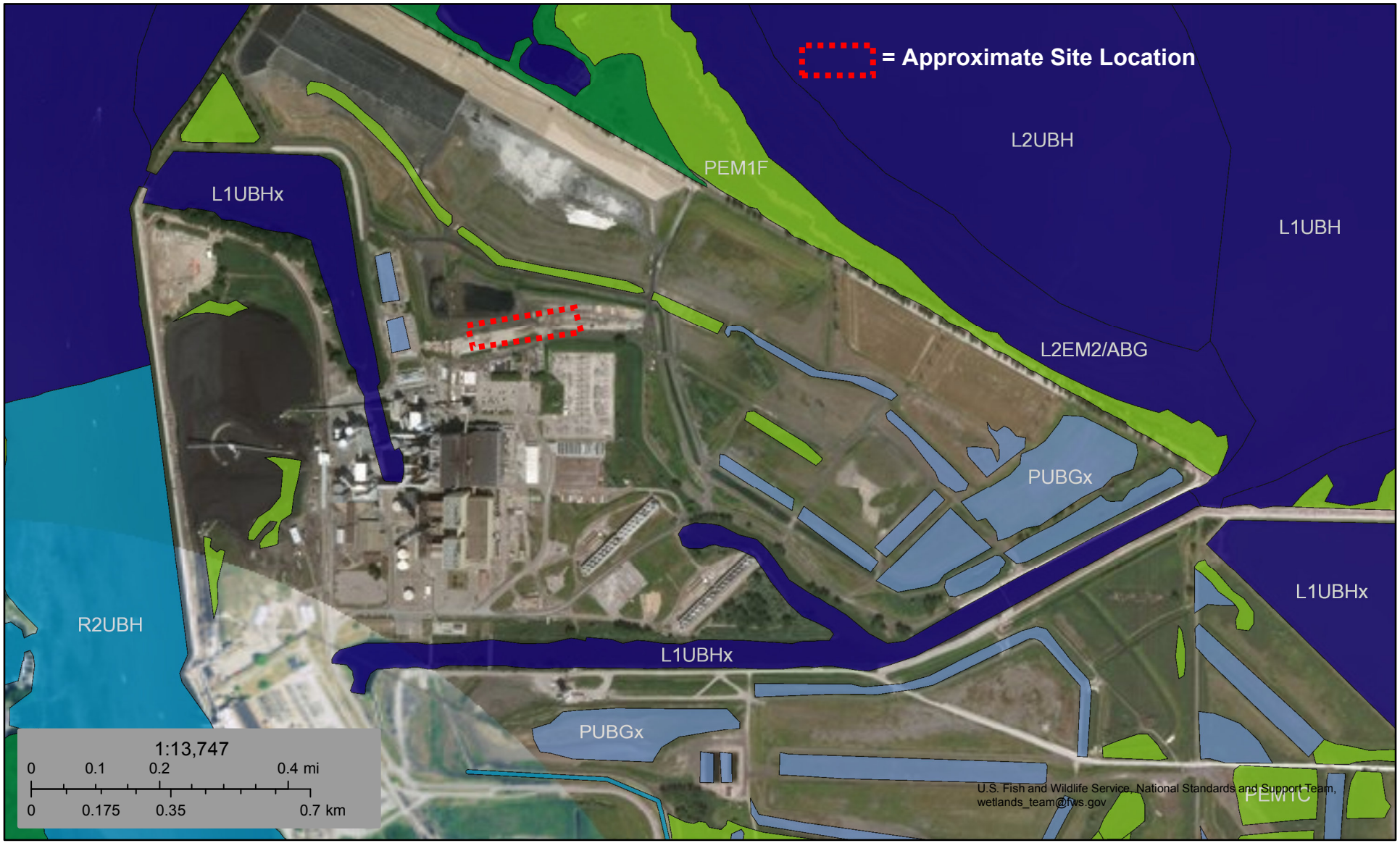
U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, C. V. Noble, and J. F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USDA-NRCS. 2010. “Field Indicators of Hydric Soils in the United States (version 7.0).” https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_053171.pdf

# FIGURES

U.S. Fish and Wildlife Service
National Wetlands Inventory

# DE Karn Bottom Ash Lined Impoundment
# FIGURE 1

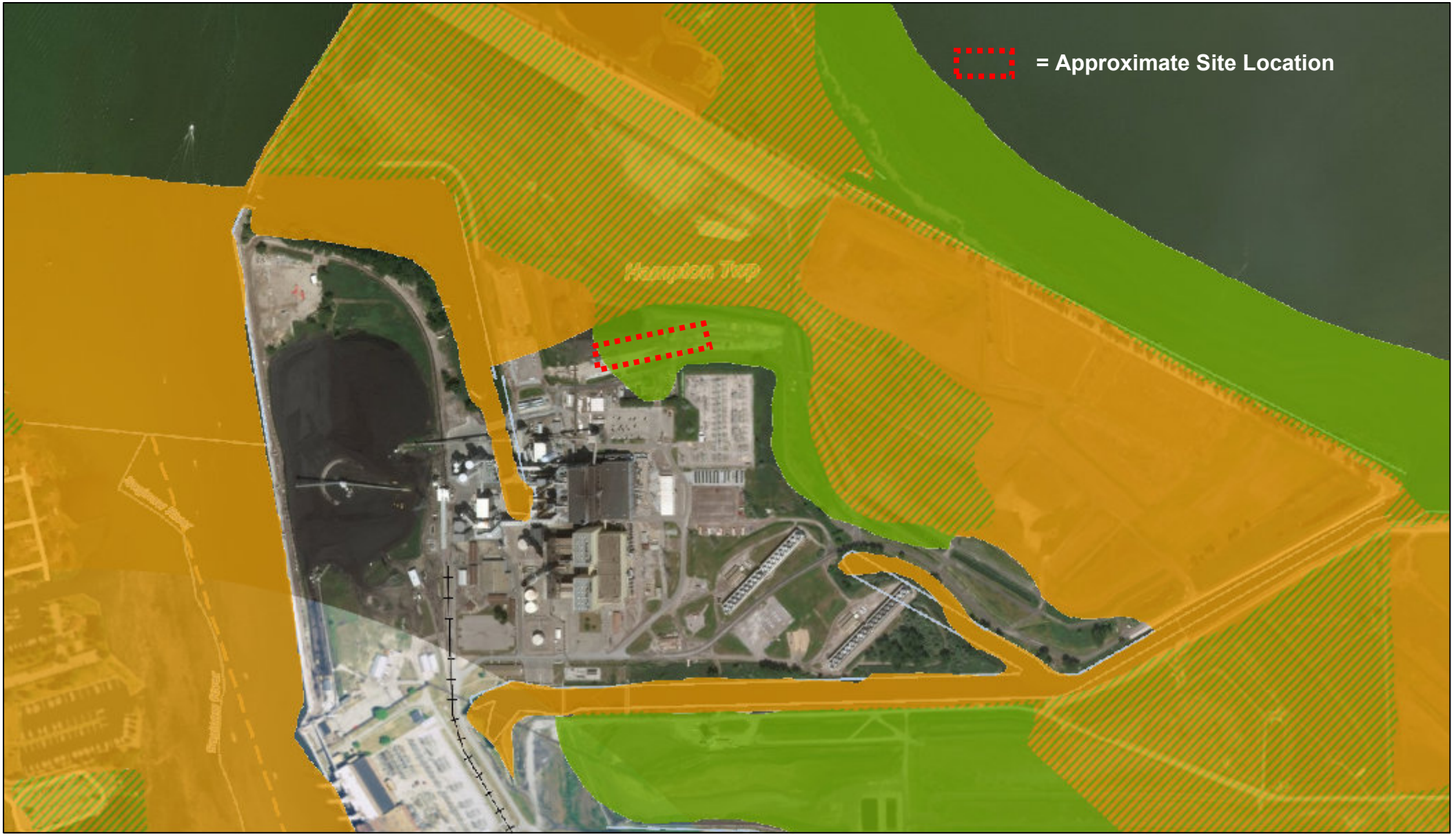



January 26, 2018

**Wetlands**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

# FIGURE 2 MDEQ Wetlands Map Viewer




January 26, 2018

**Part 303 Final Wetlands Inventory**

- Wetlands as identified on NWI and MIRIS maps
- Soil areas which include wetland soils
- Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils

1:8,811

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

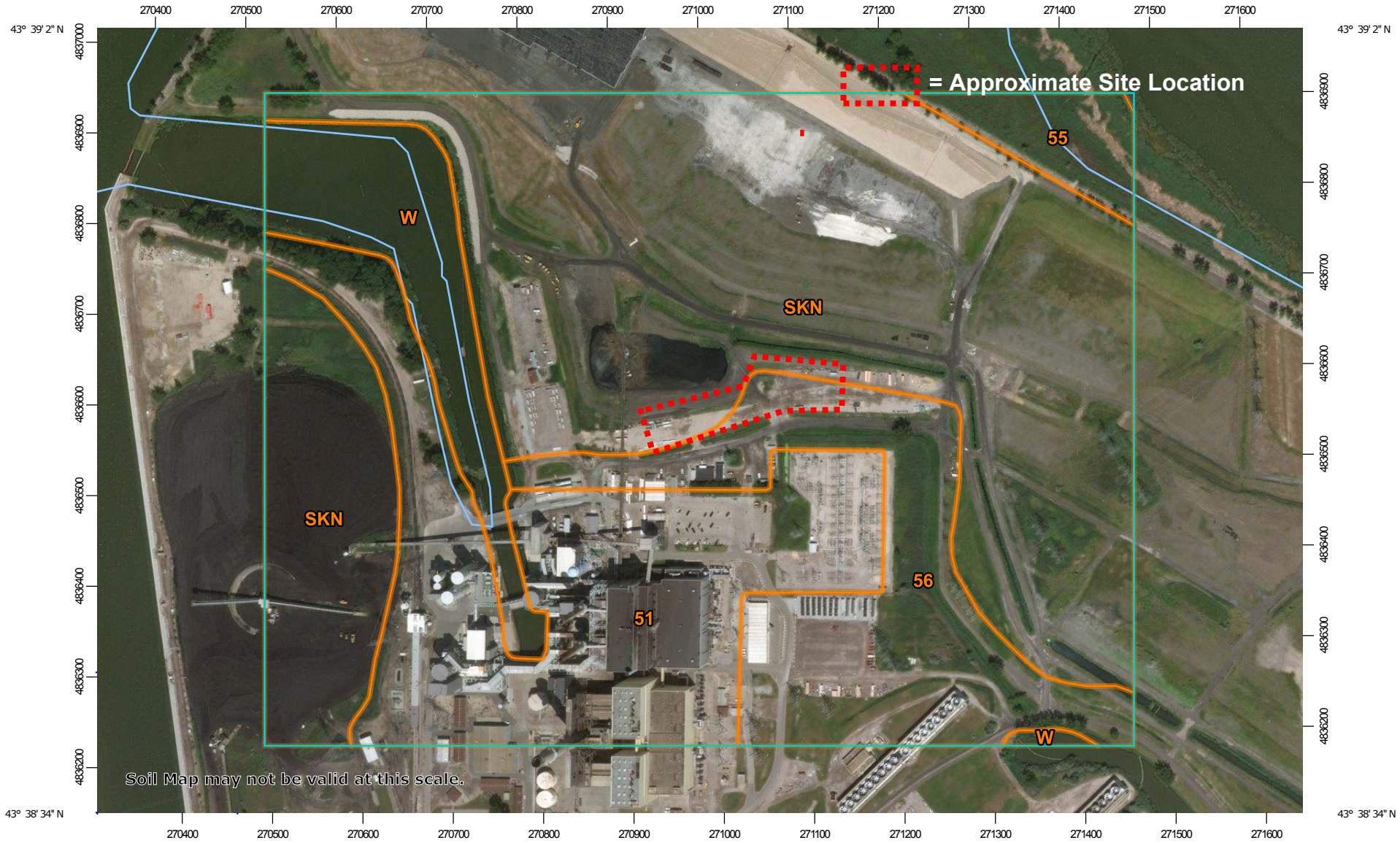
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS,

Disclamer: This map is not intended to be used to determine the specific locations and jurisdictional boundaries of wetland areas subject to regulation. More information regarding this map, including how to obtain a copy can be accessed at www.michigan.gov/wetlands.

Map by: State of Michigan - CSS

Soil Map—Bay County, Michigan
(CEC Karn Property)

# FIGURE 3




Map Scale: 1:6,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

# ATTACHMENT A

# Site Photographs

## CEC DEK BOTTOM ASH LINED IMPOUNDMENT WETLAND ASSESSMENT
## ESSEXVILLE, MICHIGAN

| | |
|---|---|
| **PHOTO 1**<br>**Photograph taken on March 23, 2018 from near the middle of the south side of the Site facing east.** |  |
| | |
| **PHOTO 2**<br>**Photograph taken on March 23, 2018 from near the middle of the south side of the Site facing west.** |  |

| | |
|---|---|
| **PHOTO 3**<br>**Photograph taken on March 23, 2018 from near the northeast corner of the Site facing west.** |  |
| | |
| **PHOTO 4**<br>**Photograph taken on March 23, 2018 from near the middle of the north part of the Site facing east.** |  |