Clearview Solar I, LLC

Clearview Solar

Exhibit M

Part 1 of 3

Geology and Hydrogeology Report

Report

Case No. 20-1362-EL-BGN

HULL

Environment / Energy / Infrastructure

November 24, 2020

Mr. Doug Herling
Clearview Solar I, LLC
1105 Navasota Street
Austin, Texas 78702

RE: Geology and Hydrogeology Report, Clearview Solar Project in Champaign County, Ohio; ORR023.0008

Dear Doug:

Hull & Associates, LLC (Hull) is pleased to provide Clearview Solar I, LLC (Client) with this Geology and Hydrogeology Report for the proposed Clearview Solar Project located in Champaign County, Ohio (Project). The proposed development is a utility-scale solar energy facility in an approximate 1,200-acre rural aera in extreme northwestern Champaign County (Project Area; also further defined below). The proposed Facility (defined below) will include solar panels, along with associated infrastructure such as access roads, electrical collection lines, and a project switchyard.

The purpose of this report is to provide the appropriate investigation and analysis to support the Client's application to the Ohio Power Siting Board (OPSB) to construct and operate the Project. Specifically, the report provides information relevant to the following two provisions of Ohio Administrative Code (OAC) 4906-4, OPSB's rules for applications for electric generation facilities:

OAC 4906-4-08(A)(4)

(4) Water Impacts. The applicant shall provide information regarding water impacts

- (a) Provide an evaluation of the impact to public and private water supplies due to construction and operation of the facility.
- (b) Provide an evaluation of the impact to public and private water supplies due to pollution control equipment failures.
- (c) Provide existing maps of aquifers, water wells, and drinking water source protection areas that may be directly affected by the proposed facility.
- (d) Describe how construction and operation of the facility will comply with any drinking water source protection plans near the project area.
- (e) Provide an analysis of the prospects of floods for the area, including the probability of occurrences and likely consequences of various flood stages, and describe plans to mitigate any likely adverse consequences.

OAC 4906-4-08(A)(5)

(5) Geological features. The applicant shall provide a map of suitable scale showing the proposed facility, geological features of the proposed facility site, topographic contours, existing oil and gas wells, and injection wells. The applicant shall also:

- (a) Describe the suitability of the site geology and plans to remedy any inadequacies.
- (b) Describe the suitability of soil for grading, compaction, and drainage, and describe plans to remedy any inadequacies and store the soils during post-construction reclamation.

6397 Emerald Parkway, Suite 200, Dublin, Ohio 43016
614.793.8777 614.793.9070 fax www.hullinc.com

(c) Describe plans for the test borings, including closure plans for such borings. Plans for the test borings shall contain a timeline for providing the test boring logs and the following information to the board:

(i) Subsurface soil properties
(ii) Static water level
(iii) Rock quality description
(iv) Per cent recovery
(v) Depth and description of bedrock contact

For this report, the following definitions have been used when describing the Project pursuant to the OPSB's current rules (OAC 4906-1-01):

- **Project Area:** "all land within a contiguous geographic boundary that contains the facility, associated setbacks, and properties under lease or agreement that contain any components of the facility" (OAC 4906-1-01(GG)).

- **Facility:** "the proposed major utility facility and all associated facilities" (OAC 4901-1-01(W)).

- **Study Area:** is defined by Hull to better describe the region outside of the Project Area that was included during database searches of available public information. The Study Area includes all of Champaign County, Logan County and Shelby County so as to capture all areas whose physical characteristics could globally impact the Project Area (e.g., floodplains, faults, regional geology).

STUDY APPROACH

A literature review of readily available hydrogeological and geotechnical documents was completed to develop a generalized understanding of the suitability of conditions within the Project Area for the construction of the proposed Facility. The information summarized in this report was obtained from available online databases and/or documents maintained or produced by the following federal, state, and local agencies:

1. Federal Emergency Management Agency (FEMA);
2. Ohio Department of Agriculture (ODA);
3. Ohio Department of Natural Resources (ODNR);
4. Ohio Environmental Protection Agency (Ohio EPA);
5. Ohio Department of Transportation District 7 (ODOT);
6. Office of the Champaign County Engineer;
7. United States Department of Agriculture (USDA); and
8. United States Geological Survey (USGS).

No environmental studies or structural evaluations were performed as part of the scope of work for this report, and therefore no information relative to environmental or structural considerations are included in this report.

This study also included a reconnaissance of the Project Area and interviews of certain government agency personnel.

A Preliminary Geotechnical Exploration was conducted to obtain information as described in OAC 4906-4-08(A)(5)(c) and will be provided under separate cover.

PROJECT LOCATION

The Project Area comprises approximately 1,200 acres of rural property in Adams Township near the community of Rosewood in the extreme northwest corner of Champaign County, Ohio, as shown on Figure 1 and subsequent figures presented in this report.

DESKTOP INFORMATION REVIEW AND ANALYSIS

The following provides a summary of the information reviewed and its applicability to the proposed Project.

Regional Geology

The Study Area lies within the Southern Ohio Loamy Till Plains region of the Till Plains section of the Central Lowland Physiographic Region. With a loamy till surface, distinguishing characteristics of this region include end and recessional moraines, commonly associated with boulder belts, between relatively flat-lying ground moraine, cut by steep-valleyed large streams. Stream valleys filled with outwash alternate between broad floodplains and narrows. Buried valleys are common. Surface elevations in the Southern Ohio Loamy Till Plains range from approximately 530 to 1,150 feet above mean sea level (msl) (Ohio Division of Geological Survey, 1998).

The surface topography within the Project Area is largely the result of the Wisconsinan-age ice-deposited ground moraine. The surface deposits are characterized as high-lime, Wisconsinan-age till over Lower Paleozoic-age carbonate rocks and shales to the east (Ohio Division of Geological Survey, 2005). The surface elevation within the Project Area is approximately 1080 feet msl. Based on the depth to bedrock in the Project Area, as discussed below, the thickness of unconsolidated glacial drift is estimated to range from approximately 160 feet to over 500 feet.

The predominant uppermost bedrock units within the Project Area are the Lockport Dolomite (Sl), Clinton and Cataract Groups, undifferentiated (Sc), and the Cincinnati Group (Oc) (see Figure 2). The Lockport Dolomite is composed of dolomite with variegated white to shades of gray, finely to coarsely crystalline and mostly in medium to massive beds. The Clinton and Cataract Groups are composed of green to reddish gray, fine to crystalline dolomite, limestone and shale. The Cincinnati Group consists of interbedded shale, limestone and dolomite. (Ohio Division Geological Survey, 2006).

The bedrock topographic surface is shown on Figure 3. Bedrock dips to the approximate center of the Project Area to a northwest to southeast trending buried valley. Bedrock elevations range between 500 to 920 feet msl. ODNR water well logs indicate bedrock was encountered at approximately 165 to 180 feet below ground surface (bgs) during drilling of several water wells at properties adjoining the Project Area.

Karst Topography

No probable karst areas have been identified within the Project Area (see Figure 4). The nearest mapped karst feature, a field verified karst, is approximately 10.5 miles west of the Project Area near Sidney, Ohio.

Seismicity

Structural features (e.g. faults, folds) and earthquake epicenters within the Study Area are shown on Figure 5. A review of the geologic and seismic information indicated that no historical earthquake epicenters are mapped within the Project Area. The nearest seismic events occurred in 1939 and included 2.5- and 3.1-magnitude earthquakes located in Logan County, Ohio, with an epicenter located approximately 2 and 2.5 miles north of the Project Area, respectively. A 4.7-magnitude earthquake occurred in 1875 approximately 4 miles south of the Project Area in Champaign County (ODNR Web, 2020). There are no mapped faults located within the Project Area; however, one of the most historically active seismic areas in Ohio, the Anna-Champaign Fault starts approximately 1.3 miles north of the Project Area extending outside the Study Area in the northwest direction.

Moderately damaging earthquakes occur in the Anna seismic zone every two or three decades, and smaller earthquakes are felt here two or three times per decade. Historically, seismicity has been episodic with periods of frequent activity and periods of low activity (Dart, R.L. and Hansen, M.C, 2008).

The design of the facility will follow the Ohio Build Code (OBC) which has provisions for earthquake design data.

Hydrology and Hydrogeology

Surface water flow within the Project Area is generally toward the north. The entire Project Area is located within the Ohio River Drainage Basin. One surface water body is present within the Project Area, Indian Creek. The stream generally flows from the south to north. Most of the surface water runoff flows into Indian Creek, which generally bisects the eastern portion of the Project Area. Indian Creek flows north into the Great Miami River, and subsequently into the Ohio River.

Figure 6 was prepared using information obtained from the ODNR and FEMA and shows there are no 100-year floodplain areas located within the Project Area. A mapped 100-year floodplain is shown to the immediate west of the Project Area, along Little Indian Creek in neighboring Shelby and Miami Counties. A 100-year floodplain is an area where the occurrence of an extreme hydrologic event resulting in a flood is expected at a 100-year recurrence interval (i.e., a flood of that magnitude has a 1 percent chance of happening in any given year). All areas within the Project Area are designated by FEMA as an Area of Minimal Flood Hazard. Therefore, there is likely no adverse consequences to the project as a result of flooding.

Several potential wetlands are mapped by the National Wetlands Inventory and are located within the Project Area mostly surrounding Indian Creek and on the western and southwestern portions of the Project Area. Any wetlands potentially indicated by the National Wetlands Inventory would need to be confirmed by on-site delineations.

According to the Ground-Water Resources of Champaign County (Schmidt, 1985), the principal groundwater source for the majority of the Project Area is the Farmersville Complex Aquifer and the Miami River Buried Valley Aquifer. Groundwater yields from this region can produce up to 300 gallons per minute (gpm) from limestone aquifers at depths greater than 225 feet bgs. Farm and domestic supplies of 5 to 15 gallons per minute are developed from thick glacial drift at depths of as much as 335 feet bgs. The aquifer and well locations are shown on Figure 7. Water well location information was provided by ODNR, Ohio EPA, and

the Champaign County Health Department. Based on the geocoding of water wells from ODNR, no wells are located within the Project Area. The Water Well Log and Drilling Reports for those wells shown adjoining the Project Area on Figure 7 indicate that, with one exception, there is a minimum of 30 feet of clay between the ground surface and water bearing zones at each well location. Of the sixteen well locations included on the figure, 11 of the wells were installed in sand and gravel at depths ranging from 16 to 114 feet. The remaining five wells were installed in limestone bedrock which was encountered at depths ranging from 165 to 181 feet below ground surface. Static water level measurements at the time of installation ranged from approximately 5.5 to 66 feet below ground surface. There is no information on the logs that indicate groundwater was encountered in any units above the sand and/or gravel in which the wells were completed. This indicates that the final static water levels included on the Drilling Reports are representative of the potentiometric surface of the groundwater within water bearing units under confined conditions. The Water Well Log and Drilling Report are included in Attachment A.

The presence of Source Water Protection Areas (SWPAs) for public water systems within the Project Area was evaluated. SWPAs are areas defined and approved by the Ohio EPA for the purpose of protecting drinking water resources. The SWPA map provided by Ohio EPA, Division of Drinking and Ground Waters, included in Attachment B shows that the 5-year time of travel for groundwater for the Quincy Village Potable Water Supply is located within the north central portion of the Project Area (Ohio Environmental Protection Agency, 2020). This SWPA acts as a protective measure for potable water resources at a community well located in Quincy, Ohio, which draws water from an unconsolidated aquifer approximately 60 feet from the ground surface (ODNR Web, 2020).

Environmental regulatory programs of the Ohio EPA, as well as other regulatory agencies such as the Ohio Bureau of Underground Storage Regulations (BUSTR), have adopted regulations that restrict specific activities within SWPAs. These activities include concentrated animal feeding operations, wastewater treatment land application systems, industrial, municipal and residual waste landfills, leaking underground storage tanks (LUSTs), and voluntary action program (VAP) cleanups. The restrictions typically apply to SWPAs relying on groundwater as their drinking water source. Hull has reviewed the range of programs which have adopted rules related to the presence of SWPAs and has concluded that construction of the proposed solar farm facility will not constitute an activity that would be restricted within either a surface water or groundwater SWPA.

Based on the construction and operation of the Facility, there will be no hazardous substances and/or petroleum underlying or emanating from the Project Area. All oils used within the electrical substation will be non-polychlorinated biphenyls (PCBs) and a spill control plan will be prepared if applicable. Although the Ground-Water Resources of Champaign County indicates the principal groundwater source for landowners in the Project Area is from the limestone aquifers at depths greater than 225 feet bgs., the drilling reports for local wells indicate that several wells are installed in unconsolidated sand and gravel units at depths ranging from 16 to 114 feet bgs. Groundwater was not indicated in any units above the zone in which the wells were ultimately completed. Given the shallow construction depth anticipated with installation of the proposed solar arrays, approximately 8 to 10 feet bgs, groundwater may not be encountered during construction. Therefore, it is unlikely that the construction and operation of the Facility will have a negative impact on public and private water supplies. With the methods of construction and operation of the Facility, no pollution control equipment will be required.

Well Survey

The Client mailed out a brief well survey to nine property owners whose land comprises the Project Area. The survey included multiple questions regarding the number, depth, installation date, and construction of wells on their properties. Additional information was requested regarding the aquifer type, depth to water,

and yield of each well. The survey also requested information regarding any problems experienced by the property owners with their wells.

Nine of the responses to the survey were returned to the Client and provided to Hull. Of the Nine survey respondents, seven reported having no wells on their property.

One respondent confirmed a domestic well (i.e., potable) on their property, which is on the western edge of the Project Area. The well is reported to be an 8-inch diameter well drilled to 80 feet bgs with a steel casing and approximate yield of 1.2 gallons per minute and is located approximately 20 feet from a house on the parcel. The respondent was unaware of the groundwater source and depth to water. Another respondent confirmed two domestic wells, one at 9381 Snapptown Road and one at 8675 Snapptown Road. The wells are reported to be 6-inch diameter and drilled to 190 feet and 114 feet, respectively with PVC casings and with approximate yields of 500 gallons per minute. The Client has confirmed that no project infrastructure will be constructed within several hundred feet of these wells.

Soil Survey

Soil surveys provide maps of surficial soils and general descriptions of the various soil types over the survey area and can be used as a tool to compare the suitability of large areas for general land uses. The USDA Soil Conservation Service Soil Survey of Champaign County (USDA, 1984) maps the majority of the surficial soils within the Project Area as Brookston silty clay loam (BsA) and Crosby silt loam (CrA) which cover approximately 49 and 40 percent of the Project Area, respectively. The remainder of the Project Area is covered by various silt loams as shown in the soil types map, Figure 8.

The soil survey information suggests that the Brookston silty loams have 0 to 2 percent slopes and are poorly drained soils. The permeability of these soils is generally low to moderately high, the available water capacity is moderate (8.1 inches), and the depth to the top of the seasonal high-water table can range from 0 to 12 inches bgs. The Crosby silt loam have 0 to 2 and 2 to 6 percent slopes and are somewhat poorly drained soils. The permeability of these soils is low to moderately high, the available water capacity is moderate (5.7 inches), and the depth to the top of the seasonal high-water table is 6 to 24 inches bgs. (USDA Web, 2020).

Oil and Gas Wells and Injection Wells

Based on the geocoding of oil & gas wells and active Class II injection wells from ODNR, no wells are located within the Project Area. The closest oil & gas well is located approximately 1,800 feet north of the Project Area. The status of this well is considered "Final Restoration" which means the well has been plugged and abandoned and inspected by a Division inspector to ensure that all oil and gas equipment have been removed. There are no Class II injection wells within the immediate vicinity of the Project Area.

Underground and Surface Mines

Information obtained from the ODNR Division of Mineral Resources (ODNR, Web, 2020) indicates that there are no mapped abandoned underground or surface mines in the Project Area. The closest active industrial mineral surface mine to the Project Area is greater than 6 miles away. Soil survey information provided by the USDA further indicates that there are no surface mine quarries located in the Project Area (USDA, 2019). Figure 9 illustrates that no known coal, underground, abandoned, or surface mines are mapped within the Project Area.

PROJECT AREA RECONNAISSANCE

Hull completed a field reconnaissance of the Project Area on August 7, 2020, to observe site conditions including topography, surface geologic features, and surface water conditions. The areas within and adjoining the Project Area predominantly consist of agricultural fields. In general, the Project Area appears to be adequately drained. However, it should be noted that no significant rain events had occurred within several days prior to this reconnaissance. Based on a review of the existing topography of the Project Area and the visual observations completed by Hull, it is anticipated that the potential for rockfalls and landslides is very low due to the relative flat topography of the Project Area. In addition, Hull did not observe sinkholes, depressions, or evidence of karst topography within the Project Area. Representative photographs from the site reconnaissance and a photo location map are presented in Attachment C which illustrate the general Project Area conditions.

AGENCY INTERVIEWS

Hull contacted Mr. Dan Grilliot, District Geotechnical Engineer at the ODOT District 7 office to inquire about ODOT's knowledge and experience of previous construction projects, subsurface conditions, and maintenance history within the Project Area. Mr. Grilliot stated that ODOT has no historical records for the Project Area. He also stated that he is not aware of any historical geotechnical issues within the vicinity of the Project Area.

Hull has reached out to the Champaign County Engineer, Mr. Steven McCall, PE, PS, to inquire about his knowledge and experience of previous construction projects, subsurface conditions, maintenance history, etc. of the Project Area. At this time, we have not had a chance to discuss the project with him; however, the Client plans to collaborate with his office through the continued development and design of the Project.

SUMMARY

Based on the information reviewed and gathered to date, it does not appear that the local geology and/or hydrogeology will be an obstacle to construction of the proposed solar modules, access roads, and associated site improvements. Likewise, based on Hull's knowledge of typical solar module foundation construction, it does not appear that the construction of the proposed solar array will have a significant negative impact on the local geology and/or hydrogeology of the Project Area.

There are no 100-year floodplain areas located within the Project Area. The 100-year floodplain area is shown to the immediate west of the Project Area along Little Indian Creek in neighboring Shelby and Miami Counties. Construction and operation of the Facility is anticipated to only necessitate minor grading that would not result in significant changes to the topography within the Project Area. Therefore, construction and operation of the Facility is not anticipated to result in any significant negative impact to the 100-year floodplain.

Given the depth of water wells located in the vicinity of the Project Area, the amount of relatively impermeable clay encountered between the ground surface and the water bearing units and the apparent absence of groundwater above the zones in which the wells were completed, it is unlikely that the construction and operation of the solar project will impact local public and private water supplies.

Based on the information reviewed and the field reconnaissance, it appears that there are favorable subsurface conditions for design and construction of the solar arrays, access roads, and site development. Based on a review of the soil survey information and our experience with earthwork in the region in which the Project Area is located, the soils are expected to be suitable for grading, compaction, and drainage for

the solar arrays. During construction, topsoil will be removed and stockpiled from areas where soils are planned to be disturbed. The stockpiled topsoil will be reused during site restoration activities to provide a surficial layer that supports vegetation growth. Due to the apparent depth of bedrock, it is anticipated that excavation within bedrock will be unlikely within the Project Area. Furthermore, no karst areas were identified in the Project Area. We recommend that a final geotechnical investigation be performed to determine recommendations for the final foundation system and access road design and construction.

Except for the results of the site reconnaissance, the conclusions included in this report are based on general summaries available through the resources previously listed. There may be anomalies in the geologic and hydrogeologic conditions in the Project Area that cannot be discerned by the scale of the data used in this study. As noted previously, final, site-specific geotechnical information should be obtained and reviewed prior to final solar array foundation design and construction.

STANDARD OF CARE

Hull has performed its services using that degree of care and skill ordinarily exercised under similar conditions by reputable members of its profession practicing in the same or similar locality at the time of service. No other warranty, expressed or implied, is made or intended by our proposal or by our oral or written reports. The work does not attempt to evaluate past or present compliance with federal, state, or local environmental or land use laws or regulations. Conclusions presented by Hull regarding the area within the Project Area are consistent with the Scope of Work, level of effort specified, and investigative techniques employed. Reports, opinions, letters, and other documents do not evaluate the presence or absence of any condition not specifically analyzed and reported. Hull makes no guarantees regarding the completeness or accuracy of any information obtained from public or private files or information provided by subcontractors.

If you have any questions regarding the summary and conclusions presented in this Desktop Review, please do not hesitate to contact either of the undersigned at your convenience.

Sincerely,

Cory E. Schoonover
Project Manager

Trent Hathaway, P.E.
Project Engineer

Attachments

REFERENCES

1. Dart, R.L. and Hansen, M.C, 2008, Earthquakes in Ohio and Vicinity 1776-2007: U.S. Geological Survey Open-File Report 2008-1221, Map, scale 1:1,000,000.

2. Ohio Department of Natural Resources. *Water Well Log and Drilling Report*. Retrieved August 2020, from Division of Water website: https://apps.ohiodnr.gov/water/maptechs/wellogs/app/.

3. Ohio Department of Natural Resources, *Descriptions of Geologic Map Units*. Retrieved August 2020, from Division of Geological Survey website: http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/Misc_State_Maps&Pubs/mapunits.pdf.

4. Ohio Department of Natural Resources. *ODNR Mines of Ohio Viewer*. Retrieved August 2020, from website: https://gis.ohiodnr.gov/MapViewer/?config=OhioMines

5. Ohio Department of Natural Resources. *Ohio Earthquake Epicenters*. Retrieved August 2020, from Geographic Information Systems website: https://gis.ohiodnr.gov/MapViewer/?config=Earthquakes.

6. Ohio Division of Geological Survey, 1998, Physiographic regions of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2p., scale 1:2,100,000.

7. Ohio Division of Geological Survey, 2006, Bedrock Geologic Map of Ohio: Ohio Division of Geological Survey Map BG-1, version 6.0, scale 1:500,000.

8. Ohio Division of Geological Survey, rev. 2006, Ohio Karst Areas: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2p., scale 1:2,000,000.

9. Ohio Division of Geological Survey, 2005, Glacial Map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2p., scale 1:2,000,000.

10. Ohio Environmental Protection Agency. Drinking Water Source Protection Areas – Groundwater Public Water Systems. Retrieved February 2020, from website: https://oepa.maps.arcgis.com/apps/webappviewer/index.html?id=3b39e11ba7fc43c3b41801e3580e6d21

11. United States Department of Agriculture, Soil Conservation Service, Soil Survey of Champaign County, 1984.

12. United States Department of Agriculture, *Web Soil Survey*. Retrieved February 2020, from Natural Resources Conservation Service-site: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

13. Schmidt, James J., 1985, Ground-Water Resources of Champaign County, Ohio Department of Natural Resources, Division of Water.

Summary: Application - Part 15 of 31 Ex. M (1 of 3) Geology and Hydrogeology Report electronically filed by Christine M.T. Pirik on behalf of Clearview Solar I, LLC