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September 17, 2021

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

Re: **Case No. 20-417-EL-BGN -**In the Matter of the Application of Grover Hill Wind, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio.

Third Supplemental Response to Third Data Request – Second Supplemental Response to Fifth Data Request – Supplemental Response to Sixth Data Request from Staff of the Ohio Power Siting Board - Geotechnical

Dear Ms. Troupe:

Attached please find Grover Hill Wind, LLC's ("Applicant") Supplemental Responses to the Third, Fifth, and Sixth Data Requests from Staff of the Ohio Power Siting Board ("OPSB Staff"). The Applicant provided these responses to OPSB Staff on September 17, 2021.

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

Respectfully submitted,

/s/ *Christine M.T. Pirik*
Christine M.T. Pirik (0029759)
(Counsel of Record)
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CERTIFICATE OF SERVICE

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to these cases. In addition, the undersigned certifies that a copy of the foregoing document is also being served upon the persons below this 17th day of September, 2021.

/s/ Christine M.T. Pirik
Christine M.T. Pirik (0029759)

Counsel:

werner.margard@ohioattorneygeneral.gov

Administrative Law Judge:

greta.see@puco.ohio.gov
david.hicks@puco.ohio.gov

4821-2453-4011 v1 [73809-23]

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of Grover Hill Wind, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio.	))))	Case No: 20-417-EL-BGN

GROVER HILL WIND, LLC 'S
THIRD SUPPLEMENTAL RESPONSE TO THE THIRD DATA REQUEST – SECOND SUPPLEMENTAL RESPONSE TO THE FIFTH DATA REQUEST – SUPPLEMENTAL RESPONSE TO THE SIXTH DATA REQUEST
FROM THE STAFF OF THE OHIO POWER SITING BOARD

On May 3, 2021, as supplemented on June 7, 2021, Grover Hill Wind, LLC ("Applicant") filed an application ("Application") with the Ohio Power Siting Board ("OPSB") proposing to construct a wind-powered electric generation facility in Paulding County, Ohio ("Project"). Now comes the Applicant providing the following Supplemental Responses to the Third, Fifth, and Sixth Data Requests from the OPSB Staff regarding geotechnical information pertaining to the proposed Grover Hill Wind Project.

In response to questions from OPSB Staff regarding the geotechnical investigation, the Applicant had Westwood perform geotechnical studies for the Project Area. Attached please find a memorandum from Westwood summarizing the studies and providing the preliminary results from the studies, as well as the attached preliminary results obtained from the studies.

Respectfully submitted,

/s/ *Christine M.T. Pirik*
Christine M.T. Pirik (0029759)
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MEMORANDUM

Date: September 17, 2021

Re: Data Request for Geotechnical Information and Site Suitability – Grover Hill Wind Farm, Paulding County, Ohio

File: R0015695.00

To: Grover Hill Wind, LLC

From: Eric Hansen and Dean Sather

Introduction

On May 3, 2021, Grover Hill Wind, LLC (Applicant) filed its Application for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio (Facility). The Applicant filed a Supplement to the Application on June 7, 2021. The staff of the Ohio Power Siting Board has requested specific information from the Applicant to support the process of determining the completeness of the application in compliance with the requirements of Ohio Rev. Code §4906.06 (see Case No. 20-417-EL-BGN, Memorandum in Support of Motion for Extension of Time for Determining Completeness, July 2, 2021 [Memorandum]).

Item 8 of the Memorandum requested additional information regarding the geologic features of the project.

> "The Application lacks information concerning site specific geological features for the individual wind turbines, permanent meteorological towers, and collection substation equipment. The Applicant provided a preliminary desktop geohazard assessment (Application, Exhibit G) which did not include the sub-requirements of this rule for foundation locations of the collection substation electrical equipment support structures or permanent meteorological towers. Satisfaction of this requirement typically comes in the form of a geotechnical engineering report. Such a report would typically include, among other things, test boring results, recommended foundation type and appropriate installation methods for wind turbine foundations, collection substation electrical equipment foundations, permanent meteorological towers support structures, and site-specific geologic information required by the rule to resolve any anomalies such as bedrock competency, potential areas requiring blasting, hydrogeology, or other geological conditions prior to foundation design and construction for that equipment and wind turbines."

Westwood Professional Services, Inc. (Westwood) in collaboration with the Applicant prepared this memo to provide additional information and address issues offered in the OPSB Staff data requests.

Survey Design

Subsequently, the Applicant initiated a geotechnical investigation comprised of a combination of field exploration, laboratory testing, engineering analysis, and report preparation to be used in the final engineering design and construction of the project. The scope of the geotechnical investigations include:

1. **Soil Borings** –Standard penetration test (SPT) samples will be collected at 2.5 ft intervals to a depth of 15 ft and every 5 ft thereafter to review the subsurface features of the project area. These investigations will be conducted at all 23 proposed turbine locations, the proposed operations and maintenance (O&M) building location, the substation location, and two proposed MET tower locations.

2. **Electrical Resistivity Testing** – Electrical resistivity surveys will be conducted at nine (9) locations in accordance with ASTM G57 using the Wenner four-electrode method. Resistance measurements will be performed with probe spacing of 5, 10, 20, 30, 50, 100, and 200 feet in both the north/south and east/west directions at one (1) location within the substation footprint. Resistance measurements will be performed with probe spacing of 5, 10, 20, 30, 50, and 100 feet in both the north/south and east/west directions at eight (8) turbine locations.

3. **Geophysical Testing** – Seismic refraction and surface wave surveys will be conducted at five (5) locations to measure P-wave velocities used to assess rock rippability and S-wave velocities to assess dynamic shear modulus of the material. P-wave seismic refraction technique is the most appropriate method for mapping bedrock depth and rippability. P-wave seismic refraction data acquisition will be combined with 1D multi-channel analysis of surface waves (MASW) data acquisition (Rayleigh wave) to develop an S-wave velocity model. P-wave seismic refraction and MASW data will be collected along five (5), 235-foot-long seismic lines at the site to map bedrock rippability and S-wave velocities in the upper 30 to 50 ft. S-wave seismic refraction and Love wave MASW data may also be collected if Raleigh wave data collection is unsuccessful.

4. **Piezometer Installation and Monitoring** – Applicant will install temporary standpipe piezometers at each of the 23 turbine locations to monitor groundwater conditions. The 2-inch diameter PVC pipe piezometers will extend to a depth of approximately 15 feet bgs, with the bottom 5-10 feet screened. Piezometers will extend up to approximately 3-5 feet above ground surface with a PVC screw cap and will be backfilled with sand 2-3’ above the screen and bentonite to the ground surface. The water level will be measured immediately after installation and again later in the Fall.

5. **Laboratory Testing** – Geotechnical laboratory testing will be performed on samples retrieved from the explorations. The number and type of tests may change based on the soil encountered during the field exploration. Our laboratory testing may include the following for each site:
    a. Moisture content
    b. Moisture-density relationship (Proctor)
    c. Grain size analysis
    d. Atterberg limits
    e. Unconfined compression
    f. Consolidation
    g. Thermal resistivity dry-out curves on six (6) bulk soil samples recompacted at natural moisture content to 90% of the standard Proctor maximum dry density
    h. Corrosivity tests including pH, soluble sulfates, and soluble chlorides

6. **Engineering Analysis and Report Preparation** – Based on the findings of our field exploration and laboratory testing, we will perform engineering analyses, develop conclusions, and provide recommendations for geotechnical related aspects. Our final report will be reviewed and sealed by a Professional Engineer (PE) registered in the project state. The geotechnical report will conform to the requirements of the applicable building code and include the following:
    a. Introduction and description of test methods
    b. Discussion of local geologic and subsurface conditions, including groundwater
    c. Discussion and recommendations
        - Soil properties
        - General Earthwork Considerations (i.e., clearing/grubbing, excavations, water control, subgrade preparation, fill placement, cut and fill slopes)
        - General Foundation Considerations (i.e., corrosivity, seismic, frost depth)
        - Turbine foundation design parameters (i.e., bearing capacity, settlement, buoyancy, and rotational stiffness)
        - Substation, O&M, and MET deep and shallow foundation design parameters (i.e., sin friction, end bearing, bearing capacity, settlement)
        - Access road construction
    d. Geotechnical Investigation location map
    e. Soil boring logs
    f. Laboratory test results

The results to be compiled in the final geotechnical report will be directed to provide specific responses to questions regarding geologic issues in Staff Data Requests #5, questions #55 and #56 (received June 29, 2021), and Staff Data Request #6 (received July 19, 2021)

Preliminary Geotechnical Results

Geotechnical field investigations were concluded on September 14, 2021. The following summary has been compiled to provide a preliminary assessment of the geologic features of the project area and an initial assessment of the suitability of the locations included in these investigations to support the construction of the proposed project facilities.

1. **Test Boring Results** – A total of 29 test borings were conducted during the field investigations (23 at proposed turbine locations, 3 at the substation site, 2 at each MET tower location, and 1 at the O&M site). Twenty-six of the 29 test borings yielded any feature of concern. The 3 test borings located at the substation site did show the presence of a shallow fill, possibly remnant of earlier residential occupation. Limited soil correction may be required for the use of slab on grade or conventional shallow strip footings. Shallow pier foundations can be designed to bear on suitable soil below the shallow fill.

2. **Soil Properties** – All 29 of the test borings identified the soils as stiff clays. Only the 3 test borings, located at the substation site exhibited the additional shallow fill component. At this point in the review, the classification of the soils did not produce any issues that would be of concern for staging, constructing, or operating the proposed facility utilizing common spread foundations for the turbines and conventional gravel road construction. Detailed analysis of the soil properties will be included in the final report.

3. **Static Water Level** – (Staff Data Request #3, question #3, received June 25, 2021). Given the potential for perched groundwater discussed within the application, has the Applicant determined

if the turbine foundations are expected to impact the project area hydrogeology? If so, please discuss the extent of that potential impact.

In most of the test borings (23 of the 29 or 79.3%) the Static Water Level was not encountered or registered. This was due, in part, that the measurement taken during drilling and that short term groundwater measurements in clayey soil are typically less reliable due to low permeability. Piezometers were placed within each of the bores at each of the 23 turbine locations. Readings will be collected at a future data after the piezometers have time to equilibrate. It is important to note that the 6 readings acquired during the field investigations indicate a Static Water Level more than 20 feet. This is a greater depth than indicated in wells previously recorded within project footprint. The data compiled to date indicates that the proposed project facilities (turbines, substation, O&M foundations, and MET towers) will not encounter or impact groundwater resources. Final analysis of this feature will be forthcoming in the final geotechnical report.

4. **Bedrock Competency** – Ten of the test borings did not extend into the underlying bedrock. Of the 19 that did penetrate the underlying bedrock, 16 exhibited rock quality competencies greater than 65%. The vuggy nature of the encountered bedrock is likely the result of the weathering of the bedrock surface (saprolite) in the lower portions of the soil profile. This is common for calcareous bedrock formations such as those present across the site.

5. **Presence of Karst Features** – Staff Data Request #3, question #6, received June 25, 2021). Exhibit G (Desktop Geohazard Assessment by Westwood) Executive Summary indicates the desktop assessment "has revealed no subsurface conditions that would preclude the development of the proposed wind project." Exhibit 8 shows conditions (carbonate bedrock overlain by less than 20 feet of glacial drift) necessary for karst feature development exists. If karst features are identified during construction, what mitigation efforts will be pursued to ensure adequate foundations for all wind facility equipment?

   No karst features were encountered in the test borings. This is based on observations during drilling such as barrel drop or loss of drilling fluids.

6. **Depth to Bedrock** – The depth to bedrock encountered during the field investigations ranged from 16 to 35 feet, with an average of 24 feet. The indicated depth to bedrock is well below the estimated 11 foot depth of the Spread Footing Foundation currently recommended for construction.

7. **Bedrock Contact Description** – In all test borings, the bedrock contact is described as weathered rock/saprolite that transitions to competent bedrock. There are no indications that the quality of the underlying bedrock in the areas surrounding the proposed project facilities will be impacted by bedrock integrity concerns.

8. **Blasting Requirements** – As the observed depth to bedrock ranges between 16 and 35 feet below grade, it is anticipated that no blasting or ripping of bedrock will be required for the construction of facility foundations. The Spread Footing Foundations currently recommended for turbine foundations are not expected to extend more than 11 feet below grade and are not expected to encounter bedrock. The potential drilled Pier foundations recommended for the Substation, O&M, and MET Towers are not expected to extend beyond 6-8 feet below grade; also avoiding bedrock.

9. **Hydrogeologic Concerns** – (Staff Data Request #3, question #3, received June 25, 2021 – see response 3 above). The preliminary data affirms that wind project is expected to have a no impact on groundwater resources in the project area. This finding is based on a review of regional well data and project-specific data collected in the preliminary geotechnical exploration.

   Regionally, data was evaluated from 67 wells previously recorded within project footprint. As summarized in the attached table (Attachment A), static water levels average 14.2 feet below ground surface (bgs) north of Highway 14 and 13.3 feet bgs south of Highway 14. Overall, well depth ranges from 40 to 101 feet and averages 55 feet in depth. These wells are completed in the limestone bedrock, which is encountered at an average depth of 26.8 feet below grade across the project area.

   This Ohio Department of Natural Resources data is supported by the findings of the preliminary geotechnical study. During the drilling operations, groundwater was encountered between 21-30 feet bgs in 6 of the 29 borings. Piezometers were placed within each of the bores at each of the 23 turbine locations. Readings will be collected at a future data after the piezometers have time to equilibrate. It is important to note that the 6 readings acquired during the field investigations indicate a Static Water Level more than 20 feet. This is a greater depth than indicated in wells previously recorded within project footprint. This depth is below the anticipated shallow spread footing depth of 11 feet bgs. Again, piezometers were placed within each of the bores at each of the 23 turbine locations. Readings will be collected at a future data after the piezometers have time to equilibrate. Once this data is collected and processed, it will be made available to the OPSB Staff for review. The results of this study will also be included in the final geotechnical report.

   Based on these data, the project will not have short term impact on the regional groundwater because no dewatering is needed for foundation construction. Additionally, long-term impacts are not expected because the shallow spread footings will not intersect the regional shallow water table. Should bedrock anchored pile be needed, regional drinking water wells will not be impacted because pile embedment depths are typically 5-10 feet for limestone formations such as that underlying the project area. Static water level in regional wells averages 10-11 feet below the top of the bedrock formation. Surface water hydrology and infiltration will not be altered based on the wide distribution of the turbine footings across the project area and the low total impervious area of the foundation and access road systems. This distribution, along with the continued agricultural use of the project area, allows continued infiltration of surface water, which is regionally managed by extensive drain tile networks.

10. **Recommended Foundation Type** – Following the completion of detailed geotechnical explorations prior to the commencement of construction, suitable foundation systems will be designed for each proposed turbine site. Spread footing foundations are currently being recommended and a design depth of 11 feet is typical for the proposed turbines.

    The footing portion is octagonal and spreads out below grade approximately 50 feet in diameter. The pedestal portion is a concrete cylinder rising approximately 3 feet above the foundation. The anchor bolt cage for the spread footing foundation consists of steel tie rods within PVC sleeves. At the top and bottom of the cage are embedment rings which hold the tie rods in alignment. The anchor bolt cage extends from the bottom of the footing through the top of the pedestal providing anchors for the turbine tower. The excavation area around and over the foundation will be backfilled with material excavated from on-site. The top of the foundation will be a nominal

18-foot diameter pedestal that typically extends 6 to 8 inches above grade and is surrounded by a 10-foot wide gravel ring. At the base of each tower, an area approximately 120 feet by 60 feet will be developed as a level, compacted stone crane pad for use during construction and will be within the temporary construction workspace.

11. **Foundation Installation Method** – Foundation construction is completed in stages, dictated by landscape features and foundation type. Specific stages may include foundation pit excavation, outer concrete form setting, rebar and bolt cage assembly, pouring, casting, and finishing of the concrete, exterior concrete form removal, foundation pit backfilling and compacting, and foundation site and workspace area restoration. Excavation and foundation construction will be conducted in the manner that will minimize the dimensions of the workspace and the duration that the open excavated areas are required to be open to install the foundations.

    Preparation activities at individual tower sites may involve the removal of vegetative cover and the grading topsoil within a 120-foot radius around each tower (the placement and orientation of the workspace can be adjusted to avoid sensitive ecological resources or to comply with landowner wishes). If located in agricultural land, the topsoil within the 120-foot radius of the workspace will be stripped, segregated, and stockpiled. An excavator will be used to dig the foundation pit. All subsoil and rock materials will be segregated from topsoil during the excavation process.

Recommendations

The data collected during the preliminary geotechnical investigation of the Grover Hill Project, as summarized in the attached preliminary spreadsheet (Attachment B), indicate the site is suitable for the construction of the proposed project facilities with conventional design and construction methods.

This memo has been prepared for the exclusive use by Starwood Energy Group for the Grover Hill Wind Project. The preliminary geotechnical assessment summarized in this memo is based on a review of raw field data and initial visual assessments. The primary focus of this memo was to provide baseline geotechnical data regarding site suitability for the proposed facilities of the Grover Hill Wind Project. Subsequent detailed summaries of the geotechnical investigation necessary to validate conditions and more accurately characterize the geologic features and subsurface conditions of the project will be compiled and presented to the OPSB. The field investigations began the week of August 30, 2021 and completed September 14, 2021. The lab analysis and report compile are estimated to take an additional 6 weeks to complete (through October 29, 2021). The Applicant anticipates having the completed geotechnical report ready to provide to the OPSB by the first week of November, for review and inclusion in the OPSB staff report.

Please contact us if you have any questions.

Sincerely,
WESTWOOD PROFFESSIONAL SERVICES, INC.

Eric Hansen
Director, Environmental Services

Dean T. Sather
Senior Project Manager

		Well #	depth	bed	swl
11	1	319360	75	41	18
	2	319368	43	0	21
	3	2000977	52	51	14
12	4	56307	63	35	14
	5	412735	50	31	14
13	6	821639	44	28	14
	7	367454	50	25	10
	8	194007	60	24	12
14	9	62045	47	28	8
	10	86002	42	38	12
	11	935837	51	24	20
	12	2048969	50	42	11
15	13	910672	49	34	16
	14	2045558	101	31	32
	15	855222	48	31	25
22	16	371625	70	24	12
	17	353504	56	24	10
	18	86069	60	28	6
	19	371606	52	25	9
	20	212492	48	28	7
23	21	1001558	57	28	18
	22	2014134	57	54	20
	23	821581	44	25	14
	24	184136	40	21	10
	25	91518	42	20	6
	26	288724	55	25	12
24	27	194036	55	26	11
	28	142504	50	26	7
	29	2032338	83	21	25
	30	2045946	66	63	18
	31	2043471	70	22	20
	32	142550	44	21	9
	33	708396	69	22	10
	34	638156	40	25	17
Avg N 3/5			55.38	29.14	14.17
25	35	747625	42	27	16
	36	855318	67	24	18
	37	2005622	63	29	16
	38	117250	70	48	12
26	39	91534	50	20	8
	40	906329	52	24	22
	41	987159	58	22	20
	42	306058	40	21	17
	43	62030	58	22	8
27	44	2005239	56	16	20
	45	62010	55	27	6

		Well #	depth	bed	swl
	46	2025996	76	21	25
	47	267462	55	21	7
	48	319393	50	18	9
	49	972099	51	15	14
34	50	142513	40	20	6
	51	811882	43	25	14
	52	2056880	63	26	12
	53	2023380	55	16	12
	54	267489	45	19	6
	55	228147	50	20	8
	56	228144	44	29	9
35	57	784858	48	26	16
	58	117222	63	39	14
	59	2005621	55	27	14
	60	104764	89	24	6
	61	333483	52	24	12
36	62	906325	50	0	20
	63	86070	52	20	6
	64	881922	61	27	16
	65	644831	34	23	17
	66	2025065	74	70	17
	67	257816	65	17	16
Avg S 2/5			55.33	24.45	13.3
Avg Cmp.			55.35	26.83	13.74

Website: Ohio Geology Interactive Map

https://gis.ohiodnr.gov/website/dgs/geologyviewer/#

9/16/2021

4906	4906-4-09(A)(2)(b)(ii)
OPSB	OPSB Memo 7/2/21

		4906	4906	4906		4906	4906	4906		OPSB	OPSB	OPSB
Bore Location	**Test Boring Results**	**Soil Properties**	**Static Water Level****	**Bedrock/Rock Quality Competency**	**Karst/Dissolution Features Present (Y/N)**	**Percent recovery**	**Depth to Bedrock**	**Bedrock Contact Description**	**Blasting Requirements**	**Hydrogeologic Concerns**	**Recommended Foundation Type**	**Foundation Installation Method**
Met Tower	No concerns	Stiff clay	DNE*	No coring	-	-	23.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
Met Tower	No concerns	Stiff clay	DNE*	No coring	-	-	18	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
O&M	No concerns	Fill, Stiff clay	DNE*	No coring	-	-	21.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
Substation 1	Shallow fill present	Fill, Stiff clay	DNE*	97%	Vuggy texture	100%	21	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
Substation 2	Shallow fill present	Fill, Stiff clay	DNE*	No coring	-	-	21	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
Substation 3	Shallow fill present	Fill, Stiff clay	DNE*	No coring	-	-	21	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing / Drilled Pier	Conventional excavation
Turbine 11	No concerns	Stiff clay	30*	No coring	-	-	31	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 13	No concerns	Stiff clay	DNE	No coring	-	-	30	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 14	No concerns	Stiff clay	22*	13% / 73%	Vuggy texture	72% / 87%	27	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 15	No concerns	Stiff clay	DNE	No coring	-	-	30	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 16	No concerns	Stiff clay	DNE*	77%	Vuggy texture	77%	27.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 17	No concerns	Stiff clay	22*	50%	Vuggy texture	87%	27.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 25	No concerns	Stiff clay	DNE*	68%	Vuggy texture, two 3" bit drops	87%	26	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 26	No concerns	Stiff clay	DNE*	75%	Vuggy texture	97%	29	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 27	No concerns	Stiff clay	DNE*	90%	Vuggy texture	100%	25	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 28	No concerns	Stiff clay	22*	78%	Vuggy texture	90%	22	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 29	No concerns	Stiff clay	DNE*	45%	Vuggy texture	100%	23	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 30	No concerns	Stiff clay	DNE*	80%	Vuggy texture	100%	16	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 31	No concerns	Stiff clay	DNE*	20%	Vuggy texture, 9' soil infilling	20%	26.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 32	No concerns	Stiff clay	DNE*	85%	Vuggy texture	100%	19	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 33	No concerns	Stiff clay	DNE*	75%	-	100%	22	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 34	No concerns	Stiff clay	DNE*	67%	Vuggy texture	95%	17	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 35	No concerns	Stiff clay	DNE*	83%	Vuggy texture	100%	17.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 36	No concerns	Stiff clay	DNE*	72%	Vuggy texture	100%	25	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 37	No concerns	Stiff clay	DNE*	70%	Vuggy texture	100%	17	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 38	No concerns	Stiff clay	DNE*	100%	Vuggy texture	100%	21.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 40	No concerns	Stiff clay	DNE	No coring	-	-	35	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 41	No concerns	Stiff clay	25*	No coring	-	-	34	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation
Turbine 43	No concerns	Stiff clay	21.5*	68%	Vuggy texture	95%	21.5	Weathered rock/saprolite transitioning into competent bedrock	None	None	Spread footing	Conventional excavation

*Measurement taken during drilling. Short term groundwater measurements in clayey soil are typically less reliable due to low permeability.

**Additional piezometer readings to be taken at a later date after piezometers have time to equilibrate.

Summary: Response - Third Supplemental Response to Third Data Request – Second Supplemental Response to Fifth Data Request – Supplemental Response to Sixth Data Request from Staff of the Ohio Power Siting Board - Geotechnical electronically filed by Christine M.T. Pirik on behalf of Grover Hill Wind, LLC