# **Exhibit B Updated Geological Report**

RRC

**September 30, 2021** 



# **Geotechnical Report**

# EMERSON CREEK WIND PROJECT ERIE AND HURON COUNTIES, OHIO

Prepared By:



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September 30, 2021 RRC Project No. MD1901007



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September 30, 2021

Apex Clean Energy, Inc. 310 Fourth Street NE, Suite 300 Charlottesville, VA 22902

Attn: Mr. Clay Parrish

Re: Geotechnical Report

Emerson Creek Wind Project Erie and Huron Counties, Ohio RRC Project No. MD1901007

Dear Mr. Parrish:

RRC Power & Energy, LLC (RRC) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed Emerson Creek Wind Project.

The purpose of the geotechnical engineering study was to explore and evaluate subsurface conditions at selected locations across the site, and to develop geotechnical design and construction recommendations for the project. Final Geotechnical Report for Emerson Creek Wind Project dated was submitted on March 6, 2020. Upon request by the Client, RRC performed supplemental geotechnical investigations at relocated WTG sites T10a, T57a, T59a, T64a, T71a, and T78a. Additional geotechnical and geophysical investigations were performed to further evaluate the karst risk at WTG sites T25, T26, and T75. Current version of the final geotechnical report is updated to include the results and recommendations based on supplemental geotechnical investigation at sites discussed above. This final Geotechnical Report supersedes the version dated April 29, 2020.

We appreciate the opportunity to be of service to Apex Clean Energy, Inc. We are prepared to provide construction materials testing services during the construction phase of the project. Please call us if you have any questions concerning this report or any of our services.

Respectfully submitted,

RRC Power & Energy, LLC (RRC)

Seounghyun "Brian" Rho, Ph.D., E.I.T.

Geotechnical Engineer

#### **GEOTECHNICAL REPORT**

### **EMERSON CREEK WIND PROJECT ERIE AND HURON COUNTIES, OHIO**

prepared for

### APEX CLEAN ENERGY, INC. CHARLOTTESVILLE, VIRGINIA

Revision	Date	Description
	8/2/2019	Draft V1
	2/7/2020	Draft V2
0	3/6/2020	Final Submittal
1	4/29/2020	<ul><li>Appendix A: Update Table A1</li><li>Appendix A: Add Table A4</li></ul>
2	10/30/2021	<ul> <li>Supplemental geotechnical investigations at relocated WTG locations T10a, T57a, T59a, T64a, T71a and T78a</li> <li>2-D El Survey at WTG's T25, T26, T42 and T75 for karst risk assessment. Supplemental confirmation borings WTG's T25, T26 and T75.</li> <li>Updated Section 5.1, Table A1, and Table A2 based on WTG T66a</li> </ul>

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### **TABLE OF CONTENTS**

		Pa	age
1.0	INTRO	DDUCTION	1
2.0	PROF	OSED CONSTRUCTION	1
		EXPLORATION	
5.0	3.1		
	3.1	Field Exploration and Testing	
4.0		URFACE CONDITIONS	
	4.1	Geology	5
	4.2	Subsurface Stratigraphy	
	4.3	Laboratory Test Results	
	4.4	Groundwater Conditions	
	4.5	Geophysical Properties	
	4.6	Rho Thermal Resistivity Surveys	
	4.7	Preliminary Geohazard Assessment	
5.0	<b>GEOT</b>	ECHNICAL RECOMMENDATIONS	.14
	5.1	General	.14
	5.2	Turbine Gravity Foundation System	.18
	5.3	Substation and O&M Building Shallow Foundation System	
	5.4	Substation Deep Foundation Systems	
	5.5	Lateral Earth Pressures	
	5.6	Seismic Considerations	
6.0	FOUN	IDATION CONSTRUCTION CRITERIA	.23
	6.1	Site Preparation	.23
	6.2	On-Site Excavated Materials as Overburden Backfill	.23
	6.3	Structural Fill Specifications	
	6.4	Reuse of On-site Materials as Structural Fill Below Foundation	
	6.5	Shallow Foundation Construction	
	6.6	Drilled Pier Foundation Construction	
	6.7	Open Excavations	
	6.8	Corrosivity	
	6.9	Drainage and Construction Dewatering	
	6.10	Foundation Excavation and Rippability	
	6.11	Access Roadways and Crane Pads Design and Construction Recommendations	
	6.12 6.13	Foundation Grout and Compaction Injection	
7 C		Permanent Slope Configuration	
		DENCES	
× 11	~	Peru es	~ /



#### **APPENDICES**

#### **APPENDIX A**

**Table A1:** Summary of Foundation Design Net Allowable Bearing Pressure and Design Groundwater Recommendations

Table A2: Summary of Geographic Coordinates and Subsurface Exploration

Table A3: Well Log Information Obtained from the Ohio Department of Natural Resources

Table A4: Summary of Utility Locate Tickets (Ohio 811)

Figure 1: Site Location Map

Figure 2: WTG Boring Locations on a Topographic Map

Figure 3: Substation and O&M Building Boring Locations Map

Figure 4: MASW Survey Locations Map

Figure 5: Electrical Resistivity (ER) Testing Locations Map

Figure 6: Thermal Resistivity (TR) Testing Locations Map

Figure 7: Site Vicinity Geologic Map

Figure 8: Site Vicinity Bedrock Geologic Map

Figure 9: Site Vicinity Karst Map

Figure 10: Well Locations Obtained from the Ohio Department of Natural Resources

Figure 11: Weighted Average Shear Wave Velocity at Selected WTG Sites

Figure 12: Electrical Imaging Testing at Selected WTG Sites

Figure 13: Percolation Test Locations Map

Boring Log Key

**Logs of Boring** 

#### **APPENDIX B**

Maximum Dry Density - Optimum Moisture Content Relationships - ASTM D698

Unconsolidated-Undrained Triaxial Test Results – ASTM D2850

Uniaxial Compressive Strength Test Results – ASTM D7012

Uniaxial Compressive Strength of Intact Rock Cores Test Results – ASTM D7012

One-Dimensional Consolidation Test Results – ASTM D2435

Minimum Soil Box Resistivity and pH Test Results – ASTM G51 and ASTM G187

Chloride and Sulfate Test Results – AASHTO T291 and ASTM C1580

Laboratory CBR (California Bearing Ratio) Test Results – ASTM D1883

Grain Size Distribution Test Results – ASTM D6913

Summary of Laboratory Results

#### **APPENDIX C**

MASW Survey Results

**Electrical Resistivity Survey Results** 

Thermal Resistivity Test Report

#### APPENDIX D

Deep Foundation Recommendations for Substation



#### **GEOTECHNICAL REPORT**

## EMERSON CREEK WIND PROJECT ERIE AND HURON COUNTIES, OHIO

#### 1.0 INTRODUCTION

RRC has completed the authorized final subsurface exploration and geotechnical engineering evaluation for the proposed Emerson Creek Wind Project. The site is located within Erie and Huron Counties near Bellevue, Ohio. The approximate location of the project site is shown in Figure 1, Site Location Map, within Appendix A.

The purpose of this investigation was to:

- Explore subsurface soil, bedrock and groundwater conditions;
- Conduct field and laboratory testing to characterize the subsurface soil and bedrock properties at selected locations across the site; and
- Provide geotechnical engineering parameters for the design of foundation systems and access roadways.

The recommendations contained in this report are based upon results of field and laboratory testing, engineering analyses, experience with similar soil and bedrock conditions, and our understanding of the proposed project.

As part of the scope of work for the final phase site investigation, RRC performed 1-D Multi-Channel Analysis of Surface Waves (MASW) and Electrical Resistivity surveys at designated locations across the project site. RRC collected shallow soil samples from selected locations within the project site and transported the samples to RRC's laboratory and Geotherm, USA to obtain the relationships of the maximum dry density with the optimum moisture content, California Bearing Ratio (CBR) testing and thermal resistivity testing. In addition, RRC performed electrical imaging (EI) surveys at selected turbine locations.

Our recommendations contained herein are also based on in-situ geophysical survey results, interpretation of published geological maps, and groundwater level data collected from published well logs.

#### 2.0 PROPOSED CONSTRUCTION

We understand this phase of this project will consist of the construction of approximately 300 MW of wind power provided by about 52 to 71 unspecified wind turbine generators (WTG's) and associated facilities, which will be selected from the locations included within the turbine layout used in this study. Anticipated unfactored loads for WTG's are not available during the preparation of this geotechnical report.



The WTG's are anticipated to be supported on gravity foundation systems with an anticipated embedment depth of about 12 feet below the finished grade. We have assumed the finished turbine pad grade is at or slightly above the existing ground surface. Private-access roadways will most likely be surfaced with imported road-base materials from nearby quarry pits to support construction and vehicular traffic loads during and after construction.

#### 3.0 SITE EXPLORATION

RRC conducted drilling conventional geotechnical borings at 80 proposed WTG locations, substation location and O&M Building location from April 1, 2019 to December 20, 2019. In addition, a total of 5 test pits were excavated to perform in-situ Thermal Resistivity testing by Geotherm, and bulk soil samples were collected at depths of about 2 to 4 feet for Thermal Resistivity (TR) tests at locations provided by Apex Clean Energy Management, LLC.

RRC drilled additional conventional boreholes at six relocated WTG locations, Turbine Nos. T-10a, T-57a, T-59a, T-64a, T-71a, and T-78a. This supplemental scope occurred on May 18, 2021 and during the period of July 28 to July 30, 2021.

As part of the supplementary investigation, RRC performed 2D Electrical Imaging surveys at Turbine Nos. 25, 26, 42, and 75 during the period of August 10 through August 13, 2021. Based on the results of El profile, a total of 3 confirmation borings were drilled within footprint of each WTG site (T-25, T-26 and T-75) to correlate soil/bedrock profile. Confirmation borings were drilled during the period of August 18 to August 24, 2021. The borings were drilled to a depth of approximately 35 feet below existing site grade at the WTG sites. RRC's geotechnical design letter Emerson Creek Wind Project – Karst Assessment T-25, T-26, T-42 and T-75 dated September 13, 2021, presents our finding and recommendations for these sites.

Figure 2 within Appendix A shows WTG Boring Locations on a Topographic Map. Figure 3 within Appendix A shows Substation and O&M Building boring locations drilled as part of the site investigation. Figure 4 shows the MASW survey locations. Figure 5 shows the Electrical Resistivity testing locations. Figure 6 shows the Thermal Resistivity testing locations.

Engineering properties of the subsurface materials were assessed through laboratory testing on selected soil and bedrock samples. The following section describes our site exploration program in detail.

#### 3.1 Field Exploration and Testing

A summary of geographic latitude and longitude coordinates and depth of each boring drilled as part of this subsurface exploration program is presented in Table A2 within Appendix A.

The borings conducted in 2019 were advanced with two track-mounted drill rigs utilizing continuous flight hollow stem augers to a depth of practical auger refusal. For the new scope in 2021, we utilized track/ATV-mounted Mobile B57 drill rigs and drillers used solid and/or hollow



stem augers to a depth of practical auger refusal. Disturbed samples were obtained using Standard Penetration Test (SPT) samplers. Representative bulk samples of the subgrade materials were also obtained from selected locations for maximum dry density-optimum moisture content relationships, laboratory thermal resistivity testing and CBR testing.

Disturbed samples were obtained using Standard Penetration Test (SPT) samplers. Penetration resistance values were recorded using methods based on the standard penetration test (SPT), in accordance with ASTM D1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. This test consists of driving the sampler into the ground utilizing a 140-pound hammer with a free-falling distance of 30 inches. The number of blows required to advance the sampler 18 inches is counted and recorded, with the sum of the blows to drive the last 12 inches. The sum of the blows driving the sampler for the last 12 inches was referred to as the standard penetration resistance value (N-value) for SPT samplers. Results of the field tests are shown on the logs of boring under the "Field Data" column and are preceded by the letter "N". Subsurface materials were collected from the SPT samplers in the field, visually classified, placed in plastic bags, and labeled as to location and depth. All SPT samples were arranged in core boxes and transported to the laboratory for further analysis.

NX/NQ coring techniques, with about 2-inch inside diameter NX/NQ wire-line core barrels, were utilized to advance the borings from a depth of practical auger refusal to the full depth of exploration. The rock-like materials were qualitatively evaluated using the Rock Quality Designation (RQD) index system. The RQD is a modified core recovery percentage in which all of the pieces of sound core greater than 4 inches long are summed and divided by the length of the core run (generally 5 to 10 feet). The RQD values are shown on the logs of boring under the "Field Data" column. Core run intervals are typically 60 to 120 inches in length and are delineated on the logs of boring. The RQD values are categorized according to Table 3.1.1 presented below in accordance with ASTM D6032. All rock core samples were arranged in core boxes and transported to the laboratory for further analysis.

Table 3.1.1 Rock Quality Designation

RQD (%)	Rock Quality
0 – 25	Very Poor
25 – 50	Poor
50 – 75	Fair
75 – 90	Good
90 – 100	Excellent

Soils were classified in general accordance with the Unified Soil Classification System (USCS); ASTM D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The soil and bedrock classification symbols appear on the logs of boring and are briefly described in Appendix A. Bedrock materials were classified in general accordance with



the general notes for rock classification included as part of ASTM D5878: Standard Guides for Using Rock-Mass Classification Systems for Engineering Purposes. Bedrock percent recovery and rock quality designation (RQD) were recorded in accordance with ASTM D6032: Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core.

Field logs were prepared for each boring at the time of drilling by RRC's field geologist and field engineer. The project engineer and geologist reviewed each field logs of boring and the soil and bedrock samples, and appropriate modifications were made if necessary.

The field logs of boring contain visual classification of the materials encountered during drilling as well as the interpretation of the subsurface conditions between samples. Final logs of boring, included in Appendix A, represent our interpretation of the field logs of boring and necessary modifications based on laboratory testing performed on select samples. The final logs of boring describe the materials encountered, their approximate thickness, and the various depths at which the samples were obtained.

The field testing and sampling were conducted in general accordance with the requirements of the following:

- ASTM D1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils;
- ASTM D6032: Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core; and
- Locally accepted practices in this area.

During the field operations, the borings were observed for groundwater levels and noted at the top of the logs of boring. Following the completion of the drilling operations, the borings were backfilled in accordance with the state regulations.

#### 3.2 Laboratory Analysis

The soil/bedrock samples were returned to the laboratory, examined by the project engineer and geologist, and applicable laboratory testing was assigned on selected soil/bedrock samples. Laboratory testing was performed in general accordance with ASTM and locally accepted practices. The following laboratory methods of analyses were generally utilized, where sample quality allowed:

- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System): ASTM D2487;
- Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass: ASTM D2216;
- Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils: ASTM D4318;
- Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-μm)
   Sieve: ASTM D1140;



- Standard Test Method for Particle-Size Analysis of Soils: ASTM D6913;
- Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures: ASTM D7012;
- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort: ASTM D698;
- Standard Test Methods for California Bearing Ratio (CBR) of Laboratory-Compacted Soils: ASTM D1883:
- Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method: ASTM G187;
- Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing: ASTM G51:
- Standard Test Method for Water-Soluble Sulfate in Soil: ASTM C1580; and
- Standard Method of Test for Determining Water-Soluble Chloride Content in Soil: AASHTO T291.

#### 4.0 SUBSURFACE CONDITIONS

#### 4.1 Geology

The geologic interpretations contained herein are based on available geological maps and literature, and review of the logs of excavation as part of this study. Sedimentary rock from the Devonian Period constitutes the bedrock geology across project site. Shale and Limestone are the major rock types found within the rock formations locally. Overlying the area bedrock are glacial till deposits from the Quaternary Period. The Geologic map of the Lorain and Put-in-Bay 30' x 60' quadrangle and Quaternary geologic map of the Lake Erie 4° x 6° quadrangle, United States (References 1 and 2), indicate that the subsurface materials on the site consist of the following geologic units of the listed geologic time periods.

#### **Quaternary Period**

• Clayey Till (tca): Yellowish-brown, pale-brown, brown, or grayish-brown to gray calcareous silty clay loam and clay loam, locally overlain by peat or swamp deposits. Generally 6 to 30 feet thick. Consists of both ground moraine and end moraine glacial deposits.

#### **Devonian Period**

- **Shale** (Sh): Ohio Shale, black to brown, silty, carboniferous, fissile parted shale with gray to green soft clay shale beds.
- Shale with minor Limestone (S-L): Prout Limestone, Plum Brook Shale, and Olentangy Shale. The Prout Limestone is hard, siliceous, gray to brown limestone 3 to 10 feet thick and underlain by the Plum Brook Shale which is a gray to green, soft, fossiliferous and calcareous clay shale 50 to 80 feet thick. South of the Plum Brook is the Olentangy Shale which is a greenish-gray, calcareous, slightly fossiliferous clay shale.



• Limestone (Ls): Delaware and Columbus Limestones. Delaware Limestone is medium brown, fine to medium crystalline, fossiliferous and cherty with thin shale layers. Columbus Limestone is light to medium gray to brown, fine to coarse crystalline, fossiliferous and cherty. The lower portion of the Columbus is light brown to gray, dolomitic, massively bedded and contains quartz grains in the basal ten feet. Combined the Delaware and Columbus Limestones are 200 feet thick.

Figure 7 and 8 in Appendix A shows the project boundaries approximately plotted on geologic and bedrock geologic maps.

Based on the available geologic maps and studies, WTG foundation sites in the northwestern portion of the project site are located within an area where carbonate rocks (limestone) are present and may be susceptible to karst features such as voids and other solution cavities. Karst features typically occur in limestone, dolomite, or dolomitic limestone bedrock, as well as evaporite deposits such as gypsum. Figure 9 within Appendix A depicts the project boundaries in conjunction with mapped karst zones near the project site.

#### 4.2 Subsurface Stratigraphy

As indicated on the logs of boring for locations drilled as part of this study, native soils were encountered approximately beneath 0 to 18 inches of the topsoil and extended to the top of the bedrock at depths ranging from approximately 2 to 49 feet below the existing ground surface or extended to the full depth of exploration. The native soils generally consisted of the following:

- Soft to hard lean to fat clay with varying amounts of silt, sand and gravel;
- Loose to very dense sand with varying amounts of clay, silt and gravel;
- Medium dense to very dense gravel with varying amounts of clay, silt and sand.

Limestone and Shale are the predominant types of bedrock encountered across the site. When encountered, the limestone/shale bedrock extended to the full depth of exploration. Some limestone formations exhibited potential open voids or fissures within the bedrock matrix such as WTG sites T-24 and T-43. The limestone/shale bedrock materials encountered in the borings were very hard based upon SPT N Values.

The limestone/shale bedrock encountered in the borings varied from soft to hard in rock hardness. Some limestone/shale formations exhibited slightly to highly weathered seams and layers. Fractures in the limestone were noted to be filled with clay or sand at some locations. In addition, the limestone bedrock encountered exhibited vuggy characteristics. The bedrock materials ranged from Very Poor to Excellent in terms of Rock Quality.

It should be noted loss of drilling fluids and/or potential voids were observed within the limestone in some of borings. The potential voids observed were based on core barrel drops, sudden loss of drilling fluid circulation and poor core recovery as observed by the drillers, field engineer and field geologist during the coring operations. Sudden loss of fluid circulation may



indicate the presence of open voids and/or fractures within the limestone. These WTG locations are summarized in Table A1 within Appendix A.

The above descriptions are general and depth ranges shown on the logs of boring are approximate because boundaries between different strata are seldom clear and abrupt in the field. In addition, the lines separating major strata types do not necessarily represent distinct lines of demarcation of the various strata. Detailed logs of boring for locations drilled as part of this study, which present the stratum descriptions, types of sampling used and laboratory test data, are presented in Appendix A. The Boring Log Key, defining the terms and descriptive symbols used on each log of boring, is also presented in Appendix A.

#### 4.3 Laboratory Test Results

Standard Proctor tests were performed to obtain the maximum dry unit weight and optimum moisture content in accordance with ASTM D698 on representative bulk soil samples collected at selected locations as part of this study. A summary of the test results is presented in Table 4.3.1.

Table 4.3.1 Summary of Standard Proctor Test Results

Sample Location	Depth (feet)	Material Type	Liquid Limit (%)	Plasticity Index (%)	Maximum Dry Unit Weight (pcf)	Optimum Moisture Content (%)
TR-1 (T-63)	2 to 4	CH	51	31	102.9	21.0
TR-2 (T-48)	2 to 4	CL	41	22	107.0	18.3
TR-3	2 to 4	CL	37	18	107.4	18.0
TR-4 (T-08)	2 to 4	CL	27	11	113.1	14.5
TR-5 (SUB)	2 to 4	CL	46	27	101.1	20.3

Notes: % = percent; pcf = pounds per cubic foot; CL = Lean Clay; CH = Fat Clay.

Results of Unconsolidated-Undrained (UU) Triaxial tests performed, in accordance with ASTM D2850, on undisturbed soil samples from selected boring locations are summarized in Table 4.3.2.

Table 4.3.2 Summary of Unconsolidated-Undrained Triaxial Test Results

Boring No.	Depth (feet)	Material Type	Confining Pressure (psi)	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Undrained Shear Strength, <i>S</i> <sub>u</sub> (psf)
T-58	12	CL	9.5	120.9	14.7	2,050
T-66	24	CL	19.0	116.6	17.2	2,770
T-82	24	CL	19.0	110.3	20.7	1,480
T-83	21	CL	16.0	115.0	18.4	1,460

Notes: pcf = pounds per cubic foot; % = percent; CL = Lean Clay.

Results of Unconfined Compressive Strength (UC) tests performed, in accordance with ASTM D2166, on undisturbed soil samples are summarized in Table 4.3.3.



Table 4.3.3 Summary of Unconfined Compressive Strength Test Results

Sample Location	Depth (feet)	Material Type	In-situ Dry Unit Weight (pcf)	In-situ Moisture Content (%)	Unconfined Compressive Strength, q <sub>u</sub> (psf)
T-65	24	CL	120.8	14.8	9,040
T-70	34	CL	120.7	15.4	7,320

Notes: pcf = pounds per cubic foot; % = percent; psf = pounds per square foot; CL = Lean Clay.

Results of rock core compressive strength testing performed in accordance with ASTM D7012 on selected rock core samples will be summarized in Table 4.3.4.

Table 4.3.4 Summary of Rock Core Compressive Strength Test Results

Sample Location	Depth (feet)	Material Type	Unit Weight (pcf)	Compressive Strength of Rock Cores, q <sub>u</sub> (tsf)
T-01	8	LIMESTONE	168.4	1,065
T-07	17	LIMESTONE	165.3	1,099
T-20B	15	LIMESTONE	165.7	923
T25-B2	18	LIMESTONE	174.4	1,074
T-30	21	SHALE	163.0	357
T-34	12.5	LIMESTONE	164.3	849
T-36	16	SHALE	148.2	922
T-43	16	LIMESTONE	174.7	1,092
T-45B	29	SHALE	153.7	734
T-75	13	LIMESTONE	182.7	1,613
T-87	12.5	LIMESTONE	168.3	784

One-dimensional consolidation tests were performed in accordance with ASTM D2435, on selected relatively undisturbed soil samples. Results of these tests are summarized in Table 4.3.5.

Table 4.3.5 Summary of 1-D Consolidation Test Results

Sample Location	Depth (feet)	Material Type	σ' <sub>vo</sub> (psf)	<i>p</i> ' <sub>c</sub> (psf)	C <sub>c</sub>	<b>C</b> r	<b>e</b> <sub>o</sub>	OCR
T-66	24	CL	2,074	4,200	0.103	0.015	0.479	2.0
T-82	24	CL	2,260	2,300	0.097	0.013	0.495	1.0

Notes: psf = pounds per square foot;  $\sigma'_{vo}$ = estimated in-situ Effective Vertical Stress;  $p'_c$  = Preconsolidation Pressure;  $C_c$  = Compression Index;  $C_r$  = Recompression Index;  $e_o$  = Initial Void Ratio; OCR = Over-consolidation Ratio; CL = Lean Clay.

Results of water-soluble sulfate and chloride testing performed in accordance with ASTM C1580 and AASHTO T-290 on shallow soil samples from selected borings will be summarized in Table 4.3.6.



Table 4.3.6 Summary of Sulfate and Chloride Contents

Sample Location	Depth (feet)	Material Type	Chloride Contents (% by weight)	Sulfate Contents (% by weight)
T-06	4	CL	ND	0.0021
T-26	4	CL	ND	0.0022
T-45A	1	CL	ND	0.0111
T-54	4	CL	0.0014	0.0136
T-66	4	CL	ND	0.0048
SUB-1	4	CL	ND	0.0081

Notes: % = percent; ND = Not Detected; CL = Lean Clay.

Results of Minimum Resistivity and pH testing performed in accordance with ASTM G187 and ASTM G51 respectively on shallow soil samples from selected borings will be summarized in Table 4.3.7.

Table 4.3.7 Summary of Minimum Resistivity and pH Test Results

Sample Location	Depth (feet)	Material Type	Minimum Resistivity(ohm-cm)	рН
T-06	1	CL	1,830	7.5
T-26	1	CL	1,480	7.4
T-45A	4	CL	2,290	7.6
T-54	1	CL	1,370	7.7
T-66	1	CL	2,030	7.4
SUB-1	1	CL	2,660	6.8

Notes: CL = Lean Clay.

Laboratory CBR tests were performed on shallow soil subgrade samples. A summary of the CBR test results along with the design dry unit weight values (at 95% of the maximum dry density as determined by ASTM D698 at the optimum moisture content) is presented in Table 4.3.8.

Table 4.3.8 Summary of CBR Test Results

Sample Location	Depth (feet)	Material Type	Design Dry Unit Weight (pcf)	CBR at 95% Compaction (%)
T-63	2 to 4	СН	97.8	1.7
T-08	2 to 4	CL	107.4	1.3

Notes: pcf = pounds per cubic foot; % = percent; CH = Fat Clay; CL = Lean Clay.

Graphical test results of laboratory testing completed as part of this study along with the summary of laboratory testing are presented in Appendix B.

#### 4.4 Groundwater Conditions

For foundation design purposes, the groundwater can be assumed to be 0 to 2 feet below the ground surface for investigated WTG locations, recommended design groundwater level for each turbine site was shown in the Table A1 within Appendix A. The design groundwater levels,



which RRC recommends at investigated turbine sites in Table A1, are for turbine foundation structural design purposes only, and incorporate about 2 feet of buffer for seasonal groundwater variations; those design groundwater levels should not be relied on to characterize the groundwater condition for the purpose of construction dewatering.

Groundwater was encountered between 4 to 52 feet during drilling prior to rock coring. As part of the rock coring operations, water was introduced into the borehole at a majority of the WTG locations to facilitate wet rotary rock coring drilling methods. The introduction of water inhibits groundwater level measurements during and immediately after drilling. Upon completion of the drilling operations, the borings were backfilled in accordance with the state of Ohio and local regulations; therefore, subsequent groundwater measurements are not available.

RRC installed temporary standpipe piezometers at each investigated WTG location due to the presence of shallow groundwater. Groundwater table (GWT) in the 80 installed piezometers was measured at depths ranging from about 0.3 to deeper than 13 feet below existing site grade during the monitoring periods. Summary of groundwater levels measured in the piezometers are presented in the Table A1 within Appendix A. These readings are initial readings and may not reflect the final groundwater level after equilibrium.

Based upon review of published well logs in Erie and Huron Counties, Ohio, available from Reference 4 (Ohio Department of Natural Resources), within the project site, static groundwater levels were reported to be between 2 and 90 feet below the ground surface at well locations summarized in Table A3 within Appendix A. The shallowest groundwater level was recorded at about 2 feet below the ground surface at Well No. 901470 located within project area. The well locations shown on Table A3 are plotted on Figure 10, Well Locations Obtained from the Ohio Department of Natural Resources), within Appendix A.

It should be noted the water wells were installed to deep aquifers below typical turbine foundation depth and indicate piezometric or static groundwater level within those deep aquifers only. The static water levels from the deep wells do not always provide useful groundwater information for shallow aquifers or perched water tables near turbine foundation depths that should be considered in turbine foundation design. Based upon the information obtained from the borings drilled as part of this study and a review of well log records, it is our opinion that static groundwater level should have an impact on shallow gravity foundation system design and construction at the locations drilled as part of this study.

It is imperative to note that the short-term groundwater level observations performed as part of this study are not an accurate evaluation of groundwater levels at the project site, and this report should not be interpreted as a comprehensive groundwater study. The observations during this investigation may also not represent conditions at the time of construction and it should be understood the presence of groundwater may have influences on certain construction activities and long-term performance of foundations and roadways. Groundwater levels are highly dependent on climatic and hydrologic conditions before and after construction, the site



development including irrigation demands, drainage and other factors. If a detailed groundwater study is desired, a groundwater hydrologist should be retained to provide these services.

#### 4.5 Geophysical Properties

RRC performed 1-D MASW surveys and electrical resistivity (ER) tests at selected turbine and substation locations during the second mobilization, which was on January, 2020. The purpose of MASW surveys is to obtain shear wave velocity ( $V_s$ ) profiles at selected WTG locations. The MASW survey methodologies and results are discussed in Section 4.5.1. The Electrical Resistivity survey methodologies are presented in Section 4.5.2.

#### 4.5.1 MASW Survey

The Multi-Channel-Analysis-of-Surface-Waves (MASW) method is a non-intrusive/non-destructive technique which uses the nature of the Rayleigh waves to evaluate engineering and geotechnical properties (stiffness) of subsurface materials. Rayleigh waves of different wavelengths (or frequencies) travel at different velocities when they propagate along the surface of a layered system (material properties vary with depth). This property is called dispersion. In other words, the velocity of Rayleigh wave is dependent on the wavelength in the non-homogeneous system. Also, Rayleigh waves of different wavelengths travel/sample within different depth ranges (usually, waves of shorter wavelengths travel within shallower depth ranges).

Typically, for 1-D MASW survey, a linear array composed of twenty-four 4.5 Hz geophones with 5-foot equal spacing between each pair is laid out in the selected locations. Total length of the array is approximately 115 feet. A 16-pound sledge hammer is employed as the seismic source to generate a desired frequency (wavelength) range of the seismic waves by striking on a plate (placed 10, 25 and 40 feet away from the first geophone) aligned within the geophone array. Seismic data are collected using the data recording device and processed using SurfSeis 4.0.4 computer software developed by Kansas Geological Survey (KGS).

The processed shear wave velocities are used to determine certain soil characteristics based on simple equations. For example, the soil shear modulus can be calculated using the following equation:

$$G = \rho V_S^2$$

where:

G = Shear Modulus (psf);

 $\rho$  = Mass density (pcf/(ft/sec.<sup>2</sup>)); and

 $V_s$  = Shear wave velocity (ft/sec.)

Young's Modulus, *E*, can also be calculated from the shear wave velocity data using the following equation:



$$E = 2G(1+v)$$

where:

E = Young's Modulus (psf); and

v = Poisson's Ratio.

The weighted average is calculated based on the following formula based on the 2015 International Building Code (IBC) (Reference 5):

$$\overline{V_S} = \frac{\sum_{i}^{n} d_i}{\sum_{i}^{n} \frac{d_i}{V_{Si}}}$$

Where:

 $d_i$  = Thickness of any layer between 0 and 100 feet; and

 $V_{si}$ = Shear wave velocity of a layer.

Figure 11 within Appendix A show weighted average of measured shear wave velocity at the project site for the selected turbine locations where MASW was conducted. Note that the measured shear wave velocity using MASW may not be available up to 100 feet. In the case where measured shear wave velocity is available for less than 100 feet, the weighted shear wave velocity is calculated based on available depths.

To determine the rotational stiffness of the underlying soil and bedrock, the parameters outlined in Table 4.5.1.1 can be used in the computation of the elastic and shear moduli when shear wave velocities are determined by geophysical methods.

Table 4.5.1.1 Recommended Soil and Bedrock Parameters

		Average Total Unit Weight
Soil/ Material Type	Poisson's Ratio	(pcf)
Soft to Medium Stiff Clay Soils	0.30(1)	115 <sup>(1)</sup>
Stiff to Hard Clay Soils	0.30(1)	120 <sup>(1)</sup>
Loose to Medium Dense Sand and Silt Soils	0.35(1)	115 <sup>(1)</sup>
Dense to Very Dense Sand and Silt Soils	0.35(1)	120(1)
Limestone/Shale Bedrock	0.30	150
Structural Fill Materials (minimum 5 feet thick)	0.35	120

Note: (1) Based on Reference 6 (see page 123 for Poisson's ratio and page 163 for unit weight).

Computed parameters from the MASW surveys represent soil behavior at small strain; appropriate reduction factor should be used by the foundation designer to determine the rotational stiffness of the foundation system for large strain case.

Results of the MASW surveys are presented within Appendix C of this report.



#### 4.5.2 Electrical Resistivity Survey

RRC performed electrical resistivity surveys at selected locations during the second mobilization, which was on January 2020. The electrical resistivity testing was conducted utilizing a digital ground resistance tester using the Wenner 4-pin array method. The tests were performed using 2 perpendicular array arrangements at 'a' spacing ranging from 2 to 60 feet at selected WTG locations and from 2 to 200 feet at the proposed Substation site. It shall be considered by designer that these surveys were performed when ground was partially frozen, additional tests may be needed for design purposes.

Results of the electrical resistivity testing are presented in Appendix C.

Interpretation of the electrical resistivity survey is beyond the scope of this study and should be performed by the design team.

#### 4.6 Rho Thermal Resistivity Surveys

In-situ thermal resistivity testing was performed by Geotherm USA, at a total of 5 selected locations. Bulk samples of native soil samples were collected at locations shown in Figure 6 within Appendix A for laboratory thermal resistivity testing in accordance with IEEE Standard. Thermal resistivity tests were performed on remolded soil samples obtained at depths ranging from 2 to 4 feet below existing site grade. The disturbed soil samples were remolded to 92% of their respective maximum dry density as determined by ASTM D698 at "as-received" moisture content prior to the thermal resistivity testing. Thermal resistivity values were then tested with samples at a series of moisture contents from "as-received" moisture content to 0% moisture content to provide a thermal resistivity dry-out curve. Results of thermal resistivity tests are presented within Appendix C.

Interpretation of the field and laboratory thermal resistivity tests results is beyond the scope of this study and should be performed by the design team.

#### 4.7 Preliminary Geohazard Assessment

#### 4.7.1 Flood Hazard

Based on Federal Emergency Management Agency (FEMA) maps, topographic maps and aerial imagery, it appears that the proposed turbine locations can be considered a low risk to flood hazard. FEMA flood hazard maps indicate the sites investigated as part of this study are in an area identified as Zone X. Areas identified as Zone X are considered as 0.2% or less annual chance flood event, or areas of minimal flood hazard.

#### 4.7.2 Expansive Soils

Based upon review of the logs of boring and available geological maps and literature expansive soils are not expected to be encountered within the majority of project site and can be considered as a low risk.



#### 4.7.3 Frost Penetration Depth

According to USACE EM 1110-1-1905 (Reference 7), the average frost penetration depth is approximately 3.5 feet below finished site grade for the project site.

#### 4.7.4 Karst Potential

Water soluble rocks located near, or exposed at, the surface have the potential for the development of karst and dissolution features. Rocks, or mineral deposits, such as limestone, dolomite, gypsum/anhydrite and salt are all soluble to groundwater. The aforementioned formations within 20 feet below the ground surface have a high-risk potential, while remain problematic when encountered at 20 to 100 feet below the ground surface.

Based upon review of the logs of boring and available geological maps and literature, karst potential is considered low to high for overall project sites. For select WTG locations T-25, T-26, T-42 and T-75 with a low to high risk of karst potential, RRC performed supplemental geophysical survey (EI survey) to further evaluate the bedrock conditions and presence of voids or solution cavities within foundation footprint. Additional confirmation borings were also drilled at moderate to high risk sites (T-25, T-26 and T-75). Based on the interpretation of the EI survey results and logs of confirmation borings, voids or dissolution features were not identified within foundation footprint. Therefore, it is our opinion that risk to foundation stability due to potential karst feature at T-25, T-26, T-42 and T-75 is low. Additional void assessment and/or grout injection is not required. These sites are deemed suitable for proposed construction.

#### 4.7.5 Slope Stability

Based on existing site topography and RRC's observations during geotechnical field exploration, the investigated WTG sites are setback a sufficient distance away from the escarpment edges and crests of slopes; therefore, slope stability is not anticipated to be a major concern for this project site, assuming minimum site grading occurs during construction phase.

#### 4.7.6 Seismicity

The state of Ohio as a whole is a region with relatively low seismicity. The peak horizontal ground accelerations near the project site were computed to be 0.063g for Site Class D. In addition, based on 2015 IBC, the Seismic Design Category is "A" for the project site. Therefore, the risk of seismic hazard is considered very low at the project site.

#### 5.0 GEOTECHNICAL RECOMMENDATIONS

#### 5.1 General

The turbine sites drilled as part of this study appear suitable for the proposed construction. A summary of anticipated conditions that will require attention for the design and construction is presented below:

Each log of boring was carefully reviewed for the presence of soft to medium stiff clays,
 loose sand layer(s) and/or non-competent materials below and near anticipated



foundation bearing elevation. Net allowable bearing capacity at WTG sites are outlined in the Table A1, Summary of Foundation Design Net Allowable Bearing Pressure and Design Groundwater Recommendations, within Appendix A. The subgrade soils and bedrock at anticipated bearing elevation for majority of the turbine locations drilled as part of this study are generally suitable for support of shallow gravity foundations without modifications. However, if soft to medium stiff clays, loose sand layer(s) or noncompetent materials are encountered below or near anticipated foundation bearing elevation during foundation excavations, these materials should be over-excavated to a competent soil or bedrock layer. The removed materials may be re-compacted or replaced with on-site suitable materials or structural fill meeting the requirements outlined in subsequent sections of this report. Excavations should be observed by a qualified representative of the geotechnical engineer prior to backfilling to assess the suitability of the foundation soils and to verify the over-excavation depths. In some cases, additional over-excavation may be necessary.

Replacement materials should be compacted to a minimum of 97% of the maximum dry density as determined by ASTM D698 and moisture conditioned to within 2% of optimum moisture content. The over-excavated area should extend a minimum of 2 feet beyond the edges of the foundation and then downward at a 1H:1V slope to the required over-excavation depth. The foundation excavations should be sloped and/or shored in accordance with OHSA regulations as required.

In general, over-excavation and replacement with structural fill could be considered for soil improvement depths up to about 15 feet below existing ground surface, if feasible. For soil improvement greater than 15 feet below existing ground surface, the cost of performing over-excavation and replacement will likely be excessive; therefore, deep soil improvement measures such as Rammed Aggregate Piers (RAP) or other equivalent ground surface improvement techniques could be considered. Based on geotechnical investigation results, a deep soil improvement is anticipated at a total of 3 WTG locations (T-66a, T-67, and T-71a) to depths varying from 29 to 35 feet below ground surface to achieve 3,500 psf or higher bearing capacity at the foundation bearing elevation.

The recommended deep soil improvement depths should be verified by the deep soil improvement designer/contractor upon review of RRC logs of borings. Note logs of boring for T-66a is approximately 60 feet offset from the center of the foundation. This offset distance is within acceptable industry standards; however, design-build contractor may perform additional testing for design optimization as required. The intent of deep soil improvement is to improve bearing capacity of foundation supporting soils and reduce excessive total and differential settlement.

 The north section of project site is mapped in an area where carbonate rocks, such as limestone, are located near the ground surface. Carbonate rocks are susceptible to solution cavities or karst features. Dissolution features were observed within rock core



samples at some of the boring locations. Water loss during rock core and/or what appear to be potential voids were also encountered in some of the turbine borings (T-24 and T-43) at the time of our field exploration. The water loss during rock core in some of the borings appears to be the results of the highly fractured and/or porous and vuggy nature of the limestone bedrock in this area.

There is a risk associated with constructing foundations in areas where karst is mapped. Additional investigations such seismic refraction, electrical imaging combined with exploratory boreholes are methods generally utilized to further investigate karst features where risk is moderate to high. Based on the exploratory boreholes, limited El survey results, RRC has identified the risk as low to high at this project site. Recommendations for electrical imaging and void assessment with grouting are included within Table A1 in Appendix A.

• It is our understanding that moderate to high-risk sites (T-24, T-43, T-73 and T-74) are not part of final construction layout. If these sites are considered for construction, further void assessment and void mitigation using electrical imaging (EI) and or pilot holes shall be performed by the contractor during construction phase. Depending on the results of the additional investigation, mitigation and the determination of a geotechnical engineer, these moderate to high-risk sites may be mitigated and built safely at these locations.

Based on results of soil/bedrock borings, the presence of voids can be further verified by drilling pilot holes to minimum depths of about 15 to 30 feet below existing site grade prior to implementing a grouting program at selected problematic high-risk sites. The pilot holes should be drilled by a qualified contractor using an air percussion drill rig equipment or similar in a pre-determined pattern. Pressure grouting to depths of about 20 to 30 feet below existing site grade will be required for boreholes where voids are verified.

• It is anticipated excavations may be advanced with conventional earth moving equipment where native soils extend below foundation bearing elevations. The use of heavy-duty excavation equipment such as hydraulic rock hammer along with blasting to advance foundation excavations will most likely be required where hard bedrock is encountered at shallow depths. If blasting is utilized, the blasting contractors should have sufficient experience with blasting of limestone bedrock in this area. The limestone in this area may contain variable amounts of solution cavities and differing degrees of fracturing, with shale being interbedded with limestone in some areas.

Excavation contractors and/or underground utility installers should consider performing test pits or probing tests to evaluate proper means and methods for advancing excavations. Potential caving/sloughing within narrow and shallow utility trenches may require sidewalls of trenches to be sloped in order to install utilities. Excavated trench bottoms should be thoroughly cleaned prior to cable placement and backfilling.



• In areas where a combination of soil or bedrock are exposed at foundation bearing elevation, the soil subgrade should be over-excavated to competent bedrock and replaced with either lean concrete having a minimum 28-day compressive strength of 1,000 psi or compacted structural fill.

It is crucial to maintain a uniform foundation subgrade support below the turbine foundation to reduce the potential of excessive differential foundation settlement. If compacted structural fill is used below the turbine foundation, the thickness of structural fill below the turbine foundation shall be a minimum of 6 inches, and the structural fill thickness shall be kept as uniform as possible with no abrupt thickness change.

- To bring the turbine pads to construction grade, as well as for the construction of the proposed access roadways, the proposed project site may require grading operations within some areas. The extent and location of the site grading is unknown at this time. The Geotechnical Engineer of Record shall be retained to review the civil drawings and cross-sections for each of the turbine pads and critical areas along the proposed roadways once they become available if significant grading is planned. This will allow us to be able to further assess the need for additional studies such as slope stability analyses. However, we anticipate the majority of turbine foundations will bear on bedrock or other strong geo-materials with minimal slope stability concerns provided measures outlined in this report are implemented.
- WTG foundations located adjacent to natural or man-made slopes should be setback laterally from the top of the slope. The minimum setback distance should be 25 feet from the edge of foundation to the crest of any natural or man-made slopes. Proper drainage measures should be taken to reduce the impacts from water to man-made cut and fill slopes as well as all undisturbed natural slopes.

It is imperative that a qualified representative of the geotechnical engineer observe each foundation excavation at the time of excavation to verify exposed foundation soil and bedrock bearing conditions and to assess the need and limits of removal and replacement.

Detailed foundation design and construction recommendations are outlined in subsequent sections of this report. The geotechnical recommendations presented in this report, including but not limited to foundation bearing capacity values, anticipated ground improvement depths and estimated foundation settlements, deep foundation design soil parameters and lateral deflection analysis parameters, are based on assumed or anticipated finished site grade, foundation type/size/depth and foundation bearing pressure. RRC's geotechnical recommendations presented in this report should be verified when information on the foundation design and site grading become available.

Detailed foundation design and construction recommendations are outlined in subsequent sections of this report.



#### 5.2 Turbine Gravity Foundation System

The use of gravity foundation systems for support of the WTG's is considered acceptable. Bearing capacity and settlement calculations were performed in general accordance with methodologies outlined in the 2<sup>nd</sup> Edition of "Guidelines for Design of Wind Turbines" (Reference 9) and generally accepted standard of care and practice along with experience with similar soil conditions in this type of geological setting. Detailed discussions of bearing capacity and settlement for WTG bearing on native soils and bedrock are outlined in the following subsections.

#### 5.2.1 Bearing Capacity and Settlement of Gravity Foundation System

Net allowable bearing pressures presented in Table A1 in Appendix A can be used in the structural design for foundation bearing directly on native soils and bedrock provided the remedial measures outlined in Section 5.1 and in Table A1 within Appendix A are followed. Information obtained from ODNR Division of Geological Survey was also used to determine recommendations for additional assessment and remedial measures of potential karstic areas, which are included within Table A1 in Appendix A. Electrical imaging testing locations map is shown as Figure 12 within Appendix A.

Based upon anticipated structural loading, the total settlement is estimated to be on the order of 1.0 inch or less under normal operating loading condition. The estimated differential settlement across the foundation diameter is anticipated to be less than 0.3% under both dead load and normal operating loading conditions.

Table 5.2.1.1 presents a summary of design parameters for on-site soil/bedrock and structural fill materials required for the foundation design.

Table 5.2.1.1 Recommended Soil and Bedrock Design Parameters

	Friction	Modulus of Subgrade Reaction,
Soil/ Material Type	Coefficient (1)	<b>k</b> s <sup>(2)</sup> (pci)
Loose Sand	0.40	50
Medium Dense Sand	0.45	100
Dense to Very Dense Sand Soils	0.45	150
Soft to medium Stiff Clay	0.35	40
Stiff to Hard Clay and Silt Soils	0.35	75
Limestone/Shale Bedrock	0.50	150

Note: (1) If necessary, lateral passive earth pressures can be considered to develop additional resistance. The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

(2) For 1-ft, X 1-ft, Plate.

The use of on-site clay, sand or gravel, and well-graded processed limestone/shale bedrock as backfill against foundations is considered acceptable provided the materials are properly processed and placed. Overburden backfill over foundations should be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D698 to reduce the



potential of erosion and/or scour events. Recommendations for use of on-site materials, borrow material or structural fill are discussed further in subsequent sections within this report.

#### 5.3 Substation and O&M Building Shallow Foundation System

The finished site grade at the proposed Substation, and O&M Building location is not available during preparation of this report, and we have assumed the finished grade is at or slightly above the existing ground surface. Clay soils with varying amounts of sand and silt were encountered at or near foundation bearing elevation in the borings drilled within the footprint of the Substation, and O&M Building locations. The clay soils encountered at the anticipated foundation bearing elevation drilled as part of this study are considered stiff to hard in terms of consistency. In areas where clay soils are encountered beneath shallow foundation bearing elevation, small lightly loaded structures within these facilities may utilize continuous or pad footings bearing on native soils or newly placed engineered fill materials.

The footing should have a minimum embedment of 3.5 feet below finished site grade for confinement and frost penetration. A minimum width of 18 inches for strip footings and a minimum of 24 inches for spread footings are recommended.

For reinforced concrete slabs bearing at finished grade, we recommend over-excavation of foundation subgrade soils to a minimum of 3.5 feet below the finished grade. Within the frost depth (about 0 to 3.5 feet), the native soils should be replaced with non-frost susceptible fill material or flowable fill (controlled low strength material) having compressive strength of at least 150 psi. The non-frost susceptible fill material, consisting of granular materials which have less than 5% passing a No. 200 Sieve, should be moisture conditioned within 2% of optimum moisture content and should be compacted to a minimum of 97% of the maximum dry density as determined by ASTM D698. Other alternatives such as thermal insulation may be used to protect against frost and the contractor or designer of thermal insulation shall be responsible for compliance with local building codes. A net allowable bearing pressure 1,000 psf can be used for reinforced concrete slabs bearing at finished graded provided the above design guidelines are followed.

For shallow foundation systems, net allowable bearing pressures, which include a factor of safety of 3, outlined in Table 5.3.1 and Table 5.3.2 can be used for the Substation and O&M Building structure locations, respectively. Anticipated settlement of the foundations under service loads will be on the order of about 1.0 inches or less.

Table 5.3.1 Recommended Soil Parameters for Structural Design of Footing and Mat Foundations at Substation

Parameter	Design Value at Substation
Design Groundwater Depth, ft	>10
Average Unit Weight, pcf	115
Modulus of Subgrade Reaction, pci	45*
Undrained Shear Strength, psf	1,000



Parameter	Design Value at Substation
Friction Coefficient at Foundation Base	0.35
Net allowable bearing pressure for Strip or Continuous Footings (psf) width 1.5 feet or larger	2,000
Net allowable bearing pressure for Square or Pad Footings (psf) width 2 feet or larger	2,500

Notes: pcf = pounds per cubic foot; psf = pounds per square foot; pci = pounds per cubic inch.

Table 5.3.2 Recommended Soil Parameters for Structural Design of Footing and Mat Foundations at O&M Building Location

Parameter	Design Value at O&M Building Location
Design Groundwater Depth, ft	7.5
Average Unit Weight, pcf	115
Modulus of Subgrade Reaction, pci	35*
Undrained Shear Strength, psf	650
Friction Coefficient at Foundation Base	0.35
Net allowable bearing pressure for Strip or Continuous Footings (psf) width 1.5 feet or larger	1,250
Net allowable bearing pressure for Square or Pad Footings (psf) width 2 feet or larger	1,500

Notes: pcf = pounds per cubic foot; psf = pounds per square foot; pci = pounds per cubic inch.

It is recommended that a qualified representative of a geotechnical engineer observe shallow foundation excavations in this area to assess the need for any over-excavation and recompaction and/or replacement.

For structural design of the footings and mat foundations, the parameters outlined in Table 5.3.1 and Table 5.3.2 can be used. Other design and construction recommendations are outlined in the ACI design Manual should be followed. It is imperative that proper drainage be maintained during construction and throughout the life of the substation structures to provide for adequate shallow foundation performance.

#### 5.4 Substation Deep Foundation Systems

Structure elements with heavy axial loads and/or large overturning moments may utilize drilled pier foundations. Pier lengths will likely be dictated by overturning resistance. Allowable end bearing pressures and allowable skin friction values at the substation are presented in Appendix D.

Allowable end bearing pressures and allowable skin frictions utilize a factor of safety of 3 and 2.5, respectively. Skin friction values should be reduced by 25% when calculating pull-out resistance. Settlement associated with drilled piers is anticipated to be on the order of about ½ to 1 inch. For proper installation of steel rebar and concrete piers should have a minimum



<sup>\*</sup> For a 1 ft. x 1 ft. Plate.

<sup>\*</sup> For a 1 ft. x 1 ft. Plate.

diameter of 1½ feet. The length of the drilled piers should be determined by the structural engineer to satisfy axial and lateral loading.

It is imperative that the design provides positive drainage away from the foundations during construction and throughout the life of the structure.

Lateral load analysis may be performed using the LPILE computer program. LPILE uses a p-y curve finite difference technique for predicting the soil-structure interaction and response. Based on our interpretation of the subsurface strata and the results of the field and laboratory tests, the parameters outlined within Appendix D may be used to evaluate drilled piers under lateral loads.

Vertical steel reinforcement to resist tensile loads caused by uplift forces should extend the full length of the pier shaft. Additional reinforcement required by structural demands for axial compressive loads, lateral loads, or minimum reinforcement required by design codes should be satisfied.

#### 5.5 Lateral Earth Pressures

Lateral earth pressures will apply in strata where soils are the main constituent. The turbine will be designed to resist all lateral movements; therefore, the "at rest" lateral earth pressure will develop. Where the design includes restrained elements, the following "at rest" equivalent fluid pressures are recommended as shown in Table 5.5.1.

Table 5.5.1 Recommended Equivalent Fluid Pressures for "At Rest" Lateral Earth Pressures

Material Type	"At Rest" Coefficient of Lateral Earth Pressure, Ko	Equivalent Fluid Pressure for "At Rest"  Lateral Earth Pressure (psf/ft)
Clay Soils	0.59	71.0
Sand Soils	0.47	56.0
Limestone/Shale Bedrock	0.29	44.0

Passive and active earth pressure resistance will only mobilize after significant movement of the foundation. The passive case occurs where a structural element tends to move into the soil mass. The active case occurs when the element tends to move away from the soil mass. Both cases are applicable for unrestrained foundation elements.

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements when using on-site soils as backfill are shown on Table 5.5.2 and Table 5.5.3 for active and passive lateral earth pressures, respectively.



Table 5.5.2 Recommended Equivalent Fluid Pressures for Active Lateral Earth Pressures

	Active Coefficient of Lateral Earth	Equivalent Fluid Pressure for Active Lateral Earth Pressure
Material Type	Pressure, Ka	(psf/ft)
Clay Soils	0.42	50.0
Sand Soils	0.31	37.0
Limestone/Shale Bedrock	0.17	25.0

Table 5.5.3 Recommended Equivalent Fluid Pressures for Passive Lateral Earth Pressures

Material Type	Passive Coefficient of Lateral Earth Pressure, Kp	Equivalent Fluid Pressure for Passive Lateral Earth Pressure (psf/ft)
Clay Soils	2.37	285.0
Sand Soils	3.25	390.0
Limestone/Shale Bedrock	5.83	875.0

The equivalent pressures listed above are based on an average total unit weight of 120 pcf for on-site clay and sand soils, and 150 pcf for bedrock. For soils below the free water surface, hydrostatic pressure should be added to the lateral earth pressure, and the equivalent fluid pressures should be calculated using the effective unit weights (the above total unit weight minus 62.4 pcf) multiplied by the appropriate earth pressure coefficient (Ko, Ka, & Kp). The above earth pressure values do not include safety factors. Surcharge loads should also be considered where appropriate. The values apply only to cases where the ground surface is level. We should be contacted to provide suitable values for cases where the ground surface is sloped.

#### 5.6 Seismic Considerations

For structural designs based upon the 2015 International Building Code (IBC) (Reference 5), Site Class D should be used for WTG sites as part of this project. The Mapped Spectral Response Acceleration for the 1 second ( $S_1$ ) and short periods ( $S_2$ ) were computed using the U.S. Seismic Design Maps Web-based application Program developed by the United States Geological Survey (USGS) (Reference 8). Table 5.6.1 summarizes recommended seismic parameters to be used in the design.

Table 5.6.1 Recommended Seismic Parameters

	Recommended
Parameter	Calculated Value
S <sub>S</sub> – Mapped Spectral Response Acceleration at Short Period (0.2-Second)	0.129
S <sub>1</sub> – Mapped Spectral Response Acceleration at 1-Second Period	0.056
Fa (Site Coefficient) – Site Class D	1.6
F <sub>v</sub> (Site Coefficient) – Site Class D	2.4



#### 6.0 FOUNDATION CONSTRUCTION CRITERIA

#### 6.1 Site Preparation

Prior to construction, we recommend adequate positive drainage be provided to maintain a relatively dry condition in the area of proposed construction. This will be very important if any work is attempted during periods of prolonged rainfall. Ponding of water in the areas of construction should be avoided. Winter conditions can also impact the construction process. Newly placed fill should not be placed on frozen subgrade and frozen material should not be used for fill.

Site preparation should begin by removing surface vegetation, organic topsoil, and major root systems within the foundation areas. Deleterious materials should be placed in non-structural areas or removed from the site. During excavation of the turbine foundations, every effort should be made to avoid disturbing the subgrade materials at the planned foundation bearing elevation. When the subgrade is disturbed, the resulting surface should be re-compacted to achieve a minimum compaction of 97% of the maximum dry density as determined by ASTM D698 and moisture conditioned within 2% of optimum moisture content. In areas where removal of the subgrade materials is required, proper slopes meeting federal, and state OSHA requirements should be maintained. The base of each foundation excavation should be observed by a geotechnical engineer or a qualified representative prior to foundation installation.

#### 6.2 On-Site Excavated Materials as Overburden Backfill

The use of on-site clay, sand, gravel and processed bedrock material is considered acceptable as overburden backfill materials placed above and against the sides of turbine foundations provided the materials are properly processed and placed. The backfill materials should be free of organics, roots and deleterious materials, and approved by the on-site geotechnical representative prior to use. Excavated bedrock shall be processed to a maximum size of 6 inches or smaller prior to use within the overburden backfill matrix. During excavation and grading, proposed backfill material not immediately placed and compacted shall be stockpiled and protected from moisture by sealing the surface with light compaction.

Based on our experience with these types of materials and results of maximum dry density-optimum moisture content relationships performed as part of this study (ASTM D698), anticipated overburden backfill densities are outlined in Table 6.2.1.

Table 6.2.1 Overburden Backfill Density Range Requirement

	Dry Backfill Unit	Moist Backfill Unit Weight Range,
Soil/ Material Type	Weight Range, γ <sub>d</sub> (pcf)	γ <sub>total</sub> (pcf)
Processed Bedrock with Soil Mixture*	110-130	115-140
On-site Lean Clay soils	95-115	105-135

Note: pcf= pounds per cubic foot; \*estimated



The backfill materials should be placed in thin, loose lifts not exceeding 12 inches prior to compacting. Each lift of backfill material should be compacted, moisture conditioned properly, and tested to meet the minimum and maximum dry and moist unit weight values specified in the foundation design drawing. In addition, each lift of backfill material over turbine foundations should be compacted to dry densities of at least 95% of the maximum dry density as determined by ASTM D698, to reduce the potential of erosion and fill settlement. The top surface of the backfill should be kept with sufficient drainage slope (minimum 2% gradient) to allow surface water runoff during construction.

In areas where granular materials or properly processed limestone bedrock are used for the overburden backfill, consideration could be given to use a minimum of 12-inch cap using clay soils on top of overburden backfill zone to reduce any surface water infiltration. The clay cap should be extended a minimum of 5 feet beyond the turbine foundation perimeter.

In areas where structural elements such as transformer pads are supported on overburden backfill materials or where crane pads are extended to the overburden backfill zone, we recommend the overburden backfill below the transformer pads or crane pads follow the general foundation overburden backfill requirements outlined above, as well as specific specifications from the pad designer to satisfy both bearing capacity and settlement requirement of the pad design. As a general guideline, RRC suggests a minimum 3 feet (in thickness) of the overburden backfill below the transformer pads or crane pads be compacted to a minimum of 97% of the maximum dry density as determined by ASTM D698 and moisture conditioned within 2% of optimum moisture content; the suggested backfill compaction should extend a minimum lateral distance of 1 foot beyond the edges of the crane/transformer pad and then downward at a slope of 1:1 (H:V) below the foundation elevation.

#### 6.3 Structural Fill Specifications

Structural fill material beneath foundations, where required, should consist of a non-expansive, well-graded material with sufficient binder for compaction purposes and recommended to meet the Ohio Department of Transportation Type 2 or better. As a guide, structural fill meeting the following specifications is recommended:

	Percent Finer by Weight
1 "	100
3/4 "	100
3/8 "	80-100
No. 4 Sieve	60-100
No. 8 Sieve	45-95
No. 50 Sieve0	7-55
No. 200 Sieve	0-15
Maximum Plasticity Index	6
Maximum Liquid Limit	25
<ul> <li>Percent of wear, Los Angeles test, maximum</li> </ul>	50%



Structural fill should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 95% per ASTM D 1557 or a minimum of 97% per ASTM D 698. The structural fill should be moisture conditioned within 2% of optimum moisture content.

#### 6.4 Reuse of On-site Materials as Structural Fill Below Foundation

Modification of unsuitable foundation soils shall consist of over-excavation and replacement with any of the following materials:

- 1. On-site lean clay and sand/gravel soils may be reused beneath the foundation with approval of the proposed material by a geotechnical engineer.
  - i. On-site material used beneath the foundation shall have a maximum plasticity index of 12 and a maximum liquid limit of 40.
  - ii. These reused materials shall be compacted to a minimum of 97% of the maximum dry density as determined by ASTM D698 or 95% as determined by ASTM D1557 and shall be moisture conditioned within 2% of optimum moisture content.
- 2. Borrow lean clay and sand/gravel soils may be used beneath the foundation with approval of the proposed material by a geotechnical engineer. Borrow material shall meet the requirements outlined in the items (i) and (ii) above.
- 3. Structural fill meeting the criteria shown in Section 6.3 of this report.

#### 6.5 Shallow Foundation Construction

The following construction criteria and general guidance should be observed during foundation construction:

- All foundation excavations should be observed by a Geotechnical Engineer or a qualified representative to assess proper bearing materials are present at foundation bearing elevation in accordance with the recommendations given herein, and to assess the need for densification of the subgrade materials.
- Special care should be taken to protect the exposed soils from being disturbed, freezing
  or drying out prior to the placement of structural fill.
- The foundation contactor should determine proper excavation means and methods. The foundation excavation should be sloped sufficiently to create internal sumps for runoff collection and removal. Foundation excavations subject to rainfall and possible deterioration from accumulated water should be protected using a protective "mud-slab" (concrete) not less than 2 inches in thickness. If surface runoff water or groundwater



seepage accumulates at the bottom of the foundation excavation, it should be collected and removed and not allowed to adversely affect the quality of the bearing surface.

- The foundation excavations should be checked for size and cleaned of loose material and debris prior to the placement of reinforcing steel. Precautions should be taken during the placement of reinforcement and concrete to prevent the loose excavated material from falling into the excavation. A proof-roll of the excavation subgrade should be performed with a fully-loaded front-end loader or a similar equipment to assess the need for any shallow remedial measures. If excessive deflection or soft areas are observed while performing the proof-roll operations, the remedial measures outlined in previous sections of this report should be followed, if applicable. The proof-roll operations should be observed by a qualified representative of the geotechnical engineer. In addition, Static or Dynamic Cone Penetrometer (depending on the subgrade materials exposed at foundation bearing elevation) should be conducted to verify foundation design bearing pressures are met.
- Prior to the placement of concrete, water or frozen ground if present must be removed from the foundation excavation.
- Prompt placement of concrete in the excavation as it is completed, cleaned, and observed is strongly recommended.

#### 6.6 Drilled Pier Foundation Construction

The following items are important for the successful completion of drilled pier foundations:

- A Geotechnical Engineer or his representative should observe all pier excavations. This
  pier inspection is to verify proper depth, bearing stratum, soil conditions and to record
  other observations regarding the pier construction.
- The pier excavations shall be checked for size and to determine that free water (for dry pier excavation) and loose material have been removed prior to the placement of concrete. Precautions should be taken during the placement of the pier reinforcement and concrete to prevent the loose excavated material from falling into the excavation.
- Prompt placement of concrete in the excavation as it is completed, cleaned, and inspected is strongly recommended. Under no circumstances should a pier/shaft be drilled that cannot be filled with concrete before the end of the workday.
- The reinforcement steel cage placed in the shaft should be designed to be stable and centered during the placement of concrete.



- We recommend that the construction contract include a budget for temporary casing and/or slurry drilling, in case the sloughing of sands or entry of water prevents the proper construction of the piers.
- Drilled pier/shaft construction should follow applicable industry standard. Means and methods of construction shall be determined by the design/build contractor.

#### 6.7 Open Excavations

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes.

Surcharge loads, either static or dynamic, should not be applied to an excavation slope. Construction equipment should be prevented from traveling along or near the top of the excavation slope. Monitoring of temporary slopes, trenches, and dewatering during construction should be undertaken by the contractor to detect early warnings of movement within slopes, structures, pavements, etc.

In all cases of excavations, sloped excavations and trench shields are recommended for excavations greater than 4 feet in depth. OSHA and applicable state and local standards should be observed and followed. Site safety is the responsibility of the contractor.

#### 6.8 Corrosivity

Water-soluble sulfate and chloride testing results, shown in Section 4.3 of the report, indicated the surficial soils exhibit "Negligible" (S0) sulfate contents and "non-aggressive to aggressive" chloride content. The use of Type I cement should be considered for all at grade and below ground concrete at majority of the structures within the project area. However, if there is minimal cost differential, the use of Type II cement could be considered for higher sulfate resistance. Foundation concrete should be designed in accordance with Chapter 4 of ACI 318: Building Code Requirements for Structural Concrete and Commentary.

Minimum resistivity and pH testing results, shown in Section 4.3 of the report, indicated the surficial soils exhibit "Corrosive" to "Moderately Corrosive" characteristics for majority sites as shown in Table 6.8.1 based on Reference 10. Cathodic protection for buried metal pipe should be designed by a qualified corrosion engineer, if required.



Table 6.8.1 Effect of Resistivity on Corrosion

Aggressiveness	Resistivity in ohm-cm
Very Corrosive	< 700
Corrosive	700 – 2,000
Moderately Corrosive	2,000 – 5,000
Mildly Corrosive	5,000 – 10,000
Non-Corrosive	> 10,000

#### 6.9 Drainage and Construction Dewatering

Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structures. Ponding of water near the foundation elements from improper drainage should not be permitted.

Based on the available groundwater information, shallow groundwater shall be considered as a concern for the turbine foundation excavation dewatering at the proposed project site. If shallow perched water is present at turbine sites where clay soils are exposed within the turbine foundation excavation depths, we anticipate the groundwater re-charge rate may be slow enough to conduct excavation dewatering with conventional sumps and "trash" pumps.

#### 6.10 Foundation Excavation and Rippability

Seismic Velocity (seismic p-wave velocity) is indication of hardness and fracture density of the rock, which in turn can be correlated to rippability of bedrock material. MASW surveys will be performed when site access is available, then p-wave velocity of the bedrock material within shallow foundation embedment depth can be estimated, which will be included in the final report. Generally, seismic p-wave velocities less than 3,000 feet per second indicate native soil or heavily weathered bedrock materials. On the other hand, p-wave velocities larger than 10,000 feet per second indicate non-weathered bedrock materials. Limestone/Shale rocks with p-wave velocity less than 6,000 feet per second can be ripped using CAT Multi- or Single Shank No. 8 Series D Ripper or equivalent (Reference 11). For higher p-wave velocity (greater than 7,500 feet per second), larger equipment (D9R, D10R or D11R) may be required.

It should be noted that rippability using p-wave velocity is only one of the various aspects for rippability of the bedrock. Proper equipment selection and sound ripping techniques are critical to effective and economic ripping. The ripping contractor/operator, familiar with local geology, shall be consulted for further evaluation. In addition to p-wave velocity, other features such as degree of weathering, joints, discontinuities and other structural features also influence rippability. In some cases uses of hydraulic rock hammer or blasting may be required to facilitate efficient ripping and removal of bedrock. Means and methods for foundation excavation should be determined by construction contractor.



#### 6.11 Access Roadways and Crane Pads Design and Construction Recommendations

Access Roadways: It is our understanding that private access roadways will be built for construction and maintenance purposes. Traffic volumes during construction are anticipated to be frequent with heavy equipment utilizing the access roadways. Following the construction period, the traffic volumes will be light and vehicles accessing the roadways will generally consist of pickup trucks and occasional single and multi- unit truck traffic. The section thickness design should be based upon the methodology outlined by the American Association of State Highways and Transportation Officials (AASHTO) for design of aggregate-surfaced roadways (Reference 12).

The surficial materials encountered within a majority of the borings indicated native soils consisting of clay and sand soils with varying amounts of silt and gravel. The sand soils are generally considered to be a moderate material in terms of supporting vehicular and construction traffic as defined by AASHTO when used for support of pavement structures, while the clay soils are generally considered as poor material to support pavement structures.

Laboratory CBR testing indicated the subgrade soils for the private access roadways when compacted to about 95% of the maximum dry density as determined by ASTM D698 at optimum moisture content have CBR value ranging from 1.3 to 1.7%. The access roadways actual pavement thickness should be determined by the design/build contractor, keeping in mind the frequency, duration and requirements of the turbine manufacturer.

Prior to the placement of the aggregate base materials along access roadway alignments, stripping and removal of existing vegetation and other deleterious materials from the proposed roadway alignment should be performed. Topsoil and organics could be up to about 30 inches or more in thickness in some areas and should not be allowed for use in structural areas or along roadway alignments. The subgrade along access roadways should be scarified to a minimum depth of 12 inches; moisture conditioned within 2 percent of the optimum moisture content and re-compacted to a minimum of 95% of the maximum dry density as determined in accordance with ASTM D698. The exposed subgrade should then be proof-rolled prior to the placement of the aggregate base course materials to assess the presence of soft areas and the need for remedial measures, if any. In areas where bedrock is encountered at the surface, proof roll is not necessary. In areas where excessive "pumping" of the subgrade is observed, consideration should be given to placing geogrid (Tensar Biaxial Type 2 or equivalent) on top of geotextile (Mirafi HP 570 or equivalent) above the exposed subgrade soils, otherwise removal of unsuitable soils in these areas and re-compaction and/or replacement with granular soils will be required. Aggregate base materials should be compacted to a minimum of 95% of ASTM D1557 or a minimum of 98% of ASTM D698 and within 2% of the optimum moisture content. Consideration could be also be given to performing a cement or lime mix design to stabilize the subgrade soils supporting pavement structures as an alternative. Aggregate base thickness for stabilized access roadway sections could be reduced.



Crane Pads: Based upon review of logs of boring for the turbine sites completed as part of this study stiff to hard clay soils and medium dense to very dense sand soils are expected to be encountered below topsoil at the majority of the crane pads areas adjacent to WTG sites. To improve the performance of the subgrade soils supporting crane pads, we recommend the exposed subgrade (after stripping and removal of organic soils, vegetation and other deleterious materials) be scarified and reworked to a depth of 12 inches below existing site grade. The reworked area should extend a minimum horizontal distance of 3 feet beyond the edges of the crane pads. Reworked on-site subgrade soils should be compacted to a minimum of 97% of the maximum dry density within 2% of optimum moisture content per ASTM D698. In areas where bedrock is encountered at the surface, scarification and reworking are not required.

We recommend the compacted subgrade be tested by proof-rolling. A fully loaded 40,000 lbs., double-axle water-truck or equivalent should be used for proof-roll tests. The subgrade soil should not deflect more than 1-inch under the imposed loads. If higher deflections are observed, the subgrade soil should be over-excavated to suitable material and replaced with a properly compacted material in accordance with Section 6.3 or Section 6.4 of this report. In addition, consideration should be given to the use of either Static or Dynamic Cone Penetrometer (depending on the subgrade materials exposed at foundation bearing elevation) as an added measure to verify design bearing pressures and the need for any remedial measures.

Once a suitable subgrade condition has been achieved, a structural gravel pad should be placed to a thickness of approximately 18 inches. The crushed stone or aggregate base should conform to the requirements of the Section 6.3 of this report or better. The base material should be compacted to a minimum of 98% of the maximum dry density and within 2% of optimum moisture content as determined in accordance with ASTM D698. Crane pads constructed as recommended above are anticipated to have an allowable bearing capacity of about 3,000 to 5,500 psf at finished crane pad level. For bearing loads in excess of this amount, load distribution mats should be utilized so that the bearing capacity is not exceeded. Composite mats are capable of widely distributing the crane loads to the underlying soils for crane pads. The type and number of layers of these composite mats should be determined by the contractor and/or manufacturer to assure proper performance of the crane pads.

As existing sinkholes within project site are reported by ODNR data summary, proposed crane pads and crane walks shall not be constructed at or near reported sinkholes. Additional investigation, such as Electrical Imaging (EI), is recommended in order to lower the risk of potential sinkholes or other potential karst features near the proposed crane walk sections.

**General Considerations:** It is imperative that proper drainage of the subgrade be provided in the construction of the roadways and crane pads to enhance their performance. Post-construction proof rolling of the subgrade materials should be performed prior to re-opening the roadways for traffic after periods of heavy rainfall/snow melt to assess stability of the roadway and the need for remedial measures. The proof-roll should be accomplished with a fully loaded



water truck or similar heavy equipment. Areas where remedial measures are required should be re-worked and corrected prior to acceptance. It is also imperative that periodic inspection of the access roadways be performed following periods of rainfall or snowmelt to assess the condition of the roads and the need for remedial measures.

### 6.12 Foundation Grout and Compaction Injection

It is our understanding that moderate to high-risk sites (T-24, T-43, T-73 and T-74) are not part of the final construction array. Therefore, additional voids assessment and/or grout injection using pilot holes is not anticipated for this project.

### 6.13 Permanent Slope Configuration

In general, the following slope configurations outlined in Table 6.13.1 should be followed for cut slopes based upon material types.

Table 6.13.1 Permanent Cut Slope Configurations

Material Type	Maximum Slope Configuration (Horizontal:Vertical)
On-site Soils	3:1
Bedrock	0.75:1

The outlined configuration should be further evaluated prior to construction to assure stability throughout the life of the structure. The grading plans should provide for mid-height benches to aid in diverting surface water flow from the embankment's face if the slope height exceeds 15 feet. The face of the cut slopes should be observed by a qualified geologist to assess the need for any slope configuration modifications or the use of reinforcing measures.

Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structure. Ponding of water near the foundation elements from improper drainage should not be permitted.

### 7.0 LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is likely soil conditions will vary between or beyond the points explored. If soil conditions are encountered during construction that differ from those described herein, we should be notified immediately in order to provide supplemental recommendations (if needed). If the scope of the proposed construction, including the proposed loads or structural locations, changes from those described in this report, our data should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No



warranty is expressed or implied. The recommendations provided in this report are based on the assumption RRC will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the client and only for the purposes stated, within three years from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client, or the client's design team members for this particular project, who wishes to use this report shall notify RRC of such intended use. Based on the intended use of the report, RRC may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release RRC from any liability resulting from the use of this report by any unauthorized party.

Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the authors of this report, are only mentioned in the given standard; they are not incorporated into it or "included by reference," as that latter term is used relative to contracts or other matters of law.

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# **APPENDIX A**

Emerson Creek Wind Project - Erie and Huron Counites, Ohio Geotechnical Report - Appendix A

Remarks														G. Bannard from provinced Construction I arrest													RQD. Removed from proposed Construction Layout														Borino locatoin: about BO feet SSW offset from the	center of the proposed turbine location for T66a				Removed from proposed Construction Layout	oved										
Subgrade Condition														Dotantial voids from 11 to 13 feet	Very loose Sand over wee	Highly weathered Shale/Limestone.											Potential voids from 17 to 18 feet. Very poor																			Sinkholes to the South.	Sinkholes to the South. Soft soils over weathered Shale/Limestone.	onio orai wasina an									
Void Assessment and Miligation before Construction														and/or hadronly on uttan to minimum assessment death of 20	Supplemental El study and confirmation borings performed. Low risk confirmed.	al El study and confirmation borings perfor										formerlet El study prefermed	orm void assessment and/or bedrock grouting to minimum assessment depth of 30 feet. El recommended																			Perform Electrical Imaging (El) for verification. Sinkhole in vicinity.	Electrical Imaging (EI) for verification.  I study and confirmation borings perfe	Obpiditibilidi La vivog sera commissione comiga periorimos, vers nos									
Karst Risk Assessment	TOW	NON			MOT		MOT		ш					MOT HIGH						ш			Ш	MOT			HIGH Perfe	NON		MOT	MOT	MOT	MOT	Т	71			MOT		MOT			MOT		MOT	MODERATE	MODERATE	MOT	MOT	Ш	Ш	MOT	Ш	пом	NOT	том	
Depth of Potential Voids Encountered within Borehole (ft, bgs)	ON	Q Q	ON	2 9	ON	0 Q	ON	9 S	ON	Q Q	ON.	ON ON	ON ON	NO 11 to 13	NO	0 N	NO	ON ON	2 02	ON	ON ON	ON NO	ON	ON ON	NO	Q Q	17 to 18	ON ON	NO	ON	ON	0 Q	ON	NO NO	ON S	Q. Q.	ON O	Q Q	ON	NO	ON	ON :	NO NO	ON ON	ON	NO	ON ON	2 O S	ON ON	ON ON	NO	ON ON	ON	NO	ON ON	ON O	
Recommendations for Soil Improvement <sup>(1)</sup>	:	: :					:					:			-			:			:			3 1				: :			:				Perform Overexcavation and Replacement with Structural	Fill to 13 feet to achieve 3,500 per or higher capacity			;			Soil Improvem	Perform Deep Soil Improvement to 29 feet	; ;	Perform Deep Soil Improvement to 35 feet							; ;		Old Layout	1		
Net Allowable Bearing Capacity (qnet all ) Under Normal Operating Load Conditions Based on Foundation Bearing Elevation of 22 ft (pgs. psf)	6,000	000'9	6,000	9,000	5,000	2,000	9'000'9	0000						8,000																			4,000						4,000	3,500								6,000							4,000		
Recommended Design Groundwater B Depth (ft.)	0.0		0.0			0.0	0.0	0.0	0.0	0.0	2.0	2.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	l
Piezometer GWL on February 2020 (ft.)	2.5	5.3	1.6	3.5	1.98	2.4	1.2	2.0	1.2	9.0	4.1	8,5	3.1	2.0	1.4	3.5	1.6	9.0	2.2	1.5	3.0	2:2	2.1	2.2	1.5	8.1	1.3	1 6	3.1	6.0	1.5	30	1.5	1.7	1.6	0.1	0.7	97.0	1,4	1.8	2.2	1.5	1:0	: 9	119	1.3	12.7	2.5	1.2	118	9.0		8:0	2.0	1.6	1.8	
Piezometer GWL on January 2020 (ft.)	1.7	97.	:		:	: :		3.0	0.8	9.0	8.5	4.2	2.8	2.7		3.4	2.1	1.5	3.0	4.1	3,4	2.8	3,4			1 6		1.5				: :		n :				: :		1.0	1.6	1.2	1.7	1.3	2.2	2.5	2.4	0.3	1.6		1.4	1.1					١
Piezometer GWL on December 2019							:		:								-								-	- 0				***		NA NA	2.8		: 0	9.0 NE		9.0	1.3	1.8		1						: :	4.2	1.3	0.7	9.5		-	3.9	1.8	
Piezometer GWL after installation (ft.)	8.5	N N	NE	2 2	NE	2 2	NE	W W	NE	9.2 NF	J. P.	N N	N N	2 2	NE	NE VE	NA	9.2	ž V	10.4	AN NA	NA	NA	NE 7.3	7.7	1.7 NE	N. S.	¥ ¥	NE SE	NE NE	NE	3.5	13	aN.	Ne s	2 4	5.0	9.5 6.5	N.	NE NE	NE .	¥ :	2 2	Y Y	N.	N N	2 2	. W !	11.4 11.4	N N	NE 15	13 R	NE	NE	13	NE	
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Groundwater During Drilling (ft.)		NE NE	NE	2 2	NE	2 2	NE	7.5	7.0	7.0	NE	N.	14	¥ ¥	4.5	15	12	_		6	4 4 4	4	NE	NE 13	6	- N	NE	4 N	6	NE	NE	6 5	61	44	24	29 12	18	및 및	52	47	NE	£	2 2	39 NE	38	W W	NE 7	14	焸	40	191	29	N		N N	47	
Longitude	-82.687070	-82.797720	-82.783112	-82.787932	-82.787182	-82.787640	-82.781567	-82.696969 -82.696969	-82.683923	-82.741589	-82.737826	-82.735204	-82.736863	-82.757024	-82.811454	-82.804800	-82.755309	-82.796827	-82,752195	-82.797954	-82.744461	-82.771065	-82.750999	-82.826303 -82.826303	-82.781587	-82.781489	-82.831090	-82.774713	-82.781886	-82.829454	-82.781455	-82.822230	-82.832867	+	+	-92.0620673	-82.822818	-82.744422	-82.744297	-82.827884	_	-82.763591	-82.777417	-82,788934	-82,777069	-82.815969	-82.803113	-82.755836	-82,776172	-82.740271	-82.824749	-82.827139	-82.827098	-82.784857	28 6	-82.827851	
D Latitude	41.331470	41.318510	41.318050	41.314163	41.310109	41.309756	41.305128	41.303804	41.301861	41.297773	41.295016	41.291780	41.284045	41.263784	41.256898	41.255529	41.247445	41.246008	41.244309	41.242334	41.241983	41.238171	41.238015	41.235902	41.207509	41.203875	41.198112	41.192592	41.181870	41.176582	41.151717	41.150265	41.141995	41.139042	41.137179	41.137/51	41.130843	41.115596	41,110964	41.099160	41.096579	41.095790	41.094265	41.091692	41.087231	41.309842	41.260506	41.197831	41.197446	41,110892	41.058500	41.049640	41.241977	41.311303	41.136254	41.098514	ļ
Turbine/Boring ID (FIR_LAY_057)	2	4 2	- 4	9 6	T109 <sup>FS</sup>	112	T13	T16	T16	117	T19	T20	122	123	125	128	128	128	131	T32	T33	138	136	T37	T40	T41	T43	T44	T46	T47	T49	22 52	T62	3 25	156	15/8": TK8	T599 <sup>[2]</sup>	20 E	T62	T64a <sup>FR</sup>	T65	T66a <sup>FI</sup>	18/ T68	170	T718 <sup>22</sup>	T73	174	176	T77 T78a <sup>FR</sup>	179	181	22 22	T87	T10	T57	25	l



Table A2 - Summary of Subsurface Exploration and Geographic Coordinates

	Remarks	1, MTO	removed from the proposed construction W to layout		Kemoved from the proposed construction WIG layout				About 750 feet SW offset from T10										Kellioved from the proposed construction wile layout	About 30 feet SE offset from T-25	About 20 feet NW offset from T-25		About 40 foot MANIM offers from T-26	About 40 feet East offset from T-26 About 40 feet East offset from T-26								1	Kemoved from the proposed construction wile layout			Removed from the proposed construction WTG layout								Domotod from the recovered construction MTG laterst	Nethored from the proposed constitution who agont	About ESD foot North offoot from TS7	About 550 reet Not it offset from 157		About 210 feet SW offset from T59				About 240 feet North offset from T64	About 60 feet SSW offset from the center of the proposed turbine location for 166a	
Groundwater	Immediately After Drilling (ft)	NA	NA	NA	ΑN	NA	Y S	S AN	NA	₹ ₹	NA	NE 13.5	36	NA 24	i Y	Y Y	G Z	AN A	NA NA	AN	¥ A	NA	Y S	NA	NA	AN AN	NA	14	N N	NA NA	AN AN	NA	NA	AN	A A	NA	Y X	NA	NA 3. NA	NA	4 4	X X	NA	AN	NA	¥α	23	NA	ΨZ	NA	40	74 24	17	N S S	N.
	Groundwater During Drilling (ft)	NE	4.0	19.0	NE	NE	¥ ¥	E	₩:	¥ ¥	NE	7.5	7.0	7.0	밀	NA	ç <del>1</del>	J.	4.5	a l	8 S S	15	<b>밀</b>	NE	NE	12	7	7	D 4	NA	# ¥	NE	12	6	V N	NE :	± ₩	6	¥ ¥	NE	9	4 6	19	44	24	A 6	24	NE	18	NE	52	47	47	- 13 N	INC
	RQD	Poor	NA	NA	Good	Poor	Poor	NA	Good	Good	Good	A A	NA ::	NA NA	NA NA	Poor	NA NA	Very Poor	Fair	Fair	Fair	NA	Fair	Poor	Very Poor	Very Poor	Very Poor	NA NA	NA NA	Poor	Poor	Fair	NA	NA	Poor	Very Poor	Good	Fair	Fair	NA	NA NA	X X	NA	NA	NA	Y S	N AN	NA	Poor	NA	NA S	AN AN	NA K	¥ V V	LAN.
	Total Depth (ft)	24.0	19.0	25.0	27.0	27.0	28.0	25.0	30.0	28.0	31.0	30.5	40.0	38.0	48.0	32.0	19.0	25.0	31.0	35.0	35.5	30.0	35.5	35.0	25.0	34.0	30.0	25.0	31.0	27.0	20.0	28.0	26.0	18.5	30.0	20.0	33.0	33.0	39.0	37.0	33.0	40.0	31.0	48.0	39.5	39.0	54.0	28.0	35.0	48.0	54.0	93.0	51.5	55.5	0.00
	Rock Core (ft)		0.0	0.0	17.0	20.0	20.0	4.0	21.5	20.0	10.0	0.0	0.0	0.0	0.0	28.0	0.0	15.0	15.0	25.0	25.0	0.0	25.0	25.0	18.0	8.0	20.0	0.0	0.0	25.0	8.0	23.0	0.0	0.0	20.0	11.0	15.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
	Air Rotary (ft)	0:0	0:0		0.0				0:0			0:0		0:0			0:0		0:0	0.0	0.0	0.0	0.0	0.0	0.0	0:0	0.0	0.0	0:0	0.0	0:0	0:0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0		0.0		0.0			0.0		0.0	
	Auger (ft)	4.0	19.0		10.0	7.0	13.0	21.0	8.5	8.0	21.0	30.5	40.0	48.0	48.0	4.0	19.0	10.0	16.0	10.0	10.5	30.0	10.5	10.0	7.0	31.0	10.0	25.0	31.0	2.0	12.0	5.0	26.0	18.5			18.0	23.0	39.0	37.0	33.0	25.0	31.0	48.0	39.5	25.0	54.0	28.0	25.0	48.0	54.0	47.0	51.5	55.5	0.00
	Drilling/Test Date	4/17/19	4/2/19	4/3/19	4/22/19	4/23/19	4/23/19	4/24/19	5/18/21	4/22/19	4/25/19	4/2/19	4/1/19	5/22/19 4/3/19	5/23/19	5/24/19	4/4/19	4/16/19	4/27/19	8/19/21	8/18-8/19/21	4/29/19	8/23/21	8/23/21	4/17/19	4/22/19	4/18/19	4/25/19	5/20/19	5/22/19	4/26/19	5/1/19	5/25/19	4/5/19	4/5/19	4/29/19	4/6/19	4/8/19	4/30/19	5/25/19	12/12/19	12/16/19	5/30/19	5/15/19	5/14/19	12/17/19	12/18/19	5/12/19	7/29/21	5/12/19	12/11/19	12/8/19	7/30/21	5/3/19	012110
Thermal	Resistivity Testing																																																						
Electrical	Resistivty Survey											×																							×	4							×											*	٧
	MASW Survey											×																							×	:																		×	٧
RRC	Boring/Testing Longitude	-82.797344	-82.687070	-82.684174	-82.680044	-82.783112	-82.776072	-82.784857	-82.787196	-82.799754	-82.781567	-82.688400	-82.683923	-82.741589	-82.737826	-82.735204	-82.736863	-82.757024	-82.811454	-82.811403	-82.811487	-82.804800	-82.804806	-82.804649	-82.775587	-82.755309	-82.771245	-82.752195	-82.797954	-82.832115	-82.750999	-82.826303	-82.804853	-82.781587	-82.781489	-82.831090	-82.775036	-82.781886	-82.829454	-82.781455	-82.822230	-82.832667	-82.832555	-82.770782	-82.791465	-82.825618	-82.769033	-82.822057	-82.822800	-82.809371	-82.744297	-82.827851	-82.827906	-82.763703 -82.763703	-02.11000-
	Boring/Testing Latitude	41.337091	41.331470	41.327524	41.318510	41.318050	41.316612	41.311303	41.310120	41.305617	41.305128	41.3030804	41.301861	41.29///3	41.295016	41.291780	41.284045	41.263784	41.256898	41.256828	41.25/006	41.255529	41.255439	41.255516	41.247740	41.247445	41.244491	41.244309	41.241983	41.240369	41.238015	41.235902	41.229091	41.207509	41.203875	41.198112	41.187731	41.181870	41.176582	41.151717	41.150265	41.141995	41.138732	41.139042	41.137179	41.136254	41.132702	41.130820	41.130840	41.113883	41.110964	41.098514	41.099166	41.095547	41.034200
	Boring ID	11	T3	T4	T6	77	T8 T0	T10	T10a	T11 T12	T13	T14 T15	T16	11/	T19	T20	T22	T23	T25	T25-B1	123-B2	T26	T26-B1	T26-B3	127	T28 T29	T30	T31	132 T33	T34	135 T36	T37	T39	T40	T41 T42	T43	144 T45	T46	T47 T48	T49	T50	151 T52	T53	T54	T56	T57	157d T58	T59	T59a T60	T61	162	163 T64	T64a	165 T67	101



Table A2 - Summary of Subsurface Exploration and Geographic Coordinates

		Remarks					About 60 feet North offset from T71		Removed from the proposed construction WTG layout	Removed from the proposed construction WTG layout		About 20 feet SSW offset from T-75	About 20 feet NE offset from T-75	About 35 feet NW offset from T-75				About 800 feet NNE offset from T78						Removed from the proposed construction WTG layout	Removed from the proposed construction WTG layout	Removed from the proposed construction WTG layout		Test Pit Excavation											
	Groundwater Immediately After	Drilling (ft)	NA	NA	Ϋ́	NA	20	AN	NA	NA	NA	NA	NA	NA	NA	NA	NA	ШN	30	AN	28	16	22				NA						NA	NA	NA	NA	NA	NA	
	Groundwater During	Drilling (ft)	NE	NE	39	14	39	焸	NE	NE	2	∃N	밀	∃N	14	N.	N.	ΒN	40	ΒN	19	29	22				ΞN						ЭN	ЭN	NE	NE	7.5	ЭN	
		RQD	NA	NA	A	N	NA	Fair	Fair	Fair	Poor	Fair	Fair	Fair	NA	NA	NA	NA	AN	NA	NA	NA	NA				Poor						Very Poor	NA	NA	NA	NA	N	
		Total Depth (ft)	55.5	55.5	55.5	55.5	55.5	28.0	23.0	26.0	28.0	35.5	35.0	35.0	44.5	39.0	29.5	36.5	55.5	55.5	55.5	55.5	55.5				30.0						20.0	6.5	6.5	8.5	25.0	25.0	
	Rock Core	(#)	0.0	0.0	0.0	0.0	0.0	20.0	15.0	15.0	15.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				23.0						10.0	0.0	0.0	0.0	0.0	0.0	
	Air Rotary Rock Corr	(#)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0						0.0	0.0	0.0	0.0	0.0	0.0	
		Auger (ft)	55.5	55.5	55.5	55.5	55.5	8.0	8.0	11.0	13.0	10.5	10.0	10.0	44.5	19.0	29.5	36.5	55.5	55.5	55.5	55.5	55.5				7.0						10.0	6.5	6.5	8.5	25.0	25.0	
		Testing Drilling/Test Date Auger (ft)	5/8/19	5/7/19	5/11/19	5/6/19	7/28/21	4/23/19	4/18/19	4/18/19	4/28/19	8/22-8/23/21	8/20-8/22/21	8/22/21	4/9/19	12/19/19	5/14/19	7/28/21	12/11/19	12/6/19	12/6/19	12/8/19	12/7/19				5/21/19						4/28/19	4/28/19	4/28/19	4/28/19	4/29/19	4/30/19	
																												×	×	×	×	×							
	Electrical Resistivty	Survey																															×						
	MASW	Survey																		×																			
J	RRC Boring/Testing	Longitude	-82.777417	-82.788934	-82.817980	-82.777013	-82.777034	-82.790099	-82.815969	-82.817887	-82.803113	-82.803146	-82.803039	-82.803230	-82.755836	-82.776172	-82.823198	-82.822173	-82.740271	-82.824944	-82.824749	-82.827139	-82.823246	-82.741715	-82.753069	-82.736451	-82.827098	-82.807065	-82.811374	-82.788517	-82.776070	-82.765749	-82.764984	-82.763493	-82.763495	-82.764986	-82.801635	-82.801880	of Available
	RRC Boring/Testing	Latitude	41.092712	41.091692	41.088115	41.087076	41.087221	41.317416	41.309842	41.307049	41.260506	41.260459	41.260530	41.260546	41.197831	41.197446	41.133708	41.135766	41.110892	41.065264	41.058500	41.049640	41.048849	41.329691	41.329173	41.327917	41.241977	41.107602	41.154774	41.209883	41.316613	41.268924	41.268959	41.268962	41.269448	41.269444	41.252176	41.251718	NOTE: NF = Not Encountered: NA = Not Available
	Boring ID		T68	69L	170	1/1	T71a	T72	L173	T74	5/L	175-B1	T75-B2	175-B3	9/L	221	8/L	T78a	6/L	08L	18T	T82	L83	T84	T85	T86	Z87	TR-1 (T63)	TR-2 (T48)	TR-3	TR-4 (T8)	TR-5 (SUB)	SUB-1	SUB-2	SUB-3	SUB-4	O&M-1	O&M-2	NOTE: NE = Not E



RRC

Table A3: Well Log Information Obtained from Ohio Division of Water Resources (Reference 3)

f Water s)							
	Latitude (NAD83)	Longitude (NAD83)	Elevation (feet above sea level)	<b>Total Well Depth</b> (feet below Elevation)	Aquifer Type	Static Water Level (feet below Elevation)	Date Measured (MM/DD/YYYY)
	41.30517	-82.82758	689	135	LIMESTONE	25	07/15/2008
	41.33978	-82.76012	758	150	LIMESTONE	17	06/30/2008
	41.30135	-82.79292	714	150	LIMESTONE	21	06/22/2009
	41.35133	-82.82367	9/9	120	LIMESTONE	80	11/04/2008
984231 4:	41.3375	-82.80008	705	150	LIMESTONE	24	07/07/2008
984230 41	41.31848	-82.77013	723	150	LIMESTONE	15	07/02/2008
901470 41	41.35767	-82.74134	NA	34	ROCK	2	10/02/2000
2048717 41.	41.104242	-82.759795	NA	62	CLAY	29	07/30/2014
	41.20637	-82.8219	NA	120	LIMESTONE	36	11/03/2000
2039555 4:	41.2855	-82.825833	822	200	LIMESTONE	80	09/10/2012
2063967 41.	41.280267	-82.832767	781	155	LIMESTONE	75	08/09/2017
2063968 41.	41.281133	-82.830417	734	155	LIMESTONE	70	08/11/2017
2063969 41.	41.280867	-82.8337	962	175	LIMESTONE	80	08/14/2017
2071987 4:	41.2871	-82.833967	277	215	LIMESTONE	80	01/23/2019
2022084 41	41.08271	-82.75841	895	89	GRAVEL	22	04/23/2009
962332 41	41.08287	-82.78278	NA	120	SHALE	15	05/28/2003
2068615 41.	41.277867	-82.82875	737	215	LIMESTONE	45	06/28/2018
	41.2816	-82.8302	757	140	LIMESTONE	70	05/17/2003
2070373 41.	41.266767	-82.830883	781	175	LIMESTONE	90	08/27/2018
	41.272867	-82.8389	748	120	LIMESTONE	70	08/14/2014
2012854 41	41.27195	-82.8387	NA	31	LIMESTONE	30	08/17/2007
2012877 41.	41.271983	-82.83875	NA	41	LIMESTONE	30	08/16/2007
2012879 41.	41.271833	-82.838667	NA	37	LIMESTONE	33	08/15/2007
2012880 41	41.27195	-82.838633	NA	41	LIMESTONE	30	08/18/2007
2027295 41.	41.272333	-82.839017	NA	37	LIMESTONE	25	05/18/2010
2027300 41	41.27285	-82.839433	NA	38	LIMESTONE	30	05/19/2010
	41.27205	-82.83925	NA	37	LIMESTONE	30	05/18/2010
	41.271767	-82.838967	NA	38	LIMESTONE	37	01/31/2011
2031691 41.	41.271883	-82.839333	NA	42	LIMESTONE	37	01/31/2011
2070408 41.	41.281133	-82.833300	791	195	LIMESTONE	75	09/26/2018
2070409 41.	41.281167	-82.831967	780	215	LIMESTONE	70	09/25/2018
	41.089580	-82.741640	NA	87	CLAY & SHALE	25	06/28/2000
	41.179957	-82.813109	NA	160	LIMESTONE	26	09/13/2017
-	41.115410	-82.760140	NA	09	SHALE	13	10/07/2002
2045511 41.	41.106681	-82.785501	NA	56	SHALE	20	10/28/2013



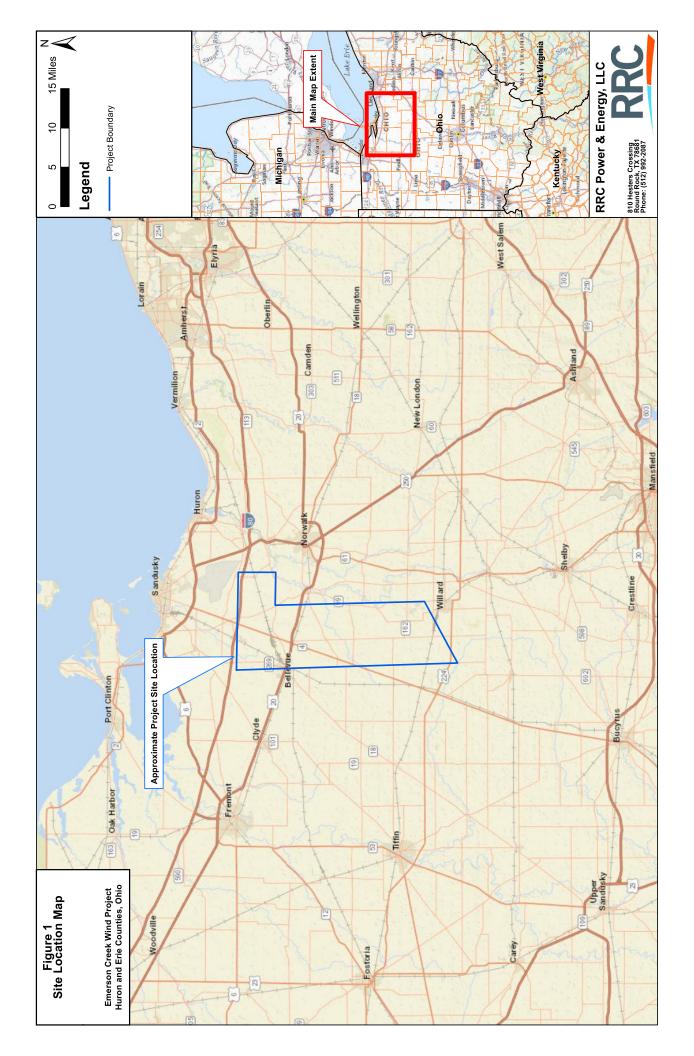
Table A4 - Summary of Utility Locate Tickets (Ohio 811)

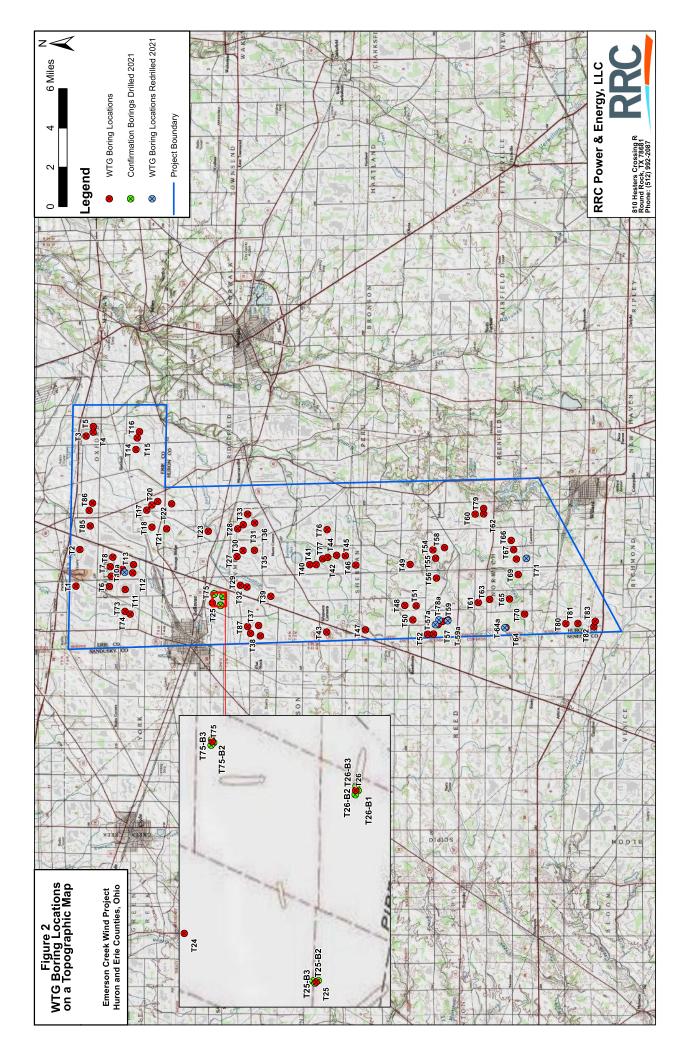
Boring ID	Latitude	Longitude	Ti-last Namelas	Barranda
T1	41.337091	-82.797344	Ticket Number B908001045	Remarks
T2	41.334851	-82.770474	2000001040	Removed from the proposed construction WTG layer
T3	41.331470	-82.687070	B908001062	Transcribe the proposed conditions in the tage
T4	41.327524	-82.684174	B908001074	
T5	41.327437	-82.680044		Removed from the proposed construction WTG layer
T6	41.318510	-82.797720	B908001080	
T7	41.318050	-82.783112	B908001083	
T8	41.316612	-82.776072	B908001089	
Т9	41.314163	-82.787932	B908001107	
T10	41.311303	-82.784857	B908001113	
T11	41.309756	-82.799754	B908001122	
T12	41.305617	-82.787640	B908001133	
T13	41.305128	-82.781567	B908001136	
T14	41.303804	-82.696969	B908001144	
T15	41.303059	-82.688400	B908001153	
T16	41.301861	-82.683923	B908001158	
T17	41.297773	-82.741589	B908001166	
T18	41.294908	-82.754023	B908001168	
T19	41.295016	-82.737826	B908001173	
T20	41.291780	-82.735204	B908001177	
T21	41.286773	-82.755319	A908501854	
T22	41.284045	-82.736863	A908501888	
T23	41.263784	-82.757024	A908501919	
T24	41.261475	-82.809764	A908501961	
T25	41.256898	-82.811454	A908501977	
T26	41.255529	-82.804800	A908501989	
T27	41.247740	-82.775587	A908502000	
T28	41.247445	-82.755309	A908502016	
T29	41.246008	-82.796827	A908502022	
T30	41.244491	-82.771245	A908502034	
T31	41.244309	-82.752195	A908502044	
T32	41.242334	-82.797954	A908502056	
T33	41.241983	-82.744461	A908502068	
T34	41.240369	-82.832115	A908502084	
T35	41.238171	-82.771065	A908502110	
T36	41.238015	-82.750999 -82.826303	A908502115	
T37	41.235902 41.234841	-82.833897	A908502127	Removed from the proposed construction WTC lov
T38			A009502151	Removed from the proposed construction WTG lay
T39 T40	41.229091 41.207509	-82.804853 -82.781587	A908502151 A908502166	
T41	41.203875	-82.781489	A908502176	
T42	41.200363	-82.777263	B933001192	
T43	41.198112	-82.831090	A908502202	
T44	41.192592	-82.774713	A908502251	
T45	41.187731	-82.775036	A908503485	
T46	41.181870	-82.781886	A908503501	
T47	41.176582	-82.829454	A908503514	
T48	41.154781	-82.811484	B933001195	
T49	41.151717	-82.781455	A908503542	
T50	41.150265	-82.822230	B933001199	
T51	41.148395	-82.811766	B933001202	
T52	41.141995	-82.832667	B933001205	
T53	41.138732	-82.832555	A908503587	
T54	41.139042	-82.770782	A908503603	
T55	41.137589	-82.776792		Removed from the proposed construction WTG lay
T56	41.137179	-82.791465	B908700558	
T57	41.136254	-82.825618	B933001208	
T58	41.132702	-82.769033	B933001211	
T59	41.130820	-82.822057	B908700566	

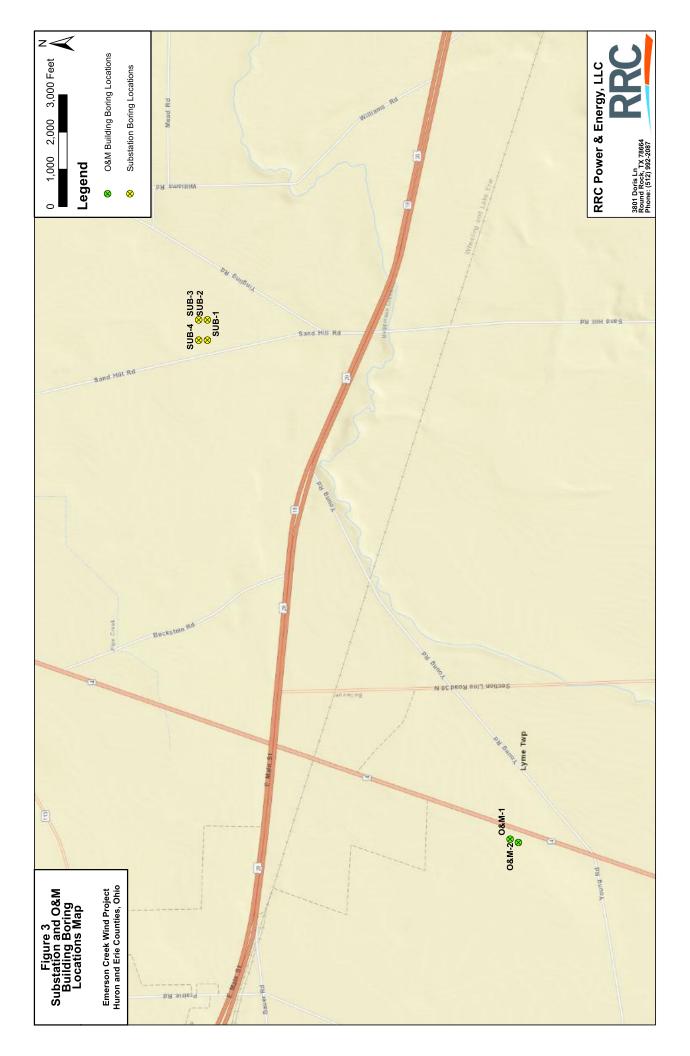


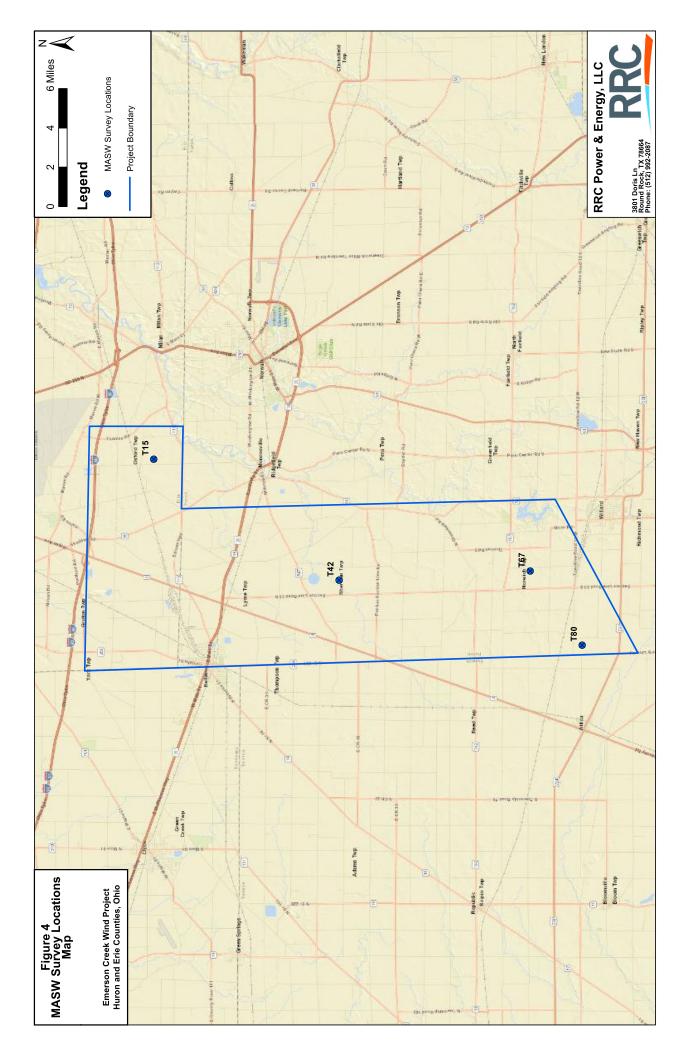
Table A4 - Summary of Utility Locate Tickets (Ohio 811)

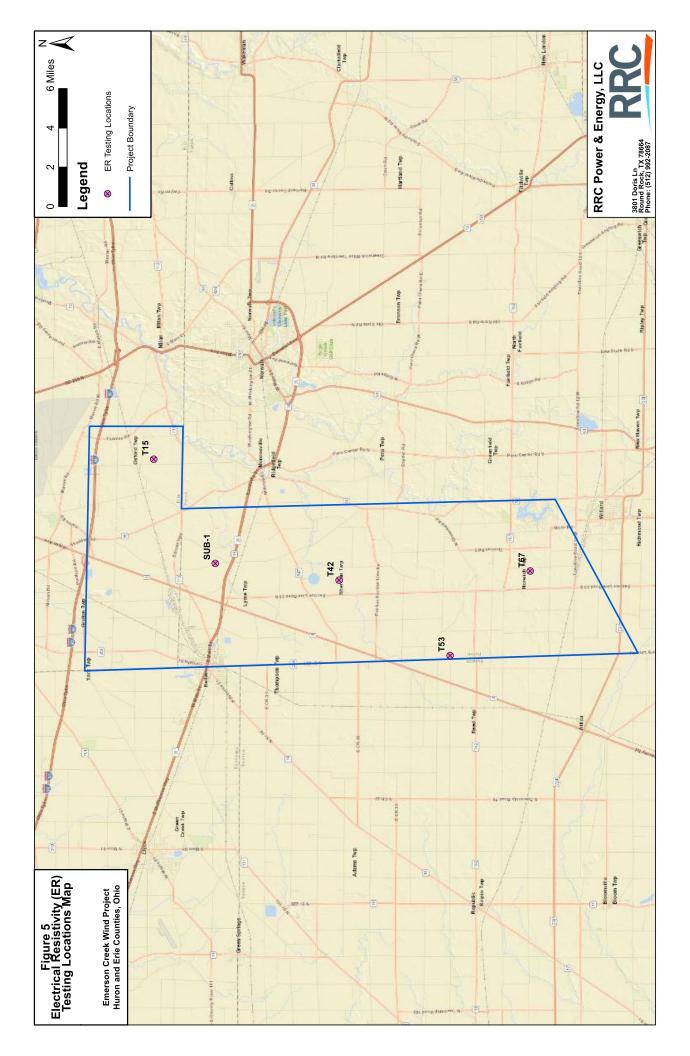
Boring ID	Latitude	Longitude		
			Ticket Number	Remarks
T60	41.115596	-82.744422	B933001213	
T61	41.113883	-82.809371	B908700585	
T62	41.110964	-82.744297	B933001217	
T63	41.107601	-82.807071	B908700597	
T64	41.098514	-82.827851	B933001220	
T65	41.096579	-82.806805	B908700610	
T66	41.095647	-82.763703	B908700614	
T67	41.094265	-82.770634	B908700618	
T68	41.092712	-82.777417	B908700624	
T69	41.091692	-82.788934	B908700647	
T70	41.088115	-82.817980	B908700652	
T71	41.087076	-82.777013	B908700657	
T72	41.317416	-82.790099	B908001181	
T73	41.309842	-82.815969	B908001186	
T74	41.307049	-82.817887	B908001194	
T75	41.260506	-82.803113	B908700665	
T76	41.197831	-82.755836	B908700670	
T77	41.197446	-82.776172	B933001222	
T78	41.133708	-82.823198	B908700678	
T79	41.110892	-82.740271	B933001223	
T80	41.065264	-82.824944	B933001225	
T81	41.058500	-82.824749	B933001228	
T82	41.049640	-82.827139	B933001230	
T83	41.048849	-82.823246	B933001235	
T84	41.329691	-82.741715		Removed from the proposed construction WTG layor
T85	41.329173	-82.753069		Removed from the proposed construction WTG layor
T86	41.327917	-82.736451		Removed from the proposed construction WTG layor
T87	41.241977	-82.827098	B908700706	

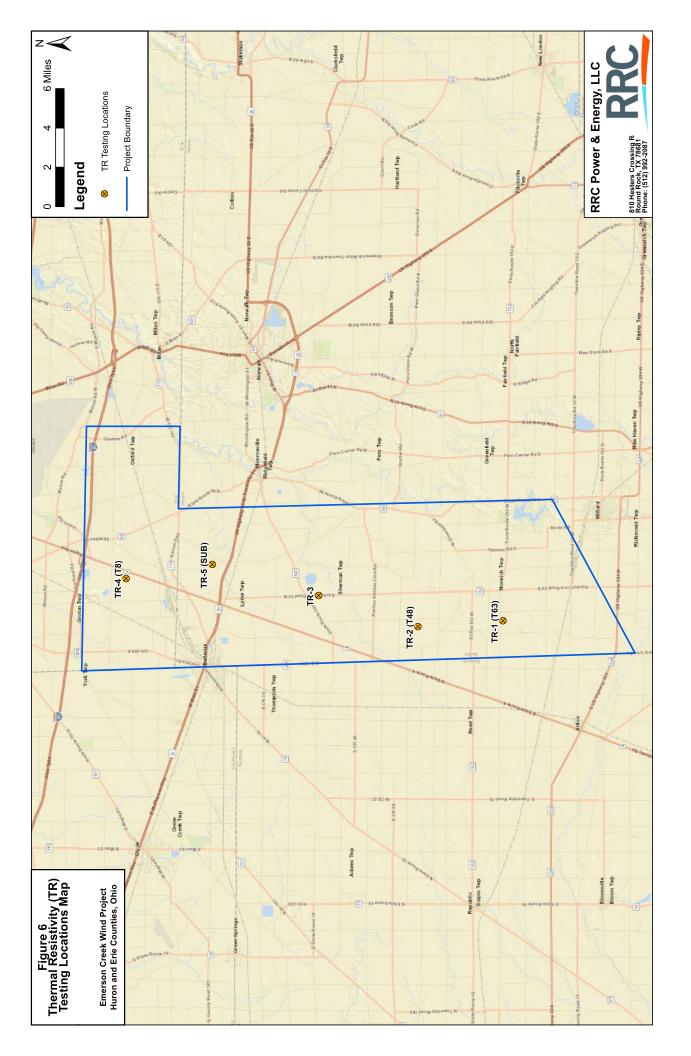


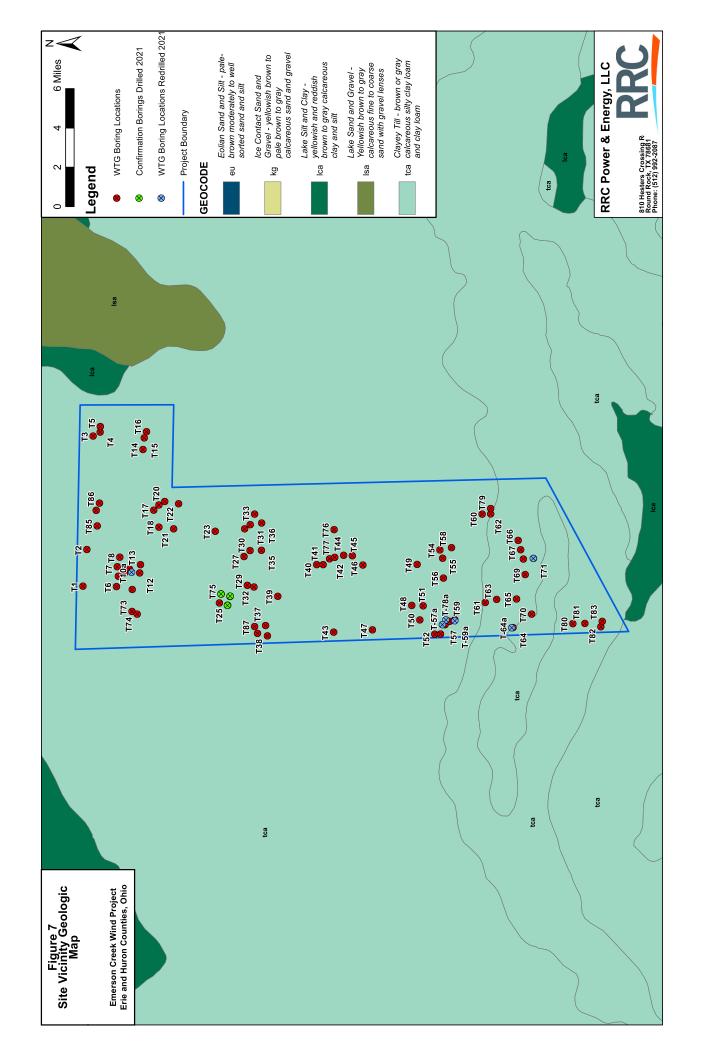


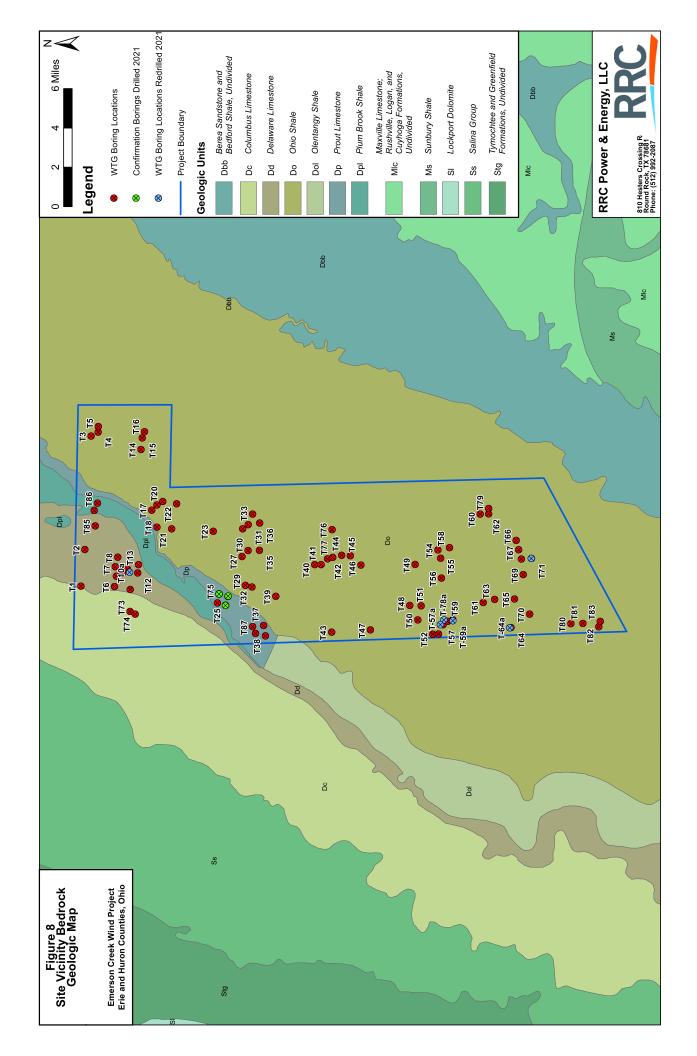


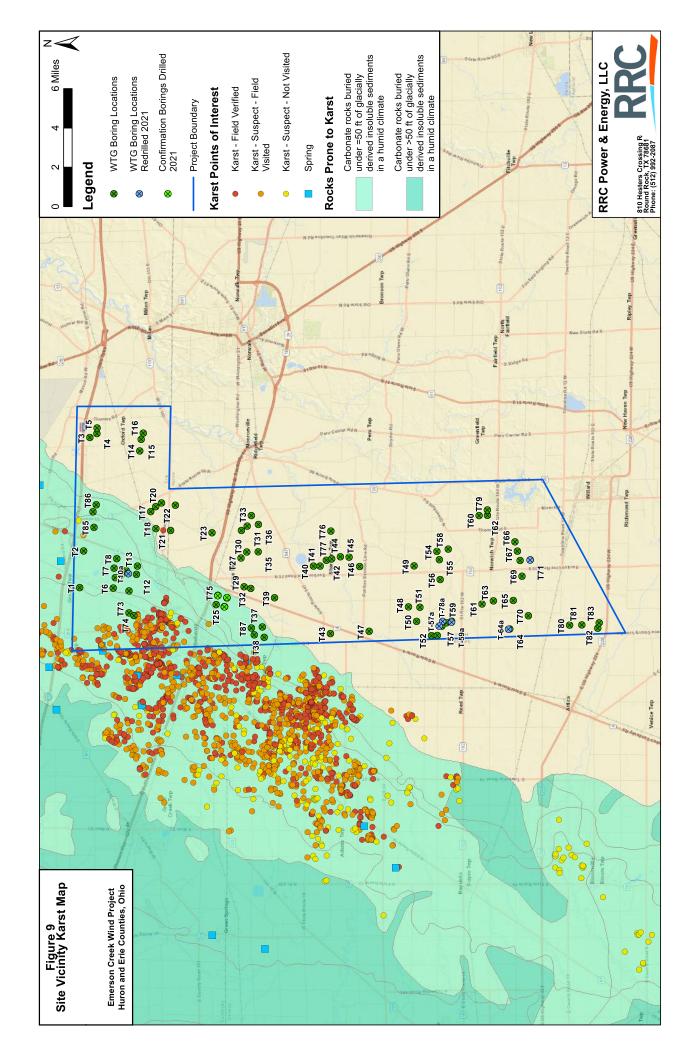


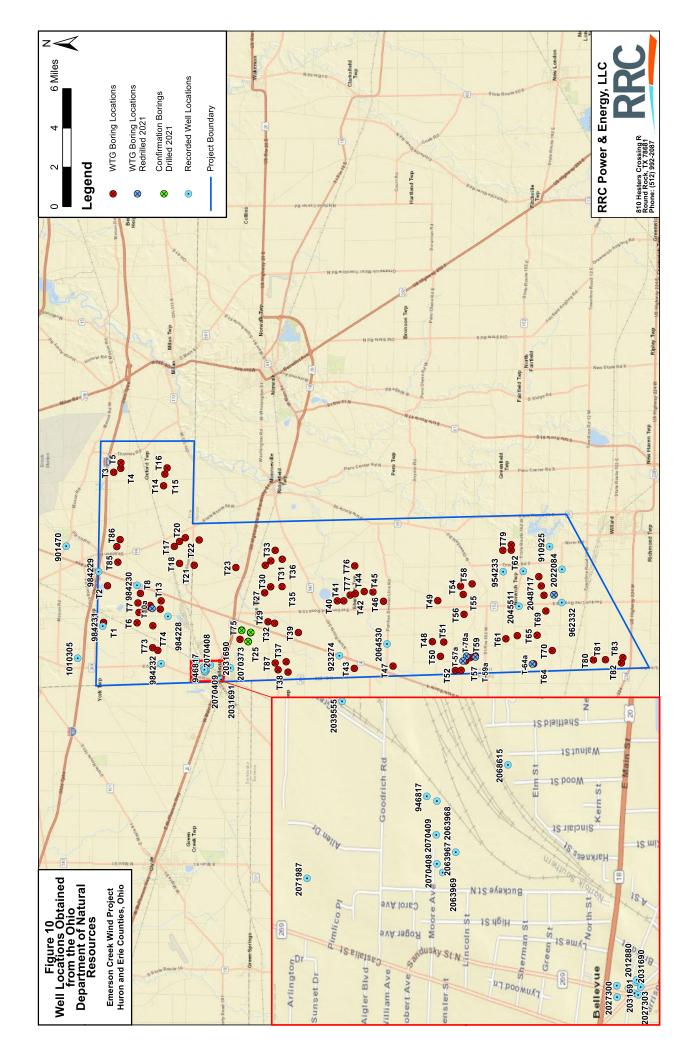












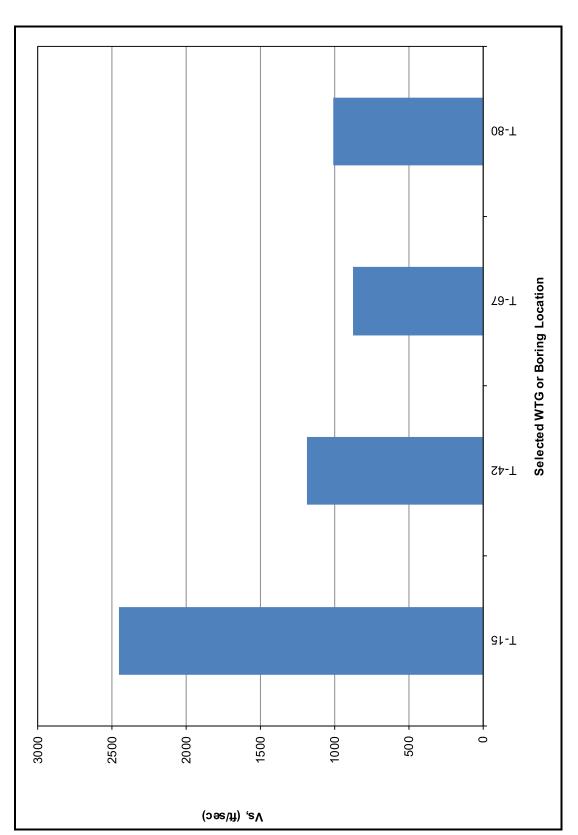
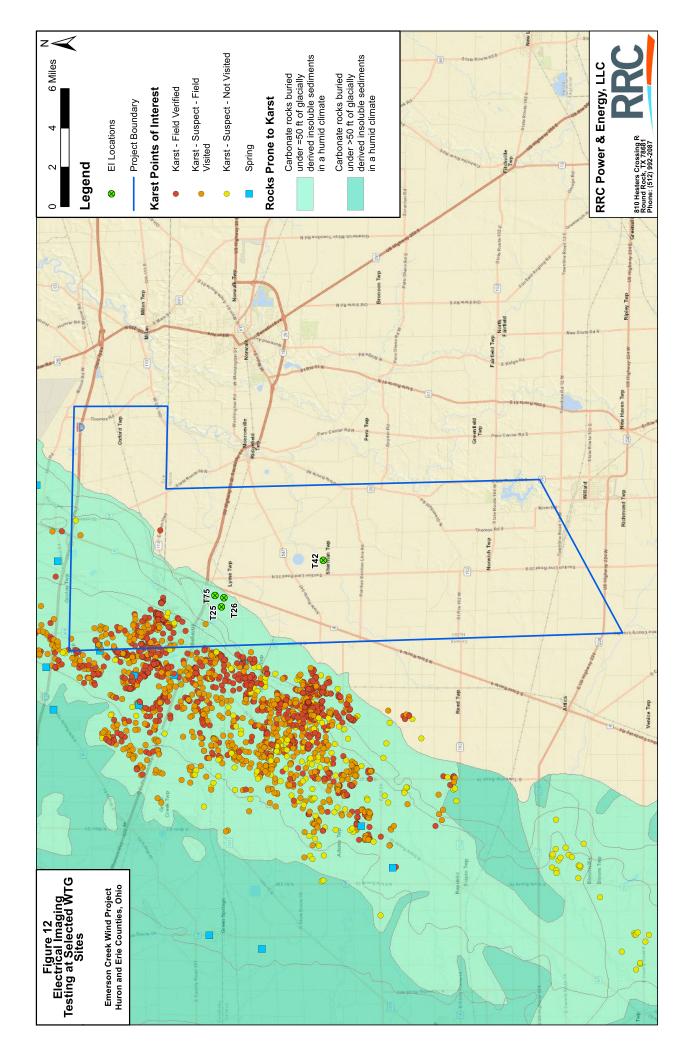


Figure 11 – Weighted Average Shear Wave Velocity at Selected WTG Sites





# **BORING LOG KEY**

	FIE	LD	DATA			LΑ	ВО	RATO	RY DA	ATA			DRILLING METHOD(S):
				(		ERBE IMITS							Continuous Flight Auger/Hollow-stem Auger/Wet Rotary/NX Core
SYMBOL	(FT)	SS	S/FT SQ FT S	RE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	ING PRESSURE S/SQ IN)	NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Subsurface water was not encountered either during or upon completion of the drilling operations.
	рертн	SAMPLES	N: BLOWS/FT P: TONS/SQ F T: BLOWS R: % RQD: %	MOISTURE	LIQI	PLA	PLA	Y DE UND	MPR RENC	LURI	CONFINING (POUNDS/SC	MINUS	SURFACE ELEVATION: ft.
SOIL	DEI	SA	29.5% BE 9.5%	MO	LL	PL	Ы	DR. PO	STS (TC)	FAI	88	MIN	DESCRIPTION OF STRATUM
	5 10		N = 50 (SPT) N = 40 (Modi	F SPO	ON SAI A Sam JTTING	MPLE pler) GS DUNDWA	TER OE	SERVATIOI DF DRILLI	NG, OR AS \$	SHOWN			TESTING SYMBOLS DEFINITIOINS  N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

# TYPICAL SOIL AND ROCK SYMBOLS (USCS CLASSIFICATION)

Lean Clay (CL)		Poorly-Graded Sand (SP)		Claystone
Fat Clay (CH)		Well-Graded Sand (SW)		BASALT
Silt (ML)	000	Poorly-Graded Gravel (GP)		Limestone
Elastic Silt (MH)	*	Well-Graded Gravel (GW)		Sandstone
Silty Sand (SM)		Clayey Gravel (GC)	× × × × × × × × × × × × × × × × × × ×	Siltstone
Clayey Sand (SC)		Silty Gravel (GM)		Fill Material
Silty, Clayey Sand (SC-SM)		Silty Clay (CL-ML)		Shale

## **DEGREE OF WEATHERING**

- 1) Unweathered: No evidence of any chemical or mechanical alteration.
- 2) Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered.
- 3) Moderately weathered: Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10% to 50% of the rock volume altered
- 4) Highly weathered: Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
- 5) Decomposed: rock reduced to a soil with relicit rock texture, generally molded and crumbled by hand.

## SOIL STRUCTURE

Calcareous.......Containing calcium carbonate

Slickensided......The presence of planes of weakness having a slick and glossy appearance

Interbedded.......Alternating layers of varying material



P - POCKET PENETROMETER RESISTANCE

**RQD - ROCK QUALITY DESIGNATION** 

T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

GPS COORDINATES: Lat. 41.337091, Long. -82.797344

\*Denotes Total Unit Weight

NUMBER: MD1901007

DATE(S) DRILLED: 4/17/2019

											DATE(S) DRILLED: 4/17/2019
FIE	ELD	DATA		L	ABO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
SOIL SYMBOL DEPTH (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: R. R. ROD: %	MOISTURE CONTENT (%)	ERBEIN PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 4 ft.; NX Wet Rock Coring: 4 to 24 ft.  GROUNDWATER INFORMATION: No groundwater encountered during drilling prior to the introduction of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
	$\overline{\mathbf{X}}$	N = 50/1"	32								\3 in. Topsoil LEAN CLAY (CL), with Sand, with Gravel, dark brown, hard, dry to
5	$\dashv$	N = 50/3" R = 100 RQD = 25 R = 99				168	1064.88		0.0		moist   SILTY GRAVEL (GM), gray, very dense, fine to coarse grained, subangular to subrounded   LIMESTONE, gray, fine grained, slightly to moderately weathered, weak to moderately strong rock
15		R = 99 RQD = 25 R = 100 RQD = 62									
20		R = 96 RQD = 80									Total Depth = 24 ft
											Total Depth = 24 ft.
		DARD PENE					E DE				REMARKS:



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** Erie and Huron Counties, OH LOCATION:

NUMBER: MD1901007

DATE(S) DRILLED:	4/2/2019
DRILLING METHOD	(S):

	FIE	LC	DATA			L	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
$\Box$						ERBI	ERG						Hollow Stem Auger
MD1901007EMERSON CREEK - MD1901007.GPJ	<b>DEP</b> TH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: No groundwater encountered during or immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
N 17.7.	-			40									10 in. Topsoil
MER	-	7	N = 7	40									LEAN CLAY (CL), with Sand, light brown to light gray, medium stiff, moist
1007	- 5	$\overline{X}$	N = 65	10									SHALE, dark gray, hard to very hard, moist to wet
4D190	-	$\frac{1}{}$	N = 50/1"										
. —	- - - 10	$\frac{1}{\sqrt{2}}$	N = 50/1"	4									Grading dry to moist
	- - -												
ERSC ERSC	-	<u>X</u>	N = 50/1"										
9/E	- 15 -	<del> </del> X	N = 50/1"										
18/20	-	-											
	-	×	N = 50/1"										A D ( ) (0.5 f)
NTVPR													Auger Refusal = 19.5 ft.
VE/GII													
G DRI													
IICAL													
GEOT													
SIGN													
)2 DE													
NOPZI													
SNO													
EKA													
4:14 -													
0/21 1													
1 - 9/1													
11.GD													
JNN ON ON ON ON ON ON ON ON ON ON ON ON O													
)G A (													
					L	L						L	
			DARD PENET						Œ				REMARKS:
- WAB	T - TXI	TOC	CONE PEN	ETR/	IOITA								GPS COORDINATES: Lat. 41.331470, Long82.687070 Auger refusal at 7 ft.; offset 32 ft. north of stake, drill to 19.5 ft.
ž			CORE RECO			OITA	N						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/3/2019

	FIE	LC	DATA			LA	ABO	RATO	DRY DA	λTΑ			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				۱۲ (%)						(%) :	JRE	MINUS NO. 200 SIEVE (%)	
5				CONTENT	_	⊢	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	SIEV	GROUNDWATER INFORMATION:
BOL	_		E	oo	LIQUID LIMIT	PLASTIC LIMIT	SI FI	Tig Ci.Fi	SIVE H FT)	FAII	G PR	. 200	Groundwater encountered at 19 ft. during drilling and not measured immediately after drilling
SYME	E) H	LES	WS/F	TUR	aub	AST	AST	DS/C	PRES NGTI S/SQ	IN A	NN.	S NO	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE	LL	PL	립 PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRA	POS	) NIN	SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
3 3 1,1,1,1 2,7,7,7,1		口				'-			000			_	10 in. Topsoil
SOIL SYMBOL	-	<del> </del> X	N = 7	30									LEAN CLAY (CL), trace Sand, light brown, medium stiff, dry to moist
	- - 5	$\pm$	N = 50/1"										SHALE, dark gray, hard, dry to moist
	-	$\frac{1}{\sqrt{2}}$	N. 50/4#	0									
	-	Н	N = 50/1" N = 25/0"	3									
	- 10 -	$\uparrow \uparrow$	N = 25/0"										
	-	$\overline{\mathbb{X}}$	N = 50/1"										
	- - 15	$\overline{\mathbb{X}}$	N = 50/1"	2									
	-	-											
	- - - 20	$\frac{1}{}$	N = 50/1"	Z									
	- -												
	-		N = 25/0" /-										
ייורט			14 - 23/0										Auger Refusal = 24 ft.
<u> </u>													
70.7													
5													
5													
5													
WARLE LOG - LOG A GWALO LOD - 97 IQIZ 14- R.IOTERATIONS/OFINE DESIGN/GEO ECTIVICALLO DAVELOR WITHOUT 14:14- R.IOTERATIONS/OFINE ROOM													
	N - STA		ARD PENE	ΓRAT	ION :	L TEST	RES	ISTANC	 Œ				REMARKS:
اِ اِ	P - PO	CKE	T PENETRO	DMET	ΓER F	RESIS	TAN	CE					GPS COORDINATES: Lat. 41.327524, Long82.684174



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/22/2019

													DATE(5) DRILLED. 4/22/2019
	FIE	ELC	DATA			L	ABO	RATO	DRY DA	λTΑ			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 27 ft.
				(%		LIMIT:	S			~		(%	
				=			Ä			%) ::	뿜	/E (	
				MOISTURE CONTENT (%)	١.	I ⊨	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
ا بر			-	6	LIQUID LIMIT	PLASTIC LIMIT	≟	> t;	∃ (F	Ŋ.		000	No groundwater encountered prior to the introduction of drilling flui
J BC	Ē	w	F Q	H		1	1	ISIT /CU	ISSI TH	Ĭ.	\S\S		
SYI	H.	Ę	SWS SWS SWS	ji		LAS	LAS	DEN PDS	S/S(S	Z.	<u>                                   </u>	S	CLIDEACE ELEVATION (ET):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	SIO				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	<u>R</u>		MINUS NO.	SURFACE ELEVATION (FT):
222		/ல	/ 20.00	2	LL	PL	PI		OWE	Ś	0.6	Σ	DESCRIPTION OF STRATUM
	-	$\forall$	N = 7	17									\[ 1 in. Topsoil \] LEAN CLAY (CL), with Sand, gray to brown, medium stiff to hard,
	-	7	11 - 7	''									dry to moist
		$\forall$	N = 15	13									
	- 5 -	$\mathcal{H}$	11 10	'									
	-	$\forall$	N = 41	12									Grading gray
	-	Н		'-									
Ц	- 10		N = 50/4"			†							LIMESTONE, gray, fine grained, slightly weathered, weak to
귄	-	H	R = 100										moderately strong rock
$\exists$	-	11	RQD = 23 R = 98										
$\Box$	- 15	H	RQD = 75										
	-	11											
Н	-	-11	D 07										
Ц	- 20	41	R = 97 RQD = 90										
Ц		-11	1145 00										
	-	11											
ᅦ	- - 25	11	R = 100										
$\vdash$	- 23	-11	RQD = 100										
	-	Ħ											
													Total Depth = 27 ft.
$\sqcup$													
			ARD PENE T PENETR						Œ				REMARKS:
			CONE PEN										GPS COORDINATES: Lat. 41.318510, Long82.797720



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/23/0219

													DATE(3) DRILLED. 4/23/0219
	FIE	ELC	DATA			L/	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger: 0 to 7 ft.; NX Wet Rock Coring: 7 to 27 ft.
				(%)		_IMIT:				(9)	ш	(%)	
				Ä			X			() ()	SUR	:VE	GROUNDWATER INFORMATION:
				E	⊨	Ψ	PLASTICITY INDEX	_		Ę	SES(	200 SIEVE	No groundwater encountered prior to the introduction of drilling flui
ᇫᅵ			_ <u> </u> _   <u>_</u>   <u>_</u>	8	LIQUID LIMIT	PLASTIC LIMIT	E E	Ε̈́Ξ	SIVE FT)	FA	PR S		Two groundwater encountered prior to the introduction of drilling had
¥	F)	ES	VS/F S/SQ VS	l R		\STI	STI	ENS S/C	SST.	TA	DS/8	Ŏ.	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% SLOV	MOISTURE CONTENT (%)	Ρ	J-T	P.		MPF NS/	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
SO	DE	$\backslash S$	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	×	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STI	88	Σ	DESCRIPTION OF STRATUM
	-	$\overline{A}$											\2 in. Topsoil
	-	$\mathcal{A}$	N = 5	19									LEAN CLAY (CL), trace Sand and Gravel, brown, medium stiff, dry to moist
$\mathcal{A}$		$\forall$	N = 50/4"	13									CLAYEY GRAVEL (GC), brown, very dense, moist, coarse
$\mathcal{Z}$	- 5 -	7	14 00/4										grained, subangular to subrounded
Ï	-	1											LIMESTONE, fine to medium grained, moderately weathered,
긔	- - 10	11	R = 88.3										weak to moderately strong rock
口	- 10 -	41	RQD = 15										
၂	-	#											
긥	- - 15	11	R = 100 RQD = 45										
Ш	-	41	NQD - 45										
$\dashv$	-	#1											
7	- - 20	刞	R = 100 RQD = 91					165	1098.72		0.0		
7	- 20	41	NQD - 91										Grading slightly to moderately weathered
$\Box$	-	#											
耳	- - 25	11	R = 100 RQD = 87										
#	- 20	41	NQD - 07										
		П											Total Depth = 27 ft.
													Total Boptii 27 it.
$\perp$		$\coprod$	ADD 55::				DE6						DEMARKO
			ARD PENE T PENETR						JE				REMARKS:   GPS COORDINATES: Lat. 41.318050, Long82.783112
			CONE PEN										*Denotes Total Unit Weight

\*Denotes Total Unit Weight



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/23/2019

$\vdash$													DATE(5) DRILLED. 4/23/2019
	FIE	ELD	DATA			L/	<b>ABO</b>	RATO	DRY DA	ΛTΑ			DRILLING METHOD(S):
П						ERBE							Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 28 ft.
				(%	L	IMIT	S			~		(%	
				)   <del> </del>			EX			%) ::	뿜	/E (	
				MOISTURE CONTENT (%)		⊨	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
_ [			_	Ö	LIQUID LIMIT	PLASTIC LIMIT	<u></u>	노峼	₩ (£	ALL	₩ ᢓ	8 00	No groundwater encountered prior to the introduction of drilling fluid
<u> </u>	F		Ēά	) Ш		읟	ICI	SIT. CU.	SSI .	E	15 F		
<u>}</u> }	<u>н</u>	ГË	S/S/S/ WS/S/S/ S/S/S/ S/S/S/ S/S/S/ S/S/S/ S/s/ S/S/ S/s S/S/ S/S/ S/s S/S/ S/s S/s	5		AS-	AS <sup>-</sup>	DS/	187.08/S	∢ Z	<u>₹</u>	N	
SOLZAZ DESIGNACE DE CANDALO DA VEGA TANDA DO TRANSPORTA DE LA CANDA DO TRANSPORTA DE LA CANDA DA CANDA	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	_SIC				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	₹	불	MINUS NO.	SURFACE ELEVATION (FT):
S	ag .	\∞	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ž	LL	PL	PI	F 5	ST.	S	26	Σ	DESCRIPTION OF STRATUM
5///	-	$\Box$		1.0									\1 in. Topsoil
	_	$+$ $\!$	N = 6	18									LEAN CLAY (CL), with Sand and Gravel, light reddish brown,
		$\downarrow$											medium stiff to hard, dry to moist
	- 5	+X	N = 12	11									
		$\downarrow$	N. 50/01	١.,									
44	_	$\mathcal{H}$	N = 50/3"	11									Grading gray
	10	11	R = 87.5										LIMESTONE, gray, fine grained, slightly weathered, weak to moderately strong rock
	- '		RQD = 15										moderately strong rock
$\vdash \vdash$		11											
口	L ,_	H	D 400										
	- 15	11	R = 100 RQD = 40										Grading fresh to slightly weathered
	_	-11	1100 - 40										
	_	#											
	- 20	Ш	R = 100										
Н	_	11	RQD = 96										
	_	Н											
	- - 25	11	R = 100										
	- 23	-11	RQD = 95										
		11											
													Total Depth = 28 ft.
													10tal Deptil – 201t.
$\square$	<u>.</u>	$\Box$		<u> </u>		<u> </u>			<u> </u>				
			ARD PENE T PENETRO						Æ				REMARKS:
			CONE PEN										GPS COORDINATES: Lat. 41.316612, Long82.776072
<u> </u>	R - RO	CK	CORE REC	OVEF	RY								
<u> </u>	KQD -	KU(	CK QUALITY	r DES	SIGN/	AHON	١						



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/24/2019

<u></u>	LD	DATA	(%		ERBE	RG	RATC	RY DA	ΛTΑ			DRILLING METHOD(S): Hollow Stem Auger: 0 to 13 ft.; NX Wet Rock Coring: 13 to 28 ft.
1)			(%									Hollow Stem Auger: 0 to 13 ft.: NX Wet Rock Coring: 13 to 28 ft.
(1.			(%	. 1		<u> </u>						
(1.			ئ		IMITS				(%	щ	(%)	
<u></u>			ΙΝΞ			DEX			() ()	SUR	:VE	GROUNDWATER INFORMATION:
<u>-</u>			NTE	⊨	PLASTIC LIMIT	PLASTICITY INDEX	<b>—</b>	ш _	Ę	SES(	200 SIEVE (%)	No groundwater encountered prior to the introduction of drilling flui
_		FE	S	LIQUID LIMIT	IC LI	ICIT	F.U.	SIVI TE	-FA	3 PF SQ I	. 200	Two groundwater encountered prior to the introduction of driving had
<u></u>	Sä	NS/F S/SG NS	UR.	alu	AST	AST	ENS OS/C	RES VGTI /SQ.	ΑΑ	NIN DS/	8	
DEP I H (F I)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
<u> </u>	&/	Z T T S S	ĭ	LL	PL	PI	RA	ST.	ST	88	Σ	DESCRIPTION OF STRATUM
-	$ abla_{i}$	<b>V</b> = 6										∖3 in. Topsoil  LEAN CLAY (CL), with Sand, light reddish brown, medium stiff to
-	H'	<b>1</b> – 0										hard, dry to moist
5 -	Mr	N = 18	17									Grading grayish brown
-												
_	Ŋι	N = 23	13									
- 10 -	χı	N = 23	10	24	16	8					72	
-												
-	X 1	N = 50/2"										Grading gray
- 15 -	11,	R = 99										LIMESTONE, gray, fine grained, slightly weathered, weak to moderately strong rock
-												moderately strong rook
-	H											
- 20 -	11,	⋜ = 98										
-	Ħ	RQD = 92										
-	H											
25 -												
-	Ш	RQD = 81										
-												
												Total Depth = 28 ft.
								 E				REMARKS:
POC			OMET ETR/									GPS COORDINATES: Lat. 41.314163, Long82.787932
1 1 2		STAND	N = 23 N = 23 N = 23 N = 50/2" R = 99 RQD = 70 R = 98 RQD = 92 R = 94 RQD = 81	N = 23	N = 23	N = 23	N = 23	N = 23	N = 23	N = 23	N = 23	N = 23



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/18/2021

$\vdash$													DDILLING METHOD(0):
	FIE	:LD	DATA					RATC	RY DA	λΤΑ			DRILLING METHOD(S):
					ATT	ERBI	RG						Solid Stem Auger: 0 to 8.5 ft; NX Wet Rock Coring: 8.5 to 30 ft.
				(%)	L	IMIT:	5			(9	ш	(%)	
.				Ę			X			%	뿔	Æ	
				MOISTURE CONTENT (%)	١.	⊨	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	GROUNDWATER INFORMATION:
			<sub> </sub>	ģ	LIQUID LIMIT	PLASTIC LIMIT	T	누峼	J (E	Ŋ.		00	No groundwater encountered during or immediately after drilling
	F.	,,	Få	\ \ \ \ \ \ \ \		은	TIC	ISIT /CU	SSE Z	F	19/30	0.2	
	E)	ľ	WS/S/W	🖺	l De	AS	AS	DS,	NG-NG-	Ž.	<u>E</u> 9	Ž	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	OIS				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ΡĄ	\langle \bar{2}{2}	MINUS NO.	SURFACE ELEVATION (FT):
S	<u> </u>	\∞	\ <u> </u>	ž	LL	PL	PI	F 5	S E	ST	ρę	⅀	DESCRIPTION OF STRATUM
5 [ <del>-1//</del> .]	-	$\forall$											2 ft. Topsoil
	-	+	N = 7										FAT CLAY (CH), trace Sand, brown to gray, medium stiff, dry to
	-	$\downarrow$											moist
	- 5	-X	N = 12	25									LEAN CLAY (CL), with Sand, light brown to gray, stiff to hard, dry
	-	$\downarrow$											to moist
	-		N = 60/7"	13									Grading dark olive brown
╁┼┼┼	- - 10		R = 94										Grading with occasional Limestone fragments
	- 10	-11	RQD = 78										LIMESTONE, dark gray to light gray, fine to medium grained,
;	-	-11	R = 97										fresh, strong to very strong rock, fossiliferous 2 in. Chert seam at 9 ft.
	-	11	RQD = 83										Z III. Officit south at 5 it.
	- 15	Н											
	-	11	R = 98										
	-	Ш	RQD = 78										
╬┼┼╬	-	11											
	- 20 -	П											Encountered Chert from 20 to 20.5 ft.
	-	-11	R = 98										Encountered Chert from 22 to 22.5 ft.
	-	11	RQD = 82										Encountered other from 22 to 22.5 ft.
	- 25	Н											
	-	11	R = 100										
Į I	-	Ш	RQD = 70										
NEW FWANDE ELOG A GINNEUT GULT 19:14 - R. OF ERATIONS OF ZOZ. DESIGNAGEO I COMPOSED SECONDO SEGNATORIO CAREA CONTRACTORIO CAREA CONTRACTORIO SEGNATORIO CAREA CONTRACTORIO CONTRACTORIO SEGNATORIO CAREA CONTRACTORIO SEGNATORIO CAREA CONTRACTORIO SEGNATORIO SEGNA	- 20	11											
	- 30	П											T-1-1 down - 20 ft
													Total depth = 30 ft.
<u> </u>													
1													
5													
<u> </u>													
一、	N - ST		ARD PENE	TRAT	ION .	TEST	RESI	STANC	i i i i i i i i i i i i i i i i i i i				REMARKS:
			T PENETRO						<b>/</b> L				REIMARKS:   GPS COORDINATES: Lat. 41.310120, Long82.787196
1	T - TXE	TOC	CONE PEN	IETR/	IOITA								2. 2 23 3. 2. 1. 23. 24. 11.0 10 120, 2011g. 02.101 100
<u> </u>			CORE REC CK QUALIT			\TI^*	J						
<u> </u>	<b>TUD -</b>	ĸυ	on QUALIT	ו חבי	SIGIN/	4HOI	N						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/22/2019

													DATE(3) DRILLED. 4/22/2019
	FIE	ELD	DATA			LA	ABO	RATC	RY DA	ΛTΑ			DRILLING METHOD(S):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: % ROD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT HERE		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 14 ft.; NX Wet Rock Coring: 14 to 28 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling flui  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
									00,0			_	∖1 in. Topsoil
	- - - 5		N = 7 N = 8	18									LEAN CLAY (CL), trace Sand, brown, medium stiff, dry to moist
	- - - - 10	$\perp$	N = 30 N = 34										CLAYEY SAND (SC), brown, medium dense to dense, moist, fine to medium grained
	- -	$\forall$	N = 66/10"	12									FAT CLAY (CH), trace Sand, brown, hard, dry to moist
	- - 15 - -		R = 97 RQD = 78										LIMESTONE, gray, fine grained, slightly weathered, weak to moderately strong rock
	- - 20 - -		R = 98 RQD = 92										
	- - 25 - -	-	R = 100 RQD = 95										
													Total Depth = 28 ft.
١	- PO	CKE	ARD PENE T PENETR CONE PEN	OME	TER F	RESIS	TANG	CE	E E				REMARKS: GPS COORDINATES: Lat. 41.309756, Long82.799754



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/25/2019

	FIE	LD	DATA			LA	ABO	RATO	RY DA	AΤΑ			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 28 ft.
				(%)	L	_IMITS	S			(9	Ш	(%)	
				Z			)EX			Б (%	l N	VE	CDOLINDVA/ATED INFORMATION.
				MOISTURE CONTENT (%)	<b>-</b>	Η	PLASTICITY INDEX	_		STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
9			  _ E	8	LIQUID LIMIT	PLASTIC LIMIT	LE I	F₽	FI	FA	PR S	200	No groundwater encountered prior to the introduction of drilling flui
WB	FT	ES	/S/F /SQ /S	뿔		ST	STI	S/C	SQ FSS	IAT	S/SC	Š.	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	LOW LOW Si.%	IST	Ιğ	PLA	PLA		MPR NS/	N S N		MINUS NO.	SURFACE ELEVATION (FT):
SOI	H (	\SAI\	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR	50	Σ	DESCRIPTION OF STRATUM
		$\Box$											∖2 in. Topsoil
<i>///</i> t		'IK	N = 6	21									LEAN CLAY (CL), with Sand, brown, medium stiff to hard, dry to
		H	N = 11										moist
<i>//</i> /	5	14	N = 11										
		$\mathbf{A}$	N = 50/2" _	16									
ᆛ		Н											LIMESTONE, gray, fine grained, slightly weathered, weak to
댞	10		R = 92 RQD = 53										moderately strong rock
끆		Ш											
다		11.											Grading moderately weathered
茸	15	11	R = 96 RQD = 75										
弌		Ш											
다		11.	D 00										
ぱ	20		R = 99 RQD = 97										
士		11											
╁		11.	D - 400										
┰	25		R = 100 RQD = 92										
4		11											
													Total Depth = 28 ft.
- 1													
			ARD PENET						E E				REMARKS: GPS COORDINATES: Lat. 41.305617, Long82.787640



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/25/2019

$\vdash$		-, -	DATA				\ D \			Τ.Δ			DRILLING METHOD(S):
	FIE	LL	DATA		_ A ===			RAIC	DRY DA	NΙΑ			Hollow Stem Auger: 0 to 21 ft.; NX Wet Rock Coring: 21 to 31 ft.
				_	AII	ERBE	=RG   S						The lieu Stein Adger. Site 21 ft., 1700 West Nook Selling. 21 to 31 ft.
				MOISTURE CONTENT (%)						(%)	쀭	200 SIEVE (%)	
덊				Ë		_	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	EVE	GROUNDWATER INFORMATION:
).   J				K	<b>⊨</b>	PLASTIC LIMIT	۸	. 1	ш (		₩ (£	IS 0	No groundwater encountered prior to the introduction of drilling fluid
801 80   301	_		L E	Ö	LIQUID LIMIT	C	ICIT	YT!S	Si + F	ΓFΑ	S P	. 20	The great and th
M X MO	<u>E</u>	ES	NS/R S/SC VS	L. L.		\ST	٦ST	ENS OS/C	SES SO IS	Ę	NN/SQ	2	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	SLONS Slons Slons	ISI	음	3	PL	DRY DENSITY POUNDS/CU.FT	REN	₽¥.	 필등	MINUS NO.	SURFACE ELEVATION (FT):
ERSON CREEK - MD1901007.GPJ	DE	/S	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	×	LL	PL	PI	DR PO	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ST	85	Σ	DESCRIPTION OF STRATUM
	-												\1 in. Topsoil
	<u>-</u>	X	N = 5	28									FAT CLAY (CH), trace Sand, brown, medium stiff, dry to moist
	-	$\downarrow$											
	- 5 -	<u>X</u>	N = 6										
- MD19901001	-	$\forall$	N = 40	10									LEAN CLAY (CL), with Sand, brown, stiff, dry to moist
	-	$^{\perp}$	N = 12	19									
	- 10	-X	N = 51	11									SHALE, gray, hard, dry to moist
	-	$\downarrow$											
	-	+X	N = 93/7"										
	- - 15	-X	N = 50/4"	16									
	-	$\Box$											
25	-	7											
	- - 20	$\mathbf{X}$	N = 50/5"										
	- 20	+											LIMESTONE, gray, fine grained, slightly weathered, weak to
	-	11	R = 100										moderately strong rock
	-	-11	RQD = 88										
$\S$	- 25 -	11											
	-	-11	D = 400										
	-	41	R = 100 RQD = 92										
	- 30	Ш											
													Total Depth = 31 ft.
													Total Deptit – 31 it.
ח אר													
24													
7 7													
<u></u>													
6													
<u> </u>													
¥													
ġШ													
!   [			ARD PENET						Œ				REMARKS:
			ET PENETRO CONE PEN										GPS COORDINATES: Lat. 41.305128, Long82.781567
il F	R - RO	CK	CORE REC	OVEF	RY								
Z	<b>TUD -</b>	KÜ	CK QUALITY	, DE	SIGN/	AHON	٧						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/2/2019

		FIE	LC	DATA			L	4BO	RATO	DRY DA	λTΑ			DRILLING METHOD(S):
T							ERBE							Hollow Stem Auger
- MD1901007/EMERSON CREEK - MD1901007.GPJ	SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	D PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 11.5 ft. during drilling and not measured immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
ONO	7,:	,												10 in. Topsoil
1901007\EMERS		5		N = 8 N = 5	22									LEAN CLAY (CL), trace Sand, light brown, medium stiff, moist
J. M.	▋		$\overline{\mathbb{A}}$	N = 75/9"	26									SHALE, dark gray, very hard, wet
	▋	10	A	N = 50/2"	7									
DRIVE\GINT\PROJECTS\2019\EMERSON CREEK			$\forall$	N = 50/2"	¥-									Grading dry to moist, interbedded with occasional Clay seams
EMER	▋	15	$\overline{\mathbb{X}}$	N = 50/2"										
3/2019	₽		7											
JECTS		20	$\frac{1}{\lambda}$	N = 50/4"	13									
TPR0	⇟													
Æ/GIN				N - 50/5"										
3 DRIV	=	25	X	N = 50/5"										
IICAL/C				N. 50/0#										
ECH.	=	30	Ť	N = 50/3"										
NGEO														Auger Refusal at 30.5 ft.
ESIGN														
2/02 DI														
1S/0P;														
ATION														
OPER														
4 - R:\														
21 14:														
- 9/10/.														
.GDT .														
NNL01														
G A G														
G-L0														
LE LO				DARD PENET						Œ				REMARKS:
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:14 - R.\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G	٦	- TXE	OT	ET PENETRO CONE PEN CORE RECO	IETR/	OITA								GPS COORDINATES: Lat. 41.303804, Long82.696969
REN				CK QUALITY			OITA	٧						



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/1/2019

													DATE(S) DRILLED: 4/1/2019
F	FIEL	D DAT	Α			LA	ABO	RATO	RY DA	AΤΑ			DRILLING METHOD(S):
				_		ERBE							Hollow Stem Auger
				(%) I						(%)	쀭	MINUS NO. 200 SIEVE (%)	
				EN.		<b>-</b>	NDE			R	SSU	IEVE	GROUNDWATER INFORMATION:
٦		_		NO.	IM	IM	ΙΤΥ Ι	누峼	VE T)	AILL	PRE S	S 00:	Groundwater encountered at 2.5 ft. during drilling and measured at
MBC TT	ا ا	S PFT		RE (		STIC	этіс	VSIT S/CU	ESSI STH Q. F	ATF	NG I	10.2	13.5 ft. immediately after drilling
SOIL SYMBOL	O I I O I V	WO'S	%	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	APRE ENG NS/S	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	US N	SURFACE ELEVATION (FT):
		N: BLOWS/FT P: TONS/SQ FT T: BLOWS	ROD %	MO	LL	PL	PI	Pol	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR	88	Z	DESCRIPTION OF STRATUM
N 1,1:	+			40									10 in. Topsoil
	1	N = 23	7	<u>7</u> 16									LEAN CLAY (CL), with Sand, dark brown, very stiff, moist
<b>#</b> 5	, ‡	N = 50	/5"	15									SHALE, gray, very hard, moist to wet
<b>量</b> `													
	1	N = 50	/4"										
<b>1</b> 1	o -⊉	N = 50	/1"										Grading light gray
	1	N 50	,OII										
	+	N = 50	-	-									Conding
<b>■</b> 1	5 ∤	N = 50	/4"	10									Grading gray
	-												
∄ ,	o 🗦	N = 50	<sub>/4"</sub>										
<u></u> 2 − 2 − 2 − 2 − 2 − 2 − 2 − 2 − 2 − 2	۷ <u>۲</u>	1 00	·										
	7												
<b>2</b>	5 뉟	N = 50	/4"										
	1												
	1												
													Auger Refusal at 29 ft.
					1001	FECT	DEC	OTANO	<u></u>				DEMARKS.
P - F	POCK	DARD P ET PEN	ETRO	DMET	TER F	RESIS	TANG	CE	<b>,</b> ⊏				REMARKS:   GPS COORDINATES: Lat. 41.303059, Long82.688400
		T CONE				N RES	SISTA	NCE					, 3



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/1/2019

	FIE	ELC	DATA			L/	\BO	RATO	RY DA	TΑ			DRILLING METHOD(S):
$\vdash$					ATT	ERBE	₽RG						Hollow Stem Auger
				(%)	L	IMITS				(%	ш	(%)	
<u>a</u>				MOISTURE CONTENT (%)			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
007.G				ONTE	<u></u>	PLASTIC LIMIT	NΙ	<u> </u>	ш	Į.	S (S)	O SIE	Groundwater encountered at 7 ft. during drilling and measured at 36
1901 BOL	F		TH C	E CC	LIQUID LIMIT	JOI.	TICIT	SITY CU.F	SSIV TH	T FA	G PI	). 20	ft. immediately after drilling
W S	Щ. Н	LES	WS/SC	TUR		AST	AST	DS/(	NGT NGT S/SQ	Z Z	NN	S NC	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	IOIS	LL			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	T.	NO NO	) N	SURFACE ELEVATION (FT):
RSON CREEK - MD1901007.GPJ		\S	/ ZTHKK	2	LL	PL	PI	О	Owc	S	0.6	2	DESCRIPTION OF STRATUM
RSO	-	$\overline{\mathbb{A}}$	N = 6	24									FAT CLAY (CH), with Sand, dark brown, medium stiff to stiff, dry
'AEME	-												to moist
7007	- 5 -	$\mathbb{A}$	N = 11	16									Grading trace Gravel
MD190	-	$\forall$	N = 50/3"	7									SHALE, dark brown hard, dry to moist
-	-	H	N = 50/2"	11									Grading dark gray
CREEK	- 10 -	7	N - 50/2	11									Grading dark gray
NOS	-	$\forall$	N = 50/2"										
MER	- - 15	$\frac{1}{2}$	N = 50/1"										
19/E	-	+											
TS/2(	-	7											
SEE SEE	- - 20	$\forall$	N = 50/4"										
PR PR	-	П											
N N N N N N N N N N N N N N N N N N N	_	1											
RIVE	- 25	-M	N = 50/2"										
	-	1											
₹   	-												
	- 30 -	$\frac{1}{4}$	N = 50/3"	5									
SEOT	_	1											
DESIGNIGEOTECHNICALIG DRIVE/GINTPROJECTS/2019/EMERSON	-	$\frac{1}{2}$	N = 50/3" _										
DES	- 35 -	7	14 - 30/3	_									
2002	-	1											
	-	×	N = 50/3"										
ATIO													Auger Refusal = 39.5 ft.
PER													
R:\0													
4:14													
/21 1													
9/10													
SDT.													
IL01.0													
GN GN													
0G A													
- P													
			ARD PENET						Æ		•		REMARKS:
VABL			T PENETRO CONE PEN										GPS COORDINATES: Lat. 41.301861, Long82.683923
INEV EV	R - RO	CK	CORE RECO	OVEF	RΥ								
₩.	<b>KUU -</b>	KU	CK QUALITY	טבט	SIGN/	ATTUN	N						



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc **Emerson Creek Wind Project** PROJECT: LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/22/2019 - 5/23/2019

													DATE(3) DRILLED. 3/22/2019 - 3/23/2019
	FIE	ELC	DATA			L	<b>4BO</b>	RATO	DRY DA	ATA			DRILLING METHOD(S):
					AT	TERBI	ERG						Hollow Stem Auger: 0 to 11 ft., 19 to 38 ft.; NX Wet Rock Coring:
				(%)		LIMIT:	<u>S</u>			<u></u>		(%	11 to 19 ft.
				Ä			Ä			%) ::	<u>R</u>	/E (	
				MOISTURE CONTENT (%)	_	<del> </del>	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
٦				5	LIQUID LIMIT	PLASTIC LIMIT	}	놀	IVE (T:	-AIL	<u>R</u> C	500	Groundwater encountered at 7 ft. during drilling prior to the introduction of drilling fluid
MB(	E	တ္ယ	SQ F	R		STIC	) STS	ZS	SESS TH O. F	AT F	S/S	0.	introduction of drilling fluid
S₹	) H	ᇤ	SWO SWO SWO SWO	STU	l o	AS	[AS		PRE IS/S	Ž	ΕĞ	N St	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ğ		PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ΪΈ	N S S		• •
777		107	/ 24 - 44	_		+			0000	0)		_	DESCRIPTION OF STRATUM \\1 in. Topsoil
	-	$\perp$	N = 4										LEAN CLAY (CL), with Sand, brown, soft to hard, dry to moist
$/\!\!/\!\!/$	-	$\Box$											,,,,,,,,
	- - 5	$\overline{\mathbb{A}}$	N = 2	26									
	-												
$/\!\!/\!\!\!/$	-	-	P = N/A*										
	- 10	$\overline{X}$	N = 93/10"	14									Grading trace Gravel
44	-	$\overline{\Pi}$											LIMESTONE, gray, fine grained, moderately weathered, weak to
쿠	-	11	R = 7										moderately strong rock
井	- - 15	Ш	RQD = 0										
⇉	- 13	Н											
┧	- -	11	R = 3 RQD = 0										
ㅂ	-	$\frac{1}{M}$	N = 41										SHALE, brown, medium hard, dry to moist, with occasional Grave
	- 20	7	11 – 41										CHARLE, Brown, modium mara, ary to molot, with occasional Grave
	-	+1											
	-	$\mathbb{H}$				10	40					٥- ا	
$\equiv$	25	A	N = 44	11	28	18	10					65	
	-	+1											
=		$\downarrow$											
	30	X	N = 94/9"										Grading grayish black, moist
$\equiv$	-	71											
	-												
	35	-X	N = 50/4"										
		11											
=	-	H											
													Auger Refusal at 38 ft.
ㅡ,	N - STA	L NA	ARD PENE	TRAT	ION	TEST	RES	STANC	 E		1		REMARKS:
F	- PO	CKE	T PENETRO	OME	TER I	RESIS	TAN	CE	-				GPS COORDINATES: Lat. 41.297773, Long82.741589
			CONE PEN			N RES	SISTA	NCE					*No Recovery



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/3/2019 - 4/4/2019

													DRILLED. 4/3/2019 - 4/4/2019
	FIE	ELC	DATA					RATO	DRY DA	ATA			DRILLING METHOD(S):
				_		ERBE IMITS							Hollow Stem Auger
				MOISTURE CONTENT (%)		I				(%	Щ	200 SIEVE (%)	
<u> </u>				H			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	≣VE	GROUNDWATER INFORMATION:
07.G				E	⊨	PLASTIC LIMIT	N ≻	_	ш _	<u> </u>	SES N	SIE	Groundwater encountered at 7 ft. during drilling and measured at 24
301C	_		L E	8	LIQUID LIMIT	CL	ICIT	TTY J.U.	S L	FA	SQI	. 20(	ft. immediately after drilling
YME	FT)	ES	VS/F 8/SQ VS	l R		\STI	۱ST	S/S	SQ.	ΙAΤ	NINC DS/8	9	, ,
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	IST	g	PL	ЛΑ	Z D	MPR NS/	₹ S		MINUS NO.	SURFACE ELEVATION (FT):
SO	DE	\S\	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	M	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ST	88	Σ	DESCRIPTION OF STRATUM
N 11/1	_												10 in. Topsoil
AER.		X	N = 7										LEAN CLAY (CL), trace Sand, light brown, medium stiff to stiff, wet
N/N/E/	_	$\frac{1}{2}$	N = 14	14									
010	- 5 -	7	11 - 14	, '4									
4D 18	_	$\forall$	N = 23	<del>/</del>									WEATHERED SHALE, gray, hard, dry to moist
Ž		$\Box$											75 37 7
	- 10	7	N = 48	6									
SIOP2/02 DESIGNIGEOTECHNICALIG DRIVE\GINTIPROJECTS\2019\BMERSON CREEK - MD1901007\BM SPON CREEK - MD1901007.GPJ	Ŀ	$\frac{1}{2}$	N = 81										SHALE, gray, hard, dry to moist
ERS		$\Box$		40									
9/EN	- 15	Ä	N = 79	10									
3/201	_	+											
		$\downarrow$	N. 00/0#										
	- 20	Ä	N = 96/8"										
	_	+1											
		$\downarrow$	<u> </u>	₹									
NEW!	25	$\mathbb{A}$	N = 50/3"										
		71											
₹ E													
	- 30	-X	N = 50/2"										
	-	71											
SN/G		$\downarrow \downarrow$											
ESIG	- 35	-X	N = 50/5"	16									
		11											
		$\perp$											
	- 40	$-\mathbb{N}$	N = 50/5"										
ATIC		11											
PER	_	$\perp$	=0/0"										
Ä. E.		$\mathbb{R}$	N = 50/2"										
4:14													Auger Refusal = 44.5 ft.
21 1													
9/10/													
DT.													
01.G													
NN I													
A G													
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:14 - R:\OPERATION													
ģ		Ц		<u> </u>					<u></u>				
빌			ARD PENE T PENETRO						Œ				REMARKS: GPS COORDINATES: Lat. 41.294908, Long82.754023
WAB	T - TXI	TOC	CONE PEN	IETR/	OITA								OF 0 0001\Dirantes, Lat. 41.294900, Long02.794025
			CORE RECO			4∩ITA	J						
~ <b></b>			UN QUALIT		JI UI 1/		•						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/23/2019

	FIE	ELD	DATA			L/	ABO	RATO	DRY DA	TΑ			DRILLING METHOD(S):
					ATT	ERBE	ERG						Hollow Stem Auger
				(%)_	L	IMITS				(%	l W	200 SIEVE (%)	
GPJ				IENJ		_	NDE.			JRE (	SSUF	IEVE	GROUNDWATER INFORMATION:
11007. JL			-	NOC	IMI	PLASTIC LIMIT	PLASTICITY INDEX	≻ FT.	IVE (T.	-AILL	PRG N	S 003	No groundwater encountered during or immediately after drilling
1D190	(FT)	ပ္သ	S/FT SO F	JRE (		STIC	STIC	NSIT S/CU	ESSI 3TH 3Q. F	AT F	ING S/S(		
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LIQUID LIMIT	PLA	PLA	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
SO	ЭG	\ <u>&amp;</u>	X Y L X X   X X X X X X X X X X X X X X X X	MC	LL	PL	PI	DR PO	ST)	STI	88	Ž	DESCRIPTION OF STRATUM
DESIGNIGEOTECHNICALIG DRIVE/GINTIPROJECTS/2019/EMERSON CREEK - MD1901007/GPJ		$\frac{1}{\sqrt{2}}$	N = 8	17									3 in. Topsoil LEAN CLAY (CL), with Sand, brown, medium stiff to very stiff, dry
EME	_												to moist
7001	- 5	$\frac{1}{2}$	N = 20										
MD190	_	$\frac{1}{\lambda}$	N = 39	15									WEATHERED SHALE, dark gray, hard, dry to moist
EK-	- - 10	Д	N = 35										
I CRE													
RSON		-X	N = 51	9									
NEME	15	$\overline{\mathbb{X}}$	N = 38										SANDY LEAN CLAY, trace Gravel, dark gray, hard, dry to moist
3/2018		-											
JECTS	[	$\frac{1}{\lambda}$	N = 63/12"										
PRO.	- 20 -	7	14 00/12										
GINT		-											
RIVE	25	$\overline{\mathbb{X}}$	N = 63	9									
LIG D	-	1											
NICA	-	1  X	N = CC										
DE CONTRACTOR DE	- 30	7	N = 66										
NGEO	-	1											
SIGN	- - 35	$\overline{\mathbb{X}}$	N = 69										SHALE, gray, hard, dry to moist
	-	1											
NS\OP2\02	-												
SNOIL	- 40 -	A	N = 50/4"										
ERAI	-												
- R:\OPERATIO	- - 45	$\frac{1}{X}$	N = 50/4"										
4:14 -	-	1											
1/211	_	+											A D ( ) 1 40 (
- 9/10													Auger Refusal at 48 ft.
TGDT													
NNL01													
A G													
-Loc													
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:14	l N - ST	∐ NAP	DARD PENE	L FRAT	ION T	L TEST	RESI	STANC	L				REMARKS:
ABLE	P - PO	CKE	T PENETRO CONE PEN	DMET	ΓER F	RESIS	TANG	CE	_				GPS COORDINATES: Lat. 41.295016, Long82.737826
INEW W	R-RO	CK	CORE REC	OVEF	RY			VOL					
₩.	KUD -	KÜ	CK QUALITY	DES	SIGN/	411UN	N						



CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/24/2019

												DATE(S) DRILLED: 5/24/2019
	FIE	ELD	DATA		L	4BO	RATO	ORY DA	AΤΑ			DRILLING METHOD(S):
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT F: BLOWS R: % ROD: %	MOISTURE CONTENT (%)	ERBITION PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 4 ft.; NX Wet Rock Coring: 4 to 32 ft.  GROUNDWATER INFORMATION: No groundwater encountered during drilling prior to the introductio of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  \( \bar{2} \) in. Topsoil
	-	A	N = 16	21								SANDY LEAN CLAY (CL), brown, very stiff, dry to moist
	- - 5 -		N = 50/3" / R = 46 RQD = 25	4								\LIMESTONE, brown, very hard, dry to moist LIMESTONE, light brown, fine grained, slightly to moderately weathered, weak to moderately strong rock
	- - 10 -	-	R = 73 RQD = 36									
	- - - 15 -		R = 68 RQD = 12				166	923.04		0.0		
	- - 20 -		R = 94 RQD = 23									
	- - - 25	-	R = 83 RQD = 25 R = 100 RQD = 44									
	- - 30	-	R = 92 RQD = 33									
												Total Depth = 32 ft.
			OARD PENE					Œ				REMARKS:

P - POCKET PENETROMETER RESISTANCE

T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

RQD - ROCK QUALITY DESIGNATION

GPS COORDINATES: Lat. 41.291780, Long. -82.735204 Auger refusal at 9 ft.; Offset and drill to 32 ft. \*Denotes Total Unit Weight.



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/4/2019 - 4/6/2019

Auger refusal at 10 ft.; offset 30 ft. east of stake for coring.

Т			D 4 T 4					D 4 T 6	NDV D 4	Τ.			DDILLING METHOD(9):
_	FIE	LD	DATA					RAIC	DRY DA	NΙΑ			DRILLING METHOD(S):  Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 30 ft.
					ATT	ERBE	ERG S						Thollow Stern Auger. 9 to 10 it., NX Wet Nock Colling. 10 to 30 it.
				%) _	_					(%)	쀭	(%) :	
							PLASTICITY INDEX			RE (	SSUF	EVE	GROUNDWATER INFORMATION:
				NO	¥	₹	_ ≥	\ . <del> -</del>	ے سا		Z S	IS O	Groundwater encountered at 5 ft. during drilling prior to the
2	Ĺ		L E	ÜЩ		121	5	F.S.	SSIV TH	T F/	G P	). 20	introduction of drilling fluid
<u>X</u>	H (F	LES	/S/SI MS/SI MS	I.R	LIQUID LIMIT	PLASTIC LIMIT	AST	DS/	NGT NSC	Z	NN	S NC	
SOIL SYMBUL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE	SURFACE ELEVATION (FT):
ი 	<u> </u>	\ø\	/ z q : : : : : : : .	Σ	LL	PL	PI	22	SSF	ပ	\ <u>Q</u> €	Σ	DESCRIPTION OF STRATUM
			N = 5	24									10 in. Topsoil LEAN CLAY (CL), with Sand, light gray to brown, medium stiff,
		$\Pi$											moist
#	5	$\overline{\mathbb{A}}$	N = 53 <sup>5</sup>	¥									SHALE, dark gray, hard to very hard, moist to wet
⇟		$\prod$											
∄		$\mathbb{A}$	N = 50/2"										Grading dry to moist
╡	10	X	N = 50/1"										LIMESTONE grow fine grained moderately weethers divisal
1		11	R = 100										LIMESTONE, gray, fine grained, moderately weathered, weak rock, vertical fracture from 12 to 13 ft.
╁			RQD = 48										
1	15	#											
╁		11	R = 42										
$^{\dagger}$			RQD = 23										
Ŧ	20	H											
╁		11	R = 100										
ł			RQD = 42										
#	25	$\mathbb{H}$											Grading highly weathered
#		11	R = 100										Crading rightly weathered
⇉		11	RQD = 42										
╡	30	H											
													Total depth = 30 ft.
l													
l													
l													
٦,	N - STA	L DNA	ARD PENE	TRAT	ION :	TEST	RESI	ISTANC	Œ		1		REMARKS:
Е	- PO		T PENETRO			RESIS N RES							GPS COORDINATES: Lat. 41.286773, Long82.755319



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/4/2019

		:	DATA			1 /	\BO	DATO	DRY DA	тл			DRILLING METHOD(S):
$\vdash$	FIL	LL	TOATA		ΔΤΤ	ERBE		NAIC		NIA			Hollow Stem Auger
EMERSON CREEK - MD1901007.GPJ	DEPTH (FT)	SAMPLES	L = N   BLOWS/FT   P: TONS/SQ FT   F: BLOWS   R: %   R: %	MOISTURE CONTENT (%)	T LIQUID LIMIT	PLASTIC LIMIT	D PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	(POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 14 ft. during drilling and not measured immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  10 in. Topsoil  LEAN CLAY (CL), trace Sand, dark brown, medium stiff to hard,
	-	$\Box$											wet
0000	- 5	$\mathbb{A}$	N = 8	17									Grading trace Sand, brown, dry to moist
- MD1901007	-	$\forall$	N = 27										Grading dark grayish brown
SREEK.	- - 10	$\overline{A}$	N = 39	30									
Z ///	-	$\prod$											
SE MAN	-	H	N = 38 N = 50/5"	7 12									SHALE, dark gray, hard, dry to moist
19/EN	- 15 -	11	11 - 30/3	'2									SHALE, dark gray, hard, dry to moist
TS/20	-	11											
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:14 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\EMERSON	NI CTI		OARD PENE	TDAT		FECT	DEG	STANK	Ţ				Auger Refusal at 19 ft.  REMARKS:
EWABLE	P - PO( T - TXE	CKE	T PENETRO CONE PEN CORE RECO	OMET ETRA	TER F ATION	RESIS	TAN	CE	· <b>-</b>				GPS COORDINATES: Lat. 41.284045, Long82.736863
¥			CK QUALITY			ATION	1						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/16/2019

													DATE(S) DRILLED: 4/16/2019
	FIE	LD	DATA			L/	ABO	RATO	DRY DA	λTΑ			DRILLING METHOD(S):
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT F: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 23 ft.  GROUNDWATER INFORMATION: No groundwater encountered during drilling prior to the introductio of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
1,; ///	_	$\forall$	N - F	25									10 in. Topsoil
	- - - 5 -		N = 5 N = 26	25									LEAN CLAY (CL), trace Sand, brown, medium stiff to stiff, wet  Grading with Sand, dark gray, dry to moist
	_	+	N = 50/4"	6									SHALE, gray, hard, dry to moist
	- - 10 - -		R = 60 RQD = 0										SHALE, gray, very fine grained slight to moderately weathered, very weak to weak rock
	- 15 - - -	- - - - - - - -	R = 93 RQD = 0										
	- 20 - - -		R = 100 RQD = 0										
	- 25 -		R = 100 RQD = 67										
													Total Depth = 28 ft.
	P - PO	CKE	ARD PENE T PENETRO CONE PEN	OME	TER F	RESIS	TANG	Œ	E E		I .	l	REMARKS: GPS COORDINATES: Lat. 41.263784, Long82.757024



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/27/2019

													DATE(S) DRILLED: 4/27/2019
	FIE	LD	DATA			LA	ΑВО	RATO	RY DA	ATA			DRILLING METHOD(S):
				(%)		ERBE IMITS	S			(%	Ш	(%)	Hollow Stem Auger: 0 to 16 ft.; NX Wet Rock Coring: 16 to 31 ft.
30L			F E	MOISTURE CONTENT (%)	LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	ITY SU.FT	SIVE H FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 4.5 ft. during drilling prior to the introduction of drilling fluid
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	OISTURE	LIQUID LIMIT			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	TRAIN AT	ONFINING OUNDS/	ON SONI	SURFACE ELEVATION (FT):
7771		\ <u>\</u> \	/ z c :: c k	Σ	LL	PL	PI	2 2	9.0F	رم.	S.€	Σ	DESCRIPTION OF STRATUM \[ 1 \text{ in. Topsoil} \]
		X	N = 6	18									SANDY LEAN CLAY (CL), brown, medium stiff, moist to wet
	5		N = 7	¥									CLAYEY SAND (SC), brown, very loose to very dense, moist to wet, fine to coarse grained
	10	Н	N = 2 N = 50/4"	17									
	.0		N = 50/2"										
	15		N = 25/0"										LIMESTONE, gray, fine grained, slightly to moderately weathered
	20		R = 84 RQD = 55										weak to moderately strong rock, slightly vuggy
 	25		R = 99 RQD = 79										
	30		R = 96 RQD = 83										
													Total Depth = 31 ft.
┙	I - STA		ARD PENE	 TRAT	ION -	EST	RESI	STANC	E E				REMARKS:



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/19/2021

													DATE(S) DRILLED: 8/19/2021
	FI	ELI	D DATA			LA	٩ВО	RATO	RY DA	ΛTΑ			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 35 ft.
				(%)	<u> </u>	IMIT	S			<u></u>		(%)	
				Ä			X			%) ::	NR.	√E (	
				MOISTURE CONTENT (%)		ŧ	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	GROUNDWATER INFORMATION:
٦			<sub> -</sub>	l g	LIQUID LIMIT	PLASTIC LIMIT	Τ̈́	≺ إ.FT	≧ (F	₽	H Z	500	No groundwater encountered prior to the introduction of drilling fluid
MBC	Ē	<i>ν</i> .	7 F 00 T	W.		) E	TIC	USI //CU	SSE A.	ΑŢ.	NG/S		
SYI	) H	H	SWC %	ΙĔ		LAS	LAS	DEN	PRE S/S	Ž	ΙËΫ	N S	CUDEACE ELEVATION (ET):
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	§	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	78		MINUS NO.	SURFACE ELEVATION (FT):
s '///		\0.	) ZG F & &			PL	ы		000	o o	0 =	2	DESCRIPTION OF STRATUM  \[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	_	$\downarrow$	N = 5	20									LEAN CLAY (CL), with Sand, dark gray, medium stiff to very stiff,
	-	+											dry to moist
	- 5	$\downarrow$	N = 9										
	-	+											
		$\rightarrow$	N = 20										
////	- 10	1	N = 50/4"										SHALE, dark gray, very hard, dry to moist
$\Box$	- 10 -	-											LIMESTONE, dark gray, fine grained, slightly weathered, very
Ļ	-	_	R = 100 RQD = 7										weak rock
	_	4	NQD - 1										
T	- 15	1	1										
$\dashv$	_	-	R = 100										Grading light gray, fine to medium grained, fresh to slightly
$\dashv$	-	1	RQD = 57										weathered, weak to moderately strong rock
$\Box$	20	1	l										
$\perp$	-	7	R = 100										2 in. vuggy seam at 21 ft.
$\perp$		1	RQD = 63										
	- 25	+											6 in. Mudstone layer at 24.5 ft.
	_	1	R = 100										, and the second
士	_	-	RQD = 43										
$\top$	30	1											
$\perp$	-	1	R = 100										
		+	RQD = 53/										SHALE, dark gray, fine grained, moderately to highly weathered,
	- - 35	1											catremely weak to very weak rock
	33												Total Depth = 35 ft.
													Total Deptit
	ı N - Sī	∟ IAN	DARD PENE	TRAT	ION :	TEST	RESI	STANC	Œ			1	REMARKS:
	P - P0	OCK	ET PENETR	OME	ΓER F	RESIS	TANC	CE					GPS COORDINATES: Lat. 41.256828, Long82.811403
			T CONE PEN CORE REC			N KES	ыы́ТА	INCE					
			CK QUALIT			ATION	J						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/19/2021 - 8/20/2021

-													DATE(5) DRILLED. 0/19/2021 - 0/20/2021
	FIE	ELC	DATA	_	_	_ LA	ABO	RATO	DRY DA	TΑ		_	DRILLING METHOD(S):
						ERBE							Hollow Stem Auger: 0 to 10.5 ft.; NX Wet Rock Coring: 10.5 to 35.5 ft.
				(%)	L	_IMITS				(%	سِ ا	(%)	
				MOISTURE CONTENT (%)			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
				N	⊨	PLASTIC LIMIT	Z ≻	<b>⊢</b>	ш _	Ę	SES(S	SIE	No groundwater encountered prior to the introduction of drilling fluid
ğ			_ E	8	LIQUID LIMIT	CLI	CIT	ΞÄ	SIVE T	Ε̈́	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Two groundwater encountered prior to the introduction of drilling lidid
YME	FT)	ES	VS/F 8/SQ /S			STI	STI	SNS S/C	SQ.	١AΤ	DS/SC	9	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	TSI	ΘÏ	₽L∕	₽L∕	Z Z	MPF NS/	₹		MINUS NO.	SURFACE ELEVATION (FT):
SO	DE	\S\	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	Σ	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ST	88	Σ	DESCRIPTION OF STRATUM
	-	$\overline{A}$											1 in. Topsoil
	-	Ä	N = 8										LEAN CLAY (CL), trace Sand, dark brown, medium stiff, dry to
⇗		$\forall$	N = 7	17									moist
	- 5 -	7	N - 1	''									
	-	$\forall$	N = 7										CLAYEY SAND (SC), dark brown, loose, moist, fine grained
24	-	H	N = 50/3"										LIMESTONE, dark brown, very hard, dry to moist
卍	- 10 -		14 - 50/5										LIMESTONE, dark brown, very hard, dry to moist  LIMESTONE, dark brown, fine grained, moderately to highly
긔	-	H	R = 100										weathered, extremely weak rock
ゴ	-	41	RQD = 0										•
1	- 15 -	扣											
占	-	41	R = 100										
낙	-	11	RQD = 42					174	1073.74		0.0		Grading gray, fine to medium grained, fresh to slightly weathered, weak to strong rock
$\Box$	- 20	Ш											Weak to strong rock
7		41	R = 100										
嫦	-	11	RQD = 82										
₽	25	Ш											
╛	-	41	D 400										1.5 ft. Mudstone layer at 25.5 ft.
라	-	11	R = 100 RQD = 45										
4	- 30	$\mathbf{H}$											
4	-	11	D 400										
╛	-	+	R = 100 RQD = 57/										OLIALE dade was for a surious discontinuous the sural automate.
	- - 35	Ш											SHALE, dark gray, fine grained, moderately weathered, extremely weak to very weak rock
													Total Depth = 35.5 ft.
													10tal Deptil = 33.3 it.
-													
-													
-													
_	N - STA	LL NN	ARD PENE	TRAT	ION .	TEST	RESI	STANC	E		1		REMARKS:
F	- PO	CKE	T PENETRO	OME	TER F	RESIS	TANC	CE					GPS COORDINATES: Lat. 41.257006, Long82.811414
			CONE PEN			N KES	SISTA	NINCE					*Denotes Total Unit Weight
			CK QUALITY			ΛΟΙΤΔ	N.						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/18/2021 - 8/19/2021

$\vdash$			DATA				\ D \			ΤΛ			DRILLING METHOD(S):
	FIE	LL	DATA					RAIC	PRY DA	NΙΑ			Hollow Stem Auger: 0 to 10.5 ft.; NX Wet Rock Coring: 10.5 to 35.5
						ERBE IMITS							ft.
				MOISTURE CONTENT (%)	_					(%	Щ	(%)	
							PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE	GROUNDWATER INFORMATION:
SOIL SYMBOL					<b>—</b>	MIT	N	_		Ę	ESS (	SE	
[] 러	_			8	I≣		J	F <u>F</u>	E (F	FAI	R S	200	Groundwater encountered at 8.5 ft. during drilling prior to the introduction of drilling fluid
MB	Ē	တ္ယ	SO I	뀚		STIC	STIC	NSI.	SESS	AT	S/S	ġ.	introduction of driving hald
<u>.</u> S	Ŧ	ᇤ	WO %	STU	LIQUID LIMIT	PLASTIC LIMIT	LA8	E S	PRI IS/S	Z	문물	l SI	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ğ		PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	Æ		₹	·
5 0		\ <sub>0</sub>	/ ΖΔ⊢ΥΥ	_	LL	PL	PI		٥٥٥	o)	0 =	2	DESCRIPTION OF STRATUM  \1 in. Topsoil /
3///	_	$\mathbf{M}$	N = 10										LEAN CLAY (CL), with Sand, dark gray, stiff, moist
	-	H											LEAN OLAT (OL), Will Gand, dark gray, still, most
	- - 5	$\mathbf{M}$	N = 5										SANDY LEAN CLAY (CL), dark gray, medium stiff, moist
3///	-	$\mathcal{H}$											, , , , ,
	-	$\forall$	N = 7	18									CLAYEY SAND (SC), brown, loose to very dense, moist, fine
	-		N = 50/3"	¥ .									grained
	- 10												
	-	41	D = 400										SHALE, dark gray, fine grained, slightly to moderately weathered, very weak rock
	-	11	R = 100 RQD = 0										Very Weak rock
	- - 15	11											
		1											LIMFOTONIC constitution of the state of the
	-	41	R = 100										LIMESTONE, gray, fine grained, slightly weathered, weak to moderately strong rock
	-	11	RQD = 69										Initiately strong rock
	- 20 -	H											Grading fine to medium grained
	-	41	R = 100										
	-	11	RQD = 92										
	- 25	Ш											6 in. Mudstone layer at 24 ft.
	-	11											6 in. Mudstone layer at 26 ft.
╬┷╫	-	41	R = 100 RQD = 58										Vertical fractures at 27.5 ft.
	- - 30	11	TOOL OF										
	-	Ħ											
	-	#	R = 100										SHALE, dark gray, fine grained, highly weathered, extremely weak
		41	RQD = 42										rock
	- 35	14											
													Total Depth = 35.5 ft.
i													
-													
<u> </u>													
;													
<u> </u>													
	N - ST/		ARD PENE	TRAT	ION :	LEST	RESI	STANC	:F		1		REMARKS:
<u> </u>			T PENETRO						<b>/</b> _				REMARKS:   GPS COORDINATES: Lat. 41.256940, Long82.811487
			CONE PEN			N RES	SISTA	NCE					· · · · · · · · · · · · · · · · ·
:			CORE REC CK QUALIT			AOITA	J						
<u>'</u> '	.0,0		JI QUALII		J 1 1 1/		•						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/29/2019

	FIELD DATA  LABORATORY DATA  ATTERBERG (%) LIMITS  (%) LONG/REPLES (%) LONG/RE													DRILLING METHOD(S):
r	1					ATT	ERBE	ERG						Hollow Stem Auger
RENEWABLE LOG - LOG A GNNL01.GDT - 9/13/21 15:59 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINTITITITITITITITITITITITITITITITITITIT	SOIL SYMBOL	ЕРТН (FT)	SAMPLES	I: BLOWS/FT P: TONS/SQ FT : BLOWS E: % (QD: %	AOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY YOUNDS/CU.FT	COMPRESSIVE STRENGTH TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 15 ft. during drilling and not measured immediately after drilling  SURFACE ELEVATION (FT):
S C	n 777		\o	/ ΖΔΙΕΚΚ		LL	PL	PI		000	o)	0 =	2	DESCRIPTION OF STRATUM  \[ \bar{3} \] in. Topsoil \[ / \]
901007\EMERSC		5 . 5												LEAN CLAY (CL), with Sand, brown to gray, medium stiff to stiff, moist
MD18			$\forall$	N = 50/5"										SHALE, dark brown to gray, very hard, dry to moist
RSON CREEK - I		10		N = 50/3"										
ECTS\2019\EME					<u>Z</u> 5									
RIVE/GINT/PROJ														
CHNICAL/G DR				N = 50/2"										
DESIGN/GEOTE														Auger Refusal at 31 ft.
RATIONS/OP2/02														
15:59 - R:\OPE														
11.GDT - 9/13/2														
3 - LOG A GNNLC														
RENEWABLE LOC	F T F	P - PO( T - TXE R - RO	CKE OOT CK	ARD PENET T PENETRO CONE PEN CORE RECO	OMET ETRA OVEF	ER F ATION RY	RESIS N RES	TANG	CE	E				REMARKS: GPS COORDINATES: Lat. 41.255529, Long82.804800



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/23/2021

<u></u>												DATE(S) DRILLED: 8/23/2021	
	FIE	ELC	DATA			LA	ΑВО	RATO	RY DA	AΤΑ			DRILLING METHOD(S):
H						ERBE							Hollow Stem Auger: 0 to 10.5 ft; NX Wet Rock Coring: 10.5 to 35.5
				(%)		IMIT	S			<u></u>		(%	ft.
,				Ä			Ä			%) ::	R	^E (	
SOIL SYMBOL				MOISTURE CONTENT (%)	_	<b>₩</b>	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
			<sub> -</sub>	5	LIQUID LIMIT	PLASTIC LIMIT	Τï	논峼	ĭ. E.	-AIL	K Z	002	No groundwater encountered prior to the introduction of drilling fluid
MB(	Ē	ြ	SQ F	뿐	□	) II	TIC	risi Joy	O.F.	ATF	NG S/S	0.	
]    }	E	믭	SWC %	l IX	<u> </u>	FAS	LAS	ADS NOS	PRE S/S	Ž	ΕĞ	NS.	SURFACE ELEVATION (FT):
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ğ	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ΪΈ	N S S	MINUS NO.	·
7777		100	/ 24 - 66	_		FL	FI		0000	0)	00	_	DESCRIPTION OF STRATUM  \[ \] 3 in. Topsoil /
	_	$\perp$	N = 13										LEAN CLAY (CL), trace Sand, brown, medium stiff to hard, dry to
	_	+											moist
	- - 5	$\overline{X}$	N = 7	20									
	-	+											
	_	$\overline{X}$	N = 61/11"										
Щ	- 10	F	N = 50/2"										LIMESTONE, dark gray, very hard, dry to moist
団	- 10	1											LIMESTONE, dark gray, fine grained, slightly to moderately
Ш	-	1	R = 93										weathered, extremely weak to very weak rock
$\dashv$	- <u></u>	-11	RQD = 0										
$\dashv$	- 15 -	$\mathbf{H}$											
$\Box$	_	11	R = 100										
⇉	_	71	RQD = 0										
$\perp$	- 20	$\mathbb{H}$											
$\perp$	-	-11	R = 100										
$\Box$	_	11	RQD = 28										
$\Box$	- 25	Ш											
	_	11	D 400										
$\dashv$	_	11	R = 100 RQD = 48										
H	- 30	Ш											
	_	11											
Ш	_	-11	R = 100 RQD = 90										Grading light gray, fine to medium grained, fresh to slightly
	- 35	11	TOOD - 50										weathered, weak to moderately strong rock
		Γ.											
													Total Depth = 35.5 ft.
			DARD PENE						E				REMARKS:
			ET PENETRO CONE PEN										GPS COORDINATES: Lat. 41.255439, Long82.804806
	R - RO	CK	CORE REC	OVEF	۲Y								
	KQD -	KΟ	CK QUALIT	r DES	SIGN.	AHON	<b>N</b>						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/24/2021

<u></u>													DATE(S) DRILLED: 8/24/2021
	FIE	LC	DATA			L/	ABO	RATC	ORY DA	ATA			DRILLING METHOD(S):
SOIL SYMBOL	FIE (L1) HLd30 - 5 - 10 - 15 - 20 - 25	SAMPLES	N = 13 N = 50/3" N = 50/3" R = 100 RQD = 0 R = 100 RQD = 28 R = 100 RQD = 45	MOISTURE CONTENT (%)		ERBEIMIT PL	ERG	DRY DENSITY DOUNDS/CU.FT	COMPRESSIVE STRENGTH A COMPRESSIVE A COMPRES	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DRILLING METHOD(S): Hollow Stem Auger: 0 to 10 ft; NX Wet Rock Coring: 10 to 35 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  3 in. Topsoil  LEAN CLAY (CL), with Sand, dark brown, stiff to hard, dry to moist  LIMESTONE, dark gray, very hard, dry to moist  LIMESTONE, dark gray, fine to medium grained, moderately to highly weathered, extremely weak rock 2 in. Mudstone seam at 13 ft.  2 in. Mudstone seam at 15.5 ft.  Grading fresh to slightly weathered, weak to moderately strong rock
	- 30 - - - - - 35	-	R = 95 RQD = 77										Total Depth = 35 ft.
	P - PO T - TXI R - RO	CKE DOT ICK	DARD PENE ET PENETRO CONE PEN CORE RECC	OMET IETRA OVEF	TER F ATIOI RY	RESIS N RES	TANO SISTA	Œ	Œ				REMARKS: GPS COORDINATES: Lat. 41.255541, Long82.804950



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
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NUMBER: MD1901007

DATE(S) DRILLED: 8/23/2021

													DATE(S) DRILLED: 8/23/2021
	FIE	ELC	DATA			L/	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						TERBI							Hollow Stem Auger: 0 to 10 ft; NX Wet Rock Coring: 10 to 35 ft.
				(%	-	LIMIT:	S				l	(%	
				) 			Ä			%) =	뿔	/E (	
					١.	I ⊑	PLASTICITY INDEX			N.	iss:	200 SIEVE (%)	GROUNDWATER INFORMATION:
ا پ			⊢	6	LIQUID LIMIT	PLASTIC LIMIT	<u></u>	> t;	J (E	J.	l 뿚 Z	000	No groundwater encountered prior to the introduction of drilling flu
₩   ₩	Ē	ω,	F Q	H		1	10	ISIT /CU	SSI TH D. F	F	\S\S\C		
SOIL SYMBOL	Ή	Ĕ	SWS SWS SWS			AS	AS	DS	NG' S/S(	Z.	1 E S	2 S	OLIDEA OF ELEVATION (ET)
╛┃	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
S)		\o	/ Z Q H Q Q	2	LL	PL	PI		OSC	S	O.F.	Σ	DESCRIPTION OF STRATUM
$\mathscr{M}$		$\forall$	N = 9										3 in. Topsoil LEAN CLAY (CL), trace Sand, dark gray, medium stiff to hard, dry
		+	•										to moist
	· 5	$\perp$	N = 6										
		+											
		$\perp$	N = 50/1"	19									
4			N = 50/5"										SHALE, dark gray, very hard, dry to moist
П	10	П											LIMESTONE, dark gray, fine grained, fresh to slightly weathered,
다		1	R = 90 RQD = 0										weak to moderately strong rock
╣		41	RQD = 0										
世	15	#											
4	-	-11	R = 100										
4		11	RQD = 0										
⇉	20	Н											
Ⅎ		41	R = 100										
나		1	RQD = 30										
H	25	Н											
₽		11	R = 100										
╬		-11	RQD = 40										
┰╬	. 30	4											
ᆉ		-11	R = 100										
I		71	RQD = 95										Grading gray, fresh
	35	1											
	55												Total Depth = 35 ft.
													Total Depth 30 it.
-													
-													
$\sqcup$													
			ARD PENE T PENETR						CE				REMARKS:
	Γ - TXI	DOT	CONE PEN	IETR.	ATIO								GPS COORDINATES: Lat. 41.255516, Long82.804649
r	D D C	NOI/	CODE DEC	$\sim$	71/								1



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/17/2019

Щ,													DATE(S) DRILLED: 4/17/2019
	FIE	LC	DATA			L	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
$\Box$						ERBI							Hollow Stem Auger: 0 to 7 ft.; NX Wet Rock Coring: 7 to 27 ft.
				(%)	L	<u>-IMIT:</u>				(9)	ш	(%)	
				Ä			) EX			() E	J. S.	VE	GROUNDWATER INFORMATION:
				MOISTURE CONTENT	l <sub>⊨</sub>	₩	PLASTICITY INDEX	_		STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	
징			_E	8	M	PLASTIC LIMIT	G E	F∃	SIVE 1 FT)	FAI	P. O		No groundwater encountered during drilling prior to the introduction of drilling fluid
WB	(FT	ES	/S/F/ /SQ /S	J.R.		STI	STI	S/C	SQ.	I AT	S/SC	Š.	- C. C. IIII. 19 I G. C.
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	IST	LIQUID LIMIT	PLA	PLA	DRY DENSITY POUNDS/CU.FT	MPF SEN NS/	ZAIN		MINUS NO.	SURFACE ELEVATION (FT):
SOI	DEF	SA/	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	8	LL	PL	PI	POU	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STE	SS	M	DESCRIPTION OF STRATUM
	-												LEAN CLAY (CL), with Sand, brown, soft, moist to wet
	-	$\frac{1}{2}$	N = 4	21									
<u> </u>	-	$\downarrow$	N = 40										WEATHERED SHALE, dark gray, hard, dry to moist
$\equiv$	- 5 -	<u> </u>	N = 46										WEATTIERED STIALE, dark gray, flatu, dry to filoist
$\equiv$	-	Ŧ	N = 50/5" R = 0										SHALE, gray, fine grained, moderately to highly weathered, very
	-		RQD = 0										weak rock
	- 10 -	11	R = 100										
	-	11	RQD = 0										
$\equiv$	-	$\mathbf{H}$											
	- 15 -	11	R = 100										
	-	-11	RQD = 0										
	-	$\mathbb{H}$											
	- 20	1	R = 100										
	-	-11	RQD = 26										
	-	$\parallel$											
	25	1	R = 100 RQD = 11										
	-	Н	1100 - 11										
													Total Depth = 27 ft.
$\perp$	u ot	∐	VADD DEVIC		1001	TECT	DEC	IOTANIC	<u></u>				DEMARKS.
			DARD PENE ET PENETRO						<b>∠</b> ⊏				REMARKS:   GPS COORDINATES: Lat. 41.247740, Long82.775587
			CORE PEO			N RES	SISTA	NCE					
			CORE REC			ATION	٧						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/22/2019

	FIE	LD	DATA			L	4ВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
T						ERBI							Hollow Stem Auger: 0 to 16 ft.; NX Wet Rock Coring: 16 to 24 ft.
				(%)	-					(%)	 	(%)	
						  -	NDE.			RE (	SSUF	EVE	GROUNDWATER INFORMATION:
_			_	NO.	Η	I MI	<u> </u>	γË	√E □	AILU	N SE	S 00	Groundwater encountered at 12 ft. during drilling prior to the
	F.	S	14/80 FI 08	发		JE C	TICI	SIT/ CU:	SSIN TH Q. F	YT F.	NG F	0.2	introduction of drilling fluid
5	TH (	PLE	SWO.	STUI	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DEN	IPRE ENG IS/S	AIN /	NE S	N SC	SURFACE ELEVATION (FT):
	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
<i>///</i>		H											∖8 in. Topsoil
		X	N = 4	19									LEAN CLAY (CL), trace Sand, brown, soft to stiff, moist
	_	$\forall$	N = 4	21									Grading gray
#	5	7	11 – 4										
#		$\overline{\mathbb{A}}$	N = 10										
1	10	$\forall$	N = 11	9	25	15	10					90	
1		$\Box$	•	<u> </u>									
ŧ		$\frac{1}{4}$	N = 58	13									WEATHERED SHALE, dark gray, hard, dry to moist
₽	15	-\	N = 69/10" N = 50/1"	11									SHALE, dark gray, hard, wet
₹		41	R = 74										SHALE, gray, very fine grained slight to moderately weathered, very weak to weak rock
1		4	RQD = 0										very weak to weak rock
-	20	1	R = 95										
Ī		1	RQD = 16										
Ť		T											Total Donth = 24 ft
													Total Depth = 24 ft.
1													
	OT.		ADD DEVE	TDAT	1011	TECT	DEC	OT A N					DEMARKO
Ρ	- PO	CKE	ARD PENE T PENETR CONE PEN	OME	ΓER F	RESIS	TANC	CE	E E				REMARKS: GPS COORDINATES: Lat. 41.247445, Long82.755309



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/21/2019

													DRILLING METHOD (2)
	FIE	ELD	DATA			L/	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				(%)		IMIT				(%	Щ	(%)	
				MOISTURE CONTENT (%)			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
07.0				I N	⊨	PLASTIC LIMIT	Ν	_	ш _	5	S (S	SIE	Groundwater encountered at 7 ft. during drilling and not measured
[ [ ] 첫	$\overline{}$		<u>_</u> <u>E</u>	8	LIQUID LIMIT	CLI	CIT	ITY U.F	NS - (E	.FA	SQI	. 200	immediately after drilling
YMD1	F)	ES	VS/8 8/80 VS	L RE		\STI	\STI	ENS S/C	SQ.	۱AT	NINC DS/8	9	, ,
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	IST	\ <u>\</u>	PL	PL∕	Y DE	MPF NS/	8		SOT	SURFACE ELEVATION (FT):
[ S	DEI	/S/	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STE	88	₹	DESCRIPTION OF STRATUM
	-	H											\2 in. Topsoil
3	-	$\frac{1}{4}$	N = 7										SANDY LEAN CLAY (CL), brown, medium stiff to very stiff, dry to
	-	$\mathcal{H}$		0.5									moist
	- 5 -	A	N = 24	25									
	-	$\forall$	N = 74/11"	7									SHALE, olive gray to gray, very hard, dry to moist
≥	-	$\Box$											STALE, dive gray to gray, very flard, dry to filoist
	- 10	+X	N = 50/6"	16									
Stopzaz Designikseo i Echnical is Drive (sin 1940) EC I Storighemerson Creek - MD1901007 (sto)	-	$\downarrow \downarrow$	==										
S H	-	X	N = 50/6"										
	- 15	-M	N = 50/2"										
613	-	11											
	-	+											
	- 20	$\pm$	N = 50/3"	17									
	-	$\exists$											
	-	7											
	- - 25	$\forall$	N = 50/4"										
	- 23	+											
	-	11											
	- - 30	$\forall$	N = 50/3"										
	- 30	+											
													Auger Refusal at 31 ft.
l les													
707													
ģ													
<u>₹</u>													
뷥													
<u>ا</u> اِ													
4:14													
[21]													
9/10													
<u>:</u>													
[01:6]													
[ ]													
غٍٰك													
			ARD PENET						Œ				REMARKS:
AB	T - TXE	DOT	T PENETRO CONE PEN	IETR/	OITA								GPS COORDINATES: Lat. 41.246008, Long82.796827
	R - RO	CK	CORE REC	OVEF	RY								
<u>تا</u>	עט -	KU(	CK QUALITY	י ארי	SIGIV/	4HOI	N						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/18/2019

													DATE(S) DRILLED: 4/18/2019
	FIE	LD	DATA			L/	ABO	RATC	RY DA	λTΑ			DRILLING METHOD(S):
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT TIME		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 30 ft.  GROUNDWATER INFORMATION: Groundwater encountered at 7 ft. during drilling prior to the introduction of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
7//	-	H											8 in. Topsoil
	-	X	N = 5	23									SANDY LEAN CLAY (CL), brown, medium stiff, moist
	- - 5	<b>X</b>	N = 13										LEAN CLAY (CL), with Sand, brown, stiff, dry to moist
<u> </u>	-	$\forall$	N = 45	9									   WEATHERED SHALE, dark gray, hard, dry to moist
	-	H	N = 50/1"										3 · 3, · · · · · · · · · · · · · · · · ·
	- 10 - - - -	41	R = 80 RQD = 0										SHALE, gray, very fine grained, slight to moderately weathered, very weak rock to weak rock
	- 15 -	#											
	-	41	R = 80 RQD = 7										
▋	- - 20	1											
	-	1	R = 100					163	357.12		0.0		
	- -	1	RQD = 29										
	25	H											
	-	1	R = 100 RQD = 22										
	-	-11	KQD - 22										
	- 30												Total Depth = 30 ft.
-	- PO	CKE	ARD PENE T PENETRO CONE PEN	OMET	ΓER F	RESIS	TANG	Œ	E				REMARKS: GPS COORDINATES: Lat. 41.244491, Long82.771245 *Denotes Total Unit Weight

\*Denotes Total Unit Weight



R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/25/2019

													DATE(S) DRILLED: 4/25/2019
	FIE	ELD	DATA			L	٩BO	RATO	RY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				(%)		_IMIT:	<u>S</u>			<u></u>		(%)	
				Ä			EX			%)	<u>R</u>	VE (	ODOLINIDA/ATED INSODMATION
				MOISTURE CONTENT	_	I	PLASTICITY INDEX			J.	ESS ()	MINUS NO. 200 SIEVE	GROUNDWATER INFORMATION:
٦			l. E	5	I		Ė	<u>F</u> <u>E</u>	SIVE FT)	FAIL	R S	200	Groundwater encountered at 7 ft. during drilling and measured at 1 ft. immediately after drilling
MB	(FT	ုပ္သ	S 8 1	뷭	E	STIC	STIC	NSI.	ESS STH SQ. I	ΑT	ING S/S	ġ.	it. Infinediately after drilling
∑\ 	Ŧ	<b>P</b> E	MONSO.	STL	LIQUID LIMIT	PLASTIC LIMIT	F.	ÄÄ	APR ENC NS/8	AIN		US I	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % ROD: %	<u> </u>	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	Z	DESCRIPTION OF STRATUM
7//		Ħ											∖8 in. Topsoil
⇗		-X	N = 5										SANDY LEAN CLAY (CL), brown, soft to very stiff, dry to moist
		$\downarrow$											
	5	$\frac{1}{4}$	N = 2	20									
<i>///</i> }		$\forall$	N = 28	7									
<u>//</u>		$\Box$		_									WEATHERE CHAIF III
₫	10	X	N = 19	9									WEATHERED SHALE, dark gray, very stiff to hard, dry to moist
=		$\forall$	N = 58										
77		$\Box$		*									OLAY(E)( OANID (OO)
	15	A	N = 34	20									CLAYEY SAND (SC), brown, medium dense to dense, wet, fine to medium grained
		+											modalii graiilod
		$\downarrow$											
	20	$ \mathbb{A}$	N = 24										
		71											
				10									
			N = 50/4"	13/									SHALE, dark gray, hard, dry to moist
													Auger Refusal = 24.5 ft.
			ARD PENE						Œ		•	•	REMARKS:
			T PENETF										GPS COORDINATES: Lat. 41.244309, Long82.752195
			CONE PE			NKE	5151 <i>P</i>	NVCE					



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/20/2019

FIELD DATA LABORATORY DATA DRILLING METHOD(S):	
Hollow Stem Auger	
SOIL SYMBOL  BE BLOWS/FT  P. FILOWS/SO FT  ROD: %  MOISTURE CONTENT (%)  MOISTURE CONTENT  PLASTICITY INDEX  ROD: %  AND SOUR SESSIVE  STRAIN AT FAILURE (%)  STRAIN AT FAILURE (%)  MINUS NO. 200 SIEVE (%)	PRMATION:
L SYMBOL SITURE CONTR L COWS/FT ONS/SQ FT L COWS/FT ONDS/SQ FT L COWS/FT ONDS/SQ FT ONDS/SQ IN L SYMBOL SITURE CONTR L COWS/FT ONDS/SQ FT ONDS/SQ IN L SYMBOL SO SIE L SYMBOL SITURE ON SYMBOL	at 9 ft. during drilling and not measured
IL SYMBOL IL SYM	
SOIL SYMBOL SIRENOWS/FT P. PLOWIS/SO FT P. PLOW/S/SO FT P. PLOW/S/SO FT P. PLOWIS/SO FT P. PLOWING PRESSIVE STRAIN AT FAILL CONFINING PRE (POUNDS/SO IN) MINUS NO. 200 S  DESCRIP	(FT):
	PTION OF STRATUM
\( \) \( \)	and, brown, stiff to very stiff, dry to moist
	aria, prowin, our to vory our, ary to molec
Grading moist	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
SHALE, gray, very hard, m	oist to wet
N = 50/3"	
15 - N = 50/4"	
Grading light olive gray, dry	/ to moist
25 - N = 50/5" N = 50/5"	
N = 50/2"	
Auger Refusal at 31 ft.	
4 4	
N - STANDARD PENETRATION TEST RESISTANCE  REMARKS:  REMARKS:	44.040004
≶ T - TXDOT CONE PENETRATION RESISTANCE	. 41.242334, Long82.797954
R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION	



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/23/2109 - 4/24/2019

										DATE(S) DRILLED. 4/23/2109 - 4/24/2019
FIELD DAT	Α				RATC	PRY DA	ATA			DRILLING METHOD(S):
DEPTH (FT) SAMPLES N: BLOWS/FT P: TONS/SQ FT T: BLOWS	R.% RQD: % MOISTURE CONTENT (%)		PLASTIC LIMIT HERE		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 4 ft. during drilling and not measured immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
N = 3	20									8 in. Topsoil
5 - N = 6	¥									LEAN CLAY (CL), trace Sand, brown, soft to medium stiff, moist
N = 7	25	22	15	7					49	SILTY, CLAYEY SAND (SC-SM), brown, loose, wet, fine to coarse
10 N = 44										grained SHALE, dark gray, hard, dry to moist
N = 31 N = 54										
15 -X N = 54										∖LIMESTONE, gray, hard, dry to moist
N - STANDARD P P - POCKET PEN T - TXDOT CONE	ETROME <sup>*</sup>	TER F	RESIS	TANC	Œ	E				REMARKS: GPS COORDINATES: Lat. 41.241983, Long82.744461



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/21/2019

													DATE(S) DRILLED: 5/21/2019
	FIE	ELC	DATA			LA	4ВΟ	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT P: BLOWS R: % RCD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 2 ft.; NX Wet Rock Coring: 2 to 27 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluir  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  \( \bar{2} \) in. Topsoil
Ħ	Į	X											LIMESTONE, light brown, dry to moist
	- - - 5 - -	1 1 1 1 1	R = 78 RQD = 8 R = 82										LIMESTONE, light brown, fine grained, slightly to moderately weathered, weak to moderately strong rock
	10 - - -	- - - -	RQD = 43					164	848.88		0.0		
	- - 15 -		R = 88 RQD = 28										
	- - 20 -	-	R = 87 RQD = 8										
	- - - 25	-	R = 85 RQD = 68										
													Total Depth = 27 ft.
	P-PO	CKE	DARD PENE ET PENETRO CONE PEN	OME	ΓER F	RESIS	TANC	CE	E E				REMARKS: GPS COORDINATES: Lat. 41.240369, Long82.832115

\*Denotes Total Unit Weight



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/23/2019

													DATE(S) DRILLED: 4/23/2019
	FIE	LD	DATA			L/	ABO	RATC	RY DA	ATA			DRILLING METHOD(S):
$\dashv$				(%)		ERBE	ERG					(%)	Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 20 ft.
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	NTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 4 ft. during drilling prior to the introduction of drilling fluid SURFACE ELEVATION (FT):
los	E	\SAN	2 2 2 2 2 2 2 2 2 3 2 3 3 3 3 3 3 3 3 3	MO	LL	PL	PI	DRY POL	STR	STR	25	Σ	DESCRIPTION OF STRATUM
<del>///</del>	_	H											8 in. Topsoil
	-	$\mathbb{A}$	N = 6	24									SANDY LEAN CLAY (CL), brown, medium stiff, moist
	- - 5 -	<b>X</b>	N = 6	17									LEAN CLAY (CL), trace Sand, brown, medium stiff, moist
	- - - - 10 -		N = 50/2" R = 67 RQD = 0 R = 100	16_									SHALE, gray, very fine grained, slight to moderately weathered, very weak to weak rock
	- - - 15 -	$\frac{1}{1}$	RQD = 0 R = 100										
	- - - 20		RQD = 18										Total Depth = 20 ft.
ı	- PO	CKE	ARD PENE T PENETRO CONE PEN	OMET	ΓER F	RESIS	TANG	CE	E			<u> </u>	REMARKS: GPS COORDINATES: Lat. 41.238171, Long82.771065



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/29/2019

FIELD DATA  LABORATORY DATA  ATTERBERG  LIMITS  LABORATORY DATA  ATTERBERG  LABORATORY DATA  ATTERBERG  LABORATORY DATA  ATTERBERG  LABORATORY DATA  ATTERBERG  LABORATORY DATA  BUILING METHOD(S): Hollow Stem Auger: 0 to 12 ft.; NX Wet Rock Coring: 12 to 20 ft Hollow Stem Auger: 0 to 12 ft.; NX Wet Rock Coring: 12 to 20 ft Hollow Stem Auger: 0 to 12 ft.; NX Wet Rock Coring: 12 to 20 ft  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling in SURFACE ELEVATION (FT): DESCRIPTION OF STRATUM  Bin. Topsoil  LEAN CLAY (CL), trade Sand, brown, soft to hard, dry to moist  Bin. Topsoil  LEAN CLAY (CL), trade Sand, brown, soft to hard, dry to moist  SHALE, gray, very fine grained, slightly weathered, very weak ro  Total Depth = 20 ft.	$\frac{1}{1}$	FIE	LC	DATA		-	L	ABO	RATC	RY DA	TA			DRILLING METHOD(S):
GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is to be a second of the introduction of drilling is t	$\top$		П											· ·
GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling it    A														Hollow Stem Auger: 0 to 12 ft.; NX Wet Rock Coring: 12 to 20 ft.
N = 7   25					(%		LIMITS	S			_	l	(%	
N = 7   25					, ,			X			%) ::	뿜	/E (	
N = 7   25						١.	l ⊨	2			N.	SSS (	SIE	
N = 7   25	۱ ۲			_	ő	M	<u>⊠</u>	<u></u>	누峼	J (F	Ŋ.	H Z	000	No groundwater encountered prior to the introduction of drilling flu
N = 7   25	₫	Ē	w)	F Q	发		TIC	일	ISIT /CU	SSSI TH D. F	Ϋ́	\S\S		
N = 7   25	ה <u></u>	Ξ	Ë	SWC SWS SWS	Ϊ́	l lo	LAS	LAS	DEN LDS	PRE S/S(	Ž.		S S	CUDEACE ELEVATION (ET).
N = 7   25	SOIL SYIMBUL	EPT	AM	BLC BC BC BC	SIO				RY OUN		₹	§ §		
N = 7   25	5 7		/0	/ Żŭ H K K	2	LL	PL	PI		OWF	ώ	O.F.	Σ	
5   X N = 2   23			$\forall$	N = 7	25									
N = 23 N = 19 N = 17 R = 72 ROD = 24 R = 100 ROD = 75 ROD = 75 ROD = 25 ROD = 75 ROD = 24 R = 100 ROD = 75 ROD = 25 ROD = 75 ROD			$\mathcal{H}$	,										LEAN CLAT (CL), trade Sand, brown, sont to hard, dry to moist
N = 23 N = 19 N = 17 R = 72 ROD = 24 R = 100 ROD = 75 ROD = 75 ROD = 25 ROD = 75 ROD = 24 R = 100 ROD = 75 ROD = 25 ROD = 75 ROD		E	$\forall$	N = 2	23									
N = 19 17	<b>/</b>	5	$\mathcal{H}$	., _										
N = 19 17	<b>%</b>		$\forall$	N = 23										Grading gray
N = 50/3° R = 72 ROD = 24 R = 100 ROD = 75 R = 72 R = 100 ROD = 75 R = 100 ROD = 1000 ROD = 1000 ROD = 1000 ROD = 1000	<b>/</b>		Д											3 3 7
R = 72 ROD = 24 R = 100 ROD = 75 SHALE, gray, very fine grained, slightly weathered, very weak ro		10	X	N = 19	17									
ROD = 24 R = 100 ROD = 75  20  Total Depth = 20 ft.	4		X											CHALE grow years fine grained alightly weathered years work ree
R=100 ROD = 75 148 921.60 0.0 Total Depth = 20 ft.	<u></u>		11											SHALE, gray, very line grained, siightiy weathered, very weak foc
R = 100 RQD = 75 Total Depth = 20 ft.	⇟	15	Н	NQD - 24										
20 Total Depth = 20 ft.	<b></b>		11	R = 100					148	921.60		0.0		
Total Depth = 20 ft.	₽.		-11											
Total Depth = 20 ft.	≢.	20	11											
		20												Total Depth = 20 ft
														10tai Depti1 – 20 ft.
N - STANDARD PENETRATION TEST RESISTANCE   REMARKS:	٦ <sub>N</sub>	- STA		ARD PENE	TRAT	ION	TEST	RESI	STANC	: :E				REMARKS:
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.238015, Long82.750999	Ρ	- PO	CKE	T PENETRO	OMET	ΓERΙ	RESIS	TANC	Œ					GPS COORDINATES: Lat. 41.238015, Long82.750999
T - TXDOT CONE PENETRATION RESISTANCE  R - ROCK CORE RECOVERY  *Denotes Total Unit Weight							N KES	ыЅГА	NCE					



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/30/2019 - 5/1/2019

FIELD DATA  LABORATORY DATA  ATTERBERG LAMING.  LATTERBERG LAMING.  LATTERBERG LAMING.  LATTERBERG LAMING.  LAMING. LA														DATE(S) DRILLED: 4/30/2019 - 5/1/2019
CLA   LIMITS   LIMI		FIE	ELC	DATA			L	4BO	RATO	DRY DA	AΤΑ			· ·
GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluid    Comparison   Comparison	ヿ													Hollow Stem Auger: 0 to 5 ft.; NX Wet Rock Coring: 5 to 28 ft.
GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluid  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  2 in. Topsoil  LEAN CLAY (CL), trace Sand, brown, stiff, moist  SILTY GRAVEL (GM), gray, very dense, dry to moist, fine to coarse grained, subangular to subrounded  LIMESTONE, gray, fine grained, slightly to moderately weathered, weak to moderately strong rock  R = 98  ROD = 32  R = 97  RQD = 66  R = 97  RQD = 89  R = 97  RQD = 89					(%)	!	LIMIT:	S 			(9		(%)	
N = 11 17					Ä			EX			%) ::	<u>R</u>	√E (	
N = 11 17					벌	_	I	N			J.	ESS (I	SIE	
N = 11 17	٦			<sub> -</sub>	Ś	Ĭ	=	T;	7 F-I.	¥ (£	-AIL	K C	500	No groundwater encountered prior to the introduction of drilling fluid
N = 11 17	MBC	Ē	S	20 FT	W W		) I	TIC	USIT (CU	SSE A	AT F	NG S/S(	0.2	
N = 11 17	SYI	E	ᇤ	SWC SWC SWC %	UTS	g	LAS	LAS	DEN	PRE IS/S	Ň	ΕŠ	N SI	SUIDEACE ELEVATION (ET):
N = 11 17	SOIL SYMBOL	Ē	AM	18 : B.C.	98				RY OUI	SES	TR/			• •
LEAN CLAY (CL), trace Sand, brown, stiff, moist    SILTY GRAVEL (GM), gray, very dense, dry to moist, fine to coarse grained, subangular to subrounded LIMESTONE, gray, fine grained, slightly to moderately weathered, weak to moderately strong rock    R = 98	σ 7777		\ <sub>0</sub>	/ 24 - 44		LL	PL	PI		000	o)	0 =	2	
SILTY GRAVEL (GM), gray, very dense, dry to moist, fine to coarse grained, subangular to subrounded LIMESTONE, gray, fine grained, slightly to moderately weathered, weak to moderately strong rock  R = 98 RQD = 32  R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 89			$\forall$	N = 11	17									
R = 79 RQD = 0  R = 98 RQD = 32  R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 66  R = 97 RQD = 66	<b>//</b> }		+											ELAN OLAN (OL), trace cand, brown, still, moist
R = 79 RQD = 0  R = 98 RQD = 32  R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 66  R = 97 RQD = 66	M	. 5	X	N = 50/2"	1									SILTY GRAVEL (GM), gray, very dense, dry to moist, fine to
R = 98 RQD = 32  R = 97 RQD = 61  Grading fresh to slightly weathered Grading with occasional calcareous nodules  R = 97 RQD = 66  R = 97 RQD = 89	╁		-11											∖coarse grained, subangular to subrounded
R = 98 RQD = 32  R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 89  R = 97 RQD = 89	댜		11	RQD = 0										LIMESTONE, gray, fine grained, slightly to moderately weathered,
RQD = 32  R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 66  R = 97 RQD = 89	다		-11	D 00										weak to moderately strong rock
R = 97 RQD = 61  R = 100 RQD = 66  R = 97 RQD = 66  R = 97 RQD = 89	ヸ	10	11											
RQD = 61  R = 100 RQD = 66  R = 97 RQD = 89  Grading fresh to slightly weathered  Grading with occasional calcareous nodules	┰╫		J۱											
RQD = 61  R = 100 RQD = 66  R = 97 RQD = 89  Grading fresh to slightly weathered  Grading with occasional calcareous nodules	4		$\prod$											
R = 100 RQD = 66  R = 97 RQD = 89	ᅷ	15	1											
R = 100 RQD = 66 R = 97 RQD = 89	ᅪ		-11	KQD - 01										Grading fresh to slightly weathered
R = 100 RQD = 66 R = 97 RQD = 89	낚		Ħ											Grading with occasional calcareous nodules
R = 97 RQD = 89	4	20	41											G
RQD = 89	⇉		11	RQD = 66										
RQD = 89	₽		H											
RQD = 89	╬	25	11	R = 97										
Total Depth = 28 ft.	구		1											
Total Depth = 28 ft.	#		1				1							
														Total Depth = 28 ft.
														·
							1							
N - STANDARD PENETRATION TEST RESISTANCE REMARKS:	ᆚ	J _ QT/	الام	ARD DEVIC	TD^T		TEST	PECI	STANC	`E				DEMVDKS.
N - STANDARD PENETRATION TEST RESISTANCE   REMARKS: P - POCKET PENETROMETER RESISTANCE   GPS COORDINATES: Lat. 41.235902, Long82.826303										<i>ا</i> ت				KEIVIAKNO.   GPS COORDINATES: Lat. 41,235902, Long82,826303
T - TXDOT CONE PENETRATION RESISTANCE							N RES	SISTA	NCE					
R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION							ΑΤΙΩ	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/25/2019

													DATE(S) DRILLED: 5/25/2019
	FIE	ELC	DATA			L/	4ВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger
				(%)		LIMIT:				(%	سِ ا	(%)	
				L		١.	DEX			₹ (°	SUR	EVE	GROUNDWATER INFORMATION:
				MOISTURE CONTENT (%)	l ⊨	PLASTIC LIMIT	PLASTICITY INDEX	<b>⊢</b>		STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Groundwater encountered at 12 ft. during drilling and not measured
3OL			l E	l S	LIQUID LIMIT	IC L	CT	F F F	SSIV H FT,	ΓFΑ	SQI	. 20(	immediately after drilling
ΜX	E F	LES	WS/R NS NS			AST	AST	ENS DS/C	RES VGTI	Z	NN/	N 0	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	OIST				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	₽	E S	NUS	SURFACE ELEVATION (FT):
ω Σ	<u> </u>	\%	/ z g t g g	Ž	LL	PL	PI	22	SEF	S	86	Σ	DESCRIPTION OF STRATUM
	-	$\downarrow$	N = 7										\1 ft. Topsoil LEAN CLAY (CL), trace Sand, brown, medium stiff to stiff, dry to
	-	+											moist
	- - 5	$\overline{X}$	N = 10	15									Grading with Sand
	- -	1											
	-	- X	N = 9										Grading grayish black
	- 10	$\overline{\mathbb{X}}$	N = 20	15									SHALE, grayish black, firm to very hard, dry to moist, dry to moist
	-	1		arraycharge									
	-	$\frac{1}{2}$	N = 55										
	- 15	$\frac{1}{2}$	N = 50/6"	17									
	-	-											
	-	1											
	20	<u> </u>	N = 50/1"										
	-	+											
	-	1	N 50/0"										
	- 25 -	1	N = 50/3"										
													Auger Refusal at 26 ft.
	N - ST	∟ ANE	ARD PENE	TRAT	ION	TEST	RESI	ISTANC	Œ				REMARKS:
			T PENETR										GPS COORDINATES: Lat. 41.229091, Long82.804853
	R - RC	CK	CORE REC	OVE	٦Y			u VOĽ					
	RQD -	RO	CK QUALIT	Y DES	SIGN	<b>10ITA</b>	٧						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** Erie and Huron Counties, OH LOCATION:

NUMBER: MD1901007

DATE(S) DRILLED: 4/5/2019

5 -	Xr	N: BLOWS/FT	80 MOISTURE CONTENT (%)	LIQUID LIMIT	RBERG MITS ALCIUMII PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  Groundwater encountered at 9 ft. during drilling and not measured immediately after drilling
5 -	Xr	N = 9 N = 10	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RAIN AT FAILURE (%)	INING PRESSURE NDS/SQ IN)	O. 200 SIEVE (%	Groundwater encountered at 9 ft. during drilling and not measured
- - -	Xr	N = 9 N = 10						STI	CONF (POU	MINUS N	SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
- - -	X r	N = 10									_ 10 in. Topsoil
10 -		1 50/51									LEAN CLAY (CL), trace Sand, brown, medium stiff, dry to moist
10 -		N = 50/5" V	11								SHALE, gray, hard, dry to moist
	1	N = 50/1"									
-	×	N = 50/1"									
15 -	Į١	N = 50/1"									
-	1										
							Œ				REMARKS: GPS COORDINATES: Lat. 41.207509, Long82.781587
	STA POC	STANDA	STANDARD PENET POCKET PENETRC TXDOT CONE PENI	STANDARD PENETRATI POCKET PENETROMETI TXDOT CONE PENETRA	STANDARD PENETRATION TE POCKET PENETROMETER RE	STANDARD PENETRATION TEST RES POCKET PENETROMETER RESISTAN TXDOT CONE PENETRATION RESISTA	STANDARD PENETRATION TEST RESISTANC POCKET PENETROMETER RESISTANCE TXDOT CONE PENETRATION RESISTANCE	STANDARD PENETRATION TEST RESISTANCE POCKET PENETROMETER RESISTANCE TXDOT CONE PENETRATION RESISTANCE	STANDARD PENETRATION TEST RESISTANCE POCKET PENETROMETER RESISTANCE TXDOT CONE PENETRATION RESISTANCE	STANDARD PENETRATION TEST RESISTANCE POCKET PENETROMETER RESISTANCE TXDOT CONE PENETRATION RESISTANCE	STANDARD PENETRATION TEST RESISTANCE POCKET PENETROMETER RESISTANCE TXDOT CONE PENETRATION RESISTANCE



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/5/2019

Auger refusal at 11 ft.; offset and drill to 30 ft.

N. STANDARD PENETRATION TEST RESISTANCE  P. POCKET PENETROMETER RESISTANCE  No. STANDARD PENETRATION TEST RESISTANCE  P. POCKET PENETROMETER P													DRILLING METHOD (9)
Total Depth = 30 ft.    Continued by the	FIE	LD	DATA					RATO	PRY DA	ATA			DRILLING METHOD(S):
Second Process   Seco				_								_	Hollow Stem Auger: 0 to 11 it.; NX Wet Rock Coning: 11 to 30 it.
10 in. Topsoil   LEAN CLAY (CL), trace Sand. light brown, medium stiff to very stiff, most to wet				(%)				-		(%	Ш	(%)	
10 in. Topsoil   LEAN CLAY (CL), trace Sand. light brown, medium stiff to very stiff, most to wet				ENT		١. ا	IDE)			)	SUF	EVE	GROUNDWATER INFORMATION:
10 in. Topsoil   12   13   15   16   17   18   19   19   19   19   19   19   19				TNC	<b>₽</b>	IMI.	۷ ا		Ę (	ij	Z S	IS 0	
10 in. Topsoil   12   13   14   15   15   16   17   16   17   17   17   17   18   18   19   19   19   19   19   19	EC		FE C	О		101	ICIT	Fig.	SSIV H FT	ΤFΑ	G PI	. 20	
10 in. Topsoil   12   13   14   15   15   16   17   16   17   17   17   17   18   18   19   19   19   19   19   19	, γ <u>γ</u> Ε	LES	ws/s/ ws/s/ws	J.		AST	AST	DS/(	NGT NSQ	Z Z	NN	N N	
10 in. Topsoil   12   13   14   15   15   16   17   16   17   17   17   17   18   18   19   19   19   19   19   19	SOIL SYMBOL DEPTH (FT)	MP	BLO TON BLO 2D: %	OIS.				ZN NN NN	OMF	IRA	N N	NO.	
LEAN CLAY (CL), trace Sand, light brown, medium stiff to very stiff, moist to wet    N = 21	ν. <u>Π</u>	\ <u>\</u> \ <u>\</u> \	20.00	Σ	LL	PL	PI	2.5	9.P	'n	Ω <u></u>	Σ	
stiff, moist to wet    SHALE, dark brown, very hard, moist	<b>刻</b>	1	N = 7	22									
SHALE, dark brown, very hard, moist  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  R = 98 RQD = 33 R = 92 RQD = 78 R = 100 RQD = 88  Total Depth = 30 ft.  REMARKS: GPS COORDINATES: Lat. 41,203875, Long82,781489		$\exists$											
N - STANDARD PENETRATION TEST RESISTANCE P-POCKET PENETROMETER RESISTANCE  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  Total Depth = 30 ft.	5	1	N = 21	13									
N - STANDARD PENETRATION TEST RESISTANCE P-POCKET PENETROMETER RESISTANCE  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  Total Depth = 30 ft.	<b>4</b>	#	Ž	<u> </u>									
SHALE, gray, very fine grained, slightly to moderately weathered, very weak to weak rock  R = 98 RQD = 33  R = 92 R = 100 RQD = 88  Total Depth = 30 ft.    N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETRATION TEST RESISTANCE GPS COORDINATES; Lat. 41,203875, Long82,781489		ш											SHALE, dark brown, very nard, moist
R = 100 ROD = 0 R = 98 ROD = 33 R = 92 ROD = 78 R = 100 ROD = 88 R	10	1	N = 50/3"	11									SHALE, gray, very fine grained, slightly to moderately weathered
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE  R = 98 RQD = 33  Total Depth = 30 ft.  REMARKS: GPS COORDINATES: Lat. 41.203875, Long82.781489	<b></b>	$\prod_{i=1}^{n}$	R = 100										very weak to weak rock
R = 98 ROD = 33  R = 92 ROD = 78  R = 100 ROD = 88  Total Depth = 30 ft.  REMARKS: P - POCKET PENETROMETER RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489		<b>1</b>   F	RQD = 0										
R=92 R=100 ROD = 88  Total Depth = 30 ft.  N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489	15	<u>H</u>											
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE  R = 92 RQD = 78 R = 92 RQD = 88  Total Depth = 30 ft.  REMARKS: GPS COORDINATES: Lat. 41.203875, Long82.781489	<b>-</b>												
R = 92 RQD = 78 R = 100 RQD = 88  N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875. Long82.781489	<b>F</b>	11	RQD = 33										
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE  R = 100 RQD = 78 R = 100 RQD = 88  Total Depth = 30 ft.  REMARKS: GPS COORDINATES: Lat. 41.203875, Long82.781489	<sup>20</sup>	#											
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE  R=100 RQD = 88  Total Depth = 30 ft.  REMARKS: GPS COORDINATES: Lat. 41.203875, Long82.781489													
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41,203875, Long82,781489	<b>}</b>	-Π'	(QD = 70										
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489	₹ <sup>25</sup>	П											
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE  REMARKS: GPS COORDINATES: Lat. 41.203875, Long82.781489													
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489	<b>∄</b> 30	1											
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													Total Depth = 30 ft.
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES; Lat, 41,203875, Long82,781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat, 41,203875, Long82,781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES: Lat. 41.203875, Long82.781489													
P - POCKET PENETROMETER RESISTANCE GPS COORDINATES; Lat, 41,203875, Long82,781489									E.		1		REMARKS:
T - TXDOT CONE PENETRATION RESISTANCE Auger refusal at 11 ft : offset and drill to 30 ft													GPS COORDINATES: Lat. 41.203875, Long82.781489



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/19/2019 - 12/20/2019

													DATE(S) DRILLED: 12/19/2019 - 12/20/2019
	FIE	LC	DATA			L	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger: 0 to 12 ft.; Mud Rotary: 12 to 39 ft.
				(%)		<u>-IMIT:</u> 				(%	Щ	200 SIEVE (%)	
<u>.</u>				L N						SE (9	SUR	≣VE	GROUNDWATER INFORMATION:
)07.G				INC	⊨	PLASTIC LIMIT	PLASTICITY INDEX	  -	ш	II.	Z SES	0 SIE	No groundwater encountered prior to the introduction of drilling fluid
1901( BOL	Ē		L E	СС	I	] ]	ICI	Ti S	SSIV H FT	T FA	G PI		The great attack chassing the team of the state of the st
. MD.	_ (F) - (F)	LES	WS/IS/ WS/S/ WS	IJR	LIQUID LIMIT	AST	AST	DS/(	RES NGT S/SQ	Z	NN NDS/	NC NC	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ F T: BLOWS R: % RQD: %	MOISTURE CONTENT		_		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
ON CREEK - MD1901007.GPJ		/vì	/ <u>ຊຕ</u> ∺ແ <u></u>	Σ	LL	PL	PI		0.00	S	0.6	Σ	DESCRIPTION OF STRATUM 10 in. Topsoil
RSO	-		N = 4										FAT CLAY (CH), trace Sand, brown, soft to hard, dry to moist
	-	$\Box$											
1007	- 5	-X	N = 8	29									
9	-	$\downarrow$											
M-	-	A	N = 83/11"										Grading black to gray
<b>A</b>	10	$\frac{1}{4}$	N = 50/5"										
	-	$\forall$	N = 50/3"	20									
ξ.	-	$^{1}$											POORLY GRADED SAND (SP), black, very dense, moist to wet,
9/EN	- 15 -	<u> </u>	N = 50/6"	26									fine to medium grained
5/201	_	-											,
	-	$\frac{1}{\lambda}$	N = 25/0"										
Ş	- 20 -	7	14 - 25/0										
	-	1											
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- - 25	$\frac{1}{\lambda}$	N = 25/0"										
<u> </u>	- 25 -	7	20/0										
AL/G	-	1											
SI	- 30	$\frac{1}{2}$	N = 25/0"										
) EC	-	+											
NGEC	-	7											
SIGN	- - 35	$\frac{1}{\sqrt{2}}$	N = 25/0"										
75 DE	-	1											
)P.Z/U	-	+											
)NS/C	_	1	N = 25/0"										SHALE, olive gray, very hard, wet
SAI C													Total Depth = 39 ft.
뷥													
- K:													
5:59													
3/21 1													
- 9/13													
TC01.													
S C C													
90 A													
)  -  -													
			ARD PENE						E		1		REMARKS:
ABL			T PENETRO										GPS COORDINATES: Lat. 41.200363, Long82.777263
	R - RO	CK	CORE REC	OVEF	RY			10L					
<b>∠</b>	KQD -	RO	CK QUALITY	DES	SIGN	OITA	N						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/6/2019

$\Box$		:I D	DATA			1.7	\BO	DATO	RY DA	тл			DRILLING METHOD(S):
		LL	DATA		ΔТТ	ERBE		NAIC		NIA	<u> </u>		Hollow Stem Auger: 0 to 18 ft.; NX Wet Rock Coring: 18 to 33 ft.
				(%)	AII	IMIT	S					(%)	,
_				(s)			EX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	/E (%	
901007/EMERSON CREEK - MD1901007.GPJ				MOISTURE CONTENT	١.	⊨	PLASTICITY INDEX			URE	1883	MINUS NO. 200 SIEVE	GROUNDWATER INFORMATION:
[2] 그			  -	S	LIQUID LIMIT	PLASTIC LIMIT	ΊΤΥ	.FT	IVE T.	-AIL	H C	200 \$	Groundwater encountered at 14 ft. during drilling prior to the
D19C MBC	E	က္သ	SQ F	RE (	  D	STIC	этіс	NSIT S/CU	SESS TH O. F	ATF	NG S/S	Ō.	introduction of drilling fluid
×-N -S  -S	Ħ.	PLE	%:	STU	<u>  5</u>	-LAS	PLA9	NDS	IPRE ENG VS/S	AN	NE S	JS N	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ÖW	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR	NO JO	Ž	DESCRIPTION OF STRATUM
N 1777		П											10 in. Topsoil
SE CONTRACTOR	-	-X	N = 13	14									LEAN CLAY (CL), with Sand, brown, stiff to very stiff, wet
	-	$\downarrow \downarrow$											
9	- 5 -	Ä	N = 22	15									
- MD19	-	$\forall$	N = 26										
<sup>×</sup>	-	$\Box$											WEATHERE CHALE was a siff to bound do not provide
SEEK X	- 10 -	Ä	N = 16	10									WEATHERED SHALE, gray, stiff to hard, dry to moist
ŏ 📑	<u>-</u>	$\forall$	N = 98/9"										
DRIVE/GINTYPROJECTS/2019/EMERSON	-	H	/	7									
	- 15 -	A	N = 50/3"										
3/201	-	1											
	-	П											SHALE, dark gary, fine grained, slightly to moderately weathered,
	- 20 -		R = 82 RQD = 38										very weak to weak rock
	-	1											
	-	41	<b>5 7</b> 0										
	- 25 -	11	R = 70 RQD = 53										
	-	Ш											
	-	41	D 50										
	- 30 -		R = 58 RQD = 17										
GEO C	-	11											
NE IGN													Total Depth = 33 ft.
DES													
2/02													
SOF													
ERA													
9 													
4-													
<u>,4</u>													
10/2													
/6 - L													
1.GD													
\delta													
9													
- []													
ᆲ !			ARD PENET						E				REMARKS:
፮  -	T - TXD	OT	T PENETRO CONE PEN	ETR/	OITA								GPS COORDINATES: Lat. 41.192592, Long82.774713
	R - RO	CK	CORE REC	OVEF	RY								
ž[	<b>KUU -</b>	KU(	CK QUALITY	DES	SIGIV/	AHUN	N						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/6/2019 - 4/7/2019

													DATE(0) DIVILLED: 4/0/2013 - 4/1/2013
	FIE	ELC	DATA			L	٩BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger: 0 to 22 ft.; NX Wet Rock Coring: 22 to 37 ft.
				(%)		LIMIT:				(%)	ш	(%)	
				MOISTURE CONTENT (%)			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	VE	CDOLINDWATED INFORMATION.
					<b>—</b>	Ħ	Z	_	l	LI.	ESS (	200 SIEVE	GROUNDWATER INFORMATION:
9			   <u>L</u> E	8	Ĭ		E	TY U.F	F	ΕĀ	R S	200	No groundwater encountered prior to the introduction of drilling flui
WB	(FT	SE	/S/F /SQ /S	뿔		STI	STI	S/C	SSTS S	AT	S/SC	O	
LS)	ОЕРТН (FT)	SAMPLES	NOUS NO SNC	IST	LIQUID LIMIT	PLASTIC LIMIT	P.L	DRY DENSITY POUNDS/CU.FT	MPR NS/	N N	특불	MINUS NO.	SURFACE ELEVATION (FT):
SOIL SYMBOL	DEF	SAN	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	DR) PO(	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	98	Z	DESCRIPTION OF STRATUM
\ 1,;·													10 in. Topsoil
	_	$-\!$	N = 10	20									LEAN CLAY (CL), with Sand, light brown, stiff to very stiff, dry to
	_	$\downarrow$		l									moist
	- 5	A	N = 17	15									
$\mathcal{H}$	_	$\forall$	N = 30			+							SANDY LEAN CLAY (CL), light brown, vert stiff to hard, dry to
		$\perp$		l									moist
	10	X	N = 35	11									
<u>///</u>	_	$\forall$	N = 60			-							SHALE, dark gray, hard to very hard, dry to moist
		H	N = 50/6"										or meet, dank gray, hard to very hard, ary to mote
	- 15	$\mathcal{T}$	N - 50/6										
	_	+											
	-	$\downarrow$											Constitution of soft house on
	20	X	N = 50/1"										Grading dark brown
	-	Н				-							SHALE, dark gray, fine grained, slightly to moderately weathered,
	_	41	R = 93										very weak rock
	25	Ш	RQD = 75										
	_	Н											
	-	41	R = 95					154	734.40		0.0		
	30	Ш	RQD = 83										
	_	H											
$\equiv$	_	41	R = 100										
	35	1	RQD = 92										
		11											
													Total Depth = 37 ft.
_	 N	<u> </u>	ADD DEVE	TDAT		TECT	DE 2.	OTA NO					DEMARKO
			ARD PENE T PENETR						Æ				REMARKS: GPS COORDINATES: Lat. 41.187731, Long82.775036
			CONE PEN										*Denotes Total Unit Weight

\*Denotes Total Unit Weight



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/8/2019

	ГГ	. L					\DO			Τ,			DRILLING METHOD(S):
	FIE	LL	DATA					RAIC	RY DA	ATA			Hollow Stem Auger: 0 to 23 ft.; NX Wet Rock Coring: 23 to 33 ft.
					AII L	ERBE	:RG   S						Trollow diciti August a to 20 kt, 14% West Nook dorling. 20 to do it.
				(%)_						(%	삤	(%)	
				CONTENT		_	PLASTICITY INDEX			RE (	SUF	EVE	GROUNDWATER INFORMATION:
				K	⊨	PLASTIC LIMIT	₹	H-	ш		₩ ( <u></u>	ls o	Groundwater encountered at 9 ft. during drilling prior to the
[[]			<u> </u>	Ö	LIQUID LIMIT	ICL	ICIT	F.S.	SIS F	FA	SQ	. 20	introduction of drilling fluid
	F)	ES	NS/80 8/80 NS	J. J.		۱ST	\ST	SNS S/S	ZES GTF SQ.	Ι¥	DS/S	9	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	MOISTURE		PL/	PL/	DRY DENSITY POUNDS/CU.FT	MPF REN NS/	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE	SURFACE ELEVATION (FT):
901007 LEMERSON CREEK - MD1901007.GF2	DE	\&\	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	Σ	LL	PL	PI	P. S.	COMPRESSIVE STRENGTH (TONS/SQ. FT)	ST	SE	Σ	DESCRIPTION OF STRATUM
X 7777		H											10 in. Topsoil
	-	-	N = 2	39									LEAN CLAY (CL), with Sand, light brown, soft, dry to moist
		$\frac{1}{1}$											CUAL E dank hypery was the ward to your hand was int to you
	5	X	N = 17										SHALE, dark brown, weathered to very hard, moist to wet
		$\mathbb{H}$		7.40									
M - M		$\stackrel{\wedge}{\mathbb{H}}$	N = 34	Z 10									
X X	10	$\mathbb{A}$	N = 51										
		$\downarrow \downarrow$											
		-\[	N = 38										
	15	X	N = 40	17									
		$\Pi$											
		11											
		$\forall$	N = 92/7"										
	20	7	11 - 32/1										
		1											
DRIVE GIN I PROJECT SIZOT 9 EMERSOON		П											SHALE, light gray, very fine grained, slightly to moderately
	25	#	R = 93										weathered, very weak to weak rock
		-1	RQD = 56										\LIMESTONE, light gray, fine grained, slightly weathered, weak to moderately strong rock
		#											SHALE, gray, very fine grained, slightly to moderately weathered,
	30	11	R = 50										very weak to weak rock
	•	11	RQD = 37										
		╫											
2													Total Depth = 33 ft.
¥													
ģ													
<u> </u>													
7.1													
[ ]													
<u> </u>													
<u>-</u>													
ا ا ا													
ģ													
			ARD PENE						E				REMARKS:
ظا تا			T PENETRO CONE PEN										GPS COORDINATES: Lat. 41.181870, Long82.781886
[	R - RO	CK	CORE REC	OVEF	RY								
<u> </u>	RQD - I	RO	CK QUALITY	DES	SIGN/	ATION	1						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/29/2019

<u> </u>													DATE(5) DRILLED. 4/29/2019
	FIE	LD	DATA			L	٩BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger: 0 to 15 ft.; NX Wet Rock Coring: 15 to 25 ft.
				(%)	L	<u>IMIT:</u>	S			(9		(%)	
,				MOISTURE CONTENT (%)			X			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	
<u> </u>				Ę	_	¥	PLASTICITY INDEX			J.	ESS (I	SE	GROUNDWATER INFORMATION:
[[ ]			l. <del>L.</del>	Ö	LIQUID LIMIT	PLASTIC LIMIT	ļχ	놀	]  -  -	-AIL	<u>R</u> C	500	No groundwater encountered prior to the introduction of drilling fluid
[ W ]	Ē	S	14.00 °	W W		) E	) I	LSSI JOS	O.F	ΑT	NG S/S		
	E	닖	SWC SWC SWC %	UT	g	FAS	LAS		PRE S/S	ž	ΞŠ	N SI	SUDEACE ELEVATION (ET):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	Q	LL	PL		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	1₹		MINUS NO.	SURFACE ELEVATION (FT):
5 0 1		\ <u>o</u>	/ 24-44		LL	PL	PI		000	o)	0 =	2	DESCRIPTION OF STRATUM \[ \( \) 2 in. Topsoil \( \)
	-	$\mathbf{X}$	N = 11										LEAN CLAY (CL), with Sand, brown, stiff to hard, moist
	-	+											ELIATOLY (OL), Wall Galla, Blown, Sain to Hald, Hold
	- - 5	$\perp$	N = 14	14									
	-	$\Box$											
	-	$\pm$	N = 26										
	- 40		N = 17	13									Grading gray
	- 10 -	$\mathcal{H}$	14 - 17	'									
SOIL SYMBOL	-	$\forall$	N = 35	9									
	_	H	N = 50/6" _										CHALE grow hard dry to maint
	- 15 -	1	14 - 30/0										SHALE, gray, hard, dry to moist SHALE, gray, very fine grained, slightly to moderately weathered,
	-	-11	R = 88										very weak to weak rock
	-	11	RQD = 27										·
	- 20	Н											
	-	11	R = 98										
	-	11	RQD = 78										
	- - 25	11											
													Total Depth = 25 ft.
													'
	N - ST4		ARD PENE	TRAT	ION .	TEST	RESI	L ISTANC	ː				REMARKS:
	P - PO	CKE	T PENETRO	OMET	ΓER F	RESIS	TANG	CE	<b>-</b>				GPS COORDINATES: Lat. 41.176582, Long82.829454
			CONE PEN			N RES	SISTA	NCE					
			CORE RECO			OITA	١						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/18/2019

													DATE(S) DRILLED: 12/18/2019
	FI	ELD	DATA			LA	ABO	RATO	DRY DA	ΛTΑ			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				(%)		<u>IMIT</u>				(%	سِ ا	(%)	
2				Ä			DEX			() E	SUR	EVE	GROUNDWATER INFORMATION:
5				MOISTURE CONTENT (%)	⊨	PLASTIC LIMIT	PLASTICITY INDEX	  -	ш _	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Groundwater not encountered during drilling and measured at 31 ft.
			F E	S S	≧	IC L	ō	ļ Ĕij	SS H F	ΓFΑ	SQ	. 20	immediately after drilling
	🖳	ES	WS/S NS NS		LIQUID LIMIT	AST	AST	ENS DS/C	RES SQTIS	Ν	NN/	NO NO	
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	OIST				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RA		NUS	SURFACE ELEVATION (FT):
S S		\જ	/ <u>ຊຕ</u> :	Ž	LL	PL	PI	무진	SPE	S	86	Σ	DESCRIPTION OF STRATUM
	1	$\forall$	N = 23										\[ 2 in. Topsoil \[ \int \] LEAN CLAY (CL), trace Sand, brown, very stiff to hard, dry to
	}	+											moist
	5	-X	N = 20	16									
	1												
<u> </u>	}	-X	N = 26										
	10	-X	N = 21	14									Grading with Sand, gray
\$ ///	1	$\downarrow$											Toron Convolet 40 ft
2	1	Д	N = 24										Trace Gravel at 12 ft.
	15	-X	N = 31										
	1	4											
2 ///	1												
3///	20	-  X	N = 44	18									SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard
	<b>{</b>	7											
	1												
	25	X	N = 39										
3///	<del>}</del>												
\$ ///	4												CHAIT are was bord drug to resist
	30	X	N = 96/11"	¥									SHALE, gray, very hard, dry to moist
	}	+1											
	<b>•</b>	$\frac{1}{2}$	N = 50/3"										
	35	7	N = 50/3										
7007	1	1											
	}	-	N = 50/3"										
5													Auger Refusal at 39 ft.
¥ ¥													
4-													
<u>+</u>													
7/01/													
2													
3.													
5 ⊄													
PO P													
KENEWABLE LOG - LOG A GNNLOT GUT 1 - STOZI 14:14 - KTOPEKATIONSIOPEKATOR I PROJECT SKOTSKENITSON CREEK - MOTBOTTON CREEK	_												
			ARD PENE T PENETR						Œ				REMARKS: GPS COORDINATES: Lat. 41.154781, Long82.811484
WAE	T - TX	DOT	CONE PEN	IETR/	OITA								0. 0 00011011101
			CORE REC CK QUALIT			ATION	١						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/25/2019

													DATE(S) DRILLED: 5/25/2019
	FIE	ELC	DATA			L/	4BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger
				(%)		LIMIT:	S I			(9		(%)	
				MOISTURE CONTENT (%)			EX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	ODOLINDAVATED INICODMATION
					_	¥	PLASTICITY INDEX			J.	ESS (	SE	GROUNDWATER INFORMATION:
႕			l. <del> -</del>	5	LIQUID LIMIT	PLASTIC LIMIT	ļξ	<del> </del>	T)	FAIL	<u>R</u>	200	No groundwater encountered during or immediately after drilling
MB	Œ	က္သ	SQ F	쀭	□	) IS	STIC	NSI-	ESS STH SQ. F	ΑT	S/S	Š.	
}.	Ŧ	밀	WO.	STU	<u>  g</u>	Š	Ϋ́		IPRI ENG IS/S	AN	L 문 문	JS N	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	Į į	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR		MINUS NO.	DESCRIPTION OF STRATUM
<i>"</i>		1	, 241-44			+			00,0	0,		_	\1 in. Topsoil
	-	$\overline{\mathbb{A}}$	N = 13										LEAN CLAY (CL), with Sand, brown, stiff to very stiff, dry to moist
	-												
	- 5	-M	N = 14	13									Grading trace Sand
	-	$\downarrow$											
	-	-X	N = 18										
	- - 10	$\overline{\mathbb{A}}$	N = 28	16									
	_	$\Box$											
	-	-X	N = 21										WEATHERED SHALE, gray, very stiff, dry to moist
	- - 15	$\mathbf{A}$	N = 18	13									
=	-	$\Box$											
	-	11											
	- - 20	$\mathbf{A}$	N = 47										SHALE, gray, weathered to very hard, dry to moist
=	- 20	+											
	-	11											
	-	$\forall$	N = 50/4"										
=	- 25 -	$\mathcal{A}$	N - 30/4										
	<del>-</del>	1											
	-		N. 50/0"										
	- 30 -	$\mathcal{A}$	N = 50/2"										
	-	+1											
	-	$\downarrow$	=0/0"										
	- 35 -	X	N = 50/2"										
=	-	+											
													Auger Refusal at 37 ft.
			ARD PENE						Œ				REMARKS:
			T PENETR										GPS COORDINATES: Lat. 41.151717, Long82.781455
			CONE PEN			IN KE	5101 <i>P</i>	INCE					



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/12/2019

		=1 [	DATA			1./	\BO	DATC	DRY DA	тл			DRILLING METHOD(S):
-	"		TOATA		АТТ	ERBE		NAIC		NIA			Hollow Stem Auger
				(%)	AII	IMIT	S					(9)	
_				(s)			EX			(%)	器	/E (%	
7.GP.					_	⊥⊮	PLASTICITY INDEX			URE.	ESSI (I	SIE	GROUNDWATER INFORMATION:
2 13	1_		_ [	S	LIQUID LIMIT	PLASTIC LIMIT	SITY	F≓	SIVE FT)	FAIL	PR S	200	Groundwater encountered at 9 ft. during drilling and measured at 4 ft. immediately after drilling
MD19	(FT)	ES	VS/F NS NS	URE		STIC	STI	S/CI	RESS GTH SQ.	1 AT	S/SC	Ŏ.	The intributationy arter arising
SOIL SYMBOL	 DEРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ΔÏ	PLA	PLA	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
	DE	/&	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Σ	LL	PL	PI	R G	SEE	ST	88	Ž	DESCRIPTION OF STRATUM
SON	1	$\overline{A}$	N = 24	16									\[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	7	7											LEAN CLAT (CL), with Sand, brown, very still to hard, dry to moist
	5	-X	N = 24	<u>+</u>									Grading trace Sand
<u> </u>	1												
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1	$\Box$	N = 25	17 ¥									Grading with Sand, trace Gravel, brown to black
	10	- <u>X</u>	N = 32										Grading gray
	7	$\downarrow$	N = 23	17									Grading moist to wet
Š ///	<b>4</b>	$\Box$											SHALE, gray, hard to very hard, moist to wet
	15	7	N = 52	14									STALE, gray, hard to very hard, moist to wet
2/20 2/20	<b>}</b>												
	20	$\perp$	N = 50/2"										
PRO	1 20												
	<b>-</b>	7											
	25	-X	N = 50/3"										
	<b>‡</b>	1											
<u> </u>	1												
	30	-X	N = 25/0"										
EOI	1	$\pm$	N 50/48										
	1	×	N = 50/4"										Augus Defined at 22 ft
DES													Auger Refusal at 33 ft.
702													
퓠													
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\													
4:14													
7/21 1													
- 9/1(													
105													
NEO1													
N S V													
00.													
<u>.</u>	_												
RENEWABLE LOG - LOG A GNNLO1.GDT - 9/10/21 14:14 - R:\OPERATIONS\OPEQUZ DESIGN\GEOTECHNICAL\G DRIVE\G\GNNT\PROJECTS\OTGYN\GROW			DARD PENE ET PENETR						Œ				REMARKS: GPS COORDINATES: Lat. 41.150265, Long82.822230
=WAE	T - TX	DOT	CONE PEN	IETR/	OITA								3. 3 3 3 3 3 1 5 1 7 1 1 5 2 5 3 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			CORE REC			10 <u>1</u> T	1						
	RQD -	- KO	CK QUALIT	I DE	SIGINA	ATION	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/13/2019

<b>—</b>													DATE(S) DRILLED. 12/13/2019
	FIE	ELD	DATA			L/	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
				_		ERBI							Hollow Stem Auger: 0 to 22.5 ft.; Mud Rotary: 22.5 to 39.5 ft.
				MOISTURE CONTENT (%)		_11011 1 3		-		(%	Щ	MINUS NO. 200 SIEVE (%)	
				ENT			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	≣VE	GROUNDWATER INFORMATION:
9.				LNC	⊨	PLASTIC LIMIT		  -	ш		SES NES	IS 0	Groundwater encountered at 14 ft. during drilling prior to the
	Ē		FE	ЕСС	I	] ]	ICI	Ti S	SSIV H FT	T FA	G PI	. 20	introduction of drilling fluid
∑ W M	<u>т</u>	LES	WS/S S/SC WS	J.		AST	AST	ENS DS/C	RES VGT	Z A	NN/SQI	8	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	LSIC	F LIQUID LIMIT			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RAI	E S	NUS	SURFACE ELEVATION (FT):
S S	<u> </u>	\&	\ <u> </u>	ž	LL	PL	PI	20	SEE	ST	26	Σ	DESCRIPTION OF STRATUM
- MD1901007 LEMERSON CREEK - MD1901007.GPJ	-	$\forall$	N = 25										\[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	-	7	14 20										moist; trace Lignite at 1 ft.
	- - 5	$\downarrow$	N = 19	16									
	-	-											
	-	$\overline{\mathbb{X}}$	N = 30										
	- - 10	$\downarrow$	N = 33	15									
DAVE GIN 19-KOLE CISCO SIGNIES	- -	1										L	
	-	-X	N = 19	14 Z	27	16	11					67	SANDY LEAN CLAY (CL), gray, very stiff, dry to moist
	- - 15	$\downarrow$	N = 27	<u> </u>									
	-	<u></u>											
	-	+											
	- 20	$\overline{X}$	N = 50/4"	11									SHALE, olive gray, very hard, dry to moist
	-	_											
	-	+											
	- 25	$\overline{X}$	N = 50/2"										
	-	<u>_</u>											
DESIGNIGEO I ECHNICAL (G	-	+											
	- 30	$\overline{X}$	N = 50/5"										
	-	1											
	-	+											
5000	- 35	$\overline{X}$	N = 50/4"										
	- -	1											
ZONZAONS	-	+											
	-	×	N = 50/3"										
≧													Total Depth = 39.5 ft.
튀													
4													
- - -													
<u>-</u>													
9													
4													
칠													
ENEWABLE LOG - LOG A GNNLUT.GUT - 9/10/21 14:14 - K:\OFERATION			VADD DEVIC		1011	TEST	DEC	IOT A S I					DEMARKO
			DARD PENE ET PENETRO						Æ				REMARKS:   GPS COORDINATES: Lat. 41.148395, Long82.811766
<u>-</u>	r - TXE	TOC	CONE PEN	IETR/	ATIOI								2. 2 2 3
			CORE REC			ATION	V						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/16/2019

													DATE(S) DRILLED: 12/16/2019
	FIE	ELC	DATA			L	4BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
T				(9)		TERBI LIMIT						<u> </u>	Hollow Stem Auger: 0 to 25 ft.; Mud Rotary: 25 to 39 ft.
				MOISTURE CONTENT (%)			EX			STRAIN AT FAILURE (%)	R.	MINUS NO. 200 SIEVE (%)	
					_	ŧ	2			J.RE	lss:	SIEV	GROUNDWATER INFORMATION:
J	_		_	S	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	F≓	SIVE FT)	FAIL	PR	200	Groundwater encountered at 19 ft. during drilling prior to the introduction of drilling fluid
	(F)	ES	VS/F 1/S 1/S	URE		STIC	STI	S/CI	RESS GTH SQ.	1 AT	S/SC	Ŏ.	Throughout of drining hald
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	IST	ğ	P P	PLA	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RAIN	CONFINING PRESSURE (POUNDS/SQ IN)	SUN	SURFACE ELEVATION (FT):
2	DE	√Ş	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ĕ	LL	PL	PI	RO PO	SES	ST	85	ž	DESCRIPTION OF STRATUM
	-	$\forall$	N = 12	23									\ \ 1 in. Topsoil FAT CLAY (CH), trace Sand, light brown, stiff to very stiff, dry to
	-	+											moist
	- 5	$\overline{\mathbb{A}}$	N = 17	22									
	-	$\downarrow$											
	-	H	N = 19										
	10	X	N = 27										
	-	$\frac{1}{2}$	N = 20	14									Grading with Sand, gray
		$\Box$	N = 24	' '									Trace Lignite at 14 ft.
	- 15 -	7	IN - 24										Trace Ligitie at 14 it.
	-	1	•										
	- 20	$\frac{1}{2}$	N = 37	¥—									LEAN CLAY (CL), trace Sand and Gravel, black, hard, dry to moi
1	-	$\exists$											
1	-	+											
	- 25	$\overline{\mathbb{A}}$	N = 50/4"										
	-	1											
4	-												DOODLY CDADED CAND (CD) dark grow your doors doors
	- 30 -	A	N = 25/0"										POORLY GRADED SAND (SP), dark gray, very dense, dry to moist, fine to coarse grained
	-	1											
	- - 35	$\frac{1}{M}$	N = 25/0"										CLAYEY SAND (SC), dark gray, very dense, dry to moist, fine to
	-	+	11 20/0										coarse grained
	-	7											
4	-	*	N = 25/0"										
													Total Depth = 39 ft.
$\rfloor$		Ц		<u> </u>									
			ARD PENE T PENETR						Æ				REMARKS: GPS COORDINATES: Lat. 41.141995, Long82.832667
-	T - TXI	TOC	CONE PEN	IETR/	ATIO								Later the state of



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/30/2019

		:	DATA			1./	\BO	DATO	RY DA	ΤΛ			DRILLING METHOD(S):
	FIL	LD	DATA		АТТ	ERBE		KAIC		NIA	<u> </u>		Hollow Stem Auger
JA5				ENT (%)	Λ''	IMITS	S			₹ (%)	SURE	≡VE (%)	GROUNDWATER INFORMATION:
D1901007.c	FT)	တ္သ	S/FT SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	VSITY S/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Groundwater encountered at 19 ft. during drilling and not measured immediately after drilling
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTU	UDIJ LL	PLAS	⊒ PLAS	DRY DENSITY POUNDS/CU.FT	COMPRESTRENGTONS/S	STRAIN	SONFINI	AINUS N	SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
		П	24744	_		1 -			0000	0)	00	_	\1 in. Topsoil /
OVEMERS	- - - 5	$\Box$	N = 8 N = 13	23									LEAN CLAY (CL), trace Sand, brown, medium stiff to very stiff, dry to moist
- MD19010	- - -	$\prod$	N = 17	12									Grading with Sand
N CREEK	- 10 -	$\prod$	N = 28										WEATHERED SHALE, brownish gray, stiff to very stiff, dry to
NEMERSC	- - - 15	$\Box$	N = 23 N = 11	14									moist
\$12018	-	1	-	,									
PROJECT	- - 20 -	X	N = 50/4"	19									SHALE, dark gray, hard, dry to moist
ZEGINTA 	- -	1	N = 50/5"										
ALIG DRIV	- 25 - -	1	N - 30/3										
ECHNIC	- - 30 -		N = 50/4"										
IGN/GEO													Auger Refusal at 31 ft.
2/02 DES													
TIONS/OF													
OPERAL													
14:14 - K													
- 9/10/21													
NL01.GD1													
OG A GN													
1-90-l	 N - ST/		ARD PENE	TRAT	ION T	TEST	RESI	STANC	E E				REMARKS:
VEWABLE	P - PO T - TXI R - RO	CKE OOT CK	T PENETRO CONE PEN CORE RECO	OMET ETRA	TER F ATION RY	RESIS N RES	TANC SISTA	CE	- <b>-</b>				GPS COORDINATES: Lat. 41.138732, Long82.832555



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/15/2019

													DATE(S) DRILLED: 5/15/2019
	FIE	ELD	DATA			L	4ВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
$\top$					AT	ERBI	ERG						Hollow Stem Auger
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  No groundwater encountered during or immediately after drilling  SURFACE ELEVATION (FT):
<i>"</i>		Ħ		_		1 -	-		0000			_	DESCRIPTION OF STRATUM  \[ 4 in. Topsoil \]
	5	1 X	N = 13 N = 21	19									LEAN CLAY (CL), with Sand, brown, stiff to very stiff, moist
		$\Box$	N = 18										
	10	X	N = 18	17									
		$\forall$	N = 16										
	15		N = 21	13									Grading trace Sand and Gravel, gray
		-											
	20	-X	N = 33										
	25	-X	N = 18	10									
	30	- -X	N = 25										
	25	$\frac{1}{}$	N = 39										SANDY LEAN CLAY (CL), trace Gravel, dark gray, hard, dry to
	35	1	IV - 55										moist
	40	-X	N = 36										
	45	-X	N = 50/1"										
													Auger Refusal at 48 ft.
P T F	? - PO - TXE ? - RO	CKE DOT ICK	OARD PENE ET PENETRO CONE PEN CORE RECO	OMET IETRA OVEF	TER F ATIOI RY	RESIS N RES	STAN( SISTA	CE	DE				REMARKS: GPS COORDINATES: Lat. 41.139042, Long82.770782



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/14/2019

													DATE(S) DRILLED: 5/14/2019
	FIE	ELC	DATA			L	ABO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						TERB							Hollow Stem Auger
				(%)		LIMIT				(9)	ш	(%)	
				Ä			) EX			E (%	J. J.	VE	CDOLINDWATED INCODMATION.
				N A	L	H	PLASTICITY INDEX	_		LUR	SESS SESS	SIE	GROUNDWATER INFORMATION:
2 SOL			<sub>_</sub>	8	Ĭ		Ę	F∃	SIVE H FT)	FAI	PR S	200	No groundwater encountered during or immediately after drilling
ΥME	(FT	Si Si	VS/F S/SQ VS	H	LIQUID LIMIT	PLASTIC LIMIT	STI	SNS S/C	SQ.	١AT	S/SO	Š.	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	MOISTURE CONTENT (%)	P P		P.	DRY DENSITY POUNDS/CU.FT	MPF REN	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
SO	日	\S	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	M	LL	PL	PI	R S	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STI	88	Σ	DESCRIPTION OF STRATUM
	-	+											\1 in. Topsoil
	-	*	N = 21										LEAN CLAY (CL), trace Sand and Gravel, brown, very stiff to hard dry to moist
	- - 5	$\downarrow$	N = 23										ary to most
	F°	7											
	-	$\downarrow$	N = 25	15									
	10		N = 33										
	} 'Ŭ	+											
	-	$\downarrow$	N = 14	15									
	- - 15		N = 21										
	} '`	+											
	ļ	1											
	20	$\downarrow$	N = 27	11									
	- ~	+											
	-	7											
	- - 25	$\downarrow$	N = 46										Grading with Sand
	- 23	+											, and the second
	-	1											
	- - 30	$\downarrow$	N = 50/4"	13									Grading moist
	-	+											
	F	7											
	- 35	$\downarrow$	N = 50/3"										SHALE, dark gray, hard, moist
	- "	<u> </u>											
	F	7											
	- 40	$\downarrow$	N = 50/1.5"										
		_											
	-	+											
													Auger Refusal at 43 ft.
_	]			TDAT	ION	TECT	DEC	IOTANIC	<u> </u>				DEMARKS
			DARD PENE ET PENETR						<b>,</b> ⊏				REMARKS: GPS COORDINATES: Lat. 41.137179, Long82.791465
	T - TX	DOI	CODE DEC	<b>IETR</b>	ATIO								GF3 COORDINATES: Lat. 41.13/1/9, Long82./91465



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 7/29/2021

L													DATE(S) DRILLED: 7/29/2021
	FIE	ELC	DATA			L	4ВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
						FERBI							Hollow Stem Auger
				(%)		_IMIT:	<u>S</u>			(0	l	(%	
.				=			Ä			%) =	N	/E (	
				🗒	_	I ⊨	월			URE	SS	SIE	GROUNDWATER INFORMATION:
[] <sub> </sub>			 	00	Ĭ		<u>}</u>	놀	] [F	-AIL	<u>R</u> C	200	Groundwater encountered at 13 ft. during drilling and measured at 8 ft. immediately after drilling
MB(	E	ုလ္ပ	SQ F	뀚	□	) IS	) E	NSI-	ESS TH SO. F	AT I	S/S	ġ.	
\s	Ŧ	Ш	WO.	STU	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		PRI ENG IS/S	AIN	E 문	JS I	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
À 1/y.		$\dot{\Box}$	,			<u> </u>							10 in. Topsoil
	-	-X	N = 9	16									LEAN CLAY (CL), trace Sand, brown, medium stiff to very stiff,
		$\perp$											moist
	- 5	-X	N = 13										
	-	$\downarrow$		╧									
	-	Д	N = 17	<del>Y</del>									
	- 10	-X	N = 8										Grading grayish brown
	-	$\downarrow$											
	-	-X	N = 7	¥									Grading with Sand
	- 15	$\overline{\mathbb{A}}$	N = 29	21									
	-	$\Box$											
	-	+											
	- 20	$\frac{1}{2}$	N = 38										FAT CLAY (CH), with Sand, grayish brown to olive gray, hard,
	-	+											moist
	-	7											
	- 25	$\frac{1}{\lambda}$	N = 50/5"										SHALE, dark brown, very hard, dry to moist
	-	+											
	-	1											
	- 30	$\frac{1}{\lambda}$	N = 50/3.5"										
	-	+											
	-	11											
	- - 35	$\forall$	N = 50/2.5"										
	- 35	7	14 00/2.0										
	-	1											
		₹	N = 50/1"										
													Auger Refusal at 38.5 ft.
$\vdash$	N _ QT		ARD PENE	TD^T		TEST	DES	STANC	`E		1		DEMARKS
			T PENETR						<b>_</b>				REMARKS:   GPS COORDINATES: Lat. 41.13774, Long82.82568
] ]			CONE PEN			N RES	SISTA	NCE					, , , , , , , , , , , , , , , , , , ,



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/18/2019

<u> </u>													DATE(5) DRILLED. 12/10/2019
	FIE	LC	DATA			LA	٩BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				(%)		IMITS				(9)	ш	(%)	
<u>-</u>				ΞNΤ			PLASTICITY INDEX			() ()	SUR.	S.	GROUNDWATER INFORMATION:
07.G				NTE	L	Ψ	Ξ	_		LI	SES(	SE	Groundwater encountered at 24 ft. during drilling and measured at
3010 30L			ᆫᄩ	00 :	LIQUID LIMIT	PLASTIC LIMIT	CŢ.	Ε̈́Ξ	SIVE T FT)	F	P P S	200	23 ft. immediately after drilling
MD18	(FT	ES	VS/F 8/SQ /S	URE		STI	STI	SNS SVC	SQ.	١AT	OS/SO	Š.	3
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		PL	J-I	DRY DENSITY POUNDS/CU.FT	MPF REN	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
- MD1901007/EMERSON CREEK - MD1901007.GPJ	ЭO	$\backslash S$	X 9 1	ЭМ	LL	PL	PI	DR PO	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STI	88	M	DESCRIPTION OF STRATUM
NOS /	-	$\frac{1}{\sqrt{2}}$	N = 6	22									√3 in. Topsoil
MER.	_	A	N = 6	23									LEAN CLAY (CL), trace Sand, light brown, medium stiff to hard, dry to moist
Jac.	_	$\frac{1}{2}$	N = 9	21									dry to moist
0100	- 5 -	$\mathcal{H}$	N - 3	21									
D N	_	$\forall$	N = 19										Grading with Sand
	- 40	Ш	N = 11	13									Grading trace Sand
N. N. E.	- 10 -	7	IN - 11	13									Stading trace cand
DRIVE/GINT/PROJECTS/2019/EMERSON CREEK	_		P = 4.25	15	29	15	14	121	2.05	15.0	9.5	80	
MERS	- <u></u>	$\overline{M}$	N = 9	17	23	13	'-	121	2.00	10.0	0.5		
NEW	- 15 -	$\mathcal{A}$	N - 9	17									
3/201		1											
ECT	-	$\frac{1}{}$	NI = 44	15									
§ (///	- 20 -		N = 11	15									
F ///	_		P = 3.5	Z									
E///		$\frac{1}{\lambda}$	N = 25	7									SANDY LEAN CLAY (CL), gray, very stiff to hard, moist to wet
N//	- 25 -	$\mathcal{H}$	N = 25										OAND LEAN OLAT (OL), gray, very sun to mard, moist to wet
9		1											
S ///	_	$\frac{1}{}$	N = 32										
	- 30 -	$\mathcal{A}$	N - 32										
.03EO		1											
DESIGN/GEOTECHNICAL/G	- <u>-</u>	$\forall$	N = 39										LEAN CLAY (CL), with Sand, gray, hard, moist to wet
DES	- 35 -	7	N - 39										EE, W OE, Will Garia, gray, Hara, Moist to wot
202		1											
SYOP		$\forall$	N = 46	11									SHALE, dark gray, medium hard to very hard, moist
	- 40 -	7	N - 40	'''									of Interes, dank gray, modali mara to vory mara, motor
ERA!		1											
R:\OPERATION	L	$\forall$	N - 25/0"										
_	- 45 -	7	N = 25/0"										
14:15	_	1											
9/10/21		$\frac{1}{\lambda}$	N = 50/3"										Grading gray
_	- 50 -	79	14 - 30/3										Ciaaniy giay
[G]	_	<u> </u>											
E04	L	K	N = 25/0" _										
IND 1													Total Depth = 54 ft.
0G A													·
9-L(													
RENEWABLE LOG - LOG A GNNL01.GDT	ı N - STA	L AND	ARD PENE	ΓRΑΤ	ION :	TEST	RES	STANC	Œ				REMARKS:
ABLE	P - PO	CKE	T PENETRO	DMET	ΓER F	RESIS	TAN	CE					GPS COORDINATES: Lat. 41.132702, Long82.769033
NEW.	R - RO	CK	CORE REC	OVEF	RY			NVE					
£			CK QUALITY			1OITA	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 7/29/2021

													DATE(S) DRILLED: 7/29/2021
	FIE	ELC	DATA			L	4BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger: 0 to 25 ft.; NQ Wet Rock Coring: 25 to 35 ft.
				<u>%</u>		_IMIT:	S				l	(%	
				) 			Ä			%) =		/E (	
					١.	⊨	2			J.	iss:	)   	GROUNDWATER INFORMATION:
ږ			_	l g	Ψ	≧	<u></u>	> t;	J (E	J		000	Groundwater encountered at 17 ft. during drilling prior to the
SOIL SYMBOL	Ē	l o	T-YOU	₩ ₩	DL	일	110	ISIT /CU	SSI TH O. F	YT.	NG-	0.2	introduction of drilling fluid
5	H.	Ë	SWS/SWS		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DEN PEN	S/S(S	Ž.	E S	Z S	CLIDEACE ELEVATION (ET):
	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
) / <sub>//</sub> .·		/ഗ	/ 20.00	2	LL	PL	PI		OSE	Ś	OF	Σ	DESCRIPTION OF STRATUM
$\ddot{z}$	-		N = 8										10 in. Topsoil LEAN CLAY (CL), trace Sand, brown, medium stiff to hard, dry to
1	-	+											moist
1	- - 5	$\mathbf{X}$	N = 12										
4	-	+											
1	-	$\perp$	N = 50/5"										
1	-		N = 19										
1	- 10 -	7	IN - 13										
1	-	$\forall$	N = 14										Grading dark brown, with occasional Shale fragments
1	-	Н											
1	- 15 -	+X	N = 30	9									
	-	+	-	¥									
4	-	$\downarrow$											OUALE deals have a series hand as eight
▋	20	+X	N = 50/3.5"	'									SHALE, dark brown, very hard, moist
▋	-	7											
▋	-		N 50/01										
▋	25	Ä	N = 50/3"										SHALE, dark brown, fine grained, slightly to moderately
▋	-	41	R = 90										weathered, weak to moderately strong rock
▋	-	11	RQD = 13										, ,
=	- 30	$\mathbf{H}$											
▋	-	11	R = 100										
	-	-11	RQD = 65										
╡	- 35	11											
													Total Depth = 35 ft.
l													
l													
l													
l													
l													
٢	u er	^ \	VADD DEVI	TD^T	ION.	TEST	חבטי	CTANG	`E				DEMARKS.
			ARD PENE T PENETR						<b>,</b> ⊏				REMARKS:   GPS COORDINATES: Lat. 41.13084, Long82.8228
	r - TXI	TOC	CONE PEN	<b>NETR</b>	ATIOI								2. 2. 2. 2. 3. 1. 1. 1. 2. 2. 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 2. 1. 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/12/2019

													DATE(S) DRILLED: 12/12/2019
	FIE	ELD	DATA			L	4ВΟ	RATO	RY DA	ATA			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger
				(%)		LIMIT:	<u>S</u>			<u></u>	l	(%	
				Ä			ă			%) =	l R	\E (	
				빌	_	I	PLASTICITY INDEX			J.	SSE (I	200 SIEVE (%)	GROUNDWATER INFORMATION:
٦			l. <del>L</del>	Ś	₹		<u>È</u>	<u>≻</u> E	IVE	FAIL	N S S	500	No groundwater encountered during or immediately after drilling
MB(	E	က္သ	SQ F	쀭	□	STIC	∺	is is	ESS TH Q. F	AT	S/S		
\S	Ŧ	밀	% % %	STU	LIQUID LIMIT	PLASTIC LIMIT	\		IPRI ENG IS/S	AN	L 문 문	JS N	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	DESCRIPTION OF STRATUM
7777		+	/ ==: ==			<del>                                     </del>	<del></del>		00,0		-	<del>-</del>	\3 in. Topsoil
	_	-X	N = 19										LEAN CLAY (CL), trace Sand, light brown, very stiff to hard, dry to
	-	1											moist
	- 5	-X	N = 17	17									
	-	1											
	-	$\perp$	N = 33										
	- 10	-X	N = 36	17									
	-	1											
	-	-X	N = 18	16									FAT CLAY (CH), trace Sand, light brown, stiff to very stiff, dry to moist
	- - 15		P = 2.0										Hiost
	-	+											
	-	7											
	- 20	$\downarrow$	N = 30										
	-	+											
	-	1											
	- - 25	$\downarrow$	N = 25	19									SILT (ML), trace Sand, gray, very stiff, moist
[	- 25	+	20	"									· (···-),, g, · · · · · · · · · · · · · · · · · · ·
	- -	1											
╢╂	-	$\downarrow$	N = 20										
	- 30 -	7	11 - 20										
	-	1											
	-	$\forall$	N = 50/3"										LEAN CLAY (CL), gray, hard, moist
	- 35	1	N = 50/3"/										SHALE, gray, very hard, moist
													Auger Refusal at 35 ft.
$\Box$		L											
			DARD PENE ET PENETRO						E				REMARKS:
•	T - TXI	DOT	CONE PEN	IETR/	ATIO								GPS COORDINATES: Lat. 41.115596, Long82.744422
	P - PC	1CK	CORE REC	$\cap \setminus \vdash \vdash$	>V								



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/11/2019

													DATE(S) DRILLED: 5/11/2019
	FIE	ELC	DATA			L/	\BO	RATO	ORY DA	ATA			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				MOISTURE CONTENT (%)		_IIVII I S				(%	m m	(%)	
r l				ËN		L	NDE)			RE (	SSUF	EVE	GROUNDWATER INFORMATION:
  -				INO	Ħ	LIMI	TY II	/ FT	<u>ا</u> و	√ ILU	Z S	IS 00	Groundwater not encountered during drilling or immediately after
/BO	l F	w	TA'SO	₩ 0		TIC	TICI	ISIT) /CU.	SSIV TH	\T F,	NG F	0.20	drilling and measured at 6.5 ft. 24 hours after drilling
SYI	H (H	PLE	SWO SNS/S SNS/S SNS/S	STUF	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DEN NDS	PRE ENG	√ NIA	IN SOL	N ST	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ÖW	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
SOUL SYMBOL  SOUL SYMBOL		Ħ											∖2 in. Topsoil
2	<u> </u>	A	N = 14										LEAN CLAY (CL), with Sand, brown, stiff to very stiff, dry to moist
<u> </u>	ŀ _	$\frac{1}{2}$	N = 25										
	5	7	14 - 25	<b>Y</b>									
	F	$\overline{\mathbb{A}}$	N = 24										
	10		N = 15	16	31	16	15					74	
	<u> </u>												
	}	-X	N = 16										Grading grayish brown
	15	$\overline{\mathbb{A}}$	N = 15										
	Ė	1											
	-												
	20	$\mathbb{A}$	N = 19										
	}	+											
	-	$\frac{1}{M}$	N. 40	40									
	- 25 -	$\mathcal{A}$	N = 19	19									
	t	1											
	- - 30	$\frac{1}{\lambda}$	N = 25										
	F 30	$\mathcal{H}$	14 20										
	-	1											
	- - 35	$\forall$	N = 15										
	<u> </u>	$\exists$											
	-	+											
	40	$\overline{\mathbb{A}}$	N = 35										
	-	11											
	ļ												
	45	X	N = 74										SHALE, dark gray, hard, moist
	ŀ	$\left  \cdot \right $		L	L						L		
į		П											Auger Refusal at 48 ft.
5													Tragor rolusal at 40 lt.
3													
5													
	]	Ц		<u> </u>									
1			ARD PENE T PENETR						Æ				REMARKS:   GPS COORDINATES: Lat. 41.113883, Long82.809371
	T - TXI	TOC	CONE PEN	IETR/	10ITA								2. 2. 2. 2. 3. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
			CK QUALIT			AOITA	1						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/11/2019

L														DATE(S) DRILLED: 12/11/2019
		FIE	LC	DATA			L	٩ВО	RATO	RY DA	ATA			DRILLING METHOD(S):
							ΓERΒΙ							Hollow Stem Auger
					(%)		LIMIT:				(%	щ	(%)	
2					Ä			DEX			% (°	SUR	EVE	GROUNDWATER INFORMATION:
07.G					N	╘	LΨ	PLASTICITY INDEX	<b>⊢</b>	ш	Ę	S (S	SIE	Groundwater encountered at 52 ft. during drilling and measured at
9010	80 L	<u>_</u>		L E	S	N	IC L	ICIT	F.S.	SSIV H FT,	ГБА	G PF	. 20(	40 ft. immediately after drilling
MD	₩.	F)	LES	WS/R S/SC WS	IUR	LIQUID LIMIT	PLASTIC LIMIT	AST	DS/(	RES NGT S/SQ	Z	NN/SQ	No No	
븳	SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
MD1901007/EMERSON CREEK - MD1901007.GPJ	ος 2222	۵	\ <u>Ø</u>	<u> </u>	Σ	LL	PL	PI	2.7	0.P	'n	\Q.F	Σ	DESCRIPTION OF STRATUM
RSO			$\forall$	N = 18	16									3 in. Topsoil LEAN CLAY (CL), trace Sand and Gravel, light brown, very stiff to
EME.			$\Box$											hard, dry to moist
7007		5	$\mathbb{A}$	N = 21										
961			$\downarrow$											Crading iron stained
.:. K/			Н	N = 28	15									Grading iron stained
CREEK		10	$\mathbb{A}$	N = 30										Iron stains grade out
SI			$\forall$	N = 32	15									
/2019\EMERSON			$\frac{1}{1}$		13									
9EM		15	Ä	N = 39										
3/201	<b>//</b>		1											
ECT			$\frac{1}{2}$	N = 19	16									
S .		20	7	N - 19	10									
Ĭ.			11											
NE/G		25		P = 4.5										
IN IN	<b>//</b>	23	$\blacksquare$	F = 4.5										
NA NA			11											
SIOP2/02 DESIGN/GEOTECHNICAL/G DRIVE/GINT/PROJECT		30	$\frac{1}{\sqrt{1}}$	N = 14	28								96	SILT (ML), trace Sand, brown, stiff to very stiff, moist to wet
	ШŁ		$\Box$											
NGE			+											
Sigi	F	35	$\overline{\mathbb{A}}$	N = 18										Trace Gravel at 34 ft.
02 DE			11											
OP2														
		40	$\mathbb{A}$	N = 82										CLAYEY SAND (SC), dark gray, very dense, dry to moist, fine to medium grained
ZY.			7											medium grained
R:\OPERATION			$\frac{1}{M}$											LIFANICIAY/OL) with Canad dayly grapy bound dury to mariet
$\neg V$		45	X	N = 45										LEAN CLAY (CL), with Sand, dark gray, hard, dry to moist
4:1			+											
- 9/10/21 14:15	<b>//</b>			N = 51										
6-1		50	#	1G – NI	,									
9			1	7	<u> </u>									
N N	<b>//</b>		×	N = 50/4"										Grading trace Sand and Gravel, gray, moist to wet
A GN														Total Depth = 54.5 ft.
L0G														
RENEWABLE LOG - LOG A GNNL01.GDT			Ш											
JE L				ARD PENET T PENETRO						Æ				REMARKS:   GPS COORDINATES: Lat. 41.110964, Long82.744297
WAE	Т	- TXE	TOC	CONE PEN	ETR/	ATIO								5. 5 5 5 5 6 1. W. (1 E 6. Edit. + 1. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
JENE I				CORE RECO CK QUALITY			OITA	٧						
-						_								



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/8/2019

-	1												DATE(5) DRILLED. 5/6/2019
	FIE	LD	DATA			L/	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				MOISTURE CONTENT (%)				-		(%	Щ	200 SIEVE (%)	
<u> </u>				ENT		_	PLASTICITY INDEX			RE (	SUF	EVE	GROUNDWATER INFORMATION:
2.700				LNC	<b> </b>	Ξ	≧		ر پا		Z S	IS 0	No groundwater encountered during or immediately after drilling
1901 BOL	F		L E	EC		일	<u>[</u>	ST.	SSIV TH 2. FT	T F/	IG P	). 20	
-MD SYM	н (н	LES	WS/SC	TUR		PLASTIC LIMIT	ASI	DEN IDS/	PRE NGT S/SC	Z Z	NIN	S NC	OURTAGE ELEVATION (ET)
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	lois	F LIQUID LIMIT			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
- MD1901007EMERSON CREEK - MD1901007.GPJ		\o	/ Z T H K K	2	LL	PL	PI		OSC	S	0.6	2	DESCRIPTION OF STRATUM \[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
OSK///	1	$\forall$	N = 10										LEAN CLAY (CL), trace Sand, brown, stiff to very stiff, moist
	1	$\Box$											
001	5	$\overline{\mathbb{A}}$	N = 21										
65///	7	$\frac{1}{4}$	N. 04	47									
	1	Н	N = 21	17									
	10	X	N = 24										
DRIVE/GINT/PROJECTS/2019/EMERSON CREEK	1	$\forall$	N = 18										
SE SE	1	H											
MEM MEM	15	$\overline{A}$	N = 12										
200///	}	+1											
ST ///	<b>F</b>	$\frac{1}{4}$	N = 13	17									Grading to dark brown
§ ///	20	$\mathcal{A}$	N = 13	17									Grading to dark brown
	1	1											
		$\forall$	N = 16										
8///	25	7	N - 10										
P	1	11											
DESIGN/GEOTECHNICAL/G	1	$\forall$	N = 22										Grading with Sand, gray, dry to moist
	30	7	14 – 22										Clauming man came, gray, any to melon
9	1	11											
Sign ///	35	$\forall$	N = 25										
3	1 33	+											
2000	1	11											
VS/OP2	40	$\forall$	N = 39	15								9	POORLY GRADED SAND (SP), gray to black, dense, wet, fine to
	}	$\Pi$											coarse grained
PER/	F												
- R.\OPERATION	45	$\forall$	N = 56										LEAN CLAY (CL), trace Sand and Gravel, gray, hard, moist to wet
14:15 -	1	$\Box$											
	†	+											
- 9/10/21	50	$\blacksquare$	N = 41										Gravel grades out
.GDT - 9	1	1											
9.00	1	$\pm  $											
N N	55	A	N = 50/5"										
G A C													Total Depth = 55 ft.
٩													
RENEWABLE LOG - LOG A GNNL01	] N - ST		ARD PENE	ΓRΔΤ	ION .	L TEST	RESI	ISTANC	L		<u> </u>		REMARKS:
BLE	P - PO	CKE	T PENETRO	DME	TER F	RESIS	TAN	CE	<i>_</i>				GPS COORDINATES: Lat. 41.107601, Long82.807071
EWA			CONE PEN			N RES	SISTA	NCE					_
A L	RQD -	RO	CK QUALITY	DES	SIGN	OITA	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 7/30/2021

													DATE(S) DRILLED: 7/30/2021
	FIE	LD	DATA			L	<b>4BO</b>	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
1					ATT	ERBE	ERG						Hollow Stem Auger
				(%)		<u>IMIT:</u>				(%	<u>س</u>	(%)	
				ΙΝΉ			PLASTICITY INDEX			()	SUR	EVE	GROUNDWATER INFORMATION:
				NE	⊨	Ψ	Z ≻	<sub> </sub>	111	ILUF	N)	SIE	Groundwater encountered at 47 ft. during drilling and measured a
Ĭ	(		Ļ ti	8	N N	CLI	CIT	ΞÄ	SIVE	FAI	H Q	200	17 ft. immediately after drilling
M	I (FT	ES.	NS/F S/SQ VS	l N.E.	LIQUID LIMIT	PLASTIC LIMIT	ASTI	ENS SS/C	ZES IGTF /SQ.	۱AT	NIN DS/8	NO	, G
SOIL STMBUL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		PL	PL	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
		\&\	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ĭ	LL	PL	PI	RO	ST.	ST	85	M	DESCRIPTION OF STRATUM
<u>',;</u>		$\forall$	N = 10	18									_10 in. Topsoil LEAN CLAY (CL), trace Sand, brown, stiff to hard, dry to moist
<b>A</b>		$\mathcal{H}$											LEAN CLAT (CL), trace Sand, brown, sun to hard, dry to moist
	5	$\forall$	N = 16										
		$\Box$											
		-[	N = 16										
1	10	$\blacksquare$	N = 17										
1		$\downarrow \downarrow$											
1		Н	N = 19										
<b>#</b>	15	$\overline{\mathbb{A}}$	N = 15	15	26	15	11						Grading grayish brown
#		11	<u></u>										
1		$\downarrow \downarrow$											
1	20	-[4]	N = 12										
1		11											
		$\downarrow \downarrow$											
	25	X	N = 11										
7		-											
1		$\downarrow \downarrow$											
1	30	A	N = 21										
		+											
1		$\frac{1}{4}$	N - 50/5"										Grading with Shale fragments
1	35	Ħ	N = 50/5"										Grading with Shale hagments
1		1											
	40	$\forall$	N = 22										
1	40	71	N = 22										
1													
4	45	$\forall$	N = 50/1"										SHALE, dark gray, very hard, dry to moist
1	40	+	- 5, .	<u> </u>									
<b>F</b>		]	_	Ī									
#	50		N = 50/0.25"										
†	- •		N = 25/0" /										
													Auger Refusal at 51 ft.
	- ST/	ИU	ARD PENE	 TRAT	ION :	  FST	BE61	STANC	<u> </u> ::F				REMARKS:
Ρ.	- PO	CKE	T PENETRO	OMET	ΓER F	RESIS	TANG	CE	_				GPS COORDINATES: Lat. 41.099166, Long82.827906
١.	- IXC	IJΓ	CONE PEN	IE I RA	OHA	N KES	SISIA	NINCE					



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/9/2019 - 5/10/2019

$\vdash$		-1 -				1.	^ DO	DATO		\ T ^			DRILLING METHOD(S):
		LL	DATA					RAIC	DRY DA	ATA	1	I	Hollow Stem Auger
				()	AII	ERBE	=RG S					(6)	The state of the s
_				MOISTURE CONTENT (%)			X			(%)	묎	MINUS NO. 200 SIEVE (%)	
GPJ				TEN		⊨	PLASTICITY INDEX			JRE	รรา	SIEV	GROUNDWATER INFORMATION:
7 7			-	NO.	ΙΨ	Z	<u></u>	누땨	J (F	:AIL	PR S	300	No groundwater encountered during or immediately after drilling
D190 MBC	E	ဖြ	SQ F	RE (	IDL	TIC	STIC	VSIT S/CU	ESSI TH Q. F	AT F	NG S/S	0.2	
M - }   Y S -	] H	밀	% SNO.	STU	LIQUID LIMIT	PLASTIC LIMIT	\Z		IPRE ENG IS/S	AIN	I E G	JS N	SURFACE ELEVATION (FT):
- MD1901007/EMERSON CREEK - MD1901007.GPJ	DEРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	Ž	DESCRIPTION OF STRATUM
8 ///		$\perp$											\2 in. Topsoil
SE ///	1	-X	N = 12	16									LEAN CLAY (CL), with Sand, brown, stiff to hard, dry to moist
New Mark	7	$\frac{1}{\sqrt{2}}$	N - 04										
010	5	$\uparrow$	N = 21										
₩ 1018	1	$\downarrow$	N = 20										
	1	Д	N = 17	17									Grading trace Sand
S. S	10	7	IN - 17	17									Stading trace Sand
DESIGNIGEOTECHNICALIG DRIVEIGINTIPROJECTSI2019/EMERSON CREEK	1	$\forall$	N = 24										
MER	15	$\frac{1}{\sqrt{2}}$	N = 23	17									
10 E		7	20										
S/S/	#	1											
DE COL	20	$\downarrow$	N = 22										
8///	1 20	-											
F ///	7	-											
NEW MEN	25	I	N = 1.5	15				121	4.52	10.0	0.0		
G D													
₹///	}	-											
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	30	$\overline{\mathbb{A}}$	N = 24										Grading grayish brown, wet
B ///	1	1											
N GE	1	1											
ESIG	35	-X	N = 58										
020	4	1											
JS/OP2/02	1												
41///	40	+X	N = 47										
E ///	<b>4</b>	-											
R:\OPERATIO	1	$\downarrow$											
£ ///	45	-X	N = 30										
4	1	]											
- 9/10/21	4	$\frac{1}{\lambda}$	N = 50/6"										SHALE, dark gray, hard, moist
	50	$^{\uparrow}$	N - 30/0										or week, dank gray, mara, moot
i.G	<b>‡</b>	1											
NEO L	55	$\forall$	N = 50/4"		L								
A GN	55												Total Depth = 55 ft.
907													Total Doptil – 30 lt.
RENEWABLE LOG - LOG A GNNL01	_												
			ARD PENET ET PENETRO						CE				REMARKS:
WAB	T - TXI	TOC	CONE PEN	ETR/	ATIO								GPS COORDINATES: Lat. 41.096579, Long82.806805
ENE	K-RO RQD-	CK RO	CORE RECO	JVEF DES	KY SIGN.	OITA	٧						
		_											



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/3/2019

IEL	D	DATA			1.4	ΔRO	DATO	RY DA	ΔΤΔ			DRILLING METHOD(S):
						'DC	NAIC	אלו אל	1171			, ,
			(0		ERBE						)	Hollow Stem Auger
			%) TI			EX			(%) :	JR.	Æ (%	
			VTEN	_	ΛΙΤ	ONI.			URE.	ESSI (r	SIEV	GROUNDWATER INFORMATION:
		_ E	CO	IWI.	CLIN	СІТУ	FT.U	SIVE T FT)	FAIL	PR S	200	Groundwater encountered at 13 ft. during drilling and not measured immediately after drilling
	<u>ရ</u>	NS/F S/SQ NS	URE	an	ASTI	ASTI	ENS DS/C	RES IGT- /SQ.	N AT	NING DS/8	NO.	
	MPI	BLOV TON: BLOV 2D: %	OIST	21_			Z SUNI	OMP ONS	IRAII	IENO NNO	SONI	SURFACE ELEVATION (FT):
$\rightarrow$	જે <u>/</u>	Z G ⊢ G Z	M	LL	PL	PI	29	30F	'n	8₽	Σ	DESCRIPTION OF STRATUM \[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
7	Z۱	1 = 6	22									SANDY LEAN CLAY (CL), light brown, medium stiff to very stiff,
1	↲.		00									dry to moist
4	Ϋ́	N = 1/	20									
1	X۱	N = 15										
, =	X N	<b>1</b> = 26										LEAN CLAY (CL), trace Sand and Gravel, dark brown, soft to
=			_									hard, dry to moist
1			⊈18									
; }	X۱	N = 15	14									
}												
. 7	$\forall$	J = 5	18	31	16	15					77	Gravel grades out; grading with Sand
' -	4'	<b>1</b> – 5	10	31	10	13					''	Graver grades sat, grading mar sand
7												
; =	F	P = 2.25	17	29	17	12	117	2.77	14.9	19.0	91	Grading trace Sand
												Wat form 20 to 24 ft
)	Ϋ́	<b>N</b> = 4	23									Wet from 29 to 34 ft.
: =	ΧIν	N = 17										
-												
, -	Ŋ١	<b>1</b> = 34										
7												
. 1	$\forall$	1 - 20										
, 1	4'	N - 20										
1												
, -	Ĭ,	N = 32										
=												
; -	X 1	N = 18										
												Total Depth = 55.5 ft.
T ^ •		אסט טבאורי	грлт	1001	TEST	DEC	CTANG	<u> </u>				DEMARKS.
OC	KΕΊ	PENETRO	DMET	ER F	RESIS	TAN	CE	<b>,</b> _				REMARKS: GPS COORDINATES: Lat. 41.095647, Long82.763703
					N RES	SISTA	NCE					_
) ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		AND	N = 6  N = 17  N = 15  N = 26  N = 17  N = 15  N = 15  N = 17  N = 15  N = 18  TANDARD PENETAL AND PENETAL	N = 6 22  N = 17 20  N = 15  N = 26  N = 17 18  N = 15 14  N = 15 14  N = 5 18  P = 2.25 17  N = 4 23  N = 17  N = 34  N = 34  N = 32  N = 18	N = 6	N = 6	N = 6	N = 6	N = 6	N = 6	N = 6	N = 6



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/2/2019

L	-													DATE(S) DRILLED: 5/2/2019
	_	FIE	LL	DATA		_	_ L/	ABO	RATO	DRY DA	ATA		_	DRILLING METHOD(S):
Ī							ERBE							Hollow Stem Auger
					MOISTURE CONTENT (%)		<u>-IMIT:</u>				(%	l m	200 SIEVE (%)	
GE.					ENT			PLASTICITY INDEX			RE (	SUF	EVE	GROUNDWATER INFORMATION:
007.0	.				TNC	<b>₽</b>	PLASTIC LIMIT	≦   ≻		Ē Ć	ILUI	Z S	IS 0	No groundwater encountered during or immediately after drilling
1901	BOL	F		AFT O FT	ЫÜ		2	[ []	SITY CU.F	SSIV TH	T FA	IG P		
- MD	SYM	н П	LES	WS/S(N	TUR	LIQUID LIMIT	ASI	ASI	DEN.	NGT S/SC	N A	NIN	S NC	OUDEA OF ELEVATION (ET)
Ä	SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ F T: BLOWS R: % RQD: %	1018				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
N CR	ν   *///		\w	/ Z Q H K K	2	LL	PL	PI		OSC	S	O.F.	Σ	DESCRIPTION OF STRATUM  \( 4 \text{ in. Topsoil} \)
ERSON CREEK - MD1901007.GPJ			$\overline{X}$	N = 7										LEAN CLAY (CL), with Sand, brown, medium stiff to very stiff,
EME														moist
1007		5	-X	N = 18										
0190			$\frac{1}{}$	N = 28										Grading trace Sand, dry to moist
¥			+											Grading trace during to mote
CREEK		10	<b>A</b>	N = 23										
NO.			$\frac{1}{\lambda}$	N = 21										Grading gray
MERS	$/\!\!/$		$\frac{1}{\sqrt{2}}$	N = 12										
19/EM		15	7	11 - 12										
15/20			1											
INT/PROJEC		20	$\downarrow$	N = 6	14									
PRC			_											
GINT			7											
DRIVE		25	$\overline{X}$	N = 6	19									CLAYEY SAND (SC), olive brown, loose, dry to moist, fine grained
G D			1											
A CAL														
GEOTECHN		30	-X	N = 15										LEAN CLAY (CL), trace Sand, dark gray, stiff to hard, dry to moist
EOT			+											
			$\frac{1}{\sqrt{2}}$	N - 05										Grading trace Gravel
DESIGN		35	7	N = 25										Grading trace Graver
2/02			1											
SIOF		40	$\frac{1}{\lambda}$	N = 20										
Ó		40	+											
R:\OPERATION			7											
S. S.		45	$\overline{X}$	N = 32										
4:15			1											
/21 14			1											
- 9/10/2		50	-X	N = 26										CLAYEY SAND (SC), dark gray, medium dense, moist, fine grained
GDT -			-											9.553
			1	NI 00										SANDY LEAN CLAY (CL), dark gray, hard, moist
S S	4	55	**	N = 68										
OG A														Total Depth = 55.5 ft.
- [g														
RENEWABLE LOG - LOG A GNNL01				ARD PENET						E				REMARKS:
WABI	٦	- TXE	TOC	T PENETRO CONE PEN	IETR/	10ITA								GPS COORDINATES: Lat. 41.094265, Long82.770634
ENE	F	R - RO ROD -	CK RO	CORE RECO	OVEF	RY SIGNA	4∩ІТ	J						
$\propto$ $\Gamma$		·~D -	٠.٠	ON WORLIII	יייי	J. U. 14/		•						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/8/2019

┢	$\top$			DATA				•	D 4 T 6	)D)/D/	· <b>T</b> A			DRILLING METHOD(S):
L		FIE	:LL	DATA	ı				RAIC	DRY DA	NΙΑ		-	Hollow Stem Auger
					_	AII	TERBI LIMIT:	=RG S						Trollow Clofff Augus
					%) _						(%)	쀭	%) <sub>=</sub>	
GPJ					TEN		⊨	PLASTICITY INDEX			JRE	SSU	IEVI	GROUNDWATER INFORMATION:
1007	ا ب			_	NO.	ΗM	Ĭ	<u> </u>	<u>&gt;</u>	VE (	AILL	S S	S 00	No groundwater encountered during or immediately after drilling
0190		Œ	တ	14.00 T	RE (		JIC	ICI	US/	SSI TH Q. F	4T F	NG F	0.2	
Ĭ .	5	E) H	PLE	SWO SWO SWO	STUI	LIQUID LIMIT	PLASTIC LIMIT	LAS	DEN	PRE ENG IS/S	VIV	I N	N S(	SURFACE ELEVATION (FT):
		ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
- MD1901007/EMERSON CREEK - MD1901007.GPJ		_	П				+			0 0, 0			_	\\1.5 in. Topsoil
ERS			-X	N = 10										LEAN CLAY (CL), trace Sand, brown, stiff to very stiff, moist
NEW /			$\frac{1}{1}$	N. 40	40									
010		5	$\mathcal{A}$	N = 16	16									
M 515			$\forall$	N = 26										
		10	H	N = 16	14									
8	<b>A</b>	10	7	., 10										
DESIGNIGEOTECHNICALIG DRIVEIGINTPROJECTS/2019/EMERSON CREEK			$\forall$	N = 10	13									
MER		15		N = 11										
919			$\int$											
13/2			+1											
S S		20	$\overline{\mathbb{A}}$	N = 13										
A PR			11											
9 N			1											
NA NA		25	-X	N = 14	17									Grading moist to wet
9														
N S			$\downarrow$											
E E		30	$\frac{1}{4}$	N = 14										
EOT.			<u> </u>											
JON C		0.5	$\forall$	N = 38										CLAYEY SAND (SC), brownish gray, dense, moist to wet, fine to
DES		35	7	11 - 30										coarse grained
202			11											
NS/OP:		40	$\forall$	N = 79										LEAN CLAY (CL), trace Sand, brown, hard, moist
₽ I		10	$\int$											
PER.			+											
- R:\OPERATIO		45	$\overline{\mathbb{A}}$	N = 31										
14:15														
			$\downarrow \downarrow$											
- 9/10/21		50	X <sub>t</sub>	N = 39										
	<b>/</b>		7											
101			$\downarrow \downarrow$	N. 00										
8 Z	4	55	**	N = 38										
0G A														Total Depth = 55.5 ft.
RENEWABLE LOG - LOG A GNNL01.GDT	_]													
				ARD PENE						DE .				REMARKS:
WABL	Т	- TXE	OT	T PENETRO CONE PEN	ETR/	ATIO								GPS COORDINATES: Lat. 41.092712, Long82.777417
ENE	R	- RO QD -	CK RO	CORE REC	OVEF	RY SIGN:	10ITA	N						
ш				.,			. • •							



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/7/2019

	FIE	ELC	DATA			L	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				(%)_	L	<u>-IMIT:</u>				(%	삤	(%)	
GPJ				MOISTURE CONTENT (%)			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
71007.			-	.NOS	ΗMI	PLASTIC LIMIT	Į.	> <u>F</u>	F.	-AILL	PRE C	S 007	Groundwater encountered at 39 ft. during drilling and not measured
MD190	(FT)	Si	/S/FT /SQ F 'S	JRE (	LIQUID LIMIT	STIC	STIC	NSIT S/CU	ESS STH SQ. F	AT F	S/S(	NO. 2	immediately after drilling
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	JISTL	LIQ	PLA	PLA	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RAIN	F N	ISON	SURFACE ELEVATION (FT):
901007/EMERSON CREEK - MD1901007.GPJ	씸	\8	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ĭ	LL	PL	PI	RO.	SPE	ST	85	Σ	DESCRIPTION OF STRATUM
NSON ///		$\frac{1}{\lambda}$	N = 7										\\ \( \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
EME	-	$\Box$											moist
70010	- 5	<u> </u>	N = 11	20									
MD19	-	$\frac{1}{\lambda}$	N = 21										
Ä	- - 10		N = 14										Grading trace lignite
N CREEK	'	$\Box$											
9\EMERSON	-	$\Box$	N = 12	16									SANDY LEAN CLAY (CL), light reddish brown, stiff, moist
9/EME	15	$\frac{1}{2}$	N = 10	19									LEAN CLAY (CL), with Sand, grayish brown, stiff to hard, moist
S/201	<u> </u>	1											
TO E	- - 20	$\frac{1}{2}$	N = 17										Grading trace Sand, dry to moist
PRO MINISTRA													
DRIVE/GINT/PROJECT	_												
N N N N N N N N N N N N N N N N N N N	25	$\frac{1}{4}$	N = 23										
AL/G		-											
DESIGN/GEOTECHNICAL/G	- - 30	$\frac{1}{X}$	N = 9	16	26	17	9					75	Grading with Sand
OTEC ///													
NGE	E	$\pm$											
ESIG	35	-X	N = 32										
§ ///	E	_											
NS/OP2	- - 40	$\frac{1}{}$	N = 40	7									
	- 40												
- R:\OPERATIO	F	-											
3////	45	-X	N = 37										
14:15	F	-											
1027	F	$\frac{1}{}$	N = 34										Grading trace Sand, moist
6-1	- 50 -	7	., 07										3
19.10 10 10 10 10 10 10 10 10 10 10 10 10 1	F	7											
	- 55	$\overline{\mathbb{A}}$	N = 55										Grading moist to wet
3G A (													Total Depth = 55.5 ft.
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21				L	L	L							
LE LO			ARD PENE						E				REMARKS:
WABI	T - TXI	TOC	CONE PEN	IETR/	10ITA								GPS COORDINATES: Lat. 41.091692, Long82.788934
KENE			CORE REC CK QUALIT			1 <u>01</u> T	٧						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/10/2019 - 5/11/2019

-	1							_					DDILLING METHOD (0):
	FIE	LC	DATA					RATO	DRY DA	ATA			DRILLING METHOD(S):
				~		ERBI							Hollow Stem Auger
				MOISTURE CONTENT (%)						(%)	쀭	200 SIEVE (%)	
.GPJ				TEN		⊨	INDE			JRE	SS:	SIEV	GROUNDWATER INFORMATION:
) ) ) )			l. <del>L</del>	00 NO	F LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	ΓΥ J.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 8	No groundwater encountered during or immediately after drilling
1019C	(FT)	S	'S/FT 'SQ F S	JRE	101	STIC	STIC	NSI S/CL	ESS 3TH SQ. F	AT F	ING S/S(	9	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	IST	N	PLA	PLA	DRY DENSITY POUNDS/CU.FT	MPR RENG	ZAIN		MINUS NO.	SURFACE ELEVATION (FT):
SO	DEI	\S\	S G I S S S S S S S S S S S S S S S S S	M	LL	PL	PI	DR' PO	STE (TC	STF	88	¥	DESCRIPTION OF STRATUM
NOS	-		N = 20	14									2 in. Topsoil LEAN CLAY (CL), with Sand, brown, stiff to very stiff, dry to moist
HI WIN	-	$\mathcal{H}$	14 20	•									LEAN CLAT (CL), with Sand, brown, still to very still, dry to moist
<u>5</u>	5	$\overline{\mathbb{A}}$	N = 23										
96///	-	$\frac{1}{4}$	N. 00	45									
⊼ ///	}	Н	N = 20	15									
# ///	10	X	N = 21										
DRIVE(GINTIPROJECTS/2019)EMERSON CREEK - MD1901007/EMERSON CREEK - MD1901007.GPJ SOIL SYMBOL	-	$\forall$	N = 12	16									Grading trace Sand, gray
MER	15	$\exists$	N = 15										
919	'	$\prod$											
ZISI	F	-											
	20	$\overline{\mathbb{A}}$	N = 22										
A M	-	11											
	-	$\downarrow$											
<b>S</b>	25	X	N = 14	17									
AF ///	-	11											
DESIGN/GEOTECHNICAL/G	- 30	$\forall$	N = 11										SANDY LEAN CLAY (CL), gray, stiff to hard, moist to wet
		$\prod$											
N GE		$\perp$											
ESIG	35	-	P = 3.5	15				121	3.66	15.1	0.0		
	-	$\blacksquare$											
S/OP2/02	-	$\frac{1}{4}$	N = 37										
	- 40 -	$\mathcal{A}$	N = 37										
A MINISTRA	‡												
R:0	- - 45	$\forall$	N = 30										LEAN CLAY (CL), with Sand, gray to brown, very stiff, moist to wet
-5///	<u> </u>	$\prod$											
21/1/2	1	$\bot$											
- 9/10/	50	$\mathbb{A}$	N = 24										
GDT.	F	7											
9	_	$\frac{1}{1}$	N = 80/10"										SHALE, dark gray, very hard, moist, with trace Sand deposits
RENEWABLE LOG - LOG A GNNL01	- 55	$\mathcal{H}$	IN - OU/ IU"										
L0G,													Total Depth = 55.5 ft.
9	]												
SLE L			ARD PENET T PENETRO						CE				REMARKS: GPS COORDINATES: Lat. 41.088115, Long82.817980
EWAE	T - TXE	TOC	CONE PEN	ETR/	ATIOI								5. 5 5 5 5 6 1 1 1 1 1 1 2 1 2 1 1 1 1 1 1 1 1 1 1
ZEN	RQD -	RO	CK QUALITY	DES	SIGN	1OITA	١						
_	· <u></u>					_	_			_			



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 7/28/2021

	FIF	LГ	DATA				 4ВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
+				T	AT	ERBI	≣RG		1	, \			Hollow Stem Auger
SOIL STMBOL	<b>DEPTH (FT)</b>	SAMPLES	N. BLOWS/FT P. TONS/SQ FT T. BLOWS F. BLOWS ROP. **	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	D PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 39 ft. during drilling and measured at 20 ft. immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
\ <u>\</u>		X	N = 9	17									10 in. Topsoil LEAN CLAY (CL), trace Sand, brown, stiff, dry to moist
	5	$\Box$	N = 12										Grading light brown, trace Gypsum
		$\frac{1}{2}$	N = 14										
	10	X	N = 12	16									
		$\frac{1}{2}$	N = 12										
	15	X 1	N = 10										
	20	- - X	N = 6	<b>¥</b> 18	22	16	6					93	SILTY CLAY (CL-ML), trace Sand, brown, medium stiff, moist
	25	- - X - -	N = 8										LEAN CLAY (CL), trace Sand, brown, medium stiff to stiff, dry to moist
	30	- -X -1	N = 12										
	35	- - X	N = 9										Grading trace Gravel
	40	- - X	N = 21	<u> </u>									CLAYEY SAND (SC), dark brown, medium dense, moist, fine grained
	45	- - X	N = 13										
	50	-X	N = 18										
	55	-X	N = 28										
													Total Depth = 55.5 ft.
P T R	- PO( - TXE - RO	CKE OOT CK	DARD PENE ET PENETR CONE PEI CORE REC	OMETR. NETR. COVER	TER F ATIOI RY	RESIS N RES	STANG SISTA	CE	CE				REMARKS: GPS COORDINATES: Lat. 41.087221, Long82.777034



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/23/2019

													DATE(S) DRILLED: 4/23/2019
	FIE	ELD	DATA			L	ΑВО	RATO	DRY DA	ATA			DRILLING METHOD(S):
SOIL SYMBOL	(FT)	ES	N. BLOWS/FT P: TONS/SQ FT F: BLOWS RQD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 28 ft.  GROUNDWATER INFORMATION:  No groundwater encountered prior to the introduction of drilling fluid
)IL S	ОЕРТН (FT)	SAMPLES	BLOW TONS BLOW 8LOW	JISTC				S S S	MPF REN ONS/	RAIN	NEW OUNT	MINUS NO.	SURFACE ELEVATION (FT):
S 222		√s	\ <u> </u>	ž	LL	PL	PI	RO	SPE	ST	88	Σ	DESCRIPTION OF STRATUM
	- - - - - 5		N = 4 N = 4	25									∖2 in. Topsoil LEAN CLAY (CL), with Sand, brown, soft to hard, dry to moist
	-	$\forall$	N = 50/5"	14,									Grading trace Gravel
	- - 10 - -		R = 89 RQD = 17										LIMESTONE, gray, fine grained, moderately weathered, weak rocl
	- - 15 - -	- - - - -	R = 100 RQD = 68										
	- - 20 - -	- - - - -	R = 98 RQD = 63										
	- 25 - -		R = 98 RQD = 92										Grading fresh to slightly weathered
													Total Depth = 28 ft.
_	N - STA		ARD PENE	TRAT	ION	 TEST	RESI	STANC	<u>                                      </u>				REMARKS:
!	P - PO: T - TX[	CKE DOT	T PENETR CONE PEN	OMET NETRA	TER F ATIOI	RESIS	TAN	CE					GPS COORDINATES: Lat. 41.317416, Long82.790099



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

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PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/28/2019 - 4/29/2019

													DATE(3) DRILLED. 4/20/2019 - 4/29/2019
	FIE	LD	DATA			L/	AВО	RATO	ORY DA	ΛTΑ			DRILLING METHOD(S):
				(%) TV		ERBE	S			(%) =	URE	/E (%)	Hollow Stem Auger: 0 to 13 ft.; NX Wet Rock Coring: 13 to 28 ft.
MBOL	FT)	S	SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	O. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 7 ft. during drilling prior to the introduction of drilling fluid
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	IOISTUI	LIQUI			RY DEN OUNDS	OMPRE TRENG TONS/S	TRAIN /	ONFINI	MINUS NO.	SURFACE ELEVATION (FT):
ທ ///		\ <sub>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</sub>	/ ΖΔΕΥΥ	2	LL	PL	PI	ЬР	Owc	S	0.6	2	DESCRIPTION OF STRATUM \( \bigcit{2} \) in. Topsoil
	- - -	A	N = 4										SANDY LEAN CLAY (CL), brown, soft, moist
	- - 5 -	X	N = 8	19									LEAN CLAY (CL), with Sand, brown, medium stiff, moist
	- -	$\forall$	N = 50/5"	<u> </u>									SHALE, gray to black, very hard, moist to wet
	- 10 -	$\frac{1}{4}$	N = 50/3"	16									
	- - - - 15	1	N = 50/4" R = 75 RQD = 37					183	1612.80		0.0		LIMESTONE, light gray, fine grained, slightly to moderately weathered, weak to moderately strong rock
	- - - - 20		R = 100 RQD = 44										
	- - - - 25		R = 100 RQD = 76										
	-	11											Total Depth = 28 ft.
F	- PO	CKE	ARD PENE T PENETRO CONE PEN	OMET	ΓER F	RESIS	TANG	CE	E				REMARKS: GPS COORDINATES: Lat. 41.260506, Long82.803113 *Denotes Total Unit Weight

\*Denotes Total Unit Weight



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/22/2021 - 8/23/2021

Н													DRILLING METHOD (0):
Щ	FIE	LC	DATA					RATO	DRY DA	ATA			DRILLING METHOD(S):  1 Hollow Stem Auger: 0 to 10.5 ft.; NX Wet Rock Coring: 10.5 to 35.5
						ERBI							ft.
				MOISTURE CONTENT (%)				1		(%	<u>ا</u> ا	(%) :	
						_	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	GROUNDWATER INFORMATION:
١.١				K	<b>⊨</b>	PLASTIC LIMIT	≦		ш _		₩Ê	ls 0	No groundwater encountered prior to the introduction of drilling fluid
BG	Ē		L E	ÜШ	LIQUID LIMIT	2	5	Tion Tion	SSIN THE	T.	G P SQ		,
N X M	Ē.	LES	WS/I WS ws	J.		AST	AST	ENS DS/(	RES NGT	Z	NN NDS/	N N	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	SIC	<u> </u>			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	₽	N N	MINUS NO.	SURFACE ELEVATION (FT):
Š	<u> </u>	\જે	\ <u> </u>	Ž	LL	PL	PI	27	SPE	S	<u>β</u> €	Σ	DESCRIPTION OF STRATUM
	-	$\frac{1}{2}$	N = 4										\\ \( \) \(\
	-	7	11 – 4										LEAN CLAY (CL), trace Sand, dark gray, soft to medium stiff, dry to moist, trace roots
	- - 5	$\forall$	N = 8	22									Roots grade out; grading with Sand
	-	+											
	-	$\overline{\mathbb{A}}$	N = 75/10"										SHALE, dark gray, very hard, dry to moist
	- - 10		N = 50/3"										
$\blacksquare$	-	1											LIMESTONE, dark gray, fine grained, fresh to slightly weathered,
坩	-	11	R = 93										very weak rock
╝	- 15	11	RQD = 18										Grading gray, fine to medium grained, fresh, weak to moderately
$\dashv$	- 15 -	$\mathbf{H}$											strong rock
$\blacksquare$	- -	11	R = 100										
$\dashv$	-	11	RQD = 23										6 in. vuggy layer at 18.5 ft.
	- 20 -	$\mathbb{H}$											
$\dashv$	- -	11	R = 100										1 ft. Mudstone layer at 22 ft.
ightharpoons	-	-11	RQD = 45										
	25	H											
	-	11	R = 100										
$\Box$	-	41	RQD = 62										
	- 30 -	Ħ											SHALE, dark gray, fine grained, slightly to moderately weathered,
	-	11	R = 100										extremely weak to weak rock
	-	41	RQD = 15										
	- 35	74											
													Total Depth = 35.5 ft.
H	V - ST4		ARD PENE	TRAT	ION	L TEST	RFS	ISTANC	LLLL CE				REMARKS:
	- PO	CKE	T PENETRO	OME	TER F	RESIS	TAN	CE	_				GPS COORDINATES: Lat. 41.260459, Long82.803146
			CONE PEN			N RES	SISTA	ANCE					_
1			CK QUALITY			ΛΟΙΤΑ	d						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/20/2021 - 8/22/2021

$\vdash$		., -				-		<b>D</b> •	\D\( \ = \ \	<b>—</b>			DRILLING METHOD(S):
	FIE	:LC	DATA		I •-			RATO	DRY DA	ATA			DRILLING METHOD(S):  1 Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 35 ft.
						ERBI							The state of the s
				MOISTURE CONTENT (%)			X			(%)	쀭	E (%)	
						l <u>⊨</u>	ND			URE	SSC	200 SIEVE	GROUNDWATER INFORMATION:
ا بر ا			<sub> -</sub>	OS	IMI.	I	<u></u>	<u></u>	IVE T.	-AIL	PR C	200	No groundwater encountered prior to the introduction of drilling fluid
SYMBOL	Œ	ပ္သ	SQ F	R		STIC	STIC	NSI JO/S	ESS STH SQ. F	ATF	ING S/S(		
ΓSΥ	ОЕРТН (FT)	SAMPLES	LOWS/ COWS/	ISTL	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	MPR RENC NS/S	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	SURFACE ELEVATION (FT):
SOIL SYMBOL	DEF	SAN	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	POU	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	98	Z	DESCRIPTION OF STRATUM
	-												\2 in. Topsoil
	-	7	N = 6	19									LEAN CLAY (CL), with Sand, dark gray, soft to medium stiff, dry to moist
	- - 5	$\forall$	N = 4										
	-												
	-	-M	N = 50/4"										SHALE, dark gray, very hard, dry to moist
╡	- 10	$\blacksquare$	N = 50/4"										LIMESTONE, dark gray, fine grained, slightly weathered, extremely
$\dashv$	-	11	R = 100										weak to very weak rock
彐	-	11	RQD = 8										
$\dashv$	15	H											Grading light gray, fine to medium grained, slightly weathered, weak to moderately strong rock
$\dashv$	-	41	R = 100										Weak to moderately energy rook
$\dashv$	-	11	RQD = 60										2 in. Shale seam at 18.5 ft.
$\exists$	20	1											
$\exists$	-	1	R = 100 RQD = 43										6 in. Mudstone layer at 22 ft., dark gray, fine grained, moderately
$\exists$	- - 25	刞	TIQD - 40										weathered, extremely weak rock Grading dark gray, fine grained, slightly weathered, very weak to
$\dashv$	- 25	$\Pi$	D 400										weak rock
$\exists$	-	41	R = 100 RQD = 37										6 in. vertical fracture at 28 ft.
	- 30	4											o III. Vertical fracture at 20 it.
$\equiv$	-	Ħ	R = 100										SHALE, dark gray, fine to medium grained, slightly to moderately
	-	刞	RQD = 22										weathered, extremely weak rock
	35	Н											
													Total Depth = 35 ft.
	N CT	الم	ARD PENE	 TD^*	1001	 TEST	DEC	ISTANC	`E				DEMARKS
	- PO	CKE	T PENETRO	OME	TER F	RESIS	TAN	CE	<i>-</i> C				REMARKS:   GPS COORDINATES: Lat. 41.260530, Long82.803039
			CONE PEN			N RES	SISTA	ANCE					
			CK QUALITY			ΑΤΙΩΝ	V						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 8/22/2021

													DATE(S) DRILLED: 8/22/2021
	FIE	LD	DATA			LA	٩BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger: 0 to 10 ft.; NX Wet Rock Coring: 10 to 35 ft.
				(%)	<u> </u>	_IMITS	S	-		(9)	ш	(%)	
2				Z			Ĕ			(%	l R	VE.	ODOLINDWATED INCODMATION.
5.70				MOISTURE CONTENT	_	Ħ	PLASTICITY INDEX		l	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	GROUNDWATER INFORMATION:
0 P			SQ FT	8	I		E	<u>≻ [ </u>	FI	FA	R S	200	No groundwater encountered prior to the introduction of drilling fluid
MD18	(FT)	ပ္သ	/S/F /SQ S	JRE		STI	STI	NSI S/CI	SESS	AT	S/S	Š.	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	NONS NONS NONS	IST	LIQUID LIMIT	PLASTIC LIMIT	PLA	DRY DENSITY POUNDS/CU.FT	MPR NS/8	N.S.		MINUS NO.	SURFACE ELEVATION (FT):
CREEK - MD1901007.GPJ SOIL SYMBOL	HE.	\S/	N: BLOWS/FT P: TONS/SQ F T: BLOWS R: % RQD: %	Θ	LL	PL	PI	Pol	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	98	Z	DESCRIPTION OF STRATUM
ž ////	_	Ħ											\2 in. Topsoil
ERSON	_	$\mathbb{A}$	N = 5										LEAN CLAY (CL), trace Sand, dark brown, medium stiff to hard,
	_	$\downarrow$											dry to moist, trace roots
	- 5	$\mathbb{A}$	N = 6										Roots grade out
5	-	$\forall$	N = 50/3"	10									
<u> </u>	-	$\sim$	N = 50/5 N = 50/5"	10									
CKEE	- 10	$\mathbf{\hat{\Pi}}$	11 - 30/3										SHALE, dark gray, fine grained, slightly weathered, very weak rock
	-	Ш	_										
	-		R = 100 RQD = 35										LIMESTONE, light gray, fine grained, slightly weathered, very weak to weak rock
	- 15	H	rigb oo										to weak lock
	_		R = 100										
	_	11	RQD = 40										
	- 20	Н											Vertical fracture at 19 ft.
	-	11	R = 100										6 in. Mudstone layer at 21 ft., highly weathered, extremely weak
	_	11	RQD = 52										rock
	- 25	Н											
	-	11	R = 100										
<b>₫</b> 戸	_	11	RQD = 67										
	- 30	$\mathbf{H}$											SHALE, dark gray, fine grained, highly weathered, extremely weak
5	_	11	R = 100										rock
			RQD = 0										
	35	74											
7													Total Depth = 35 ft.
71.2													
2													
60													
2													
7/01													
5													
5.													
5													
3													
الا													
	N - STA	/ND	ARD PENE	TRAT	ION :	TEST	RES	ISTANC	 Æ				REMARKS:
			T PENETRO										GPS COORDINATES: Lat. 41.260546, Long82.803230
<u> </u>	R - RO	CK (	CORE REC	OVEF	RY			NVE					
<u> </u>	RQD -	RO	CK QUALITY	/ DES	SIGN	ATION	1						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/9/2019

Ь.													DATE(S) DRILLED: 4/9/2019
	FIE	ELC	DATA			L/	4BO	RATO	RY DA	ATA			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger
				(%)		LIMIT:	<u>S</u>			<u></u>		(%	
.				Ę			X			%) ::	꽁	VE (	
					_	₩	PLASTICITY INDEX			J.	ESS (r	SIE	GROUNDWATER INFORMATION:
ᅵᅱ			 	8	Ĭ		<u>E</u>	<del> </del>	IVE T)	FAIL	<u>R</u> 0	200	Groundwater encountered at 14 ft. during drilling and not measured immediately after drilling
MB	(FT)	ုပ္သ	S/FT SQ I	묎		STIC	STIC	NSI.	ESS STH SQ. I	AT	ING S/S	9	
\s	Ŧ	립	MO- NO.	STL	LIQUID LIMIT	PLASTIC LIMIT	Ä	HÄ	APR ENC NS/S	AN		ISI	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
317.													10 in. Topsoil
	-	-X	N = 12										LEAN CLAY (CL), with Sand, brown, stiff to hard, moist
	-	1											
	- 5	-X	N = 24	16									
	-	$\frac{1}{2}$											
	-	$\stackrel{\wedge}{\perp}$	N = 33										
	- 10	-X	N = 40	10									SHALE, gray, hard, dry to moist
	-	1											
	-	ш		4 									
	- 15	-X	N = 50/2"										
	-	1											
	-	+											
	- 20	$\overline{X}$	N = 50/1"										
	-												
	_	+											
	- - 25	$\pm$	N = 50/1"										
	-	$\int$											
	-	-											
	- - 30	$\perp$	N = 50/1"										
	-	+											
	-	7											
	- - 35	$\downarrow$	N = 50/1"										
	-	-											
	-	7											
	- - 40	$\downarrow$	N = 50/1"										
	-	+											
	-	1											
Ħ	-	×	N = 50/1"			-							
													Auger Refusal = 44.5 ft.
			ARD PENE						E				REMARKS:
			ET PENETRO CONE PEN										GPS COORDINATES: Lat. 41.197831, Long82.755836
1 -			CODE DEC										



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/19/2019

													DATE(S) DRILLED: 12/19/2019
	FIE	ELD	DATA			L/	<b>4</b> BO	RATO	ORY DA	λTΑ			DRILLING METHOD(S):
SOIL SYMBOL	<b>DEPTH (FT)</b>	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: R: R	MOISTURE CONTENT (%)		ERBELIMIT PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 19 ft.; Mud Rotary: 19 to 39 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling flui  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  \( \bigcite{2} \) in. Topsoil
	5		N = 27 N = 16 N = 30	15 14									LEAN CLAY (CL), trace Sand, brown, very stiff to hard, moist
	10	X	N = 47										Grading with Sand, moist to wet  POORLY GRADED GRAVEL (GP), light brown, very dense, dry to
Ý	15	1X 1X 1	N = 94/11" N = 64	9									moist, fine grained, angular SHALE, gray, very hard, dry to moist
	20	-X	N = 50/5"										
	25	-X	N = 25/0"										
	30	-X	N = 25/0"										
	35	-	N = 25/0" N = 25/0"										
			2010										Total Depth = 39 ft.
P T R	P - PO - TXE R - RO	CKE DOT ICK	DARD PENE ET PENETRO CONE PEN CORE RECO	OMET IETRA OVEF	TER F ATIOI RY	RESIS N RES	STAN( SISTA	CE	<u> </u> E		I		REMARKS: GPS COORDINATES: Lat. 41.197446, Long82.776172



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 7/28/2021

_													DRILLING METHOD (0)
	FIE	ELC	DATA					RATO	DRY DA	ATA			DRILLING METHOD(S):
					ATT	TERBI LIMIT:	ERG S					_	Hollow Stem Auger
				MOISTURE CONTENT (%)				-		(%	삤	MINUS NO. 200 SIEVE (%)	
				H H		١.	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	≡VE	GROUNDWATER INFORMATION:
				K	<u></u>	PLASTIC LIMIT	≧	<u> </u>	ш _	ILUF	ZES N	IIS C	No groundwater encountered during or immediately after drilling
쥖			L E	8	≧	C	딜	F F F	NS T	FA	SQL	. 20	The ground valor chocamored daming or immediatory after animing
Ĭ	E)	ES	NS/F S/SG VS	K	LIQUID LIMIT	AST	\ST	ENS OS/C	ZES IGTI	۱A۲	NN/SQ	2	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	IST		3	7	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RAII		NUS	SURFACE ELEVATION (FT):
S	B	\S	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	M	LL	PL	PI	RO PO	STS(T)	lS	88	M	DESCRIPTION OF STRATUM
<i>"</i>			N = 10										10 in. Topsoil
		A	N = 10										LEAN CLAY (CL), trace Sand, brown, stiff to hard, dry to moist, iron stained
		$\downarrow$	N = 15										iion stained
	5	7	14 - 15										
		$\forall$	N = 18										
		Н		47									
	10	A	N = 16	17									
<b>//</b> }		$\forall$	N = 22										Grading dark brown
		H											Grading dark brown
	15	-X	N = 24										
		+											
		$\downarrow$											
	20	-X	N = 24										
		7											
	25	$-\mathbb{N}$	N = 84/10"										Grading with Shale fragments
		1											
		+											
	30	$\overline{\mathbb{A}}$	N = 50/4"										SHALE, dark brown, very hard, dry to moist
╡		1											
₹		+											
▋	35	-X	N = 50/2"										
╡		×	N = 50/0.5"										
													Total Depth = 36.5 ft.
-													
-													
_	N - ST	L AND	ARD PENE	TRAT	ION	TEST	RES	ISTANO	E E				REMARKS:
F	- PO	CKE	ET PENETR	OME.	TER F	RESIS	STANG	CE					GPS COORDINATES: Lat. 41.135766, Long82.822173
			CONE PEN			NKE	5151 <i>P</i>	NVE					
			CK QUALIT			ΛΙΤΔ	N.						



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/11/2019

													DATE(5) DRILLED. 12/11/2019
	FIE	LC	DATA			L	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						TERBI							Hollow Stem Auger
				(%)		_IMIT:				(9)	ш	(%)	
				INT			) EX			() E	JU.S	VE	CDOLINDWATED INFORMATION:
77.GI				NTE	<b>—</b>	Ħ	Z	_		LUR	ESS (	l lis	GROUNDWATER INFORMATION:  Groundwater encountered at 40 ft. during drilling and measured at
30100 30L	_		 	00 :	Σ	CLI	E E	F∃	SIVE T	FAI	PR S	200	30 ft. immediately after drilling
MD18	(FT	ES	/S/F /SO /S	JRE		PLASTIC LIMIT	PLASTICITY INDEX	S/C	SES.	I AT	OS/SC	8	
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	"LOW "COWS	MOISTURE CONTENT (%)	LIQUID LIMIT	₹	P	DRY DENSITY POUNDS/CU.FT	MPF REN	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
SO	DE	$\backslash S$	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MC	LL	PL	PI	RS	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	88	Σ	DESCRIPTION OF STRATUM
NO VIVI	-	$\frac{1}{\sqrt{2}}$	N. 00										\2 in. Topsoil
AERS	_	M	N = 20										LEAN CLAY (CL), trace Sand, light brown, very stiff to hard, dry to moist
JAEN JAEN		$\frac{1}{1}$	N = 36	15									HIOIST
901007/EMERSON CREEK - MD1901007.GPJ	- 5 -	$\mathcal{H}$	11 - 30	10									
MD18	_	$\mathbf{M}$	N = 35										
¥///	- 40	$\frac{1}{4}$	N = 30	16									
CREEK	- 10 -	7	11 - 50	10									
NO NO	-	$\forall$	N = 40										
MERS	- 4-	$\Box$	N = 22	16									FAT CLAY (CH), trace Sand, gray, very stiff, dry to moist
I BYEN	- 15 -	7	IN - 22	10									1777 SETT (STT), trade sama, gray, very sam, ary to motor
S/20	_	1											
EG!	-	$\forall$	N = 22										
ROJ	- 20 -	7	IN - 22										
ALL	_	1											
		$\frac{1}{1}$	N = 17	24									SILTY SAND (SM), gray, medium dense, moist, fine to medium
DRI)	- 25 -	7	IN - 17	24									grained
AL/G	_	1											
N N	-	┪		,									
	- 30 -	1	P = +4.5	-									
SEO :	_	1											
SIGN/GEOTECHNICAL/G	- 05	$\forall$	N = 33										SANDY FAT CLAY (CH), gray, hard, dry to moist
DES	- 35 -	7	11 - 33										(3.77), gray, nara, ary to molec
2/02	_	11											
SYOP	- 40	$\frac{1}{2}$	N = 48 Z	7									
NOL	- 40 -	7	11 - 40 =	-									
ERA	-	11											
- R:\OPERATION	45	$\forall$	N = 50/4"										SHALE, gray, hard to very hard, moist to wet
	- 45 -	7	11 - 30/4										Granale, gray, mara to very mara, moter to tree
14:15	-	1											
9/10/21	- -	$\frac{1}{M}$	N = 60										
	- 50 -	7	14 - 00										
GDT.	_	11											
NE01	- - <u></u>	$\forall$	N = 90/10"										
N GN	- 55	74	14 - 90/10										
900 /													Total Depth = 55.5 ft.
RENEWABLE LOG - LOG A GNNL01													
٥Ţ			ARD PENE						E				REMARKS:
ABLE	P - PO	CKE	T PENETRO CONE PEN	OME	TER F	RESIS	TAN	CE					GPS COORDINATES: Lat. 41.110892, Long82.740271
NEW	R - RO	CK	CORE REC	OVEF	₹Y			u VOL					
#\	RQD -	RO	CK QUALITY	DES	SIGN	10ITA	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/6/2019

_													DATE(S) DRILLED: 12/6/2019
	FIE	LC	DATA			L/	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				(%) T						(%)	쀭	MINUS NO. 200 SIEVE (%)	
				MOISTURE CONTENT		l <sub>⊨</sub>	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	IEVE	GROUNDWATER INFORMATION:
			_	NO.	Ε	M	Σ	<u>&gt;</u> të.	J (E	:AILL	PR (S	S 00:	No groundwater encountered during or immediately after drilling
	Ē	ပ္ပ	SØ FI	RE (		STIC	STIC	NSIT S/CU	ESSI STH SQ. F	AT F	NG-	. O	
	ОЕРТН (FT)	SAMPLES	NONS/ NONS/ NONS/	ISTU	LIQUID LIMIT	PLASTIC LIMIT	PLA	H N	MPRI RENG NS/S	SAIN	N S	US I	SURFACE ELEVATION (FT):
	DEF	SAN	N: BLOWS/FT P: TONS/SQ F T: BLOWS R: % RQD: %	MO	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	98	Σ	DESCRIPTION OF STRATUM
7		$\frac{1}{4}$	N = 18	16									∖3 in. Topsoil
		$^{\uparrow}$	N - 10	10									FAT CLAY (CH), trace Sand, dark brown, very stiff to hard, dry to moist
	5	$\forall$	N = 40										
		$\prod$											
		A	N = 36										
	10	A	N = 35	17									
1		$\forall$	N = 28										
	45	Н	N = 22	16									
	15	$\mathcal{H}$	11 – 22	10									
		11											
	20	$\overline{\mathbb{A}}$	N = 23	22									SILTY SAND (SM), brown, medium dense, dry to moist, fine to
‡		11											medium grained
1	25	X	N = 17										FAT CLAY (CH), trace Sand, olive gray, stiff to very stiff, dry to moist
1		1											
7	30	$\forall$	N = 16	16									
	30	+	10										
		7											
	35	$\overline{A}$	N = 19										
		11											
	40	X	N = 15										
		1											
1	45	$\frac{1}{\lambda}$	N = 15										
	40	$\parallel$											
1		7											
7	50	$\overline{\mathbb{A}}$	N = 19										
1		7											
		$\downarrow \downarrow$	N 00										
4	55	$\mathbb{H}$	N = 26										
													Total Depth = 55.5 ft.
_ _ _ _	- STA	√NΓ	ARD PENE	 TRAT	ION .	 TEST	RESI	ISTANC	L CE				REMARKS:
			T PENETRO										GPS COORDINATES: Lat. 41.065264, Long82.824944



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/6/2019

<u> </u>													DATE(S) DRILLED: 12/6/2019
	FIE	LC	DATA			L	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						TERBI							Hollow Stem Auger
				(%)	L					(%	W	(%)	
				ËNT		_	VDE.			RE (	SSUF	EVE	GROUNDWATER INFORMATION:
				INO	Ħ	Ĭ		νĒ	/E	AILU	Z SE	IS 00	Groundwater encountered at 19 ft. during drilling and measured at
/BO	Ē.	(n	TA/S	Z Z		일	TICI	ISIT)	SSIV TH Q. FI	\T F,	NG F	0.20	28 ft. immediately after drilling
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
SOIL S	DEP.	SAM	R. P. C.	MO	LL	PL	PI	DRY	STRI	STR	Pon Pon	MIN	DESCRIPTION OF STRATUM
		Ħ											\3 in. Topsoil /
SOIL SYMBOL		X	N = 13										FAT CLAY (CH), trace Sand, dark brown, stiff, dry to moist
	5	$\forall$	N = 18	16							+		LEAN CLAY (CL), trace Sand, light brown, very stiff, dry to moist
	5	$\mathcal{H}$	11 10										3
		$\overline{\mathbb{A}}$	N = 16	16									
	10	$\overline{\mathbb{A}}$	N = 21										
		$\Box$	N = 16	17									
	15	X	N = 25										SILTY SAND (SM), brown, medium dense, moist, fine to medium grained
		1											
	00	$\frac{1}{M}$	N = 14	17							-		SANDY LEAN CLAY (CL), gray, stiff to very stiff, dry to moist
	20	7	11 - 14	''									(0.11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
		1											
	25	$\forall$	N = 16										
		$\Box$	_										
				<u> </u>									
	30	X	N = 16										FAT CLAY (CH), with Sand, gray, stiff to very stiff, moist
		+											
			N = 21										Grading trace Sand
	35	7	IN - 21										Clading trace during
		1											
	40	$\forall$	N = 14	18									
		$\int$											
		+											
	45	$\overline{\mathbb{A}}$	N = 13										
		7											
		$\downarrow \downarrow$	N. 40										
	50	Ä	N = 18										
		1											
	55	$\forall$	N = 19										
	JJ	H	- · <del>-</del>								1		Total Donth = 55 5 ft
													Total Depth = 55.5 ft.
N F T F F	LOT		ADD DEVE		1011	TEST	DEC	OTANIC			1		DEMADICO.
	- PO	CKE	ARD PENE T PENETR	OME	TER F	RESIS	TANG	CE	<b>∠</b> ⊏				REMARKS:   GPS COORDINATES: Lat. 41.058500, Long82.824749
T	R - RO	CK	CONE PEN	OVE	₹Y			NCE					
L F	RQD -	RO	CK QUALIT	Y DE	SIGN	OITA	١						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/7/2019 - 12/8/2019

						_					_		DATE(S) DRILLED: 12/7/2019 - 12/8/2019
	FIE	ELC	DATA			L	<b>4BO</b>	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
SOIL SYMBOL	DЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: R: ROD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater encountered at 29 ft. during drilling and measured at 16 ft. immediately after drilling SURFACE ELEVATION (FT):
, //	<u></u>					FL	FI		0000	0)	00		DESCRIPTION OF STRATUM \[ \alpha \] in. Topsoil
	- - - - 5 -		N = 12 N = 24 N = 29	22									LEAN CLAY (CL), trace Sand, brown, medium stiff to hard, dry to moist
	- - - 10 -	$\Box$	N = 31	10									
	-	Д	N = 28										
	- 15 - -	1X	N = 19	¥									
	- - 20 -	- -X -1	N = 12	19									Grading gray
	- - - 25 -		P = 1.0	21	28	16	12	110	1.48	15.0	19.0	83	Grading with Sand
	- - - 30 -	-X	N = 19	¥									
	- - - 35 -	- <del>-</del>	N = 21										
	- - - 40 - -		N = 20	13									
	- - - 45 -	<u> </u>	N = 19										
	- - - 50 - -	- - X	N = 66										
4	- - 55	$\frac{1}{2}$	N = 87/10"										SHALE, dark gray to black, very hard, dry to moist
													Total Depth = 55.5 ft.
- - -	P - PO T - TXI R - RO	CKE DOT ICK	DARD PENE ET PENETRO CONE PEN CORE RECO	OMET IETRA OVEF	TER F ATIOI RY	RESIS N RES	STAN( SISTA	CE	L CE				REMARKS: GPS COORDINATES: Lat. 41.049640, Long82.827139



CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/7/2019

		-1 -				1.	^ DO	DATO		\ <b>T</b> ^			DRILLING METHOD(S):
	FIE	LL	DATA	I		ERBE		RAIC	DRY DA	ATA		I	Hollow Stem Auger
				(%)	ATT	IMIT:	S S					(%)	
				(s)			X			(%) :	뽒	/E (%	
7.GP.					L	Ę	PLASTICITY INDEX			URE	ESSI ()	SIEV	GROUNDWATER INFORMATION:
9100 P	_		_	S	LIQUID LIMIT	PLASTIC LIMIT	Ϋ́	\ F.E.	SIVE FT)	FAIL	P.S.	200	Groundwater encountered at 22 ft. during drilling and measured at 22 ft. immediately after drilling
MD19	(FT	ES	/S/F1 /SQ /S	J.R.		STIC	STIC	S/CI	ESS GTH SQ.	I AT	S/SC	O	22 it. initiodiatory diter driming
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT	ğ	PLA	PLA	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE	SURFACE ELEVATION (FT):
R S	DE	\&	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	M	LL	PL	PI	RO O	S E E	ST	88	Ž	DESCRIPTION OF STRATUM
Nos	}	$\forall$	N = 24	16									\[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
SOIL SYMBOL	<b>F</b>	7											LEAN CLAT (CL), trace Sand, very still to flaid, dry to filoist
901007\	5	$\overline{\mathbb{A}}$	N = 41										Grading trace Gravel
96///	1												Considerandos sub
¥ ///	1	Д	N = 51										Gravel grades out
SREEK	10	X	N = 34	18									
NO W	1	$\frac{1}{2}$	N = 26										SANDY LEAN CLAY (CL), brown, very stiff, dry to moist
MERS	£	Н	N = 34										LEAN CLAY (CL), trace Sand, brown, stiff to hard, dry to moist
19/EM	15	7	N - 34										ELETAN GETTI (GE), trade dana, brown, sun to mara, ary to molet
02/20	1												
	20	$\downarrow$	N = 16										
OR WIN	1 2			18	29	16	13	115	1.46	15.0	16.0	89	
IN S	}		F = 1.5	10	29	10	13	113	1.40	13.0	10.0	09	
N N N	25	$\overline{\mathbb{A}}$	N = 16										
9///	1	1											
DESIGNIGEOTECHNICALIG DRIVE/GINTIPROJECT	1												
E C	30	$\frac{1}{\lambda}$	N = 14	21									Grading moist to wet
SEO1	1	-											
NO NO	35	$\forall$	N = 15										
DES	<b>1</b> 33	7											
P2/02	1	1											
NS/OP2	<del> </del>  - 40	$\forall$	N = 23										CLAYEY SAND (SC), dark gray, medium dense, moist, fine to
OF //	1	1											medium grained
Per ///	1	$\perp$											
¥ ////	45	+X	N = 26										LEAN CLAY (CL), trace Sand, dark gray, very stiff, moist
14:15	<b>{</b>	7											
120	7	$\downarrow$	N = 07										SANDY LEAN CLAY (CL), dark gray, very stiff, moist
-9///	50	A	N = 27										OCIVE I LEAN OLAT (OL), Mark gray, Very Still, Holst
.GD	1	1											
RENEWABLE LOG - LOG A GNNL01	55	$\frac{1}{2}$	N = 51										LEAN CLAY (CL), trace Sand, dark gray, hard, moist
Q (///	1 33	H	·										
P00													Total Depth = 55.5 ft.
8	<u>,                                    </u>	∐	ADD DELLE				D=2	IOT A					DEMANI(O
BLEL			)ARD PENE ET PENETRO						JΕ				REMARKS: GPS COORDINATES: Lat. 41.048849, Long82.823246
EWAI			CONE PEN			N RES	SISTA	NCE					
REN			CK QUALITY			OITA	٧						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/21/2019

	FIE	LD	DATA			LA	٩ВО	RATO	RY DA	ΑTΑ			DRILLING METHOD(S):
1						ERBE							Hollow Stem Auger: 0 to 7 ft.; NX Wet Rock Coring: 7 to 30 ft.
				(%	L	_IMITS	<u>S</u>				l	(%	
				Ę			Ä			%) =	N	/E (	
				MOISTURE CONTENT (%)	١.	⊨	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	GROUNDWATER INFORMATION:
ا ب			<sub> -</sub>	ő	LIQUID LIMIT	PLASTIC LIMIT	Τij	<u>&gt; Ŀ</u>	COMPRESSIVE STRENGTH (TONS/SQ. FT)	-\ -\	PRS S	500	No groundwater encountered prior to the introduction of drilling flui
₩   	Ē	တ	14/02 rs	띪		] [	TIC	SIT (CU	SSSI TH O. F	ΑŢ.	NG/S		
l S I	Ë	J.	SWC SWC SWC %	ΙΣ	l log	LAS	LAS	DE L	PRE S/S	Š	Ξĕ	N S	SUDEACE ELEVATION (ET):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	QI				DRY DENSITY POUNDS/CU.FT	MSE	74		MINUS NO.	SURFACE ELEVATION (FT):
ν 777		\o	ZTHKK	2	LL	PL	PI		200	ഗ	0.6	2	DESCRIPTION OF STRATUM \[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
		$\forall$	N = 8	18									LEAN CLAY (CL), with Sand, brown, medium stiff to hard, dry to
⇗		+											moist
	5	X	N = 14	20									
⇗		$\Box$	N - 50/1"										
#		Ñ	N = 50/1" /										LIMESTONE, light brown, fine grained, slightly to moderately
廿	. 10	Ш	R = 48										weathered, weak to moderately strong rock
Ⅎ	10	11	RQD = 29										
4		剒						168	784.08		0.0		
4		$\mathbf{H}$	R = 83										
4	15	11	RQD = 49										
ⅎ		Н											
╁		11	R = 96										
7	20	11	RQD = 46										
#		71	D = 100										
#		11	R = 100 RQD = 63										
4	25	$\mathbb{H}$											
4		11	R = 98										
라		H	RQD = 94										
4	30	11											
													Total Depth = 30 ft.
													•
			ADD DENIE		IONI	TECT	DEC	CTANC	`				
			ARD PENE						,E				REMARKS:
F	- PO	CKE	T PENETRO CONE PEN	OME	ΓER F	RESIS	STANC	CE	<b>,</b> E				REMARKS: GPS COORDINATES: Lat. 41.241977, Long82.827098 *Denotes Total Unit Weight



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

	FIE	ELC	DATA			L/	ABO	RATO	DRY DA	TΑ			DRILLING METHOD(S):
				(9)		ERBE IMITS						(9	Hollow Stem Auger: 0 to 9 ft.; NX Wet Rock Coring: 9 to 19 ft.
BOL	(Ł		FT TH Q	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SITY CU.FT	SSIVE TH 2. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	). 200 SIEVE (%)	GROUNDWATER INFORMATION:  No groundwater encountered prior to the introduction of drilling fluid
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTUR	F LIQUIE	PLAS1	⊡ PLAS1	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN A	CONFININ	MINUS NO.	SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
	-	$\downarrow$	N = 6	31									8 in. Topsoil
	-	7	11 - 0										LEAN CLAY (CL), with Sand, brown, medium stiff, moist
	- - 5 -	<u>X</u>	N = 13	17									SANDY LEAN CLAY (CL), brown, stiff, moist
	- - -		N = 50/4" N = 50/2"										SHALE, dark gray, hard, dry to moist
	- 10 - - -		R = 93 RQD = 0										SHALE, dark gray, fine grained, slightly to moderately weathered, very weak to weak rock
	- - 15 - -	-	R = 65 RQD = 17										
													Total Depth = 19 ft.
F	- PO	CKE	OARD PENET ET PENETRO CONE PEN	OME	ΓER F	RESIS	TANG	CE	Œ				REMARKS: GPS COORDINATES: Lat. 41.268959, Long82.764984



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

												DATE(S) DRILLED: 4/28/2019
	FIE	LD	DATA		LA	\BO	RATO	DRY DA	AΤΑ			DRILLING METHOD(S):
SOIL SYMBOL	<b>DEPTH (FT)</b>	SAMPLES	N: BLOWS/FT P: TONS/SQ FT P: TONS/SQ FT R: % R: % ROD: %	MOISTURE CONTENT (%)	PLASTIC LIMIT WE BEST THE BEST		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger  GROUNDWATER INFORMATION: No groundwater encountered during or immediately after drilling  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
1/2		1			 			00,0				_8 in. Topsoil
	5		N = 6 N = 12									LEAN CLAY (CL), with Sand, brown, medium stiff to stiff, moist
			N = 50/2"/									Auger Refusal at 6.25 ft.



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

													DATE(S) DRILLED: 4/28/2019
	FIE	ELC	DATA			L	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				(%)		<u>_IMIT:</u> 				(%)	ш	(%)	
				MOISTURE CONTENT (%)			X			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE (%)	CDOLINDWATED INFORMATION:
					  -	Ε	PLASTICITY INDEX	_		LUR	ESS (	SE	GROUNDWATER INFORMATION:
٦ و			<u>_</u> E	8	LIQUID LIMIT	PLASTIC LIMIT	E	F P.	SIVE T	FAI	PR 00	200	No groundwater encountered during or immediately after drilling
/MB	(FT	ES	/S/F /SQ /S	1 %		STI	ST	S/C	SQ.	I AT	S/SC	Š.	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	% CONS	IST	₽Ğ	PLA	PLA		MPF SEN NS/	SAIN		MINUS	SURFACE ELEVATION (FT):
SOI	DEF	\S	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % ROD: %	<b>₩</b>	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STF	S S	₹	DESCRIPTION OF STRATUM
11.j.	_												8 in. Topsoil
		X	N = 7										LEAN CLAY (CL), with Sand, brown, medium stiff to stiff, moist
		$\downarrow$	N - 40	1	40	20	00					00	
	- 5	Н	N = 10	23	43	20	23					83	
		$  \rangle$	N = 50/3"/	8/									SHALE, dark gray to black, very hard, dry to moist Auger Refusal at 6.25 ft.
													Auger Refusar at 6.25 it.
	ı N - ST.	L ∆ANE	ARD PENE	TRAT	ION .	TEST	RES	ISTANO	E E			<u> </u>	REMARKS:
	P - PO	CKE	T PENETR	OME	TER F	RESIS	STANG	CE					GPS COORDINATES: Lat. 41.269448, Long82.763495
			CONE PEI			N KES	SISTA	NUCE					
			CK QUALIT			OITA	V						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

		- I D				1.7	\ D ()	DATO		Τ.			DRILLING METHOD(S):
	FIE		DATA		ATT			RAIC	DRY DA	ATA		ı	Hollow Stem Auger
				<u></u>	A       L	ERBE IMITS	=RG S					_	,
				%) ⊥						(%)	문	E (%	
GPJ				TEN		⊨	PLASTICITY INDEX			뀖	SSU	EV!	GROUNDWATER INFORMATION:
1007. L			_	NO.	Ψ	PLASTIC LIMIT	<u></u>	۲ FT	₩	AILL	ÄŽ	S 00	No groundwater encountered during or immediately after drilling
/BO	F.	,,	F Q	Æ C	LIQUID LIMIT	19	101	ISIT) /CU.	SS E C	ΉF	NG F	0.2	
SYN	Э) Н	j	SWS SWS SWS	j		AS	AS	DEN IDS/	S/SC	Z	N SQN	ž S	OUDEAGE ELEVATION (ET)
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)				DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
N 3/1/2.		\w\	/ ΖΔΕΥΥ	2	LL	PL	PI	О	Owc	S	0.6	2	DESCRIPTION OF STRATUM  8 in. Topsoil
SS			N = 9										LEAN CLAY (CL), with Sand, light reddish brown, stiff to very stiff,
N N	_	$-\Box$											dry to moist
V 00	- 5	$\overline{\mathbb{A}}$	N = 22										Grading black
<u>2</u>		$\downarrow \downarrow$											
₩-	_	H	N = 50/4"										SHALE, gray, very hard, dry to moist
Ä													Auger Refusal = 8 ft.
S C													
3801													
EME													
019/													
TS/2													
DIEC													
PRC													
ZINT													
IVE/(													
3 DR													
SALYC													
H													
JEC													
GEC													
N I I													
DES													
2/02													
SYOF													
ERA.													
:\OP!													
5-R													
14:1													
0/21													
- 9/1													
GDT													
IL01.													
GN GN													
JG A													
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:15 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\EMP\9019\EMP\9019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\EMP\9019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\EMP\9019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\OT\03 DESIGN\GEOTECHNICAL\G DRIVE\03 DESIGN\G DRIVE\03 DESIGN\GEOTECHNICAL\G DRIVE\03 DESIGN\GEOTECHNICAL\G DRIVE\03 DESIGN\G DRIVE\03													
	I N - ST	LLI AND	ARD PENE	TRAT	ION -	LEST	RESI	STANC	E			<u> </u>	REMARKS:
ABLE.	P - PO	CKE	T PENETRO	OME	ΓER F	RESIS	TANG	CE	-				GPS COORDINATES: Lat. 41.269444, Long82.764986
IEW/	R - RO	CK (	CONE PEN	OVEF	RΥ			INCE					
Æ	RQD -	RO	CK QUALITY	/ DES	SIGNA	1OIT	١						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

													DATE(S) DRILLED: 4/29/2019
	FIE	ELD	DATA			L/	4BO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				(%)	L	_IMIT:	<u>S</u>				l	(%	
				Ę			Ä			%) ::	N	/E (	
				MOISTURE CONTENT	_	<b>⊨</b>	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
ا ہے			<sub> -</sub>	ő	LIQUID LIMIT	PLASTIC LIMIT	<u> </u>	> <u>F</u>	]	-\ -\	H C	500	Groundwater encountered at 7.5 ft. during drilling and not
MBC	Ē	ြ	74/8/ P 00 %	W W		E	E	US/CU	O. F	AT F	NG S/S(	0.2	measured immediately after drilling
SXI	Ĕ	ᇤ	% % %	JT.	<u> </u>	ΙŠ	[AS		PRE IS/S	Ž	ΕĞ	NS.	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	οίδ	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	TR/	N N		
		100	/ 24 - 44	_	LL	FL	FI		000	0)	105	2	DESCRIPTION OF STRATUM \( \)2 in. Topsoil
		$\downarrow$	N = 8	28									FAT CLAY (CH), trace Sand, brown, medium stiff, dry to moist
		+											
	5		N = 7	30									LEAN CLAY (CL), with Sand, brown, medium stiff, dry to moist
		$\mathbb{I}$	,	,									
$\equiv$		$\overline{\mathbb{X}}$	N = 50/4"	¥									SHALE, dark gray, very hard, dry to moist
=	. 10		N = 50/3"	4									
₽		+											
∄		$\downarrow \chi$	N = 50/2"										
=	. 45		N = 50/4"										Grading moist to wet
▋	15	*	11 - 30/4										
╡		1											
▋		$\downarrow$	N - 50/0"										
╡	20	<b>₩</b>	N = 50/2"										
₹		+											
╡			N = 50/1" _										Cuadina du da mariat
			14 00/1										Grading dry to moist  Total Depth = 24.5 ft.
													10tal Deptil - 24.5 lt.
ᆜ	J _ QT	ــا م∧ار	ARD PENE	TP^T	ION .	L TEQT	BE6	ISTANC	L		1		DEMVDK6.
F	- PO	CK	ET PENETRO	OME	ΓER F	RESIS	STAN	CE	<b>/</b> _				REMARKS:   GPS COORDINATES: Lat. 41.252176, Long82.801635
			CODE DEC			N RES	SISTA	NCE					, ,
			CORE REC			ΔΤΙΩ	NI.						



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY

**RQD - ROCK QUALITY DESIGNATION** 

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

1													DATE(5) DRILLED. 4/30/2019
	FIE	ELC	DATA			L	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
					ΑΤΊ	FERBI	ERG						Hollow Stem Auger
				(%)	<u> </u>	_IMIT		-		(9)	ш	(%)	
				F			Ă			E (%	<u>R</u>	VE.	ODOLINDA/ATED INCODMATION
					_	¥	PLASTICITY INDEX			J.	ESS (	200 SIEVE (%)	GROUNDWATER INFORMATION:
ᅵ员	_		_ =	8	LIQUID LIMIT	PLASTIC LIMIT	È	F <sub>E</sub>	SIVE FT)	FAII	R S	200	No groundwater encountered during or immediately after drilling
MB	E	ုလ္ပ	SQ I	문	□	) IS	STIC	NSI.	ESS STH SO. I	ΑT	S/S	9	
SOIL SYMBOL	Ŧ	1 = 1	MONS/NO:	STU	ප්	Ž	Ä	HÃ	IPRI ENG NS/S	AN	문목	JS I	SURFACE ELEVATION (FT):
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	DESCRIPTION OF STRATUM
7		H	/ 241-44	┢═		<del>  -</del>			0 0,0	0,			\4 in. Topsoil
	-	-X	N = 5										FAT CLAY (CH), trace Sand, brown, soft to medium stiff, moist
	-	$\perp$											
	- 5	$-\mathbb{M}$	N = 3	32	59	22	37					93	
	-	$\perp$											
	-	-X	N = 50/3"	8									SHALE, gray to dark gray, hard, dry to moist
$\equiv$	- - 10	$\perp$	N = 50/2"										
$\equiv$	-	+											
	-	-X	N = 50/3"										
=	- 1E	$\overline{A}$	N = 50/5"										
	- 15 -	+	14 00/0										
$\equiv$	-	1											
	-	$\frac{1}{\lambda}$	N - 50/0"										
=	- 20 -	<i></i>	N = 50/2"										
	-	+											
	-		N = 50/2"										
			14 - 30/2										Total Donath - 24 5 ft
													Total Depth = 24.5 ft.
			ARD PENE						CE				REMARKS:
			T PENETR										GPS COORDINATES: Lat. 41.251718, Long82.801880



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

	1												DRILLED. 4/24/2019
L	FIE	LD	DATA			L/	ABO	RATO	DRY DA	ATA			DRILLING METHOD(S):
						ERBI							Hollow Stem Auger
				MOISTURE CONTENT (%)		<u>-IMIT:</u> 				(%	யூ	200 SIEVE (%)	
3				K			PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	EVE	GROUNDWATER INFORMATION:
07.G				E	⊨	PLASTIC LIMIT		<b>⊢</b>	ш _	1	S (S	SIE	No groundwater encountered during or immediately after drilling
30 30 30 10			<u>_</u> <u>E</u>	8	LIQUID LIMIT	CL	딩	ĒΫ	NS - (E	. FA	SQI		Two groundwater encountered during of immediately after drilling
MD X	F)	ES	NS/8 8/80 VS	L RE		\ST	\ST	SNE SNC	SES SQ.	Ι	NS/SQ	8	
SOIL SYMBOL	DEРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	  SIST		7	7	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	RA I		MINUS NO.	SURFACE ELEVATION (FT):
	DE	\&\	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	M	LL	PL	PI	RO PO	SP (	ST	88	M	DESCRIPTION OF STRATUM
SIOP2/02 DESIGNIGEOTECHNICAL/G DRIVE/GINTPROJECTS/2019EMERSON CREEK - MD1901007/EMERSON CREEK - MD1901007 GPJ	-	$\forall$	N = 6										√3 in. Topsoil
ÄEN.	‡	$\mathcal{A}$	N = 6										LEAN CLAY (CL), with Sand, brown, medium stiff to hard, dry to moist
	-	$\forall$	N = 8	15									Grading trace Gravel
<u>6</u> ///	5	$\mathcal{H}$											
<u> </u>	1	$\forall$	N = 21	15									
<u> </u>	10	$\frac{1}{\sqrt{2}}$	N = 41	9									
뿡[///	10	$\mathcal{H}$	11 -										
ğ[ <u>///</u>	1	$\forall$	N = 31										WEATHERED OLIVE
	4.5	Ħ	R = 100 RQD = 92,-										WEATHERED SHALE, gray, fine to coarse grained, moderately weathered, weak rock, compacted conglomerate looking material
1961	15	$\Box$	NQD - 92/										WEATHERED SHALE, dark gray, very hard, dry to moist
3/50 8/50		11											, <b>3</b> ,, ,
		+											
8	20	$\overline{\mathbb{A}}$	N = 71/8"	17									
		11											
	٠,-		N = 50/2"										
R	25												Total depth = 25 ft.
AL/G													Total deptit – 25 ft.
욁													
띮													
99													
S C													
2002													
SOR													
ERA													
힣													
5-R													
1.1													
10/21													
6													
.G													
NL01													
<u>8</u>													
90													
-  -													
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:15 - R:\OPERATION			ARD PENE						E		•		REMARKS:
ABLI			T PENETRO CONE PEN										GPS COORDINATES: Lat. 41.311303, Long82.784857
NE NE	R-RO	CK	CORE REC	OVEF	RY			11 10L					
쀭┖	RQD -	RO	CK QUALITY	/ DES	SIGN	OITA	1						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/27/2019 - 4/28/2019

													DATE(S) DRILLED: 4/27/2019 - 4/28/2019
	FIE	ELD	DATA			L	ABO	RATO	ORY DA	ATA			DRILLING METHOD(S):
						ΓERΒΙ							Hollow Stem Auger: 0 to 5 ft.; NX Wet Rock Coring: 5 to 28 ft.
				(%)		LIMIT:				(9)	ш	(%)	
				Ä			)EX			E (%	l K	VE	CDOLINDWATED INFORMATION.
				MOISTURE CONTENT (%)	_	Ħ	PLASTICITY INDEX	_	l	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	GROUNDWATER INFORMATION:
ᅵ员	_		<u>_</u>	8	LIQUID LIMIT	PLASTIC LIMIT	l E	F⊡	FI	FA	R S	200	No groundwater encountered during drilling prior to the introductio of drilling fluid
MB	(FT	Si	S S S	뿔		STIC	STIC	NSI S/CI	SOTE SO	ΑT	S/S	NO.	of drilling fluid
\s_	Ŧ	P.E	MO'NO'	STL	ğ	Ä	٦	H N	APR S/S/	AN		US I	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MO	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR		MINUS	DESCRIPTION OF STRATUM
777		$\pm$	/		<del> </del>	+-	-				-		\3 in. Topsoil
	-	-X	N = 5	15									SANDY LEAN CLAY (CL), brown, medium stiff, moist
74	- 5	X	N = 50/2"	35		-							CLAYEY GRAVEL (GC), brown, very dense, moist, coarse
7		11	R = 83 RQD = 0										\grained, subangular to subrounded LIMESTONE, gray, fine to medium grained, moderately to highly
크	-	Н	TIGE 0										weathered, moderately strong rock
Ⅎ	- 10	11	R = 66										,
남	-	1	RQD = 0										Potential void from 11 to 13 ft.
7	-	H											
⇉	- - 15	1	R = 98										
₽	-	-11	RQD = 27										
╡	-	#											SHALE, gray, fine grained, highly weathered, weak rock
₽	-	1	R = 95										
╡	- 20	41	RQD = 13										
╡	-	1											
₽	-	$\mathbf{H}$											
╡	25	11	R = 100 RQD = 67										
	-	Ш	1100										
	•	T											Total Donth = 20 ft
													Total Depth = 28 ft.
-													
1													
١													
<u>ا۔</u> ا	N - STA	L NP	DARD PENE	TRAT	ION	TEST	RESI	STANC	Œ				REMARKS:
F	- PO	CKE	ET PENETR	OME <sup>-</sup>	TER F	RESIS	STANC	CE					GPS COORDINATES: Lat. 41.261475, Long82.809764
			CONE PEN			N RES	SISTA	NCE					
			CK QUALIT			ΛΙΤΑ	N						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc **Emerson Creek Wind Project** PROJECT: LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/29/2019

GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling supplied by the state of the sta		FIE	ELC	DATA			LA	٩во	RATO	ORY DA	ATA			DRILLING METHOD(S):
														Hollow Stem Auger: 0 to 9 ft.; NX Wet Rock Coring: 9 to 20 ft.
N = 8 19    Variable	SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	200 SIEVE	No groundwater encountered prior to the introduction of drilling fluid SURFACE ELEVATION (FT):
SANDY LEAN CLAY (CL), trace Sand, orown, medium stirr to hard, in special strength of the stre		-												∖2 in. Topsoil /
N = 18		- - - - 5			19									LEAN CLAY (CL), trace Sand, brown, medium stiff to hard, moist
N = 67 R = 67 R = 67 R = 67 R = 98 R = 98 R = 98 R = 98 R = 95 R = 16  175 1092.24  0.0    No in a praised, moderately weathered, weak to moderately strong rock, vertical fracture from 9.5 to 10 ft.    No in a praised, moderately strong rock, vertical fracture from 9.5 to 10 ft.    Potential void from 17 to 18 ft.    Total Depth = 20 ft.		-	$\blacksquare$											SANDY LEAN CLAY (CL), brown, trace Gravel, medium dense to
15 R=35 RQD = 16 175 1092.24 0.0 Potential void from 17 to 18 ft.  Total Depth = 20 ft.		- 10 - -	-	R = 67 RQD = 33 R = 98										LIMESTONE, fine grained, moderately weathered, weak to
R = 35 RQD = 16 Potential void from 17 to 18 ft.  Total Depth = 20 ft.		15	$\mathbf{H}$						175	1002.24		0.0		
Total Depth = 20 ft.		- - - 20							173	1092.24		0.0		Potential void from 17 to 18 ft.
		20												Total Depth = 20 ft.
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE REMARKS: GPS COORDINATES: Lat. 41.198112, Long82.831090	ב בספר בספר א פועונים ו בספר א פועונים ו אין אין די									Ę				



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 12/17/2019

<u> </u>													DATE(3) DRILLED. 12/11/12019
	FIE	ELD	DATA			L	4BO	RATO	ORY DA	ATA			DRILLING METHOD(S):
						TERBI LIMIT:							Hollow Stem Auger: 0 to 24.5 ft.; Mud Rotary: 24.5 to 39 ft.
				(%)						(%	삤	200 SIEVE (%)	
5				ËNT		_	L CE			RE (	SSUF	EVE	GROUNDWATER INFORMATION:
			1.	INO	F	Ĭ	≦	LE	<b>₽</b> _	√ILU	Z S	IS 00	No groundwater encountered prior to the introduction of drilling fluid
/BO	E.	,,	F O	ZE C			⊒ ⊒	SIT.	SSIN TH 2. FI	ΉF	VG F		
SYN	E)	PLE	swo swo	STUF	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DEN	PRE ENG' IS/S(	N N	I NON	N SI	SURFACE ELEVATION (FT):
SOIL SYMBOL	БЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO.	DESCRIPTION OF STRATUM
SOIL SYMBOL		$\top$				-	···		0 0, 0	•,	0.0		\1 in. Topsoil /
	-	<u> </u>	N = 18	22									LEAN CLAY (CL), trace Sand, light brown, very stiff to hard, dry to
	-	$\frac{1}{\lambda}$	N = 28										moist Grading with Sand
	- 5 -	*	11 - 20										Stading Mar Sand
	-	$\overline{X}$	N = 35	16									
	10	$\downarrow$	N = 41										
	-	$\Box$											
	_	$\frac{1}{2}$	N = 31	15									Grading trace Gravel
	- 15	-X	N = 73										SANDY LEAN CLAY (CL), brown, hard, dry to moist
	_	7											
	-	1	N 50/0"	_									LEAN CLAY (CL), trace Sand and Gravel, dark gray, hard, dry to
	- 20 -	1	N = 50/6"	9									moist
	-	1											
	- - 25	$\downarrow$	N = 50/4"										Grading with Sand, dark brown
	_												
	_	+											
	- 30	$\overline{X}$	N = 25/0"										SHALE, dark gray, very hard, dry to moist
	-	7											
	-	1	N 05/01										
	- 35 -	*	N = 25/0"										
	-	1											
	_	*	N = 25/0"										
													Total Depth = 39 ft.
2													
5													
;[			DARD PENE ET PENETRO						Œ				REMARKS: GPS COORDINATES: Lat. 41.136254, Long82.825618
	T - TXI	רסכ	CONE PEN	IETR/	ATIO								0. 0 000 (Dirw (120. Edi. 71. 100207, Edilg02.020010
il .			CORE REC			ΔΤΙΩ	NI.						



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: **Emerson Creek Wind Project** LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

	ГІГ	-1 -					^ DO			Τ.			DRILLING METHOD(S):
	FIE	LL	DATA		A T.T			RAIC	PRY DA	ATA			Hollow Stem Auger
- MD1901007EMERSON CREEK - MD1901007.GPJ	<b>DEPTH (FT)</b>	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: Groundwater not encountered during drilling and measured at 5 ft. immediately after drilling and at 8.5 ft. 24 hours after drilling SURFACE ELEVATION (FT): DESCRIPTION OF STRATUM
			N = 13										6 in. Topsoil LEAN CLAY (CL), with Sand, brown, stiff to very stiff, dry to moist
301007/EMEH	- - - 5			<b>¥</b> 17									Grading trace Sand
	-	$\overline{A}$	N = 20	¥									SANDY LEAN CLAY (CL), brown, very stiff, dry to moist
	- 10	$\overline{A}$	N = 27	12									LEAN CLAY (CL), with Sand, gray, very stiff, dry to moist
	-	$\frac{1}{2}$	N = 21										Grading trace Sand
	- - 15		N = 44										SHALE, dark gray, medium hard to very hard, moist
	-	1											
	- - - 20		N = 50/2"										
	- 20 - -		11 00/2										
	- - 25 -	- - X -	N = 50/2"	19									
	-												Auger Refusal at 28 ft.
5													
I I	P - PO T - TXI R - RO	CKE DOT CK	OARD PENE ET PENETRO CONE PEN CORE REC CK QUALIT	OMET NETRA OVER	TER F ATION RY	RESIS N RES	STANG SISTA	CE	 				REMARKS: GPS COORDINATES: Lat. 41.130820, Long82.822057



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

FIELD DATA	ATTERBERG LIMITS S LI	
LIMITS (%) H (%) H (%) H	S LIMITS  (%) LIMITS  (%) LIMITS  (%) LIMITS	
Second   S	GROUNDWATER INFORMATION: Groundwater encountered at 47 ft. during drilling and measure of the control of the co	
Complete		
Solution of the second at 4 ft. during draining and measured at 4 ft. during draining and draining	Solve of the control	
Second   S	Surface Elevation (FT):   Surface Elevatio	red at
Second   S	Surface   Surf	
N = 18	N = 18	
N = 18	N = 18  N = 33  16  N = 34  10	
N = 18	LEAN CLAY (CL), trace Sand, light brown, very stiff to hard, moist	$\overline{}$
5	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist    Sand	dry to
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 30	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
N = 34	N = 34	
N = 34 16  N = 34 16  N = 34 16  N = 37 16  N = 21 19  N = 25  N = 21 19  N = 25  N = 21 19  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  N = 50/4"  N = 50/4"  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	10 N = 34 16 N = 33 N = 21 16 P = 4.0 20 N = 24  25 N = 21 19 30 N = 25 35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
10 - N = 34	10	
N = 33	N = 33 15 N = 21 16 20 N = 24 25 N = 21 30 N = 25 35 N = 31 40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
15   N = 21   16	15 N = 21 16	
15 N = 21 16  P = 4.0  20 N = 24  30 N = 25  35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	15 N = 21	
20 X N = 24  25 X N = 21  30 X N = 25  35 X N = 31  40 X N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  45 X N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	P = 4.0 20  N = 24 25  N = 21  19 30  N = 25 35  N = 31 40  N = 87 45  N = 50/4"  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
20 N = 24  25 N = 21  30 N = 25  35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	20 N = 24  25 N = 21  30 N = 25  35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
20	20 - N = 24  25 - N = 21  30 - N = 25  35 - N = 31  40 - N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
25 N = 21 19  30 N = 25  35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  45 N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	25 N = 21 19 30 N = 25 35 N = 31 40 N = 87 SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
25 - N = 21	25 N = 21 19  30 N = 25  35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
25	25 - X N = 21	
30 N = 25 35 N = 31  40 N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	30 - N = 25 35 - N = 31 40 - N = 87 45 - N = 50/4"  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	N = 25  N = 31  N = 87  N = 87  N = 50/4"  N = 50/4"	
30 - N = 25 35 - N = 31 36 - N = 87  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  45 - N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	30 - N = 25 35 - N = 31 30 - N = 87 35 - N = 87 36 - N = 87 37 - N = 87 38 - N = 50/4"	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	35 - N = 31  40 - N = 87  45 - N = 50/4"  SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist  N = 50/4"  N = 50/4"  SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft.	SANDY LEAN CLAY (CL), trace Gravel, hard, dry to moist	
N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	45 -X N = 50/4"	
N = 50/4"  SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	45 - N = 50/4"	
SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.	45 -X N = 50/4"	
SHALE, dark gray, very hard, dry to moist Auger Refusal at 47 ft.		
Auger Refusal at 47 ft.	TEN = 50//1" /TEN = 40//1" /TEN = 10///1" /TEN = 10	
	SHALE, dark gray, very hard, dry to moist  Auger Refusal at 47 ft	/
N STANDADD DENETDATION TEST DESISTANCE DENADICO:	N STANDADD DENISTRATION TEST DESISTANCE DENAMBLES	
N - STANDARD PENETRATION TEST RESISTANCE REMARKS: GPS COORDINATES: Lat. 41.098514, Long82.827851	N - STANDARD PENETRATION TEST RESISTANCE   KEMAKKS:   P - POCKET PENETROMETER RESISTANCE   GPS COORDINATES: Lat. 41.098514. Long82.827851	
T - TXDOT CONE PENETRATION RESISTANCE	T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY	
	RQD - ROCK QUALITY DESIGNATION	



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/6/2019

													DATE(S) DRILLED: 5/6/2019
	FIELD DATA LABORATORY DATA									ATA			DRILLING METHOD(S):
						ERBE							Hollow Stem Auger
				(%)		_IMITS		-		(%	Щ	(%)	
J.B.J				ENT		١. ا	PLASTICITY INDEX			ر د	SUR	≡VE	GROUNDWATER INFORMATION:
				LNC	Ę	PLASTIC LIMIT			Щ (	ij	SES N	O SIE	Groundwater encountered at 14.25 ft. during drilling and not
1901( BOL	Ē		F E	E CC		]:  :	] <u>.</u>	TIS FUG	SSIV H FT	T FA	G PI	. 20	measured immediately after drilling
- MD	H (F	LES	WS/IS/S(	TUR	LIQUID LIMIT	AST	AST	DS/(	NGT NGT S/SQ	Z Z	NN	N S	
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)		_		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION (FT):
R 0	Ω	\v)	/ <u>\$0.500</u>	2	LL	PL	PI		Own	Ś	0.6	Σ	DESCRIPTION OF STRATUM  \[ \( \) 2 in. Topsoil \( / \)
- MD1901007/EMERSON CREEK - MD1901007.GPJ	-	$\forall$	N = 11										LEAN CLAY (CL), with Sand, brown, stiff to hard, dry to moist
EWE	-	$\Box$											
7001	- 5	$\mathbb{A}$	N = 22	15									
961	-	$\frac{1}{1}$	N 07										Grading trace Sand
	-	Щ	N = 27										Grading trace Sand
HI HI	- 10	X	N = 31	16									
DESIGNIGEOTECHNICAL IG DRIVE/GINTIPROJECTS/2019/EMERSON CREEK	_	$\forall$	N = 35										
MERS	- -	Д	N = 37	<u>Z</u>									
E C	- 15 -	A	N - 31										
S/20/	-	11											
JECT	- - 20	$\forall$	N = 18	16									
ON N	- 20	+											
E ///	-	11											
NEW	- - 25	$\forall$	N = 17										
S DR	_	$\prod$											
S S	_	-											
H.	- 30	$\overline{\mathbb{A}}$	N = 21										
	-	11											
NGE CONTRIBUTION OF THE PROPERTY OF THE PROPER	-												
ESIG	- 35	-X	N = 48										Grading with Sand
	-	7											
S/OP2/02	-	$\downarrow$											CILTY CAND (CM) deals grow to block gradium denote to denote
	- 40	X	N = 27										SILTY SAND (SM), dark gray to black, medium dense to dense, wet, fine to medium grained
RAT	-	<u> </u>											,
OP!	- - <u>, -</u>	$\forall$	N = 17										
5-R	- 45 -	$\mathcal{H}$	IN - 17										
14	<del> </del>  -												
/10/2	- - 50	$\forall$	N = 33										
, e — Г	- 30	+											
1911	-	]											
	- - 55	$\forall$	N = 30										
A G		П											Total Depth = 55.5 ft.
J- I-													1 otal Doptil – 00.0 it.
RENEWABLE LOG - LOG A GNNL01 GDT - 9/10/21 14:15 - R:\OPERATION	N CT	٦٢	VOD DEVIE	г <b>р</b> ^ т	ION: .	TEST	DEC	ISTANC	\				DEMARKS.
BLE	N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE							CE	<i>ا</i> ت			REMARKS:   GPS COORDINATES: Lat. 41.087076, Long82.777013	
JEWA	T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY						ANCE				_		
#L	R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION												



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

													DATE(S) DRILLED: 4/18/2019
	FIE	LD	DATA		LABORATORY DATA								DRILLING METHOD(S):
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N = 50/5" N = 50/2" R = 90 RQD = 17 R = 97 RQD = 72	1 MOISTURE CONTENT (%)		ERBEIN PLASTIC LIMIT PL	ERG	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 8 ft.; NX Wet Rock Coring: 8 to 23 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling flu  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM  1 in. Topsoil LEAN CLAY (CL), with Sand and Gravel, brown, hard, dry  LIMESTONE, gray, hard, dry  LIMESTONE, gray, fine grained, slightly to moderately weathered, weak rock
<del>                                      </del>	20		R = 100 RQD = 87										Total Depth = 23 ft.
			ARD PENE T PENETRO						DE .				REMARKS: GPS COORDINATES: Lat. 41.309842, Long82.815969



T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 4/17/2019 - 4/18/2019

L													DATE(S) DRILLED: 4/17/2019 - 4/18/2019
	FIE	LD	DATA			LA	4ВО	RATO	RY DA	ATA			DRILLING METHOD(S):
SOIL SYMBOL	<b>DEPTH (FT)</b>	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: R: R	MOISTURE CONTENT (%)		PLASTIC LIMIT IMI		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Hollow Stem Auger: 0 to 11 ft.; NQ Wet Rock Coring: 11 to 26 ft.  GROUNDWATER INFORMATION: No groundwater encountered prior to the introduction of drilling fluid  SURFACE ELEVATION (FT):  DESCRIPTION OF STRATUM
77	_	Ħ											∖4 in. Topsoil
	- - - 5 - - -		N = 6 N = 51 N = 17 N = 50/1"	22									LEAN CLAY (CL), with Sand, brown, medium stiff to hard, moist to wet
	- 10 -		N = 50/1 N = 50/1"	17									LIMESTONE, gray, fine grained, moderately weathered, weak roc
	- - - - 15		R = 92 RQD = 40										EINES FORE, gray, mile granied, moderatory weathered, weathered
	- - - - 20		R = 99 RQD = 65										
	- - - - 25		R = 100 RQD = 70										
													Total Depth = 26 ft.
	P - PO	CKE	ARD PENET T PENETRO CONE PEN	OMET	ΓER F	RESIS	TAN	CE	<u>                                     </u>				REMARKS: GPS COORDINATES: Lat. 41.307049, Long82.817887



RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087 CLIENT: Apex Clean Energy, Inc
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

DATE(S) DRILLED: 5/14/2019

		FIELD DATA LABORATORY DATA								тл			DRILLING METHOD(S):
	FIL		TOATA		АТТ	ERBE		KAIC		NIA	Ι		Hollow Stem Auger
				(%)	Λ' [	IMIT	S			_		(0)	
_				(°)			EX			(%)	뽒	(%	
7.GP.				MOISTURE CONTENT (%)	١.	⊨	PLASTICITY INDEX			STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
<u> </u>			-	00	LIQUID LIMIT	PLASTIC LIMIT	ΊΤΥ	<u> </u>	≧ (F	-AIL	R S	200 \$	No groundwater encountered during or immediately after drilling
MBC	FT)	တ္ယ	SQ 8	RE (		STIC	этіс	NSIT S/CU	STE ATE	ATF	S/S	Ō.	
S   .   X	HT (	12	%:	STU	<u> </u>	LA8	PLA9	NOS	IPRE ENG IS/S	AN	E S	JS N	SURFACE ELEVATION (FT):
SOIL SYMBOL	ОЕРТН (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	ЮW	LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STR	NO S	N	DESCRIPTION OF STRATUM
2///		H				. –					-		\\1.5 in. Topsoil
ERS(	_	$-\!M$	N = 10	25									LEAN CLAY (CL), with Sand, brown, stiff to very stiff, dry to moist
	-	$\downarrow$											
9	- 5	M	N = 20										
<u>5</u>	-	$\forall$	N = 25	17									Grading trace Sand, gray
≥ 	-	$\Box$		17									
	10	X	N = 75										SHALE, dark gray, medium hard to very hard, moist
	ŀ	$\forall$	N = 33										
ERS	-	$\Box$											
	15	X	N = 82/10"	14									
2018	F	7											
STS	-	$\downarrow$											
	- 20	+X	N = 50/1"										
	-	7											
	-	$\downarrow \downarrow$											
	- 25	+X	N = 50/1.5"										Grading moist to wet
الْحِوْ	-	11											
<u> </u>	-												
		Д	N = 50/2"										
EOTE													Auger Refusal at 31 ft.
SN/G													Auger Neidsar at 31 it.
ESIC													
05 D													
OP2													
SNO													
Ē													
) DPE													
<u> </u>													
4:15													
/21 1													
9/10													
ᆸ													
01.6													
) A C													
RENEWABLE LOG - LOG A GNNL01.GDT - 9/10/21 14:15 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2019\emptyroje\merson \text{CREK} - MD1901007.GPJ													
إلـــاإ	 N 0=		ADD DEVIC	TD 4 7	1011	FECT	DEC	OTANIC	<u></u>				DEMARKO.
BE I			ARD PENET T PENETRO						Æ				REMARKS:   GPS COORDINATES: Lat. 41.133708, Long82.823198
IWA!	T - TXDOT CONE PENETRATION RESISTANCE											2. 2. 2. 2. 2. 2. 2. 2. 2. 11100100, 2019. 02.020100	
ZZ ZZ ZZ	R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION												





3801 Doris Lane Round Rock, TX 78664 512.992.2087

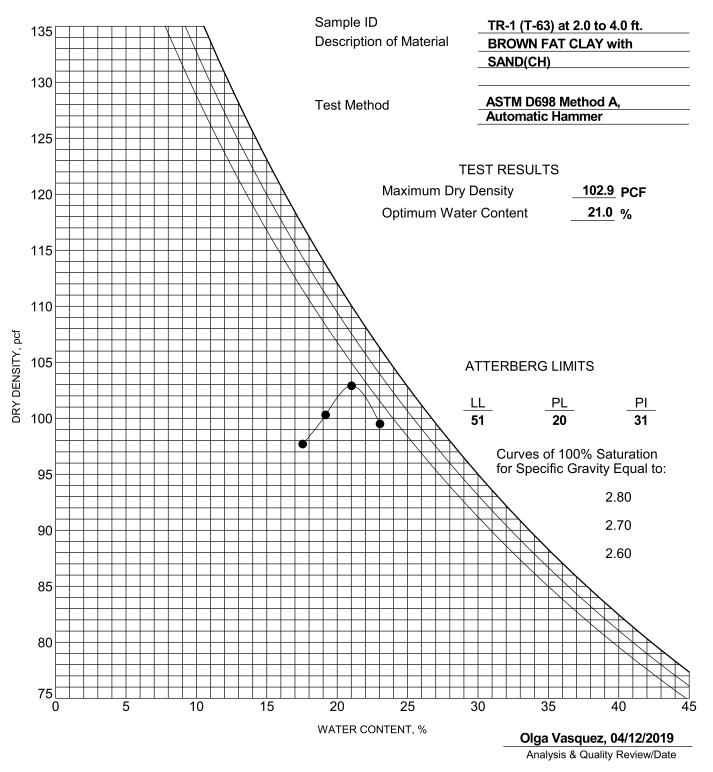
# **APPENDIX B**



Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B CLIENT:

3801 Doris Lane, Suite B Round Rock, TX 78664 Telephone: (512) 358-6048 CLIENT: RRC Power & Energy, LLC
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007



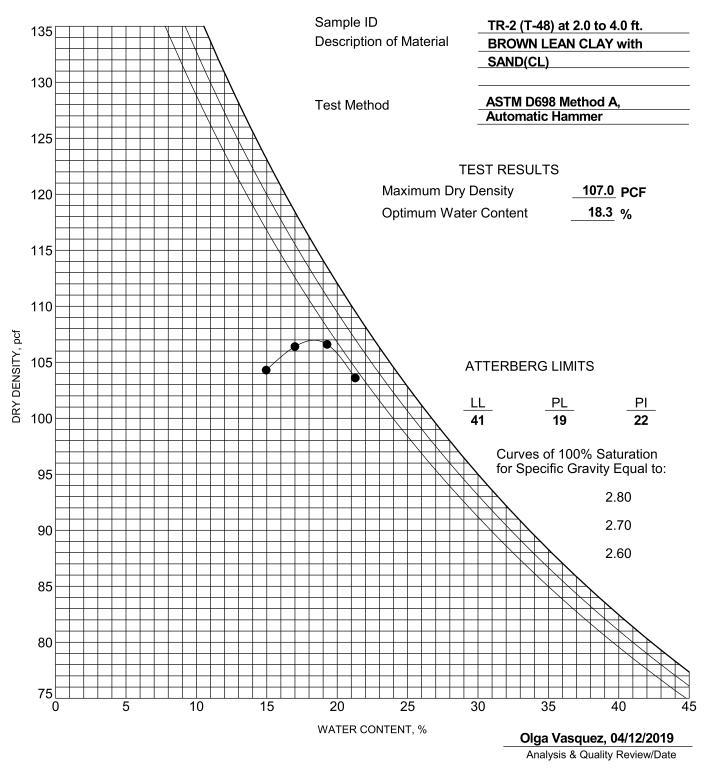
Specimens prepared by: T.W.



Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B CLIENT:

3801 Doris Lane, Suite B Round Rock, TX 78664 Telephone: (512) 358-6048 CLIENT: RRC Power & Energy, LLC
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007



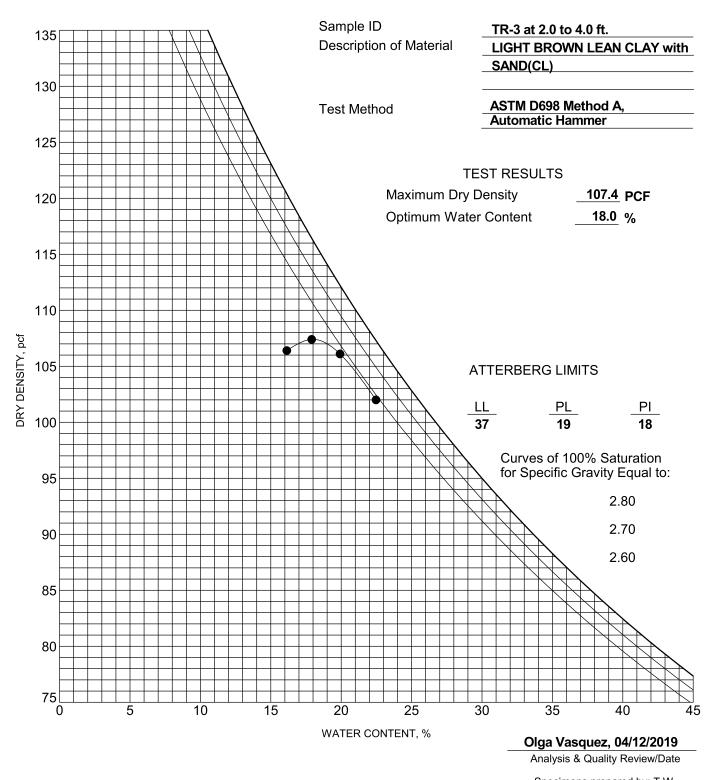
Specimens prepared by: T.W.



Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B CLIENT:

3801 Doris Lane, Suite B Round Rock, TX 78664 Telephone: (512) 358-6048 CLIENT: RRC Power & Energy, LLC
PROJECT: Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007



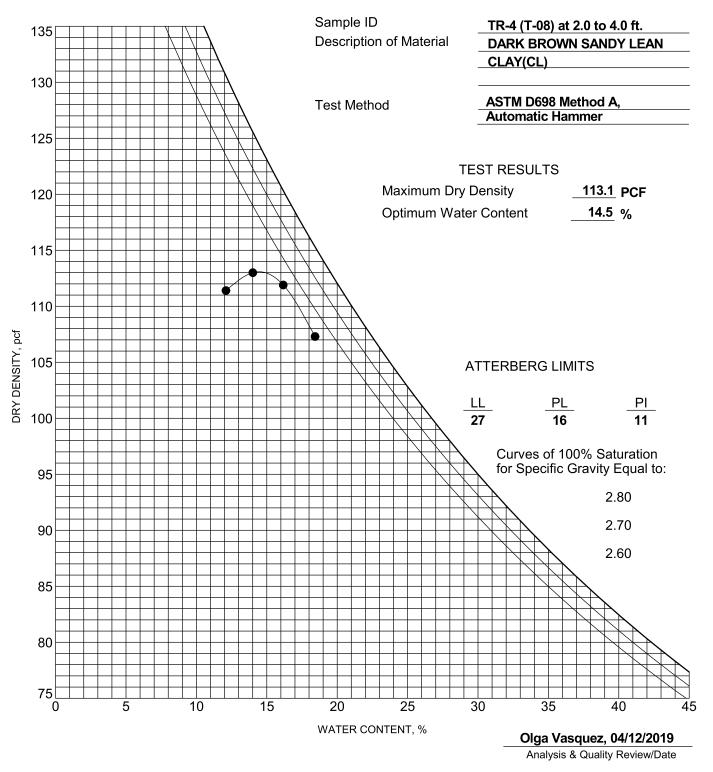
Specimens prepared by: T.W.



Beyond Engineering & Testing, LLC CLIENT: 3801 Doris Lane, Suite B Round Rock, TX 78664 Telephone: (512) 358-6048

RRC Power & Energy, LLC PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

**NUMBER:** MD1901007



Specimens prepared by: T.W.

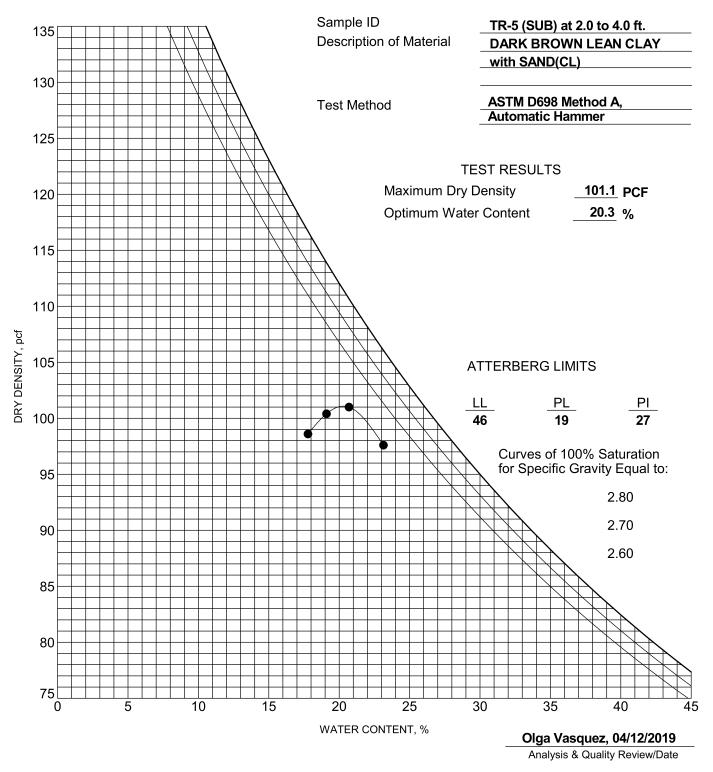


Beyond Engineering & Testing, LLC CLIENT:

3801 Doris Lane, Suite B Round Rock, TX 78664 Telephone: (512) 358-6048

RRC Power & Energy, LLC PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

**NUMBER:** MD1901007



Specimens prepared by: T.W.



# **Unconsolidated-Undrained Triaxial Compression Test**

Client: RRC Power & Energy, LLC.

RRC Project No.: MD1901007 Test Method: ASTM D2850 Test Date: 1/24/2020 Type of Specimen: Shelby Tube

Project: Emerson Creek Wind Project

Strain Rate (%/min): 1 % / min

Type of Test: Q-Test

Sample No.: T-58 at 12 ft

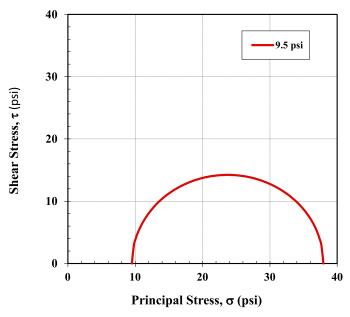
		<u>Pr</u>	incipal St	ress Diffe	erence vs. A	xial Strain	
	40	-					
(psi)	30	-					
Deviator Stress (psi)	20	-				9.5 ps	i
Dev	10		   E <sub>50%</sub>				
	0	0 :	5	10 Axial St	15 rain (%)	20	25

Initial Specimen Conditions									
Confining Pressure (psi)		9.5							
Avg. Diameter (in)	D <sub>o</sub>	2.84							
Avg. Height (in)	$H_{o}$	5.67							
In-situ Water Content (%)	Wo	14.7							
Total Unit Weight (pcf)	$\gamma_{total}$	138.7							
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	120.9							
Saturation (%)	$S_{r}$	100							
Void Ratio	e <sub>o</sub>	0.39							
Specific Gravity (Assumed)	$G_s$	2.70							

#### ailure\_

Stresses at Failure	
Maximum Deviator Stress (psi)	28.5
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of $q_u$ , $\mathcal{E}_{50}$ (%)	5.3
Total Stresses at Failure	
Major Principal Stress Corrected, $\sigma_{1C}$ (psi)	38.0
Minor Principal Stress, σ <sub>3</sub> (psi)	9.5

Mohr Circles (	Total Stress	) for Peak Stress at Failure

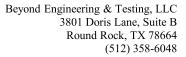


Test Results	
Unconsolidated-Undrained Compressive	
Strength at Failure,	2.05
$\sigma_{1C}$ - $\sigma_3$ (tsf)	

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was taken to correspond to the deviator stress at 15 % axial strain.

Olga Vasquez, 02/04/20

Analysis & Quality Review/Date Specimen Prepared by: T.D.





## **Unconsolidated-Undrained Triaxial Compression Test Appendix**

Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2850

Specimen: T-58 at 12 ft Test Date: 01/24/20









## **Unconsolidated-Undrained Triaxial Compression Test**

Client: RRC Power & Energy, LLC.

RRC Project No.: MD1901007 Test Method: ASTM D2850 Type of Specimen: Shelby Tube Strain Rate (%/min): 1 % / min

Project: Emerson Creek Wind Project

Test Date: 6/25/2019 Type of Test: Q-Test

Sample No.: T-66 at 24 ft

		:	Principal :	Stress Diff	erence vs. A	Axial Strain	
psi)	50	-					
	40 -	-					
Stress (	30	-				19	psi
Deviator Stress (psi)	20		<b>A</b>				
	10 -		   ε <sub>50%</sub> 				
		0	5	10 Axial S	15 train (%)	20	25

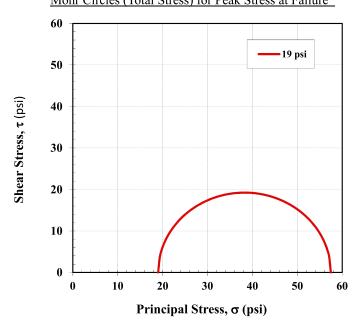
Initial Specimen Conditions								
Confining Pressure (psi)		19.0						
Avg. Diameter (in)	$D_{o}$	2.85						
Avg. Height (in)	H <sub>o</sub>	5.67						
In-situ Water Content (%)	w <sub>o</sub>	17.2						
Total Unit Weight (pcf)	$\gamma_{total}$	136.7						
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	116.6						
Saturation (%)	$S_{r}$	100						
Void Ratio	e <sub>o</sub>	0.45						
Specific Gravity (Assumed)	$G_s$	2.70						

Stresses at Failure	
Maximum Deviator Stress (psi)	38.5
Axial Strain at Failure (%)	14.9
Axial Strain at 50% of $q_u$ , $\mathcal{E}_{50}$ (%)	4.5
Total Stresses at Failure	
Major Principal Stress Corrected, $\sigma_{1C}(psi)$	57.5
Minor Principal Stress, σ <sub>3</sub> (psi)	19.0

Test Results	
Unconsolidated-Undrained Compressive	
Strength at Failure,	2.77
$\sigma_{1C}$ - $\sigma_3$ (tsf)	

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was taken to correspond to the deviator stress at 15 % axial strain.

# Mohr Circles (Total Stress) for Peak Stress at Failure



Olga Vasquez, 07/22/19

Analysis & Quality Review/Date Specimen Prepared by: T.D.





## **Unconsolidated-Undrained Triaxial Compression Test Appendix**

Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2850

Specimen: T-66 at 24 ft Test Date: 06/25/19









## **Unconsolidated-Undrained Triaxial Compression Test**

Client: RRC Power & Energy, RRC Project No.: MD1901007

Test Method: ASTM D2850

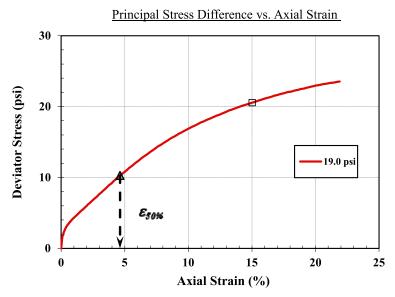
Type of Specimen: Shelby Tube Strain Rate (%/min): 1 % / min

**Initial Specimen Conditions** 

Project: Emerson Creek Wind Project

Test Date: 1/24/2020 Type of Test: Q-Test

Sample No.: T-82 at 24 ft



Confining Pressure (psi)		
D <sub>o</sub>	2.85	
H <sub>o</sub>	5.68	
w <sub>o</sub>	20.7	
Y <sub>total</sub>	133.2	
$\gamma_{ m dry}$	110.3	
S <sub>r</sub>	100	
e <sub>o</sub>	0.53	
G <sub>s</sub>	2.70	
	$\begin{array}{c} H_o \\ W_o \\ \gamma_{total} \\ \gamma_{dry} \\ S_r \\ e_o \end{array}$	

Maximum Deviator Stress (psi)	20.6
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of $q_u$ , $\mathcal{E}_{50}$ (%)	4.6
Total Stresses at Failure	
Major Principal Stress Corrected, $\sigma_{1C}$ (psi)	39.6

Stresses at Failure

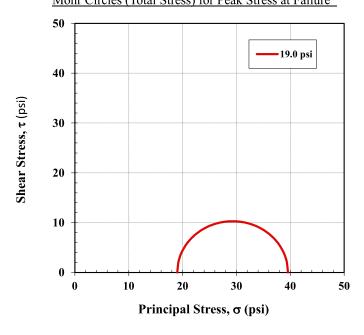
Test Results	
Unconsolidated-Undrained Compressive	
Strength at Failure,	1.48
$\sigma_{1C}$ - $\sigma_3$ (tsf)	

Minor Principal Stress,  $\sigma_3$  (psi)

19.0

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was taken to correspond to the deviator stress at 15 % axial strain.

# Mohr Circles (Total Stress) for Peak Stress at Failure



Olga Vasquez, 02/04/20

Analysis & Quality Review/Date Specimen Prepared by: T.D.





## **Unconsolidated-Undrained Triaxial Compression Test Appendix**

Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2850

Specimen: T-82 at 24 ft Test Date: 01/24/20







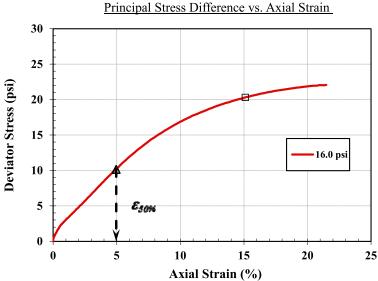


### **Unconsolidated-Undrained Triaxial Compression Test**

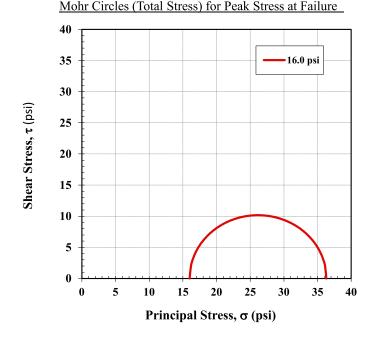
Client: RRC Power & Energy, RRC Project No.: MD1901007 Type of Specimen: Shelby Tube LLC. Test Method: ASTM D2850 Strain Rate (%/min): 1 % / min

Project: Emerson Creek Wind Project Test Date: 1/24/2020 Type of Test: Q-Test

Sample No.: T-83 at 21 ft



	, ,	E <sub>50%</sub>				
0	5	10	)	15	20	0
		Ax	ial Straiı	n (%)		
	G: 1	(T) ( 1 C)	) C D	1 0		••



Initial Specimen Conditions				
Confining Pressure (psi)		16.0		
Avg. Diameter (in)	D <sub>o</sub>	2.83		
Avg. Height (in)	H <sub>o</sub>	5.66		
In-situ Water Content (%)	w <sub>o</sub>	18.4		
Total Unit Weight (pcf)	$\gamma_{total}$	136.1		
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	115.0		
Saturation (%)	$S_{r}$	100		
Void Ratio	e <sub>o</sub>	0.47		
Specific Gravity (Assumed)	$G_{s}$	2.70		

Stresses at Failure			
Maximum Deviator Stress (psi)	20.3		
Axial Strain at Failure (%)	15.0		
Axial Strain at 50% of $q_u$ , $\mathcal{E}_{50}$ (%)	5.0		
Total Stresses at Failure			
Major Principal Stress Corrected, $\sigma_{1C}(psi)$	36.3		
Minor Principal Stress, $\sigma_3$ (psi)	16.0		

Test Results	
Unconsolidated-Undrained Compressive	
Strength at Failure,	1.46
$\sigma_{1C}$ - $\sigma_3$ (tsf)	

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was taken to correspond to the deviator stress at 15 % axial strain.

Olga Vasquez, 02/04/20

Analysis & Quality Review/Date Specimen Prepared by: T.D.





## **Unconsolidated-Undrained Triaxial Compression Test Appendix**

Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2850

Specimen: T-83 at 21 ft Test Date: 01/24/20





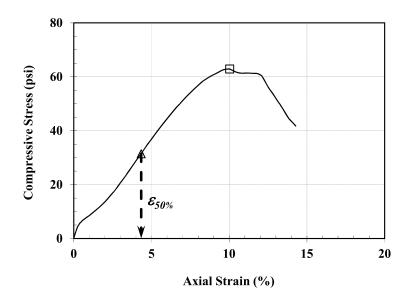




## **Unconfined Compression Test Report**

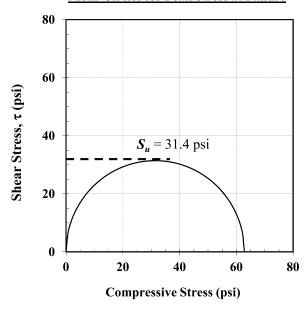
Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007 Type of Specimen: Shelby Tube Project: Emerson Creek Wind Project Test Method: ASTM D2166 Strain Rate (%/min): 1 % / min

Sample I.D.: T-65 at 24 ft Test Date: 6/26/2019



Initial Specimen Conditions				
Avg. Diameter (in)	$D_{o}$	2.84		
Avg. Height (in)	$H_{o}$	5.66		
In-situ Moisture Content (%)	w <sub>o</sub>	14.8		
Total Unit Weight (pcf)	$\gamma_{total}$	138.7		
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	120.8		
Saturation (%)	$S_{r}$	100		
Void Ratio	e <sub>o</sub>	0.40		
Specific Gravity (Assumed )	$G_s$	2.70		

#### Mohr Circles for Peak Stress at Failure



Stresses at Failure			
Unconfined Compressive Strength, $q_u$ (psi)	62.8		
Axial Strain at Failure (%)	10.0		
Axial Strain at 50 % of $q_u$ (%)	4.3		
<b>Total Stresses at Failure</b>			
Major Principal Stress, σ <sub>1</sub> (psi)	62.8		
Minor Principal Stress, σ <sub>3</sub> (psi)	0		
Undrained Shear Strength, $S_u$ (tsf)	2.26		

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Olga Vasquez, 07/22/19

Quality Review/Date

Specimen prepared & tested by: T.D.



## **Unconfined Compression Test Report**

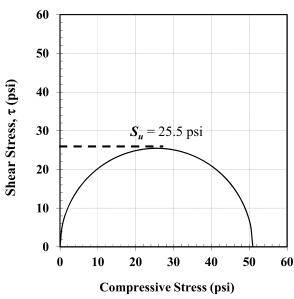
Client: RRC Power & Energy, LLC. RRC Project No.: MD1901007 Type of Specimen: Shelby Tube Project: Emerson Creek Wind Project Test Method: ASTM D2166 Strain Rate (%/min): 1 % / min

Sample I.D.: T-70 at 34 ft Test Date: 6/26/2019

	60	
Si)	50	
d) ssa.	40	
Compressive Stress (psi)	30	
mpress	20	
- C	10	ε <sub>50%</sub>
	0 -	0 5 10 15 20 25 30
	,	0 5 10 15 20 25 30  Axial Strain (%)

Initial Specimen Conditions				
Avg. Diameter (in)	$D_{o}$	2.84		
Avg. Height (in)	H <sub>o</sub>	5.67		
In-situ Moisture Content (%)	Wo	15.4		
Total Unit Weight (pcf)	$\gamma_{total}$	139.3		
Dry Unit Weight (pcf)	$\gamma_{\rm dry}$	120.7		
Saturation (%)	$S_{r}$	100		
Void Ratio	e <sub>o</sub>	0.40		
Specific Gravity (Assumed)	$G_s$	2.70		





Stresses at Failure		
Unconfined Compressive Strength, $q_u$ (psi)	50.9	
Axial Strain at Failure (%)	15.1	
Axial Strain at 50 % of $q_u$ (%)	5.8	
Total Stresses at Failure		
Major Principal Stress, σ <sub>1</sub> (psi)	50.9	
Minor Principal Stress, σ <sub>3</sub> (psi)	0	
Undrained Shear Strength, $S_u$ (tsf)	1.83	

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Olga Vasquez, 07/22/19

Quality Review/Date Specimen prepared & tested by: T.D.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-01 at 8 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	D <sub>o</sub>	1.78
Avg. Height (in)	$H_{o}$	4.09
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	168.4
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	14790.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-07 at 17 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.78
Avg. Height (in)	$H_{o}$	4.09
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	165.3
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	15260.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-20B at 15 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.76
Avg. Height (in)	$H_{o}$	4.11
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	165.7
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	12820.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method C

Sample I.D.: T25-B2 at 18ft Test Date: 9/8/2021

Type of Specimen: Intact Rock Core

Deformation Rate: 0.2 %/min



Initial Specimen Conditions		
Avg. Diameter (in)	D <sub>o</sub>	1.87
Avg. Height (in)	H <sub>o</sub>	4.71
As-Rcv'd Water Content (%)	w <sub>o</sub>	
Total Unit Weight (pcf)	γ <sub>total</sub>	174.4
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	



Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	14913
Axial Strain at Failure (%)	

HuaMiao Cao, P.E., 09/09/21

Quality Review/Date

Specimen prepared & tested by: A.P.G.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-30 at 21 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.84
Avg. Height (in)	$H_{o}$	4.15
In-situ Water Content (%)	w <sub>o</sub>	
Total Unit Weight (pcf)	$\gamma_{total}$	163.0
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	4960.0
Axial Strain at Failure (%)	-
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-34 at 12.5 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	D <sub>o</sub>	1.79
Avg. Height (in)	$H_{o}$	4.09
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	164.3
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	11790.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-36 at 16 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.87
Avg. Height (in)	$H_{o}$	4.08
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	148.2
Dry Unit Weight (pcf)	$\gamma_{dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	12800.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-43 at 16 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.87
Avg. Height (in)	$H_{o}$	4.09
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	174.7
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	15170.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-45B at 29 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	$D_{o}$	1.77
Avg. Height (in)	$H_{o}$	4.14
In-situ Water Content (%)	Wo	
Total Unit Weight (pcf)	$\gamma_{total}$	153.7
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	10200.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-75 at 13 ft Test Date: 7/8/2019

Initial Specimen Conditions		
Avg. Diameter (in)	D <sub>o</sub>	1.81
Avg. Height (in)	$H_{o}$	4.12
In-situ Water Content (%)	w <sub>o</sub>	
Total Unit Weight (pcf)	$\gamma_{total}$	182.7
Dry Unit Weight (pcf)	$\gamma_{ m dry}$	

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	22400.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



Client: RRC Power & Energy, LLC. BET Project No.: MD1901007 Type of Specimen: Intact Rock Core

Project: Emerson Creek Wind Project Test Method: ASTM D7012, Method D Deformation Rate: 0.5 % / min

Sample I.D.: T-87 at 12.5 ft Test Date: 7/8/2019

Initial Specimen Conditions				
Avg. Diameter (in)	$D_{o}$	1.78		
Avg. Height (in)	$H_{o}$	4.14		
In-situ Water Content (%)	Wo			
Total Unit Weight (pcf)	$\gamma_{total}$	168.3		
Dry Unit Weight (pcf)	$\gamma_{dry}$			

Stresses at Failure	
Uniaxial Compressive Strength, $\sigma_u$ (psi)	10890.0
Axial Strain at Failure (%)	
Axial Strain at 50% of $\sigma_u$ (%)	

Olga Vasquez, 07/23/19

Quality Review/Date

Specimen prepared & tested by: J.R.



RRC Power & Energy, LLC. Client: Project: **Emerson Creek Wind Project** 

Specimen: T-66 at 24 ft

Soil Specimen Properties	
Initial Specimen Water Content (%)	17.9
Final Specimen Water Content (%)	16.5
Initial Specimen Height (in)	0.902
Final Specimen Height (in)	0.853
Initial Dry Unit Weight, γ <sub>o</sub> (pcf)	113.1
Final Dry Unit Weight, γ <sub>f</sub> (pcf)	119.5
Initial Void Ratio, e <sub>o</sub>	0.479
Final Void Ratio, $e_f$	0.398
Initial Degree of Saturation (%)	100
Preconsolidation Pressure, p'c (psf)	4200
Seating Load (psf)	250

Beyond Project No.: MD1901007

Test Method: ASTM D2435, Method A

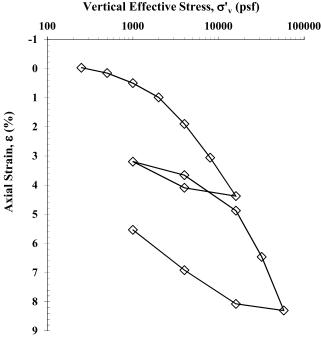
Test Date: 06/20/19

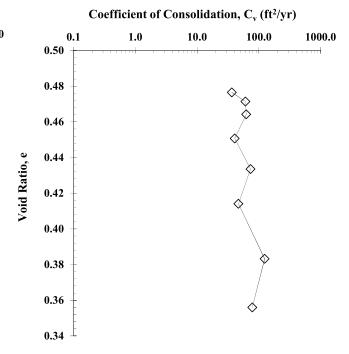
Specimen was trimmed using a trimming turntable. Specimen was inundated with tap water during testing. Coefficient of Consolidation was determined using the Log Time Method. Loading increment duration was 24 hours. The calculation was included the machine deflections that measured in each loading steps. G<sub>s</sub> assumed to be 2.68.

Preconsolidation pressure was determined by using the Casagrande construction technique. Compression Index, C<sub>c</sub> & Recompression Index, C<sub>r</sub> calculated in accordance with void ratio ( $\Delta e$ ).

Specimen Diameter: 2.497 inches

### Vertical Effective Stress, $\sigma'_v$ (psf)

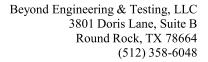




$\sigma'_{v}$ (psf)	250	500	1000	2000	4000	8000	16000	4000	1000	4000	16000
$C_v (ft^2/yr)$		36.49	60.49	62.59	40.55	73.14	46.71			64.90	148.80
Axial Strain (%)	-0.03	0.15	0.50	0.99	1.90	3.06	4.37	4.09	3.19	3.66	4.88
e	0.479	0.477	0.471	0.464	0.451	0.434	0.414	0.418	0.432	0.425	0.407

σ' <sub>v</sub> (psf)	32000	58000	16000	4000	1000
$C_v (ft^2/yr)$	123.83	78.34	-	-	
Axial Strain (%)	6.46	8.30	8.07	6.92	5.53
e	0.383	0.356	0.359	0.376	0.397

Compression Index, C<sub>c</sub> 0.103 Recompression Index, C<sub>r</sub>(1st Rebound) 0.015 Recompression Index, C<sub>r</sub> (2nd Rebound) 0.023



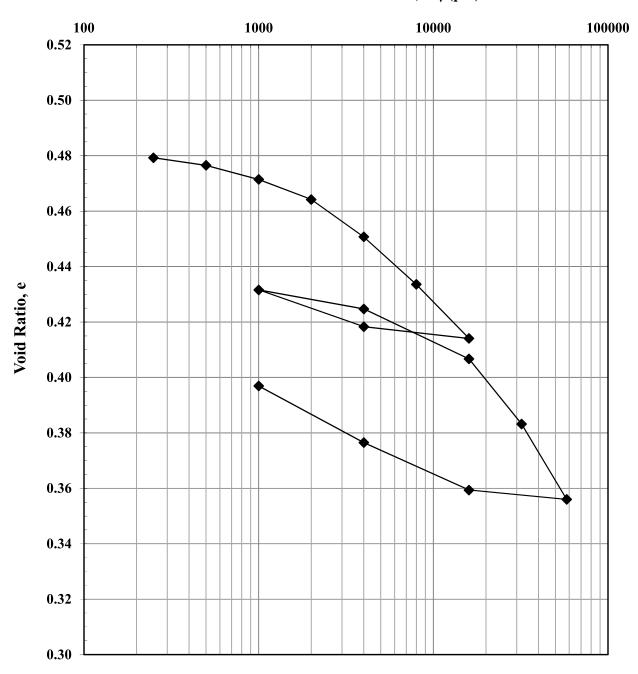


Client: RRC Power & Energy, LLC. Beyond Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2435, Method A

Specimen: T-66 at 24 ft Test Date: 06/20/19

### Vertical Effective Stress, σ', (psf)







Client: RRC Power & Energy, LLC. Beyond Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2435, Method A

Specimen: T-66 at 24 ft Test Date: 06/20/19





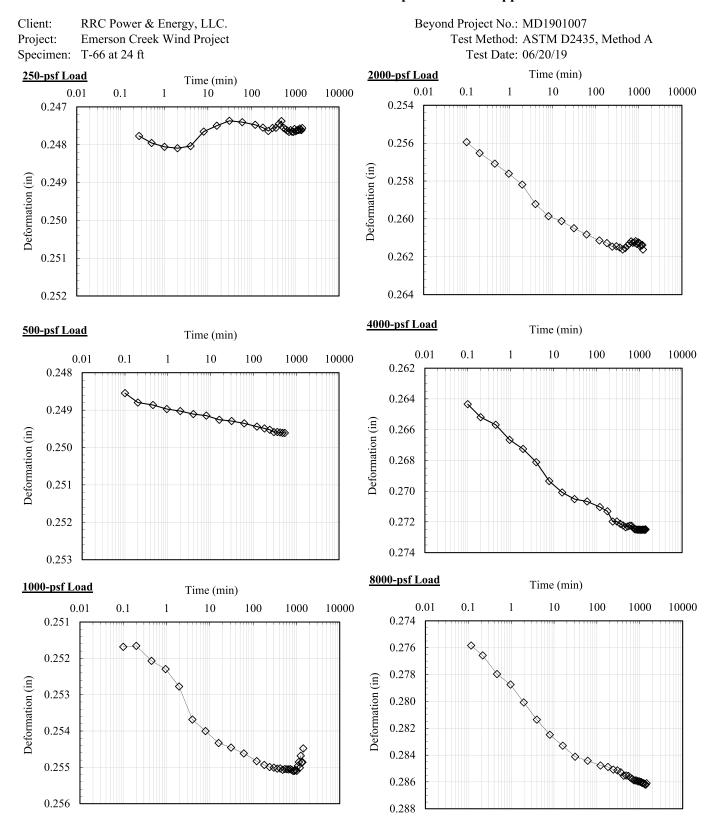


Cheng-Wei Chen, Ph.D. 07/11/19

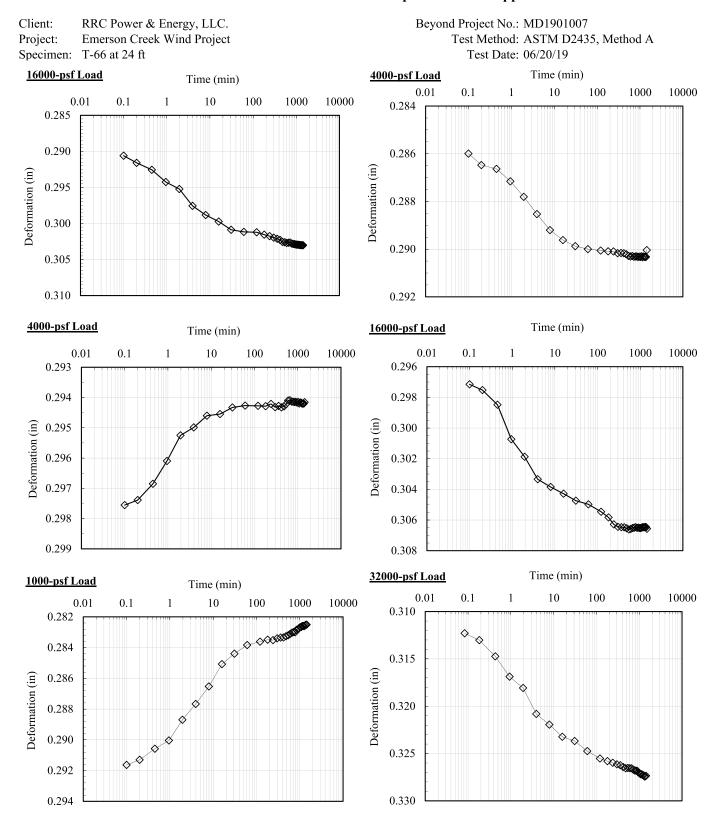
Quality Review/Date

Sample Prepared by: T.D.





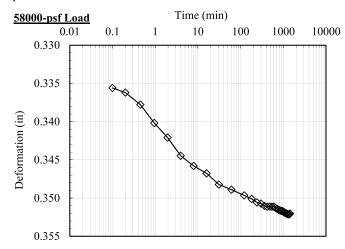


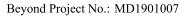




Client: RRC Power & Energy, LLC.
Project: Emerson Creek Wind Project

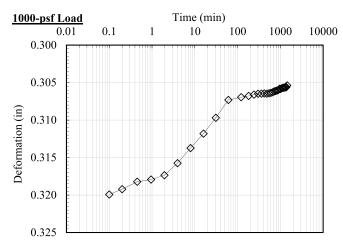
Specimen: T-66 at 24 ft

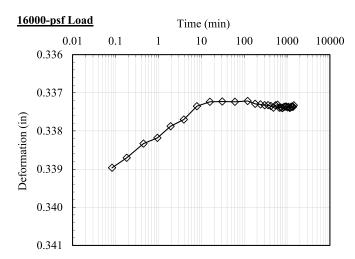


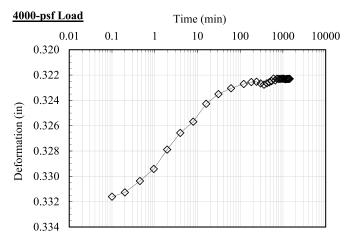


Test Method: ASTM D2435, Method A

Test Date: 06/20/19









Client: RRC Power & Energy, LLC.
Project: Emerson Creek Wind Project

Specimen: T-82 at 24 ft

Soil Specimen Properties	
Initial Specimen Water Content (%)	18.0
Final Specimen Water Content (%)	14.6
Initial Specimen Height (in)	0.897
Final Specimen Height (in)	0.832
Initial Dry Unit Weight, γ <sub>o</sub> (pcf)	111.9
Final Dry Unit Weight, γ <sub>f</sub> (pcf)	120.6
Initial Void Ratio, e <sub>o</sub>	0.495
Final Void Ratio, $e_f$	0.388
Initial Degree of Saturation (%)	97.4
Preconsolidation Pressure, p' <sub>c</sub> (psf)	2300
Seating Load (psf)	250

Beyond Project No.: MD1901007

Test Method: ASTM D2435, Method A

Test Date: 01/24/20

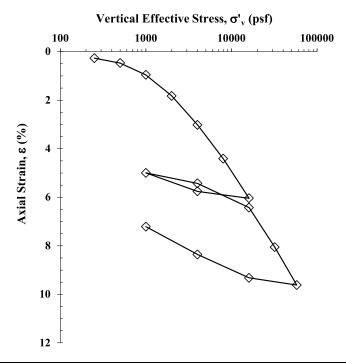
Specimen was trimmed using a trimming turntable. Specimen was inundated with tap water during testing. Coefficient of Consolidation was determined using the Log Time Method. Loading increment duration was 24 hours. The calculation was included the machine deflections that measured in each loading steps.  $G_s$  assumed to be 2.68.

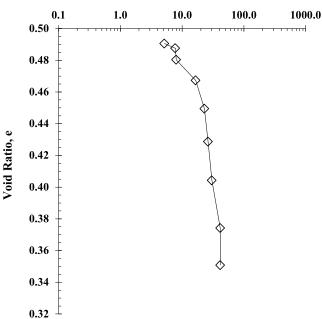
Preconsolidation pressure was determined by using the Casagrande construction technique.

Compression Index,  $C_c$  & Recompression Index,  $C_r$  calculated in accordance with void ratio ( $\Delta e$ ).

Coefficient of Consolidation, C<sub>v</sub> (ft<sup>2</sup>/yr)

Specimen Diameter: 2.499 inches

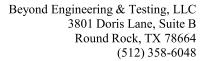




$\sigma'_{v}$ (psf)	250	500	1000	2000	4000	8000	16000	4000	1000	4000	16000
$C_v (ft^2/yr)$	5.15	7.75	8.00	16.53	22.93	26.27	30.18		-	36.06	125.37
Axial Strain (%)	0.27	0.47	0.96	1.83	3.02	4.41	6.04	5.76	5.00	5.43	6.43
e	0.491	0.488	0.480	0.467	0.449	0.429	0.404	0.409	0.420	0.413	0.399

σ' <sub>v</sub> (psf)	32000	58000	16000	4000	1000
$C_v (ft^2/yr)$	41.44	41.41	-	-	
Axial Strain (%)	8.06	9.62	9.32	8.36	7.21
e	0.374	0.351	0.355	0.370	0.387

 $Compression\ Index,\ C_c\ 0.097$  Recompression Index,  $C_r$  (1st Rebound) 0.013 Recompression Index,  $C_r$  (2nd Rebound) 0.020



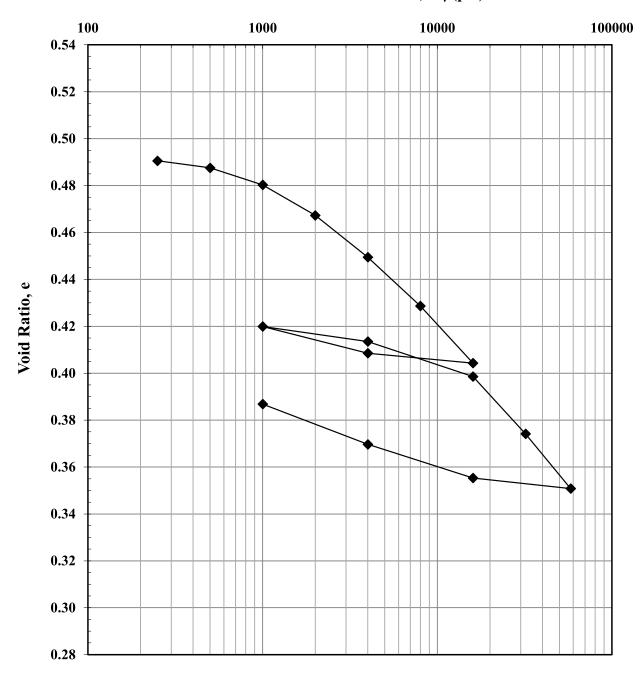


Client: RRC Power & Energy, LLC. Beyond Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2435, Method A

Specimen: T-82 at 24 ft Test Date: 01/24/20

### Vertical Effective Stress, σ', (psf)



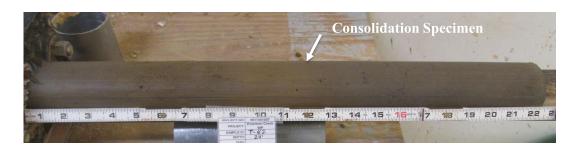




Client: RRC Power & Energy, LLC. Beyond Project No.: MD1901007

Project: Emerson Creek Wind Project Test Method: ASTM D2435, Method A

Specimen: T-82 at 24 ft Test Date: 01/24/20





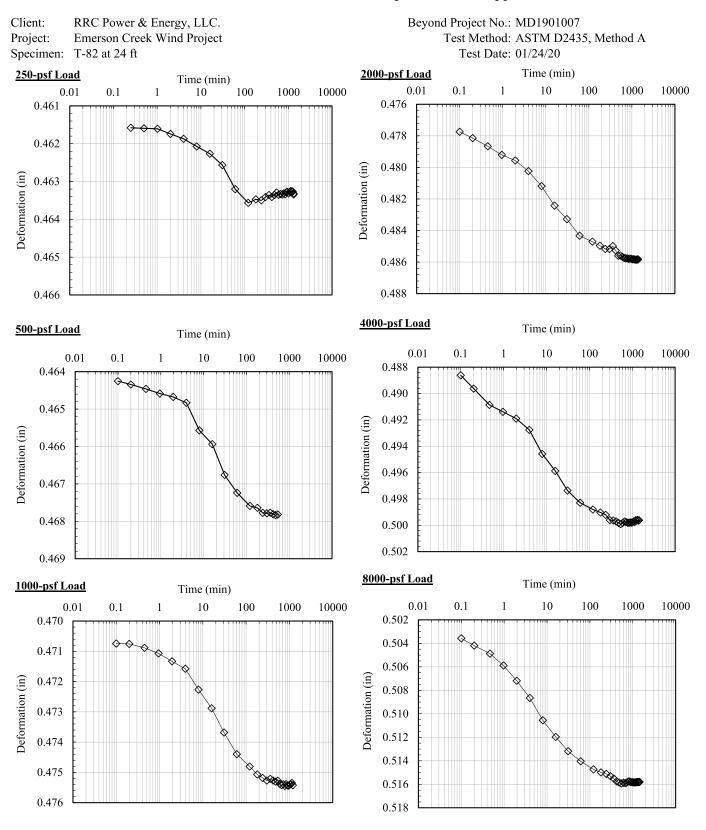


Cheng-Wei Chen, Ph.D. 02/19/20

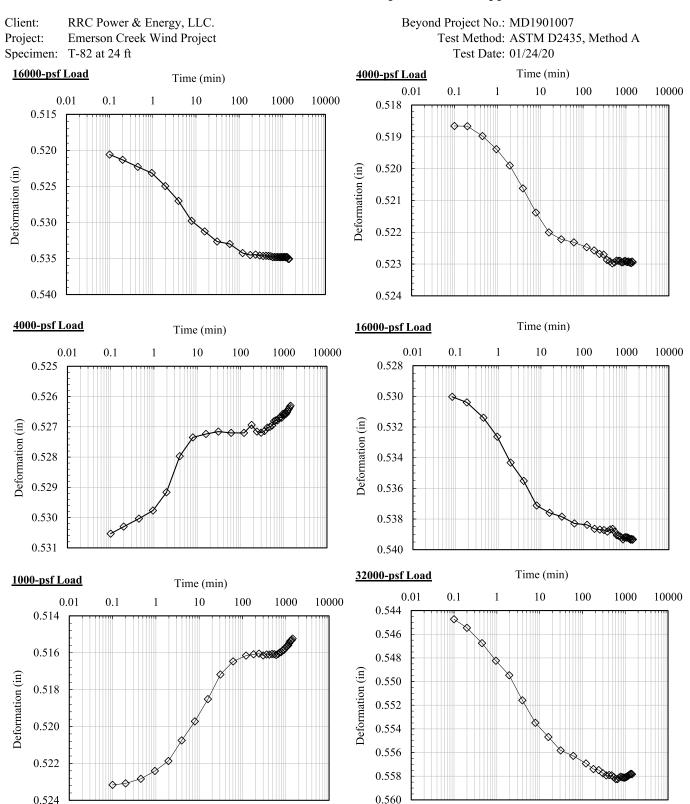
Quality Review/Date

Sample Prepared by: T.D.





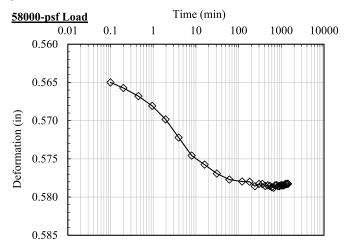


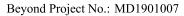




Client: RRC Power & Energy, LLC.
Project: Emerson Creek Wind Project

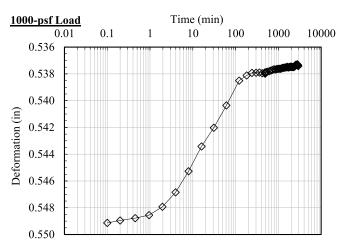
Specimen: T-82 at 24 ft

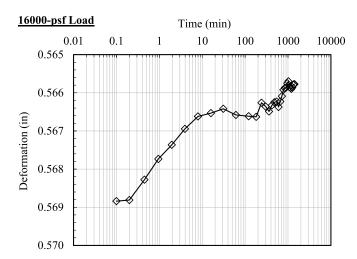


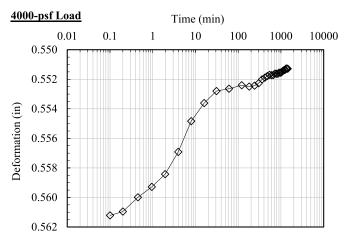


Test Method: ASTM D2435, Method A

Test Date: 01/24/20









### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007 Resistivity Meter: Humboldt, H-4385

Sample ID: T-06 at 1 ft. Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

Test Method: ASTM G51

Tested by: E.P.

Distilled Water Added (mL)	Measured Resistance (ohms)
20	6460
40	1830
60	2110
80	2300

Minimum Resistivity:	1830 ohm-cm
----------------------	-------------

### pH of Soil for Use in Corrosion Testing

As-received conditions: 7.52

Temp:	25.0 °C	pH Meter: Hanna Instruments
_		No. 99121
		Tamika Vasquez, 07/1/19
		Quality Review/Date



### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007

Sample ID: T-26 at 1 ft.

Resistivity Meter: Humboldt, H-4385

Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

Distilled Water Added (mL)	Measured Resistance (ohms)
20	5410
40	1480
60	1560
80	1760

Minimum Resistivity:	1480 ohm-cm
----------------------	-------------

### pH of Soil for Use in Corrosion Testing

As-received conditions:	7.43	Test Method: ASTM G51
Temp:	24.5 °C	pH Meter: Hanna Instruments
		No. 99121

Tamika Vasquez, 06/27/19

Quality Review/Date

Tested by: E.P.



### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007 Resistivity Meter: Humboldt, H-4385

Sample ID: T-45A at 4 ft. Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

Distilled Water Added (mL)	Measured Resistance (ohms)
20	7180
40	2290
60	2320
80	2450

Minimum Resistivity:	2290 ohm-cm
----------------------	-------------

### pH of Soil for Use in Corrosion Testing

As-received conditions:	7.59	Test Method: ASTM G51
Temp:	25.1 °C	pH Meter: Hanna Instruments
		No. 99121

Tamika Vasquez, 06/27/19

Quality Review/Date

Tested by: E.P.



### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007

Sample ID: T-54 at 1 ft.

Resistivity Meter: Humboldt, H-4385

Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

D' ('11 177 / A 11 1 / T)	M 1D 1 (1 )
Distilled Water Added (mL)	Measured Resistance (ohms)
20	5780
40	1530
60	1370
80	1700
100	1820

### pH of Soil for Use in Corrosion Testing

As-received conditions:	7.65	Test Method: ASTM G51
Temp:	25.7 °C	pH Meter: Hanna Instruments
_		No. 99121

Tamika Vasquez, 07/02/19

Quality Review/Date

Tested by: E.P.



### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007

Sample ID: T-66 at 1 ft.

Resistivity Meter: Humboldt, H-4385

Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

Distilled Water Added (mL)	Measured Resistance (ohms)
20	4980
40	2210
60	2030
80	2150
100	2210

Minimum Resistivity:	2030 ohm-cm	
----------------------	-------------	--

### pH of Soil for Use in Corrosion Testing

As-received conditions:	7.44	Test Method: ASTM G51
Temp:	23.7 °C	pH Meter: Hanna Instruments
-		No. 99121

Tamika Vasquez, 06/27/19

Quality Review/Date

Tested by: E.P.



### **Minimum Soil Resistivity**

Client: RRC Power & Energy, LLC
Project: Emerson Creek Wind Project
Test Method: ASTM G187
Test Date: 06/25/19

Project No.: MD1901007 Resistivity Meter: Humboldt, H-4385

Sample ID: Sub-1 at 1 ft. Calibrated Date: 8/20/2018

Multiplication Factor: 1.0

Distilled Water Added (mL)	Measured Resistance (ohms)
20	10100
40	2660
60	2740
80	2770

Minimum Resistivity:	2660 ohm-cm
----------------------	-------------

### pH of Soil for Use in Corrosion Testing

As-received conditions:	6.83	Test Method: ASTM G51
Temp:	25.3 °C	pH Meter: Hanna Instruments
_		No. 99121

Tamika Vasquez, 07/25/19

Quality Review/Date

Tested by: E.P.



Client: RRC Power & Energy, LLC RRC Project No.: MD1901007
Project: Emerson Creek Wind Project Testing Method: ASTM C1580

AASHTO T 291,

Method B

Test Date: 7/3/2019

No.	Sample ID & Depth	Sulfate Content (mg SO <sub>4</sub> /kg)	Chloride Content (mg/kg)
1	T-06 at 4 ft	20.9*	ND
2	T-26 at 4 ft	21.6*	ND
3	T-45A at 1 ft	111*	ND
4	T-54 at 4 ft	136*	13.6*
5	T-66 at 4 ft	48.0*	ND
6	Sub-1 at 4 ft	80.8*	ND
7			
8			
9			
10			

Note 1: Method Detection Limit (MDL) is 5 mg/L

Note 2: ND = No Detection, Below Method Detection Limit

Note 3: (\*) = Sample analyzed outside of recommended hold time.

The chloride and sulfate MDLs are volumetric. Results are mass per mass of dry soil.

Olga Vasquez, 07/03/19

Quality Review/Date Tested by: C.M.

Page 1 of 1



### **CBR** (California Bearing Ratio) Test

Client: RRC Power & Energy, LLC. Project: Emerson Creek Wind Project Sample No: TR-1 (T-63) at 2 to 4 ft

Test Method: ASTM D1883
Test Date: 5/13/2019
Rate of Penetration: 0.05 in/min

Beyond Project No.: MD1901007

# CBR for 0.100-in Penetration 5 4 3 2 1 0 85 90 95 100 105

**Dry Unit Weight (pcf)** 

	1	3	
•	2		
CBR	3		
	4		
	5		

Initial Conditions							
Specimen No.	1	2	3				
Target Dry Unit Weight (pcf)	92.6	97.8	100.8				
Condition of sample	soaked	soaked	soaked				
Surcharge Weight (lbs)	10	10	10				
Water Content (%)	21.3	21.3	21.7				
Dry Unit Weight (pcf)	92.7	97.5	100.6				
Final Conditions							
Water Content (%) at top 1-in layer after soaking	26.1	26.4	25.9				
Swell (% of initial height)	0.4	0.7	0.4				
Bearing Ratio of Sample at 0.100 in penetration	1.1	1.7	2.1				
Bearing Ratio of Sample at 0.200 in penetration	0.9	1.6	2.0				

Note: Soil specimens were remolded to a range of densities to develop the CBR versus dry density curve. It was allowed the specimens to soak for 96 hrs prior bearing test. Removed the free water and allow the specimens to drain out for 15 min. The 10-lbs surcharge load was placed during bearing test.

Olga Vasquez, 05/15/19

Analysis & Quality Review/Date Specimens prepared and tested by: R.N.



### **CBR** (California Bearing Ratio) Test

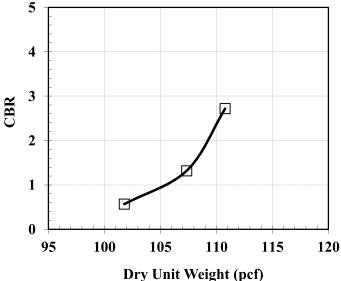
Client: RRC Power & Energy, LLC. Project: Emerson Creek Wind Project Sample No: TR-4 (T-08) at 2 to 4 ft

Test Date: 5/13/2019
Rate of Penetration: 0.05 in/min

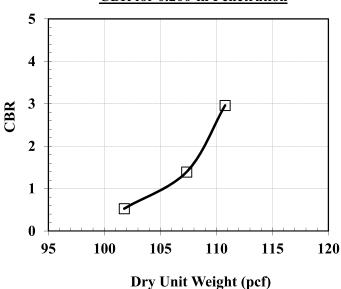
Beyond Project No.: MD1901007

Test Method: ASTM D1883

## CBR for 0.100-in Penetration



### **CBR** for 0.200-in Penetration



Initial Conditions						
Specimen No.	1	2	3			
Target Dry Unit Weight (pcf)	101.7	107.4	110.7			
Condition of sample	soaked	soaked	soaked			
Surcharge Weight (lbs)	10	10	10			
Water Content (%)	14.1	14.2	14.2			
Dry Unit Weight (pcf)	101.8	107.3	110.8			
Final Cone	ditions					
Water Content (%) at top 1-in layer after soaking	17.3	17.9	18.5			
Swell (% of initial height)	0.2	0.5	0.6			
Bearing Ratio of Sample at 0.100 in penetration	0.6	1.3	2.7			
Bearing Ratio of Sample at 0.200 in penetration	0.5	1.4	3.0			

Note: Soil specimens were remolded to a range of densities to develop the CBR versus dry density curve. It was allowed the specimens to soak for 96 hrs prior bearing test. Removed the free water and allow the specimens to drain out for 15 min. The 10-lbs surcharge load was placed during bearing test.

Olga Vasquez, 05/16/18

Analysis & Quality Review/Date Specimens prepared and tested by: R.N.



EYOND
Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Engineering & Testing Round Rock, TX 78664
Telephone: (512) 358-6048

RRC Power & Energy, LLC CLIENT: PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

T-63 at 39.0 ft. Sample ID: Date: 07/01/2019 Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 1 3/4 1/23/8 3 810 14 16 20 30 40 50 60 100 140 200 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10 0.001 0.01 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse PLClassification LL Ы Сс Cu 1.14 12.82 D60 %Gravel %Sand %Silt %Clay D100 D30 D10 9.5 1.345 0.401 0.105 9.3 82.2 8.5

### Cheng-Wei Chen, 07/01/2019

Analysis & Quality Review/Date



EYOND
Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Round Rock, TX 78664
Telephone: (512) 358-6048

CLIENT: RRC Power & Energy, LLC PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

Sample ID: TR-1 (T-63) at 2.0 ft. Date: 05/10/2019 Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 2 1.5 1 3/4 1/23/8 3 810 14 16 20 30 40 50 60 100 140 200 6 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10 0.01 0.001 **GRAIN SIZE IN MILLIMETERS** 

COBBLES	GRA	VEL	SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	SILT OR CLAT

Classification	LL	PL	PI	Сс	Cu
FAT CLAY with SAND(CH)	51	20	31		

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
9.5				0.2	15.7	84.1	

### Cheng-Wei Chen, 05/10/2019

Analysis & Quality Review/Date



19

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Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Round Rock, TX 78664
Telephone: (512) 358-6048

RRC Power & Energy, LLC CLIENT: PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

TR-2 (T-48) at 2.0 ft. Sample ID: Date: 05/10/2019 Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 1 3/4 1/23/8 3 4 6 810 14 16 20 30 40 50 60 100 140 200 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10 0.001 0.01 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine PLClassification Ы Сс Cu LL LEAN CLAY with SAND(CL) 41 19 22 D60 D30 %Gravel %Sand %Silt %Clay D100 D10

### Cheng-Wei Chen, 05/10/2019

77.6

Analysis & Quality Review/Date

Specimens prepared by: T.W.

3.2

19.2



EYOND
Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Engineering & Testing Round Rock, TX 78664
Telephone: (512) 358-6048

RRC Power & Energy, LLC CLIENT: PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

TR-3 at 2.0 ft. Sample ID: Date: 05/10/2019 Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 3/4 1/23/8 3 810 14 16 20 30 40 50 60 100 140 200 4 6 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10 0.001 0.01 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine PLClassification LL Ы Сс Cu LEAN CLAY with SAND(CL) 37 19 18 D60 D30 %Gravel %Sand %Silt %Clay D100 D10 25 4.5 18.5 77.0

### Cheng-Wei Chen, 05/10/2019

Analysis & Quality Review/Date

Date: 05/10/2019



Sample ID:

TR-4 (T-08) at 2.0 ft.

EYOND
Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Round Rock, TX 78664
Telephone: (512) 358-6048

CLIENT: RRC Power & Energy, LLC PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 1 3/4 1/23/8 3 4 6 810 14 16 20 30 40 50 60 100 140 200 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10

### **GRAIN SIZE IN MILLIMETERS**

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	SILT OR CLAT

Classification	LL	PL	PI	Сс	Cu
SANDY LEAN CLAY(CL)	27	16	11		

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
25				8.3	23.3	68.4	

### Cheng-Wei Chen, 05/10/2019

0.01

0.001

Analysis & Quality Review/Date



EYOND
Beyond Engineering & Testing, LLC 3801 Doris Lane, Suite B
Engineering & Testing Round Rock, TX 78664
Telephone: (512) 358-6048

RRC Power & Energy, LLC CLIENT: PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

NUMBER: MD1901007

TR-5 (SUB) at 2.0 ft. Sample ID: Date: 05/10/2019 Test Method: ASTM D6913 U.S. SIEVE OPENING IN INCHES 1 U.S. SIEVE NUMBERS **HYDROMETER** 2 1.5 1 3/4 1/23/8 3 4 6 810 14 16 20 30 40 50 60 100 140 200 100 90 80 PERCENT FINER BY WEIGHT 70 60 50 40 30 20 10 0.001 0.01 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine Classification LL PLЫ Сс Cu LEAN CLAY with SAND(CL) 46 19 27 D60 D30 %Gravel %Sand %Silt %Clay D100 D10 9.5 1.3 16.1 82.6

### Cheng-Wei Chen, 05/10/2019

Analysis & Quality Review/Date

## RRC

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

ergy, LLC sing Rd, Suite 120 78681 992-2087

CLIENT: Apex Clean Energy, Inc PROJECT: Emerson Creek Wind Project LOCATION: Erie and Huron Counties, OH

SUMMARY OF LABORATORY RESULTS

LOCATION: Erie and Huron Counties, OH NUMBER: MD1901007

Minimum Resistivity (ohm-cm)									1,830																						
Ŧ.									7.5																						
Sulfates (%/weight)										0.0021																					
Chlorides (%/weight)										QN																					
Confining Pressure (psi)		0.0												0.0																	
Strain at Failure (%)																															
Compressive Strength (tsf)		1064.88												1098.72																	
₫																				∞											
4																				16											
1																				24											
^ No. 200 (%)																				72											
Dry Unit Weight (pcf)		168												165																	
Water Content (%)	32		40	10	4	30	3	2	17	13	12	19	13		18	11	11	17	13	10	25	13	21	18	12	21	16	28	19	11	16
nscs																				CL											
Depth (ft)	1.0	8.0	1.0	4.0	9.0	1.0	7.0	14.0	1.0	4.0	7.0	1.0	4.0	17.0	1.0	4.0	7.0	4.0	7.0	9.0	4.0	7.0	1.0	4.0	12.0	1.0	7.0	1.0	7.0	9.0	14.0
Borehole	T-01	T-01	T-03	T-03	T-03	T-04	T-04	T-04	1-06	1-06	1-06	T-07	T-07	T-07	T-08	T-08	T-08	T-09	60-T	T-09	T-10a	T-10a	T-11	T-11	T-11	T-12	T-12	T-13	T-13	T-13	T-13

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 1 OF 10

RRC Power & Energy, LLC 810 Hesters Crossing Rd, Suite 120 Round Rock, TX 78681 Telephone: (512) 992-2087

**Emerson Creek Wind Project** Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH LOCATION:

MD1901007 NUMBER:

_																															
Minimum Resistivity (ohm-cm)																															
Hd																															
Sulfates (%/weight)																															
Chlorides (%/weight)																															
Confining Pressure (psi)																								0.0							
Strain at Failure (%)																															
Compressive Strength (tsf)																								923.04							
۵													10																		
చ													18																		
=													28																		
No. 200 (%)													65																		
Dry Unit Weight (pcf)																								166							
Water Content (%)	22	26	13	16	15	10	24	16	11	2	26	41	1	14	9	10	16	17	15	6	6	21	4		24	24	17	30	12	25	9
nscs													占																		
Depth (ft)	4.0	7.0	19.0	1.0	4.0	14.0	1.0	4.0	9.0	29.0	4.0	9.0	24.0	4.0	9.0	14.0	34.0	1.0	7.0	12.0	24.0	1.0	4.0	15.0	1.0	1.0	4.0	9.0	14.0	1.0	7.0
Borehole	T-14	T-14	T-14	T-15	T-15	T-15	T-16	T-16	T-16	T-16	T-17	T-17	T-17	T-18	T-18	T-18	T-18	T-19	T-19	T-19	T-19	T-20	T-20	T-20	T-21	T-22	T-22	T-22	T-22	T-23	T-23

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 2 OF 10

**Emerson Creek Wind Project** Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH LOCATION:

MD1901007	
NUMBER:	

To by Unit		Γ	Π						_	_		ı						1 1				_							_	_	
Dry Unit (pc)         *No. (%)         LI         PI         PI         Strength (Fallure Strength (Pallure))         Strength (Pallure)         Strength (Pallure)         Strength (Pallure)         Strength (Pallure)         PI																						1,480									Minimum Resistivity (ohm-cm)
Dry Unit (%)          LL (%)         PL (Streigh) (%)         Streigh (%)         Compressive (%)         Streigh (%)         Chordes (%)           Weight (%)         (%) <td></td> <td>7.4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Hd</td>																						7.4									Hd
Dry Unit         < No.         LL         PL         Pl         Compressive (tsf)         Strain (tsf)         Confining and the plant (tsf)           Weight (ccf)         (%)         (15)         (%)																					0.0022										Sulfates (%/weight)
Dry Unit																					Q										Chlorides (%/weight)
Dry Unit (%) LL PL PL PI Compressive (rest) (%) LL PL					0.0																			0.0							Confining Pressure (psi)
Dry Unit 200 LL PL																															Strain at Failure (%)
Dry Unit < No. Weight 2000 LL PL PL (pcf) (200					357.12																			1073.74							Compressive Strength (tsf)
Dry Unit < No. Weight 200 LL (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)													10																		Б
Dry Unit													15																		PL
Meight (pcf) 174 174 163													25																		П
													06																		< No. 200 (%)
					163																			174							Dry Unit Weight (pcf)
Contact Contac	1 2 1	20	6	20		6	23	17	16	25	11	13	6	21	19	21	19	3	20	5	31	27	18		17	20	17	18	35	15	Water Content (%)
SSS													ე																		nscs
Depth (ft) (1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	24.0	15.0	9.0	4.0	21.0	7.0	1.0	19.0	9.0	4.0	14.0	12.0	9.0	4.0	1.0	1.0	7.0	9.0	4.0	14.0	4.0	1.0	7.0	18.0	4.0	1.0	9.0	1.0	4.0	1.0	Depth (ft)
Borehole T-24 T-24 T-25 T-25 T-25-B1 T-25-B2 T-25-B2 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B1 T-26-B2 T-26 T-26-B1 T-26-B1 T-26-B1 T-26-B2 T-26-B1 T-26-B1 T-26 T-26-B1 T-26-B1 T-26-B2 T-26-B1 T-26-B2 T-26-B1		T-31	T-31	T-31	T-30	T-30	T-30	T-29	T-29	T-29	T-28	T-28	T-28	T-28	T-28	T-27	T-26-B3	T-26-B2	T-26-B1	T-26	T-26	T-26	T-25-B3	T-25-B2	T-25-B2	T-25-B1	T-25	T-25	T-24	T-24	Borehole

Not Detected; D Diluted; \*Denotes Total Unit Weight

PAGE 3 OF 10

**Emerson Creek Wind Project** Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH LOCATION:

MD1901007 NUMBER:

Borehole (ff	Depth (ft)	nscs	Water Content (%)	Dry Unit Weight (pcf)	No. 200 (%)	4	귑	₫	Compressive Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (%/weight)	Sulfates (%/weight)	Æ	Minimum Resistivity (ohm-cm)
T-32 7.	7.0		12												
T-32 19	19.0		7												
	1.0		20												
	7.0	SC-SM	25		49	22	15	7							
T-33 12	12.0		6												
	12.5			164					848.88		0.0				
T-35 1.	1.0		24												
T-35 4.	4.0		17												
T-35 7.	7.0		16												
T-36 1.	1.0		25												
T-36 4.	4.0		23												
	9.0		17												
T-36 16	16.0			148					921.60		0.0				
T-37 1.	1.0		17												
T-37 4.	4.0		_												
T-39 4.	4.0		15												
T-39 9.	9.0		15												
T-39 14	14.0		17												
T-40 1.	1.0		20												
T-40 4.	4.0		18												
T-40 7.	7.0		11												
T-41 1.	1.0		22												
T-41 4.	4.0		13												
T-41 9.	0.6		11												
T-42 4.	4.0		58												
T-42   12	12.0		20												
T-42 14	14.0		26												
T-43 1.	1.0		19												
T-43   16	16.0			175					1092.24		0.0				
T-44 1.	1.0		14												
T-44 4.	4.0		15												
Not Detected: D Diluted:	ted:														

Not Detected; D Diluted; \*Denotes Total Unit Weight

PAGE 4 OF 10

**Emerson Creek Wind Project** Apex Clean Energy, Inc LOCATION: PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH MD1901007 NUMBER:

Minimum Resistivity (ohm-cm)			2,290																												
Hd			9.7																												
Sulfates (%/weight)		0.0111																													
Chlorides (%/weight)		QN																													
Confining Pressure (psi)					0.0																										
Strain at Failure (%)																															
Compressive Strength (tsf)					734.40																										
₫																								11							
చ																								16							
4																								22							
No. 200 (%)																								29							
Dry Unit Weight (pcf)					154																										
Water Content (%)	10	20	15	11		39	10	17	14	13	6	16	14	18	13	16	13	16	17	17	14	16	15	14	1	23	22	14	23	12	14
nscs																								CF							
Depth (ft)	9.0	1.0	4.0	0.6	29.0	1.0	7.0	14.0	4.0	9.0	12.0	4.0	9.0	19.0	4.0	9.0	14.0	1.0	7.0	12.0	14.0	4.0	9.0	12.0	19.0	1.0	4.0	12.0	1.0	7.0	14.0
Borehole	T-44	T-45A	T-45A	T-45A	T-45B	T-46	T-46	T-46	T-47	T-47	T-47	T-48	T-48	T-48	T-49	T-49	T-49	T-50	T-50	T-50	T-50	T-51	T-51	T-51	T-51	T-52	T-52	T-52	T-53	T-53	T-53

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 5 OF 10

**Emerson Creek Wind Project** Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH MD1901007 LOCATION: NUMBER:

Borehole	Depth (ft)	nscs	Water Content (%)	Dry Unit Weight (pcf)	No. 200 (%)	4	귑	₫	Compressive Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (%/weight)	Sulfates (%/weight)	FQ.	Minimum Resistivity (ohm-cm)
T-53	19.0		19												
T-54	1.0		19											7.7	1,370
T-54	4.0		16									0.0014	0.0136		
T-54	9.0		17												
T-54	14.0		13												
T-54	24.0		10												
T-56	7.0		15												
T-56	12.0		15												
T-56	19.0		7												
T-56	29.0		13												
T-57a	1.0		16												
T-57a	14.0		21												
T-58	1.0		23												
T-58	4.0		21												
T-58	9.0		13												
T-58	12.0	CL	15	121	80	29	15	14	2.05	15.0	9.2				
L-58	14.0		17												
T-58	19.0		15												
T-58	39.0		7												
T-59a	14.0		6												
T-60	4.0		17												
1-60	9.0		17												
09-L	12.0		16												
1-60	24.0		19												
T-61	9.0	70	16		74	31	16	15							
T-61	24.0		19												
T-62	1.0		16												
T-62	7.0		15												
T-62	12.0		15												
T-62	19.0		16												
T-62	29.0		28		96										
	-														

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 6 OF 10

**Emerson Creek Wind Project** Erie and Huron Counties, OH Apex Clean Energy, Inc LOCATION: PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

MD1901007 NUMBER:

Minimum Resistivity (ohm-cm)										2,030																					
Hd.										7.4																					
Sulfates (%/weight)											0.0048																				
Chlorides (%/weight)											Q																				
Confining Pressure (psi)									0.0						19.0																0.0
Strain at Failure (%)									10.0						14.9																15.1
Compressive Strength (tsf)									4.52						2.77																3.66
۵					=									15	12											6					
4					15									16	17											17					
=======================================					26									31	58											26					
^ No. 200 (%)			6											77	91											75					
Dry Unit Weight (pcf)									121						117																121
Water Content (%)	17	17	15	18	15	16	17	17	15	22	20	18	14	18	17	23	14	19	16	14	13	17	20	16	19	16	14	15	16	17	15
nscs														占	CF											ر ا					
Depth (ft)	7.0	19.0	39.0	1.0	14.0	1.0	9.0	14.0	24.0	1.0	4.0	12.0	14.0	19.0	24.0	29.0	19.0	24.0	4.0	9.0	12.0	24.0	4.0	12.0	14.0	29.0	1.0	7.0	12.0	24.0	34.0
Borehole	T-63	T-63	L-63	T-64a	T-64a	T-65	T-65	T-65	T-65	99-1	99-L	1-66	1-66	99-1	99-L	1-66	L-67	L-67	L-68	T-68	L-68	L-68	69-L	69-L	69-L	69-L	T-70	T-70	T-70	T-70	1-70

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 7 OF 10

**Emerson Creek Wind Project** Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

Erie and Huron Counties, OH MD1901007 LOCATION: NUMBER:

Borehole	Depth (ft)	SOSO	Water Content (%)	Dry Unit Weight (pcf)	< No. 200 (%)	1	P.	₫	Compressive Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (%/weight)	Sulfates (%/weight)	Æ	Minimum Resistivity (ohm-cm)
T-71a	1.0		17												
T-71a	0.6		16												
T-71a	19.0	CL-ML	18		93	22	16	9							
T-72	1.0		25												
T-72	7.0		14												
T-73	1.0		17												
T-73	7.0		-												
T-74	4.0		22												
T-74	9.0		17												
1-75	4.0		19												
T-75	9.0		16												
T-75	13.0			183					1612.80		0.0				
T-75-B1	4.0		22												
T-75-B2	1.0		19												
T-75-B3	7.0		10												
T-76	4.0		16												
1-76	9.0		10												
T-76	12.0		4												
L-77	4.0		15												
T-77	7.0		14												
T-77	14.0		6												
T-78a	9.0		17												
T-79	4.0		15												
T-79	9.0		16												
T-79	14.0		16												
T-79	24.0		24												
T-80	1.0		16												
T-80	9.0		17												
T-80	14.0		16												
T-80	19.0		22												
T-80	29.0		16												

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight

PAGE 8 OF 10

Apex Clean Energy, Inc PROJECT: CLIENT:

SUMMARY OF LABORATORY RESULTS

**Emerson Creek Wind Project** Erie and Huron Counties, OH LOCATION:

MD1901007 NUMBER:

Minimum Resistivity (ohm-cm)																		2,660													
Hd																		6.8													
Sulfates (%/weight)																			0.0081												
Chlorides (%/weight)																			ND												
Confining Pressure (psi)									19.0				16.0				0.0														
Strain at Failure (%)									15.0				15.0																		
Compressive Strength (tsf)									1.48				1.46				784.08														
₫									12				13							23					37						
Д.									16				16							20					22						
TI I									28				59							43					26						
< No. 200 (%)									83				68							83					66						
Dry Unit Weight (pcf)									110				115				168														
Water Content (%)	16	16	17	17	18	22	18	19	21	13	16	18	18	21	18	20		31	17	23	8	28	30	4	32	8	15	15	6	17	22
nscs									CL				CL							CL					СН						
Depth (ft)	4.0	7.0	12.0	19.0	39.0	1.0	7.0	19.0	24.0	39.0	1.0	9.0	21.0	29.0	1.0	4.0	12.5	1.0	4.0	4.0	0.9	1.0	4.0	9.0	4.0	7.0	4.0	7.0	9.0	20.0	1.0
Borehole	T-81	T-81	T-81	T-81	T-81	T-82	T-82	T-82	T-82	T-82	L-83	£8-L	£8-1	T-83	L-87	<b>18-1</b>	<b>/8-1</b>	SUB-1	SUB-1	SUB-3	SUB-3	OM1	OM1	OM1	OMZ	OM2	T-10	T-10	T-10	T-10	T-57

Not Detected; D Diluted; \*Denotes Total Unit Weight

PAGE 9 OF 10

Apex Clean Energy, Inc CLIENT:

SUMMARY OF LABORATORY RESULTS

**Emerson Creek Wind Project** Erie and Huron Counties, OH LOCATION: PROJECT:

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	Minimum Resistivity (ohm-cm)																
	Hd																
	Sulfates (%/weight)																
	Chlorides (%/weight)																
	Confining Pressure (psi)																
	Strain at Failure (%)																
	Compressive Strength (tsf)																
	۵																
	Д.																
	TI II																
	< No. 200 (%)																
	Dry Unit Weight (pcf)																
	Water Content (%)	16	15	6	17	12	19	16	16	16	19	15	16	16	25	17	14
	nscs																
	Depth (ft)	7.0	12.0	19.0	4.0	9.0	24.0	4.0	9.0	14.0	24.0	4.0	9.0	19.0	1.0	7.0	14.0
	Borehole	T-57	T-57	T-57	T-59	T-59	T-59	T-64	T-64	T-64	T-64	T-71	T-71	T-71	T-78	T-78	T-78
_																	_

PAGE 10 OF 10

**ND** Not Detected; **D** Diluted; \*Denotes Total Unit Weight



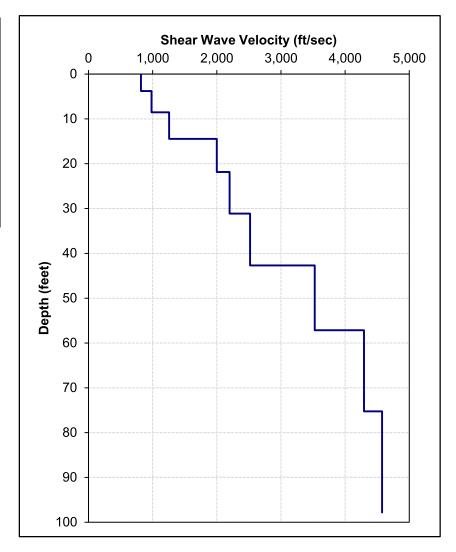


3801 Doris Lane Round Rock, TX 78664 512.992.2087

# **APPENDIX C**



	Shear Wave
Depth	Velocity
(ft)	(ft/sec)
3.8	819
8.5	982
14.5	1,258
21.9	1,999
31.1	2,199
42.7	2,519
57.2	3,527
75.2	4,294
97.8	4,578



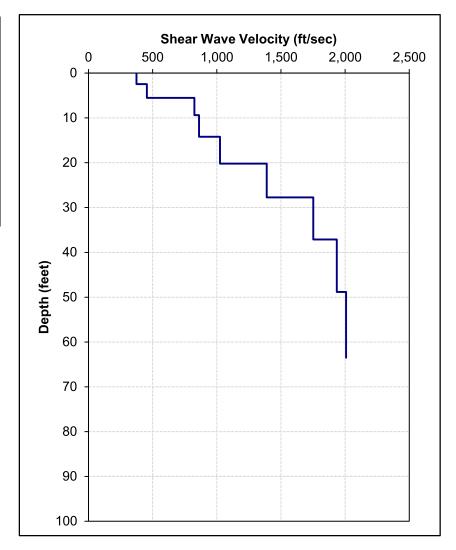
# Note:

- 1. Data collected on January 20, 2020
- 2. SurfSeis v. 4.2.4.5 computer software developed by Kansas Geological Survey was used to process the field data.





Depth	Shear Wave Velocity
(ft)	(ft/sec)
2.5	374
5.5	456
9.4	826
14.2	862
20.2	1,025
27.7	1,389
37.1	1,752
48.8	1,935
63.5	2,008



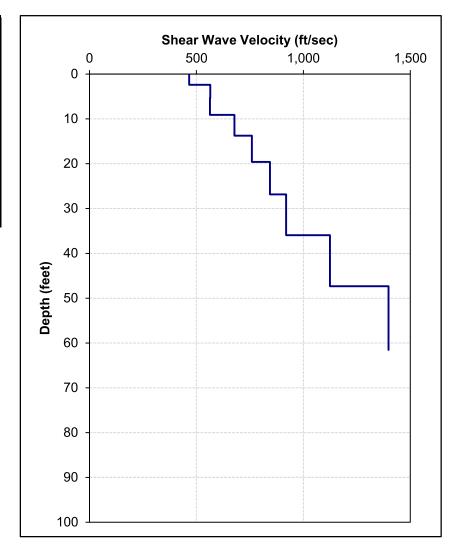
# Note:

- 1. Data collected on January 20, 2020
- 2. SurfSeis v. 4.2.4.5 computer software developed by Kansas Geological Survey was used to process the field data.





Depth	Shear Wave Velocity
(ft)	(ft/sec)
2.4	466
5.4	565
9.1	563
13.8	678
19.6	760
26.9	844
36.0	920
47.3	1,124
61.6	1,399



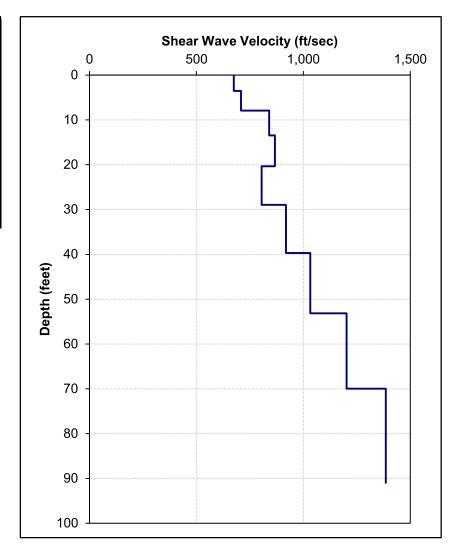
### Note:

- 1. Data collected on January 20, 2020
- 2. SurfSeis v. 4.2.4.5 computer software developed by Kansas Geological Survey was used to process the field data.





Depth	Shear Wave Velocity
(ft)	(ft/sec)
3.5	675
7.9	708
13.4	840
20.3	867
28.9	805
39.7	919
53.2	1,033
70.0	1,203
91.0	1,386



# Note:

- 1. Data collected on January 21, 2020
- 2. SurfSeis v. 4.2.4.5 computer software developed by Kansas Geological Survey was used to process the field data.



### SOIL RESISTIVITY MEASURMENT DATA SHEET

Survey ID ER T-15 DATE 1/22/2020

CLIENT Apex Clean Energy, Inc **PROJECT** Emerson Creek Wind Project Project No. MD1901007

LOCATION: Erie and Huron Counties, OH

LATITUDE : 41.303032 **LONGITUDE**: -82.68839

WEATHER: Parlty Cloudy

TOP SOIL: Lean Clay(CL), With Sand, Light Brown, Dry

TYPE OF TEST: Wenner 4-Pin Method **EQUIPMENT:** AEMC Ground Resistane Tester

SERIAL NO. 257543JJDV MODEL: 4630

CALIBRATION DUE DATE: 7/8/2020

**TEST PERFORMED BY: RRC** 

Temp. (°F) 23°F

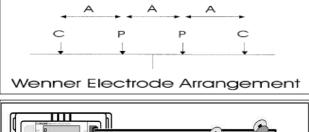
**TEST SET RANGE** 

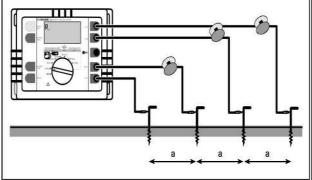
Meter Current: 1mA - 10mA

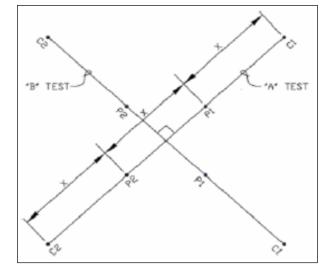
Meter Resistance: 1cOhm - 1.999 kOhm

					APPARENT	ELECTRICAL F	RESISTIVITY		
PROB	PROBE C DEPTH	PROBE P DEPTH	E-	-w	N	-S			
Spacing (ft)	(Inches)	(Inches)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Average Soil Resistivity (Ωm)
2.5	4	2	31.500	150.74	38.400	183.76			167.25
5	4	2	25.000	239.27	25.900	247.88			243.57
10	12	6	14.740	282.14	15.390	294.59			288.37
20	12+	6	5.990	229.31	6.370	243.86			236.59
40	12+	6	1.850	141.65	1.810	138.58			140.12
60	12+	6	0.960	110.25	0.940	107.96			109.11

Notes:





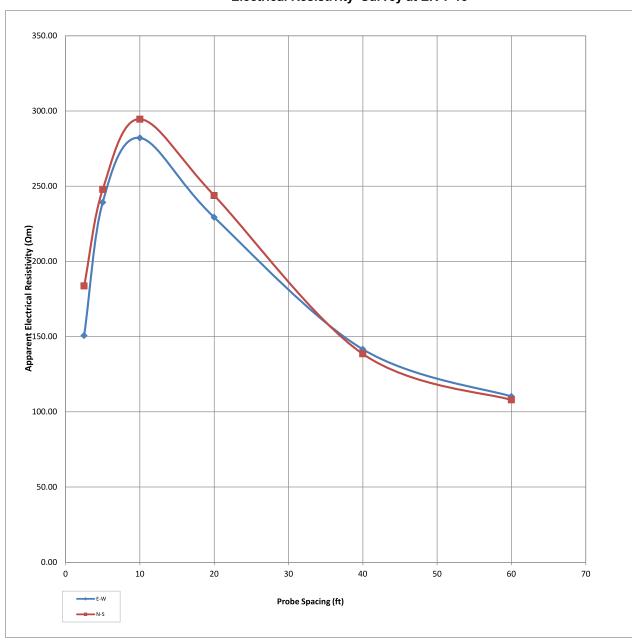


General Sketch of the test set up.

Total Array length is 3 times the probe spacing. The Apparent resistivity is calculated using the following equation: r=2\*p\*R\*spacing\*0.3048, where last item converts feet to meters. Wenner Array surveys were performed generally in accordance with IEEE std 81-2012 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System." and ASTM G-57.



# Emerson Creek Wind Project Electrical Resistivity Survey at ER T-15





### SOIL RESISTIVITY MEASURMENT DATA SHEET

Survey ID ER T-42 DATE 1/22/2020

CLIENT Apex Clean Energy, Inc **PROJECT** Emerson Creek Wind Project

LOCATION: Erie and Huron Counties, OH

LATITUDE : 41.200378 **LONGITUDE**: -82.777286

WEATHER: Parlty Cloudy

TOP SOIL: Lean Clay(CL), With Sand, Light Brown, Dry TYPE OF TEST: Wenner 4-Pin Method

**EQUIPMENT:** AEMC Ground Resistane Tester

SERIAL NO. 257543JJDV MODEL: 4630

CALIBRATION DUE DATE: 7/8/2020

**TEST PERFORMED BY: RRC** 

Project No. MD1901007

Temp. (°F) 23°F

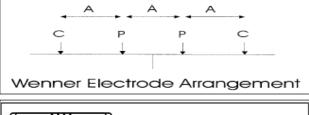
**TEST SET RANGE** 

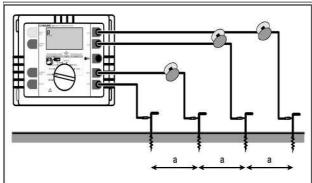
Meter Current: 1mA - 10mA

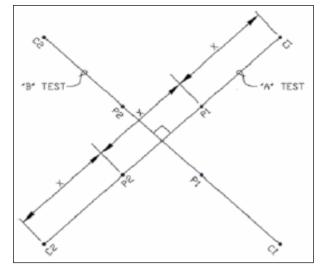
Meter Resistance: 1cOhm - 1.999 kOhm

					APPARENT	ELECTRICAL F	RESISTIVITY		
PROB	PROBE C DEPTH	PROBE P DEPTH	E-	-w	N	-S			
Spacing (ft)	(Inches)	(Inches)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Average Soil Resistivity (Ωm)
2.5	4	2	10.110	48.38	10.070	48.19			48.28
5	4	2	5.900	56.47	5.900	56.47			56.47
10	12	6	3.840	73.50	3.780	72.35			72.93
20	12+	6	2.760	105.66	2.710	103.75			104.70
40	12+	6	1.840	140.88	1.860	142.41			141.65
60	12+	6	1.280	147.01	1.330	152.75			149.88

Notes:





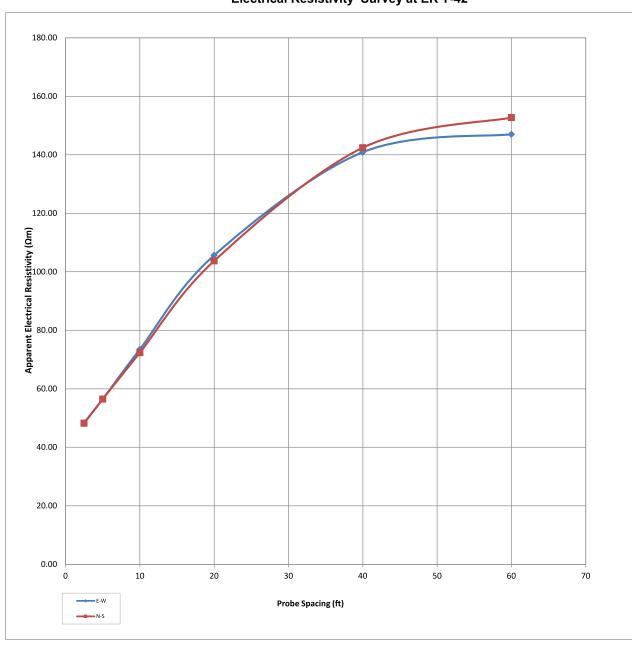


General Sketch of the test set up.

Total Array length is 3 times the probe spacing. The Apparent resistivity is calculated using the following equation: r=2\*p\*R\*spacing\*0.3048, where last item converts feet to meters. Wenner Array surveys were performed generally in accordance with IEEE std 81-2012 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System." and ASTM G-57.



# Emerson Creek Wind Project Electrical Resistivity Survey at ER T-42





### SOIL RESISTIVITY MEASURMENT DATA SHEET

Survey ID ER T-53 DATE 1/21/2020

CLIENT Apex Clean Energy, Inc **PROJECT** Emerson Creek Wind Project Project No.

LOCATION: Erie and Huron Counties, OH

LATITUDE : 41.138747 LONGITUDE: -82.832547

WEATHER: Parlty Cloudy TOP SOIL:

Lean Clay(CL), With Sand, Light Brown, Dry TYPE OF TEST: Wenner 4-Pin Method

**EQUIPMENT:** AEMC Ground Resistane Tester

SERIAL NO. 257543JJDV MODEL: 4630

CALIBRATION DUE DATE: 7/8/2020

**TEST PERFORMED BY: RRC** 

MD1901007

Temp. (°F) 26°F

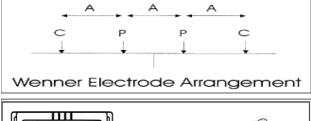
**TEST SET RANGE** 

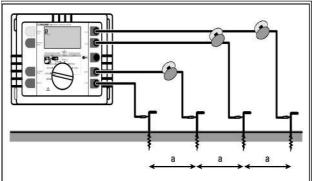
Meter Current: 1mA - 10mA

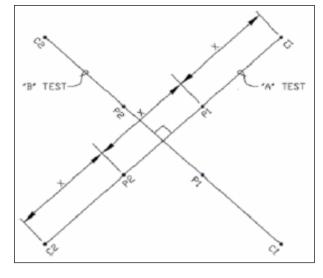
Meter Resistance: 1cOhm - 1.999 kOhm

					APPARENT	ELECTRICAL F	RESISTIVITY		
PROB	PROBE C DEPTH	PROBE P DEPTH	E-	-w	N	-S			
Spacing (ft)	(Inches)	(Inches)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Average Soil Resistivity (Ωm)
2.5	4	2	9.210	44.07	9.650	46.18			45.13
5	4	2	3.020	28.90	3.110	29.76			29.33
10	12	6	1.440	27.56	1.420	27.18			27.37
20	12+	6	0.890	34.07	0.870	33.31			33.69
40	12+	6	0.680	52.06	0.670	51.30			51.68
60	12+	6	0.590	67.76	0.590	67.76			67.76

Notes:





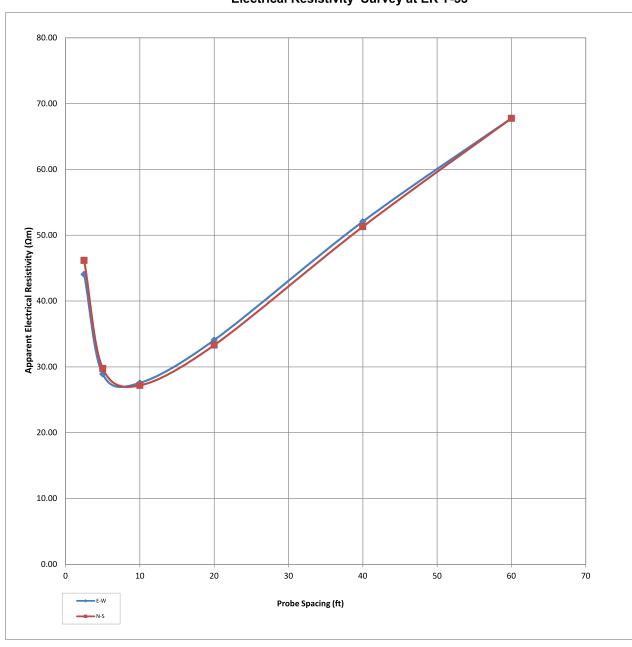


General Sketch of the test set up.

Total Array length is 3 times the probe spacing. The Apparent resistivity is calculated using the following equation: r=2\*p\*R\*spacing\*0.3048, where last item converts feet to meters. Wenner Array surveys were performed generally in accordance with IEEE std 81-2012 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System." and ASTM G-57.



# Emerson Creek Wind Project Electrical Resistivity Survey at ER T-53





### SOIL RESISTIVITY MEASURMENT DATA SHEET

Survey ID ER T-67 DATE 1/21/2020

CLIENT Apex Clean Energy, Inc **PROJECT** Emerson Creek Wind Project Project No. MD1901007

LOCATION: Erie and Huron Counties, OH

41.094198 LATITUDE : **LONGITUDE**: -82.770705

WEATHER: Parlty Cloudy TOP SOIL: Lean Clay(CL), Trace Sand, Light Brown, Dry

TYPE OF TEST: Wenner 4-Pin Method

**EQUIPMENT:** AEMC Ground Resistane Tester

SERIAL NO. 257543JJDV MODEL: 4630

CALIBRATION DUE DATE: 7/8/2020

**TEST PERFORMED BY: RRC** 

Temp. (°F) 32°F

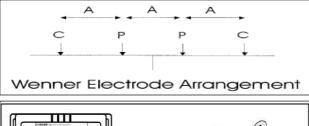
**TEST SET RANGE** 

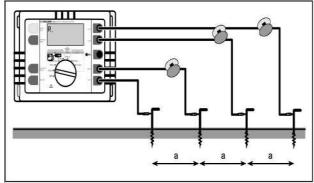
Meter Current: 1mA - 10mA

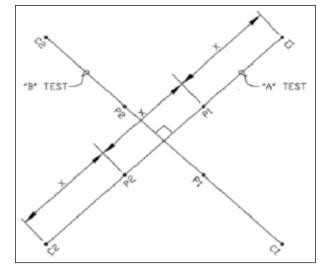
Meter Resistance: 1cOhm - 1.999 kOhm

					APPARENT	ELECTRICAL F	RESISTIVITY		
PROB	PROBE C DEPTH	PROBE P DEPTH	E-	-w	N	-S			
Spacing (ft)	(Inches)	(Inches)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Average Soil Resistivity (Ωm)
2.5	4	2	5.150	24.64	6.050	28.95			26.80
5	4	2	2.400	22.97	2.420	23.16			23.07
10	12	6	1.080	20.67	1.020	19.52			20.10
20	12+	6	0.470	17.99	0.510	19.52			18.76
40	12+	6	0.250	19.14	0.260	19.91			19.52
60	12+	6	0.190	21.82	0.190	21.82			21.82

Notes:





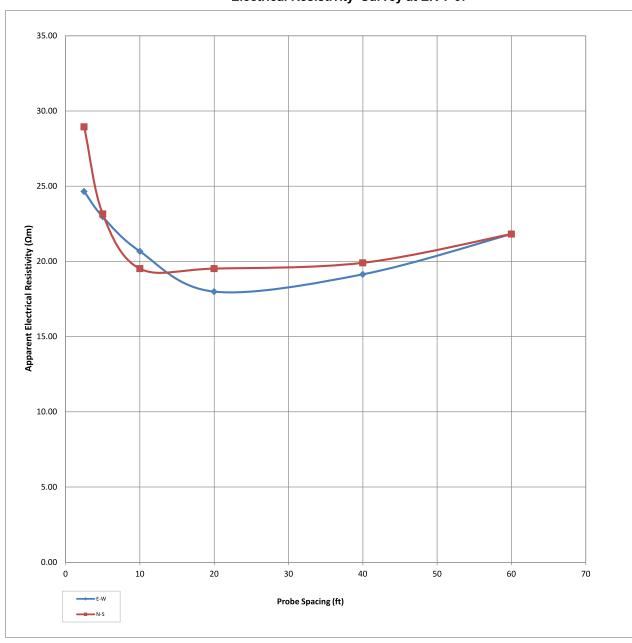


General Sketch of the test set up.

Total Array length is 3 times the probe spacing. The Apparent resistivity is calculated using the following equation: r=2\*p\*R\*spacing\*0.3048, where last item converts feet to meters. Wenner Array surveys were performed generally in accordance with IEEE std 81-2012 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System." and ASTM G-57.



# Emerson Creek Wind Project Electrical Resistivity Survey at ER T-67





### SOIL RESISTIVITY MEASURMENT DATA SHEET

Survey ID ER Substation DATE 1/22/2020

CLIENT Apex Clean Energy, Inc
PROJECT Emerson Creek Wind Project
LOCATION: Erie and Huron Counties, OH

**LATITUDE**: 41.268763 **LONGITUDE**: -82.764568

WEATHER: Cloudy
TOP SOIL: Lean Clay(CL), With Sand, Light brown, Dry

TYPE OF TEST: Wenner 4-Pin Method
EQUIPMENT: AEMC Ground Resistane Tester

**SERIAL NO.** AEMC Ground Resistane Te

 MODEL:
 4630

 CALIBRATION DUE DATE:
 7/8/2020

 TEST PERFORMED BY:
 RRC

Project No. MD1901007

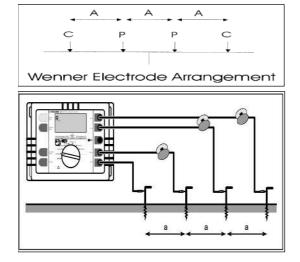
Temp. (°F) 33°F

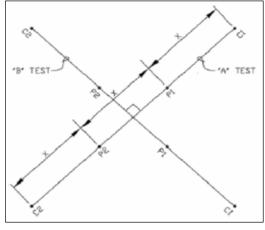
TEST SET RANGE

Meter Current: 1mA - 10mA Meter Resistance: 1cOhm - 1.999 kOhm

					APPARENT	ELECTRICAL I	RESISTIVITY		
PROB	PROBE C DEPTH	PROBE P DEPTH	E-	-W	N	-S			
Spacing (ft)	(Inches)	(Inches)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Meter reading (Ω)	Soil Resistivity (Ωm)	Average Soil Resistivity (Ωm)
0.5	4	2	96.400	92.26	112.600	107.77			100.01
1	4	2	55.000	105.28	58.200	111.40			108.34
1.5	4	2	32.700	93.89	34.600	99.34			96.62
2	4	2	22.700	86.90	23.300	89.20			88.05
3	4	2	17.270	99.17	17.850	102.50			100.84
5	4	2	11.250	107.67	12.140	116.19			111.93
7	12	6	8.220	110.14	9.900	132.65			121.40
10	12	6	7.020	134.37	7.450	142.60			138.49
15	12	6	5.090	146.14	5.260	151.03			148.59
20	12+	6	3.880	148.54	3.820	146.24			147.39
30	12+	6	2.640	151.60	2.620	150.45			151.03
45	12+	6	1.760	151.60	1.870	161.08			156.34
70	12+	6	1.320	176.87	1.310	175.53			176.20
100	12+	6+	1.010	193.33	1.010	193.33			193.33
150	12+	6+	0.710	203.86	0.690	198.11			200.99
200	12+	6+	0.490	187.59	0.510	195.24			191.41





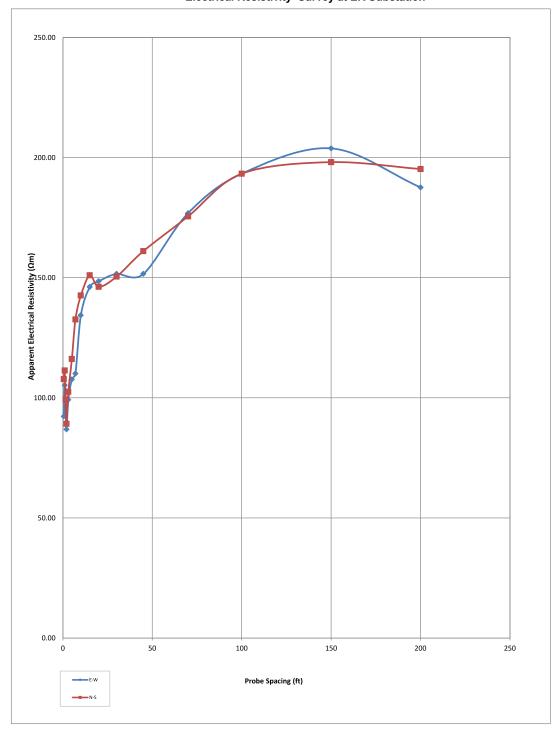


General Sketch of the test set up.

Total Array length is 3 times the probe spacing. The Apparent resistivity is calculated using the following equation: r=2\*p\*R\*spacing\*0.3048, where last item converts feet to meters. Wenner Array surveys were performed generally in accordance with IEEE std 81-2012 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System." and ASTM G-57.



# Emerson Creek Wind Project Electrical Resistivity Survey at ER Substation







4370 Contractors Common Livermore, CA 94551

Tel: 925-999-9232 Fax: 925-999-8837 info@geothermusa.com

# SOIL THERMAL SURVEY EMERSON CREEK WIND FARM PROJECT NEAR BELLEVUE, OHIO

MAY 2019

Prepared for:

RRC Power & Energy 3801 Doris Lane Round Rock, TX 78664

Submitted by:

**GEOTHERM USA, LLC** 

COOL SOLUTIONS FOR UNDERGROUND POWER CABLES THERMAL SURVEYS, CORRECTIVE BACKFILLS & INSTRUMENTATION



### INTRODUCTION

A field thermal resistivity survey of the native soils was performed for the proposed underground power cables at the **Emerson Creek Wind Farm Project near Bellevue**, **Ohio. RRC Companies** provided all the support services through a local contractor and their field personnel. This included identifying the test locations, obtaining permits, clearing underground services and providing a backhoe with operator to excavate all test pits.

### Field Testing and Soil Sampling:

Thermal resistivity testing was performed at five (5) locations along the cable routes; on April 11<sup>th</sup>, 2019 **(Table 1)**. At each location, a backhoe was used to dig a 4-foot deep test-pit and thermal resistivity tests were performed at depths of 2, 3 and 4-feet below grade. In addition, samples for visual description, moisture content and thermal dry out characterization were taken. Test location coordinates were provided by **RRC**.

In-situ thermal resistivity and ambient temperature measurements were made using field thermal probes and the *Geotherm* **TPA-2000** run off a portable power source. All thermal testing was performed in accordance with the IEEE Standard (**IEEE 442-2017**). Laboratory geotechnical testing was conducted in accordance with **ASTM**.

The field thermal resistivity values were measured at the given soil moisture on that day. Depending on weather and environmental conditions; i.e. drying due to cable heat or other heat source, seasonal drying (drought), artificial draining, water demand of crops, etc., the soil may be drier at certain times of the year. Therefore, the design thermal resistivity for the native soils should be based on the driest expected conditions.

The attached table present factual information on the subsurface conditions at the specific test pit locations; no warrantee is expressed or implied that materials or conditions other than those described may not be encountered along the cable route.

### **Laboratory Testing:**

The samples sent to us by RRC were tested at their 'as received' moisture content and at 92% of the MDD provided by *RRC*. The tests were conducted in accordance with IEEE standard 442-2017. The test results are given in **Table 2** and the thermal dryout curves are presented in **Figure 1**.

### **Comments:**

**Ambient Temperature:** In-situ testing was conducted at the time of the year when the earth ambient temperatures were not the highest. At the end of a warm summer, the ambient temperatures may increase significantly; especially at shallow depths. This should be taken into consideration for the cable rating. At the proposed cable burial depth of about 3-4 ft., temperature of about 25 °C is suggested.



Geotherm believes a maximum ambient soil temperature of approximately 25 °C shall be adequate; however, the Engineer of Record will ultimately be responsible for the determination of appropriate soil temperature assumptions.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Hoch

Nimesh Patel



**Table 1 - Field Test Results** 

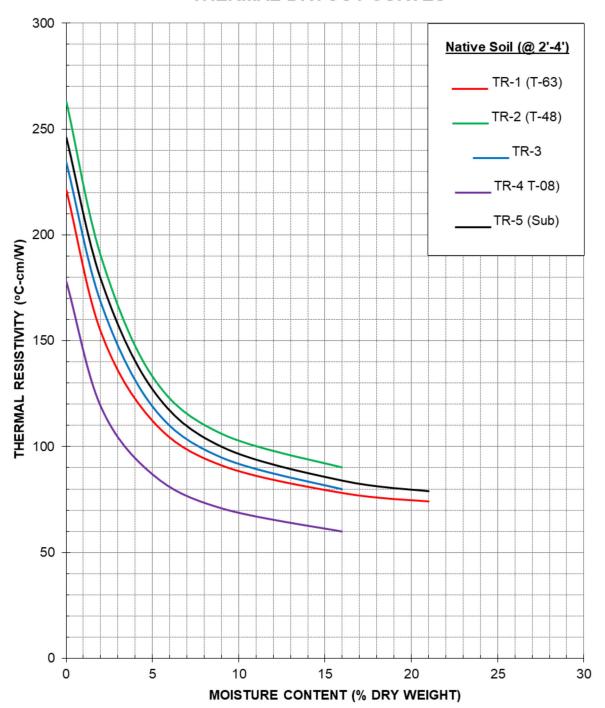
Test Pit #	Latitude	Longitude	Test Depth (ft)	Ambient Temp. (°C)	In-situ Thermal Resistivity (°C-cm/W)	RRC Description	
			2	6.0	62		
TR - 1 (T-63)	41.107602	-82.807065	3	6.9	57	Brown Fat Clay w/ Sand (CH)	
(. 55)			4	6.3	59	Jana (311)	
			2	6.5	67		
TR - 2 (T-48)	41.154774	-82.811374	3	7.6	69	Brown Lean Clay w/ Sand (CL)	
(,			4	7.1	63		
			2	5.8	60		
TR - 3	41.209883	-82.788517	3	6.6	59	Light Brown Lean Clay w/ Sand (CL)	
			4	6.1	58	J. J	
			2	6.5	48	Dark Brown Sandy	
TR - 4 (T-08)	41.316613	-82.776070	3	7.7	50	Dark Brown Sandy Lean Clay (CL)	
(1.00)			4	7.4	51		
			2	6.0	65		
TR - 5 (Sub)	41.268924	-82.765749	3	6.9	64	Dark Brown Lean Clay w/ Sand (CL)	
( = 2.0 )			4	6.3	62		

**Table 2 - Laboratory Test Results** 

Sample ID (@ 2'-4')	Description (RRC)	Thei Resis (°C-c	tivity	Moisture Content	Dry Density
,	,	Wet	Dry	(%)	(lb/ft³)
TR - 1 (T-63)	Brown Fat Clay w/ Sand (CH)	74	221	21	95
TR - 2 (T-48)	Brown Lean Clay w/ Sand (CL)	90	263	15	98
TR - 3	Light Brown Lean Clay w/ Sand (CL)	80	234	16	99
TR - 4 (T-08)	Dark Brown Sandy Lean Clay (CL)	60	178	17	104
TR - 5 (Sub)	Dark Brown Lean Clay w/ Sand (CL)	79	246	21	93



# THERMAL DRYOUT CURVES



RRC Power & Energy (RRC No. MD1901007)

Thermal Analysis of Native Soil

Emerson Creek Wind Project

May 2019 Figure 1





3801 Doris Lane Round Rock, TX 78664 512.992.2087

# **APPENDIX D**

# Table D1.1 - LPILE Computer Program Parameters for Lateral Load Analysis for Substation

Soil	Depth		K (	K (pci)	γ.	ပ	<b>•</b>	650	Erm	ncs	RQD	K <sub>rm</sub>
Layer	(feet)	LPILE Soil Type	Static	Cyclic	(bct)	(bst)	(degree)		(psi)	(psi)	(%)	
1*	0 to 3	Soft Clay (1)	-		120	:			-		-	
2	3 to 7	Stiff Clay w/o Free Water (3)	-		120	1,580		0.007	-		-	-
3	7 to 10	Stiff Clay w/o Free Water (3)		-	120	2,900		0.004	-		-	-
4	10 to 15	Weak Rock (9)			130	ŀ			120,000	1,000	20	0.0005
5	15 to 20	Weak Rock (9)	-	-	130	ł	-		120,000	1,000	20	0.0005

Notes: \*Upper 3 feet of soil should be neglected due to seasonal moisture change.

Table D1.2 - Direct Embedment/Drilled Pier Foundation Design Parameters for Substation

			λ	φ	ပ	C C Book		SPT N-		ļ	Allowable Bearing
Soil	Depth	USCS Soil & Rock	•			NOCK		Value	Deformation	Skin Friction	Pressure (FS=3)
Layer	(feet)	Classification	(bct)	(degree)	(bst)	(bst)	٦,	(blows/ft)	Modulus (ksi)	(FS=2.5) <sup>(1)</sup> (psf)	(bst)
1*	0 to 3	Soft Clay	120		-		-				
2	3 to 7	CF	120		1,580	-	2.98	12	1.4	340	4,200
3	7 to 10	CF	120		5,900	-	2.98	200	8.0	1,060	17,700
4	10 to 15	SHALE	130	31	-	2,000		-	100.0	3,100	19,200
5	15 to 20	SHALE	130	31	1	2,000	1	1	100.0	3,100	19,200

Table D1.3 – MFAD 5.1/HFAD 5.1 Rock Design Parameters for Substation

Ultimate Rock/Concrete	Bond Strength (psi)				09	09	
USCS Soil & Rock	Classification	Soft Clay	CL	CL	SHALE	SHALE	Design denth to aroundwater is 20 feet
Depth	(teet)	0 to 3	3 to 7	7 to 10	10 to 15	15 to 20	Design denth to
Soil	Layer	1*	2	3	4	2	NI-4-14

Notes: Design depth to groundwater is 20 feet

\*Upper 3 feet of soils should be neglected due to seasonal moisture change; Kp: Rankine Passive Earth Pressure Coefficient;  $\gamma$ : Effective Unit Weight ( $\gamma^2$ = $\gamma_{roal}$ -62.4 pcf);  $\phi$ : Angle of Internal Friction.

(¹) For uplift resistance, the allowable skin friction provided in table above should be reduced by 25 percent.

(2) A minimum bond length of 10 feet in bedrock and 15 feet in soils is recommended. Estimated bond strength are for gravity grout anchors. RRC recommends grout anchor capacities be verified by pull-out



# This foregoing document was electronically filed with the Public Utilities Commission of Ohio Docketing Information System on

10/28/2021 11:15:54 AM

in

Case No(s). 21-1055-EL-BGA

Summary: Application - 4 of 13 (Exhibit B - Updated Geotechnical Report) electronically filed by Christine M.T. Pirik on behalf of Firelands Wind, LLC