

September 27, 2023

Ms. Tanowa Troupe, Secretary
Ohio Power Siting Board
Docketing Division
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3797

Re: Case No. 20-1529-EL-BGN - In the Matter of the Application of Wheatsborough Solar, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Erie County, Ohio.

Certificate Compliance Condition 10 – Geotechnical Letter Update

Dear Ms. Troupe:

Wheatsborough Solar, LLC (“Applicant”) is certified to construct a solar-powered electric generation facility in Erie County, Ohio, in accordance with the order issued by the Ohio Power Siting Board (“OPSB”) in the above-referenced case.

At this time, the Applicant is filing the attached geotechnical opinion letter in compliance with Condition 10 of the Joint Stipulation and Recommendation approved by the OPSB’s September 16, 2021 order in Case No. 20-1529-EL-BGN. This information was provided to the Staff of the OPSB on September 27, 2023.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ Christine M.T. Pirik

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September 13, 2023

Project Number 19251

Ms. Carmen O'Keefe
Apex Clean Energy
120 Garrett St, Suite 700
Charlottesville, VA 22902

RE: Karst Opinion Letter, Revision 1
Wheatsborough Solar Project
Erie County, Ohio

Dear Ms. O'Keefe:

Verdantas LLC (Verdantas) is pleased to present the following Revision 1 letter summarizing our consulting services related to the Wheatsborough Solar Project located north of Bellevue in Erie County, Ohio (the project site). The purpose of this letter is to document our review of the provided information and prepare an opinion on the feasibility of a solar project. This work has been performed according to our Task Order No. 001 under the terms of our February 22, 2022 Agreement between Verdantas LLC (fka Hull & Associates, LLC) and Apex Clean Energy (Apex).

1.0 PROJECT DESCRIPTION

Based on correspondence with the project team, Apex has received comments from the Ohio Power Siting Board (OPSB) regarding Karst topography in the Project Area. Specifically, OPSB has requested that discussion be provided regarding the constructability of the project and the potential impacts to the hydrogeology of the area as it relates to the mapped Karst depressions. To assist in the performance of our review, the following documents were utilized:

- A report prepared by Hull & Associates, LLC titled, "Geology and Hydrogeology Report Wheatsborough Solar Erie County, Ohio," dated January 22, 2021 (Exhibit O of the application on February 11, 2021, in OPSB case No. 20-1529-EL-BGN);
- A report prepared by NOVA titled, "Geotechnical Engineering Report Wheatsborough Solar Erie County, Ohio," dated February 3, 2021 (Exhibit B of the application on February 11, 2021, in OPSB case No. 20-1529-BGN);
- An updated site layout file provided by Apex; and

Based on our involvement to date, the Wheatsborough Solar Project is proposed to be located on approximately 1,130 acres that includes photovoltaic solar panels, along with associated infrastructure such as access roads, electrical collection lines, inverter stations, and a project substation. The project design is ongoing, but it is expected that the solar panel racking system will consist of a series of small diameter piles or drilled foundations installed to depths of less than 10 feet, and that the site grading will be limited to minor regrading to provide the access roads and equipment pads (e.g., no mass regrading is proposed).

2.0 SITE BACKGROUND

The site geology and hydrology filed was detailed in the January 2021 Geology and Hydrogeology Report prepared by Hull. The report noted that surficial deposits consisted primarily of thin silty and sandy Wisconsinan-age lacustrine deposits and wave planed clay till. Logs for domestic supply wells obtained from the Ohio Department of Natural Resources (ODNR) indicate limestone bedrock was encountered at depths between 2 and 30 feet below ground surface within or in close proximity to the Project Area. The reviewed well logs also indicated that the domestic supply wells were completed within the limestone bedrock at depths ranging from approximately 36 to 120 feet below ground surface. Static water levels in the completed wells were highly variable and ranged from approximately 20 to 85 feet below ground surface.

The referenced Geology and Hydrology Report indicated that a relatively thin veneer of unconsolidated silts and clays overlying soluble limestone bedrock has resulted in the formation of Karst topography in the vicinity of the Project Area. Figure 4 of the referenced report shows Karst features (typically sinkholes) and depressions based on the ODNR dataset and the time of the report. Four *Field Verified* and ten *Suspect* Karst features, along with Karst depressions were mapped within the larger Project Area that was anticipated at the time of the report. Depressions are defined on the Ohio Geological Survey Karst map as a "shallow bowl or funnel shaped area representing the extent of a sinkhole." Based on the color coding included in the legend of the map, the depressions noted within the Project Area appear to be between one and three feet in depth.

The referenced February 2021 Geotechnical Engineering Report prepared by NOVA indicated conditions consistent with the referenced Geology and Hydrogeology Report. Limestone bedrock was encountered at depths between 2 and 18 feet in the explorations. Surficial materials were described as a soft to hard silty clay that increased in stiffness with depth. Groundwater was not initially encountered during drilling in each of the borings. However, after remaining open for 24 hours following completion of the borings, groundwater was observed in 8 of 25 borings at depths ranging from approximately 1.8 to 6.5 feet below ground surface. Voids were not encountered in the explorations. In regard to Karst topography, the report concludes that construction will not significantly increase the risk of Karst feature development within the Project Area or surrounding areas. The report recommends drilled and grouted racking supports to address shallow bedrock.

3.0 DISCUSSION

The latest site layout provided by APEX along with the most recent ODNR Karst dataset are shown in Figure 1 of the enclosures. Based on our review of the revised Project Area in relation to Karst features mapped by the ODNR, there are two *Suspect – Field Visited* and one *Field Verified* Karst features identified within the footprint of the current Project Area. Two of the features are located in the northern and western portion of the Project Area, and one is located in the southwest portion of the area. No features are mapped beneath the currently proposed improvements (substation, roads, panels, inverters, or fence areas). The closest *Field Verified* Karst features (sinkholes) are located just outside the southwest Project

Area boundary, and near the western border of the Project Area, beyond the proposed improvements. One *Suspect – Field Visited* feature is located within the project area, though improvements have been offset from the feature. No PV panels are proposed within 50 feet of the Karst features.

Mapped Karst depressions are present at the southern extent of the Project Area, and in the Project Area that surrounds a *Suspected – Field Visited* feature in the northern portion of the site. Based on the provided updated site layout, PV panels are located atop a portion of the northern depression, and PV panels and an access road are located atop a portion of the southern depression.

Given the recommended construction techniques for the driven or drilled/grouted piles supporting the PV panels in shallow bedrock areas (which generally correspond to the mapped Karst areas), the anticipated depth of installation (less than 10 feet), and the highly variable presence and/or depth to groundwater within the unconsolidated materials and underlying bedrock; installation and operation of the proposed PV panels and supporting equipment should have no impact on local groundwater resources or the general hydrogeology within the Project Area and are not expected to increase the risk for Karst development within or adjacent to the Project Area.

Based on our review of the Geotechnical Engineering Report, it is our opinion that Karst risks documented in the referenced report are appropriate risks based on the site conditions; and that these risks can be mitigated during the construction phase, if further encountered. The current layout appears to incorporate the recommended offsets from Karst features in the Project Area. It is our opinion that construction of PV panel racking foundations and access roads over mapped depressions, provided more severe conditions are not encountered during construction, is considered suitable. In general, good construction and housekeeping practices are anticipated to be adequate to minimize impact to the Karst topography at the site. During construction and operation of the Facility, the natural grading and drainage should be maintained, especially in areas of mapped Karst features and depressions. Areas within 50 feet of Karst features or depressions should not be utilized for stockpiles, construction staging, or material storage during construction.

4.0 CONCLUSIONS

Based on our review as discussed herein, the following conclusions are offered:

- Installation and operation of the proposed PV panels and supporting equipment should have no impact on local groundwater resources or the general hydrogeology within the Project Area and are not expected to increase the risk for Karst development within or adjacent to the Project Area.
- It is our opinion that construction of PV panel racking foundations and access roads over mapped depressions is considered suitable. If additional Karst features or significantly differing conditions are encountered during construction, they can be appropriately addressed on a case-by-case basis.
- In general, good construction and housekeeping practices are anticipated to be adequate to minimize impact to the Karst topography at the site. During construction and operation of the Facility, the natural grading and drainage should be maintained, especially in area of mapped Karst features and depressions. Areas within 50 feet of Karst features or depressions should not be utilized for stockpiles, construction staging, or material storage during construction.

5.0 CLOSURE

The recommendations of this report have been prepared according to generally accepted soil and foundation engineering practice and are based on the information reviewed to date. This report applies solely to the size, type, and location of the structures described herein. If changes are proposed, this report will not be considered valid unless the changes have been reviewed and the recommendations of this report modified as appropriate by Verdantas LLC.

We have appreciated this opportunity to be of service to you. If you have any questions or require further information, please do not hesitate to contact us.

Sincerely,

VERDANTAS LLC

A blue ink signature of Brian Lowe, consisting of a stylized 'B' and 'L'.

Brian Lowe, PE
Geotechnical Engineer

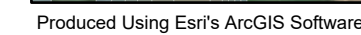
A blue ink signature of Rob Corzatt, written in a cursive style.

Rob Corzatt
Senior Project Manager

Enclosures:

Figure 1 – Karst Features and Depressions

RC/BTL/BJD/MB/BTL:btl
\\Headquarters.duffnet.com\Verdantas\Project Files\AA-BZ\ApexMgm\19251 - Wheatsborough Solar - Karst
Opinion\Working\Documents\Rpt-19251-Geotechnical Letter Report-20230913.docx



Note:
The aerial photo was acquired through the Esri Imagery Web Service.
Aerial photography dated 5/11/2022.

DISCLAIMER:
Verdantus LLC has furnished this map to the company identified in the title block (Client) for its sole and exclusive use as a preliminary planning and screening tool and field verification is necessary to confirm these data. This map is not intended to constitute any information compiled from third-party sources and these data may change over time. Areas depicted by the map are approximate and may not be accurate to mapping, surveying or engineering standards. Verdantus LLC makes no representation or guarantee as to the content, completeness or accuracy of the data or information or spatial location depicted on this map. This map is provided without warranty of any kind, including but not limited to, the implied warranties of merchantability or fitness for a particular purpose. In no event will Verdantus LLC, its owners, officers, employees or agents, be liable for damages of any kind arising out of the use of this map by Client or any other party.

September 2023

Wheatsborough Solar Project
Karst Opinion Letter

Karst Features and Depressions

Erie County, Ohio

Figure

1

**This foregoing document was electronically filed with the Public Utilities
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in

Case No(s). 20-1529-EL-BGN

Summary: Notice - Certificate Compliance Condition 10 – Geotechnical Letter
Update electronically filed by Christine M.T. Pirik on behalf of Wheatsborough
Solar, LLC.