DRAFT GEOTECHNICAL INVESTIGATION REPORT

For the Proposed

Wind Turbines and Access Roads

at the

Arkwright Summit Wind Farm
Town of Arkwright
Chautauqua County, NY

Prepared For:

Arkwright Summit Wind Farm LLC

FA No.: 081017

Prepared by:

FISHERASSOCIATES
135 Calkins Road, Rochester, NY 14623
Phone: 585-334-1310
www.fisherassoc.com

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1.0 Executive Summary

This draft report presents the geotechnical investigation performed at the proposed site of the Wind turbines (WTG) and access roads for the Arkwright Summit Windfarm in Chautauqua County, New York. The proposed locations of 37 wind turbines were explored for this investigation.

The wind turbines are to be located on the land that rises between the Portage Escarpment to the Allegheny Plateau west of Lake Erie. Ground surface elevations at turbine locations generally range between El. 1300 and El. 1800 feet. The geomorphology of this area is heavily influenced by glaciation, and surficial geology generally includes undifferentiated stratified drift assemblages, kame moraines, and glacial till.

We understand that the wind turbine foundations will consist of large concrete mats and pedestals that will resist overturning by mass. Although foundation designs were not available for this report, we understand that typically these foundations will be approximately 60 feet in diameter and will be bear approximately 10 feet below grade.

The test borings encountered subsurface conditions consistent with local surficial geology and typically included undifferentiated stratified glacial drift (glacial drift) overlying glacial till and shale bedrock. The thickness of the glacial drift varied from a few feet to over 50 feet. The glacial drift typically consisted of layers of sand, silty sand, and silty clay. In general, the cohesionless layers in the glacial drift were loose to medium dense, and the cohesive layers were stiff to very stiff. The glacial till generally consisted of hard gravelly lean silty clay with cobbles and boulders. The shale was typically soft to medium hard and horizontally bedded.

Assuming only minor fluctuations from existing ground surface elevations, the subsurface conditions at the wind turbine bearing grade (approximately 10 feet below the surface) will generally consist of either glacial drift, consisting of stiff to very stiff sandy clay, silty clay, or loose to medium dense silty sand, or glacial till, which generally consisted of hard lean silty clay with gravel. These soils will generally provide adequate bearing provided that they are not disturbed during excavation and are not allowed to saturate. We recommend that a protective layer of a nonwoven geotextile and 12 inches of structural fill, or a 3-inch thick lean concrete mudmat, is placed over approved bearing grade for protection from the elements and construction traffic. Undercutting and replacement of soft soil at bearing grade may be necessary at approximately 25% of the wind turbine sites based on the test borings. The undercuts are anticipated to be one or two feet typically, but may approach five feet based on the test boring information.

The access roads will be constructed on heterogeneous near- surface soils that typically included a large percentage of silt. The silt will be moisture-sensitive and can become unstable with an increase in moisture content. We anticipate that construction traffic will include crawler cranes, truck cranes and concrete trucks that will exert ground pressures of up to 145 pounds per square inch. To support these loads we recommend that the access road design include placing geogrid and up to 14 inches of structural fill over weak subgrade areas identified in the field by geotechnical personnel.

Based on the subsurface conditions encountered, we recommend the following geotechnical parameters are utilized for the wind turbine foundations:

Parameter	Value	Units	Notes
Min. Dry Backfill Density	100	pounds per cubic foot (pcf)	Assumes compaction achieves at least 90% of maximum dry density
Maximum Moist Backfill Density	145	pounds per cubic foot (pcf)	Assumes compaction achieves at least 95% of maximum dry density
Net Allowable Bearing Pressure	3000	pounds per square foot (psf)	Assumes foundations set on bearing grade approved by geotechnical personnel
Short Duration Increase	Not Recommended		
Estimated Differential Settlement	0.5	inches	Assumes proper foundation preparation and stiff to hard glacial till
Groundwater	See Text		In-situ soil has low permeability; "bathtub" may be created if foundation drainage not provided
Poisson' ratio	0.4	n/a	Assumes topsoil and soft soil stripped
Subgrade density below foundation	135	pcf	Assumes foundations bear on undisturbed glacial till or structural fill approved by
Shear Wave Velocity	See Text		
Seismic Site Class	C	n/a	Per IBC 2012
Sds	0.12	g's	Per IBC 2012
Sd1	0.059	g's	Per IBC 2012

The wind turbine foundation must bear on undisturbed stiff glacial drift or till at a minimum, as approved in the field by geotechnical personnel. Bearing grade must be protected during construction to ensure no loss of strength.

Refer to subsequent sections of the report for more details regarding our design recommendations, along with earthwork construction considerations. Please note *italicized* words are further defined in Exhibit A - Terms & Definitions.

2.0 Introduction

2.1 General

Fisher Associates, P.E., L.S., L.A., D.P.C. (Fisher Associates) was retained by Arkwright Summit Wind Farm, LLC (ASWF), to provide geotechnical engineering services for the proposed Arkwright Summit Wind Farm. The proposed wind farm will be located in the Town of Arkwright, Chautauqua County, New York. The proposed locations of 37 wind turbines were explored for this investigation.

Fisher Associates conducted this geotechnical investigation to obtain general subsurface condition information in the proposed area of the wind turbines. This report presents a data summary of the preliminary subsurface exploration work performed including the field and laboratory data, and a description of the subsurface soil and water conditions encountered at the preliminary test boring locations.

2.2 Site Description

The wind turbines are to be located on the land that rises between the Portage Escarpment to the Allegheny Plateau west of Lake Erie. Ground surface elevations at turbine locations generally range between El. 1300 and El. 1800 feet. The sites are presently either wooded areas or farmland.

2.3 Project Description

37 wind turbines approximately 80 meters high that is constructed on concrete spread footings with slab-on-grade;
Access roads to the wind turbine locations;
Parking areas at the bases.

3.0 Subsurface Exploration

3.1 Test Boring

The subsurface exploration program consisted of the advancement of one test boring at each of the 37 wind turbine locations. Groundwater monitoring wells were also installed at all of the sites. The test borings were performed by Earth Dimensions, Inc., and Nature's Way Environmental Consultants & Contractors, Inc. during the period of February 25, 2013 to May 28, 2015. The test borings were advanced using all-terrain rotary drill rigs equipped with 4-1/4" I.D. hollow stem augers and diamond-bit rock coring barrels. Explorations were advanced to depths of up to 60 feet below ground surface (bgs). Where auger refusal was encountered at a depth less than 30 feet bgs, a 10 foot rock core was obtained.

The test boring location and ground surface elevations were established in the field by Fisher Associates' survey personnel and utility clearances were provided by the drillers. The approximate exploration location is shown on Figure No. 2 - Subsurface Exploration Location

Plan. Test boring logs prepared by the drilling companies are attached as Appendix A - Test Boring Logs.

3.2 Laboratory Testing

Laboratory testing was performed by testing laboratories retained by the drilling contractors. Testing was performed upon samples selected by Fisher Associates. Laboratory testing included the performance of Natural Moisture Content Determination (ASTM D-2216), Grain Size Analysis (ASTM D-422), and Atterberg Limits Determination (ASTM D-4518). Laboratory testing results are attached as Appendix B to this report.

3.3 Geophysical Exploration

Geophysical exploration to measure the in-situ shear wave velocity and electrical resistivity of the ground within the wind farm are planned but have not been performed as of the date of publication of this draft report.

4.0 Summary of Subsurface Conditions

4.1 General

The wind turbines are to be located on the land that rises between the Portage Escarpment to the Allegheny Plateau west of Lake Erie. Ground surface elevations at turbine locations generally range between El. 1300 and El. 1800 feet. The geomorphology of this area is heavily influenced by glaciation, and surficial geology generally includes undifferentiated stratified drift assemblages, kame moraines, and glacial till.

The test borings encountered subsurface conditions consistent with local surficial geology and typically included undifferentiated stratified glacial drift (glacial drift) overlying glacial till and shale bedrock. The thickness of the glacial drift varied from a few feet to over 50 feet. The glacial drift typically consisted of layers of sand, silty sand, and silty clay. In general, the cohesionless layers in the glacial drift were loose to medium dense, and the cohesive layers were stiff to very stiff. The glacial till generally consisted of hard gravelly lean silty clay with cobbles and boulders. The shale was typically soft to medium hard and horizontally bedded. **Table 1 presents a summary of subsurface conditions encountered at each of the wind turbine locations**

The generalized soil profile described below and shown on the test boring logs is intended to convey trends in subsurface conditions. The boundaries between the soil strata are approximate and are based on interpretations between widely spaced explorations. Actual soil transitions and conditions may vary between the subsurface exploration locations. See the attached exploration logs within Appendix A for more details regarding the subsurface conditions.

4.2 Topsoil

A topsoil or organic layer was encountered at the ground surface at each turbine location. The thickness of the topsoil encountered ranged from approximately 0.2 feet to 2.1 feet.

4.3 Glacial Drift

Glacial drift was encountered at the majority of the wind turbine sites. The glacial drift generally consisted of stratified layers of sand, silty sand and silty clay. The drift sometimes included small amounts of gravel. The thickness of the glacial drift varied from 1.6 feet to 52.7 feet, with an average thickness of 18.1 feet. Standard Penetration Testing "N" values in the glacial drift varied from 5 blows per foot (bpf) to 58 bpf but were typically between 10 to 30 bpf. The cohesive layers in the glacial drift were typically stiff and lean.

4.4 Glacial Till

Glacial till was typically encountered below the glacial drift. The glacial till typically consisted of a binder of hard clay and silt with interbedded gravel and sand. Cobbles and boulders may also be present within the glacial till. Standard Penetration Testing "N" values in the glacial till ranged from 12 bpf to over 100 bpf, and typically exceeded 40 bpf. The glacial till typically classified as a lean silty clay during Atterberg limits testing, and generally consisted of approximately 50% silt and clay with the remainder sand and gravel.

4.5 Shale

Shale was occasionally encountered below the glacial drift or glacial till at the wind turbine locations. The shallowest depth at which shale was encountered was 10 feet, but more often it was encountered at depths greater than 20 feet. The shale was typically thinly bedded, with a Rock Quality Designation values ranging from 0 to 80. It appeared that the upper few feet of the shale was rippable at a minimum.

4.6 Groundwater

Groundwater observation wells were installed at all of the wind turbine locations. Table 2 presents a summary of the ground water level measurements that have been collected to date. No drawdown testing has been performed to establish seepage rates. It appears that groundwater seepage will be encountered during excavation of approximately half of the wind turbine foundations. Groundwater levels may be impacted by regional and local site considerations and may fluctuate over time. The fluctuations can be due to seasonal variations in precipitation and variations in soil conditions between explorations.

5.0 Geotechnical Engineering and Construction Considerations

5.1 Wind Turbine Foundations

Assuming only minor fluctuations in grading from existing ground surface elevations, the subsurface conditions at the wind turbine bearing grade (approximately 10 feet below the surface) will generally consist of either glacial drift, consisting of stiff to very stiff sandy clay, silty clay, or loose to medium dense silty sand, or glacial till, which generally consisted of hard lean silty clay with gravel. These soils will generally provide adequate bearing provided that they are not disturbed during excavation and are not allowed to saturate. We recommend that a protective layer of a nonwoven geotextile and 12 inches of structural fill, or a 3-inch thick lean concrete

mudmat, is placed over approved bearing grade for protection from the elements and construction traffic. Undercutting and replacement of soft soil at bearing grade may be necessary at approximately 25% of the wind turbine sites based on the test borings. The undercuts are anticipated to be one or two feet typically, but may approach five feet based on the test boring information. If over-excavation is required, re-establish bearing grade using structural fill placed in level lifts no thick than 12 inches and compacted to at least 95% of the maximum dry density (ASTM D-1557).

Based on the subsurface conditions encountered, we recommend the following geotechnical parameters are utilized for the wind turbine foundations:

Parameter	Value	Units	Notes
Min. Dry Backfill Density	100	pounds per cubic foot (pcf)	Assumes compaction achieves at least 90% of maximum dry density
Maximum Moist Backfill Density	145	pounds per cubic foot (pcf)	Assumes compaction achieves at least 95% of maximum dry density
Net Allowable Bearing Pressure	3000	pounds per square foot (psf)	Assumes foundations set on bearing grade approved by geotechnical personnel
Short Duration Increase	Not Recommended		
Estimated Differential Settlement	0.5	inches	Assumes proper foundation preparation and stiff to hard glacial till
Groundwater	See Table 2		In-situ soil has low permeability; "bathtub" may be created if foundation drainage not provided
Poisson' ratio	0.4	n/a	Assumes topsoil and soft soil stripped
Subgrade density below foundation	135	pcf	Assumes foundations bear on undisturbed glacial till or structural fill approved by
Shear Wave Velocity	See Text		
Seismic Site Class	C	n/a	Per IBC 2012
Sds	0.12	g's	Per IBC 2012
Sd1	0.059	g's	Per IBC 2012

Foundations should bear at least 60 inches below finished exterior grade for frost protection unless an insulated frost protection system is installed. Each foundation excavation should be inspected by qualified geotechnical personnel and approved prior to placing reinforcing steel and concrete. We recommend that foundation elements be backfilled with *compacted structural fill* to provide uplift support. Backfill in these areas should be placed in *lifts* and *compacted*.

5.2 Access Roads

The access roads will be constructed on heterogeneous near- surface soils that typically included a large percentage of silt. The silt will be moisture-sensitive and can become unstable with an increase in moisture content. We anticipate that construction traffic will include crawler cranes, truck cranes and concrete trucks that will exert ground pressures of up to 145 pounds per square inch. To support these loads we recommend that the access road design include placing geogrid and up to 14 inches of structural fill over weak subgrade areas identified in the field by geotechnical personnel as described below.

Access road preparation will begin by stripping organic-laden soil, vegetation, and stumps. Proof rolling can then be performed on exposed subgrade using a fully loaded tandem wheeled dump truck. We recommend that the access roads consist of at least 14 inches of compacted structural fill. In areas that deflect or weave more than 1 inch during proof rolling the structural fill must be reinforced by placing a layer of Mirafi HP 570 geotextile above subgrade and layer of Tensar TX5 geogrid at the midpoint of the structural fill layer. The 14 inches of structural fill should be spread the entire access road width. The crusher run stone must be compacted with a minimum of four passes of a 10 ton roller. The access road should be proof rolled again.

5.3 Lateral Earth Pressures

We recommend the following lateral earth pressure coefficients for foundation overturning calculations:

Recommended Lateral Earth Pressure Coefficients					
Coefficient of Passive Lateral Earth Pressure (Kp)	Coefficient of At-Rest Lateral Earth Pressure (Ko)	Coefficient of Active Lateral Earth Pressure (Ka)	Angle of Internal Friction	Total Unit Weight of Soil (pcf)	Submerged Unit Weight of Soil (pcf)
3.0	0.5	0.33	30°	130	65

If feasible, the foundation backfill should be drained and include a non-woven geotextile, selected considering drainage and filtration, installed around drainage stone surrounding a slotted under-drain pipe. The drainage stone should be sized in accordance with the pipe slotting or perforations. A crushed aggregate conforming to NYSDOT Standard Specifications Section 703-02, Size Designation No. 1 or No. 2 is generally acceptable. The foundation drainage stone and surrounding geotextile should extend above the drainpipe a minimum of 2 feet.

5.4 Seismic Site Classification

A seismic investigation is planned for this project but was not initiated at the time of writing of this report. Once we have performed this evaluation, this information will be added to the final report. However, for planning purposes, we developed the *seismic design classification* in accordance with the 2010 Building Code of New York State, was developed based on the test boring information. We recommend that seismic site class "C" be used for the project site. See Exhibit A - Terms & Definitions section at the end of this report for more information regarding the Seismic Site Classification.

5.5 Construction Dewatering Considerations

Construction dewatering will be required for surface water control and for excavations which encounter groundwater conditions. Surface water and groundwater should be diverted away from open excavations and prevented from accumulating on exposed subgrades.

Dewatering should be implemented in conjunction with excavation work such that the work generally proceeds in the dry. Excavation dewatering should be implemented sufficiently ahead of the excavation to maintain the groundwater levels at least 1 to 2 feet below the bottom of the excavation. If adequate dewatering is not completed, groundwater seepage and instability of the excavation bottom and sidewall could occur, particularly where the more permeable soil deposits are present. The amount of groundwater infiltration will depend on the soil condition encountered.

As a minimum, the use of sump and pump methods of dewatering will be necessary to control groundwater. Dewatering from the sumps should be commenced in advance of the excavation work to allow the groundwater to start to be drawn down. Dewatering sumps and wells should be designed to prevent the loss of fines from the soils. In addition, the selected dewatering system should be designed such that the resulting well drawdown does not adversely impact the adjacent utilities and structure foundations. Discharges from the dewatering system should be in accordance with permitted site storm-water management practices. Dewatering pumps should be operated on a continual basis, until the foundation is sufficiently and properly backfilled above the groundwater conditions.

5.6 Earthwork Construction Considerations

Based on the soils encountered in the subsurface explorations, exposed subgrade materials will generally include clayey silt, silty sand, sandy silt, and silty sand with gravel soils. Due to the grain size and composition, some areas will be sensitive to disturbance and strength degradation in the presence of excess moisture. These soils will also be frost susceptible if left exposed to inclement weather conditions during construction.

We recommend that the site preparation work be performed during seasonally dry periods to *minimize potential for degradation of the subgrade soils* and undercuts which may become necessary to establish a stable base for construction. Excavation to the proposed subgrades should be performed using a method which reduces disturbance to the subgrade soils such as a backhoe equipped with a smooth blade bucket.

Site preparation should include *densification*, *proper subgrade preparation, proof rolling* and all efforts should be made to *minimize the potential for degradation of the subgrade soils*.

Compacted Select Granular Fill may be used in general site grading operations and as backfill against exterior foundation walls. We do not recommend reuse of the *excavated soils* due the fine-grain nature of the soils. However these *excavated soils* may be considered for general site grading or trench backfilling in areas where overlying structures, pavement areas or other site facilities are not proposed, providing they are free of any organics, particles greater than 6-inch diameter, deleterious materials, and can be properly *compacted*.

6.0 Construction Observation

We recommend that a geotechnical engineer, and/or a qualified engineering technician, working under the direction of the geotechnical engineer, be retained during construction. The Engineer and/or their representative will make observations of the prepared subgrade and bearing surfaces to review that unsuitable materials have been removed. The Engineer or their representative will also observe the subsurface conditions exposed during construction for comparison to the exploration data. This will allow for adjustments that may be necessary to accommodate actual soil conditions revealed at the proposed improvement location.

7.0 Closing

We prepared this report to provide information about potential foundation design and construction considerations for the proposed. Test borings were made as part of this evaluation, and the recommendations provided herein are based on information available from the subsurface explorations. This report presents field observations, data collection and research, results, and professional opinions, and may be subject to modification if Arkwright Summit Wind Farm LLC or any other party develops subsequent information. The report has been prepared in accordance with generally accepted soil and foundation engineering practice, and no other warranty, expressed or implied, is made.

This report has been prepared for the specific and exclusive use of Arkwright Summit Wind Farm LLC, and the design team for this project and site. The report and the findings in the report shall not, in whole or in part, be disseminated or conveyed to any other party, or used or relied upon by any other party, except for the specific purpose and to the specific parties alluded to above, without the prior written consent of Fisher Associates. Fisher Associates would be pleased to discuss the conditions associated with any such additional dissemination, use, or reliance by other parties.

These conclusions and recommendations do not reflect variations in subsurface conditions which could exist in unexplored areas of the site. Regardless of the thoroughness of a subsurface exploration, there is a possibility that conditions between test borings will differ from those at the boring locations, that the conditions are not anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, an experienced geotechnical engineer should evaluate earthwork and foundation construction to verify that the field conditions match those anticipated in design, as recommended above. In the event changes are made in the proposed constructions plans, the recommendations presented in this report shall be reviewed by the geotechnical engineer and the conclusions of this report modified or verified in writing.

EXHIBIT A

Terms and Definitions

Structural Fill: Recommended to consist of Crusher Run Stone or Crushed Gravel and Sand mixture that is free of Clays, Organics, Snow, Ice and friable or deleterious particles. At minimum it should meet the following; New York State DOT specifications Item 304.12 Type 2 material.

Select Granular Fill: Material meeting the requirements of New York State DOT, standard specification Item 203.07 - Select Granular Fill.

Compacted: All fill beneath structural elements, slab-on-grade, pavement areas, and interior walls should be placed in *lifts* and compacted to 95% of maximum dry density as determined by modified proctor test (ASTM D-1557). For exterior areas with no overlying structures, 92% of maximum dry density as determined by modified proctor test (ASTM D-1557) may be used.

Lifts: Placement of fill should occur in nearly horizontal, uniform lifts not exceeding 9-inches in loose thickness and *compacted* with at least three (3) passes of suitable compaction equipment. Fill should also be placed in a stable well engineered condition and should not "pump" or show signs of movement or significant deflection (i.e. unstable conditions) as it is being constructed. All fill should be placed and *compacted* within ±2% of optimum moisture content, and the equipment used to compact the granular materials must be compatible with the material type and lift thickness. The loose lift thickness should be reduced to 6-in. in excavations where hand operated compaction equipment will be utilized.

Excavated soils - may be used for general site grading or trench backfilling in landscape areas, providing they are free of any organics, particles greater than 6-inch diameter, deleterious materials, and can be properly *compacted*. However, as previously noted, they are frost susceptible and sensitive to moisture and, therefore, may be difficult to place and compact. These soils may require drying, prior to placement, to adequately achieve the proper compaction and moisture requirements as noted above.

Densification - The subgrade densification/re-compaction should be performed prior to *proof-rolling*, under the observation of a qualified geotechnical engineer. We recommended that the exposed native soil subgrade surface be densified/re-compaction to a minimum of 95% of its maximum dry density, as determined by the modified proctor moisture-density relationship (ASTM D-1557) and meeting the above moisture requirements. This will require sampling of exposed subgrade soils, prior to commencing this work, and performing laboratory moisture-density relationship testing (ASTM D-1557) on the representative soils to establish proper control densities for the subgrade compaction. We recommend that the subgrades be compacted a minimum of ten (10) sets of overlapping passes of a vibratory compaction equipment weighing at least 10 to 15 tons.

Proper Subgrade Preparation / Proof Rolling: Excavation and removal of all surface materials, topsoil, trees, and loose/soft or wet soils. The prepared subgrade surface should be visually observed, and all deleterious materials and organic matter, should be excavated and removed. The subgrade surface should be proof-rolled with at least three (3) sets of overlapping passes of a smooth-wheel vibratory compaction equipment weighing at least 10 to 15 tons, under the

observation of a qualified geotechnical engineer. Areas that are wet, unstable, or weave excessively during proof-rolling should be excavated and replaced with compacted *structural fill*. A suitable stabilization/separation geotextile, such as Mirafi 500X, should be placed between the soil subgrades and the overlying *structural fill* layer.

Minimize Potential Degradation of the Subgrade Soils - Efforts should be made to maintain the subgrades in a dry and stable condition at all times, and traffic over exposed subgrades should be minimized to the extent practicable during construction. These efforts could include: installation of drainage swales and underdrains (i.e. "French drains") to intercept and divert surface runoff and perched groundwater away from the construction areas; sloping of the subgrade and "sealing" of the surface with a smooth drum roller to promote runoff; and restricting construction equipment traffic from traveling directly over the subgrade surfaces, especially when they are wet. Construction traffic over these subgrade soils, particularly when they are wet may cause the soils to become disturbed, destabilize, and rut/pump. Accordingly any areas that are disturbed should be undercut or over excavated and backfilled with *compacted structural fill*.

Seismic Design Classification - The spectral accelerations for the project site were obtained from the United States Geologic Survey (USGS), U.S. Seismic "Design Maps" Web Application, using the project site for the Arkwright, NY area, for a seismic site class "C". The following accelerations are based on the 2010 ASCE 7 Standard mapping, which makes use of the 2008 USGS seismic hazard data, as published in the 2010 Building Code of New York State.

Short Period Response S_{ms}	1 Second Period Response S_{M1}	5% Damped Design Spectral Response S_{DS}	5% Damped Design Spectral Response S_{D1}
0.181g	0.089g	0.120g	0.059g

TABLE

Table No. 1
Summary of Subsurface Conditions
Arkwright Summit Wind Farm
Town of Arkwright, Chautauqua County, New York

Test Boring Number	Ground Surface Elevation (ft.)	Exploration Total Depth (ft.)	Topsoil	Glacial Drift				Glacial Till				Weathered Bedrock				Apparent Bedrock		
			Thickness (ft.)	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation of Top (ft.)	Recovery/ RQD
Wind Turbine Exploration Borings																		
WTG-10		29.2	0.2	0.2		7.8	8 < N < 20	8.0		UNKNOWN	48 < N < 110	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-11		32.5	0.3	0.3		22.2	8 < N < 40	22.5		1.9	100	24.3		UNKNOWN	100.0	NOT ENCOUNTERED		
WTG-12		30.0	0.4	0.4		9.6	12 < N < 49	NOT ENCOUNTERED				10.0		UNKNOWN	GREATER THAN 100	NOT ENCOUNTERED		
WTG-15		49.6	0.7	0.7		9.3	10 < N < 32	10.0		UNKNOWN	21 < N < 100++	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-16		61.0	0.7	0.7		11.3	15 < N < 53	12.0		UNKNOWN	29 < N < 57	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-19		60.0	0.6	0.6		3.4	13	4.0		UNKNOWN	20 < N < 86	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-21		38.5	0.8	0.8		1.7	7	2.5		20.9	12 < N < 64	23.4		5.1	100++	28.5		RUN 1: REC = 97% RQD 31% RUN 2: REC = 93% RQD = 38%
WTG-22		60.0	0.9	0.9		13.5	11 < N < 18	14.4		UNKNOWN	16 < N < 163	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-27		60.0	0.4	0.4		14.6	8 < N < 18	15.0		UNKNOWN	21 < N < 89	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-28		60.0	0.2	0.2		13.3	5 < N < 19	13.5		UNKNOWN	18 < N < 75	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-29		60.0	0.2	0.2		37.8	7 < N < 58	38.0		UNKNOWN	25 < N < 62	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-30		60.0	0.6	0.6		11.9	8 < N < 24	12.5		UNKNOWN	16 < N < 149	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-32		53.7	0.5	0.5		42.5	8 < N < 51	43.0		UNKNOWN	18 < N < 100	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-33		49.4	0.3	0.3		5.2	12, 26	5.5		43.9	17< N< 145	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-36		58.9	0.5	0.5		47.5	8 < N < 35	48.0		UNKNOWN	33 < N < 102	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-41		34.1	1.0	1.0		14.0	6 < N < 25	15.0		17.5	5 < N < 29	32.5		UNKNOWN	GREATER THAN 150	NOT ENCOUNTERED		
WTG-43		39.2	0.3	0.3		22.7	6 < N < 25	23.0		11.5	22 < N < 40	34.5		UNKNOWN	GREATER THAN 150	NOT ENCOUNTERED		
WTG-47		60.0	0.4	0.4		27.6	8 < N < 91	28.0		UNKNOWN	10 < N < 35	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-49		45.3	0.7	0.7		10.8	5 < N < 12	11.5		22.9	11 < N < 20	34.4		1.1	32.0	35.5		RUN 1: REC = 100% RQD = 77 RUN 2: REC = 98% RQD = 80

Table No. 1

Summary of Subsurface Conditions

Arkwright Summit Wind Farm

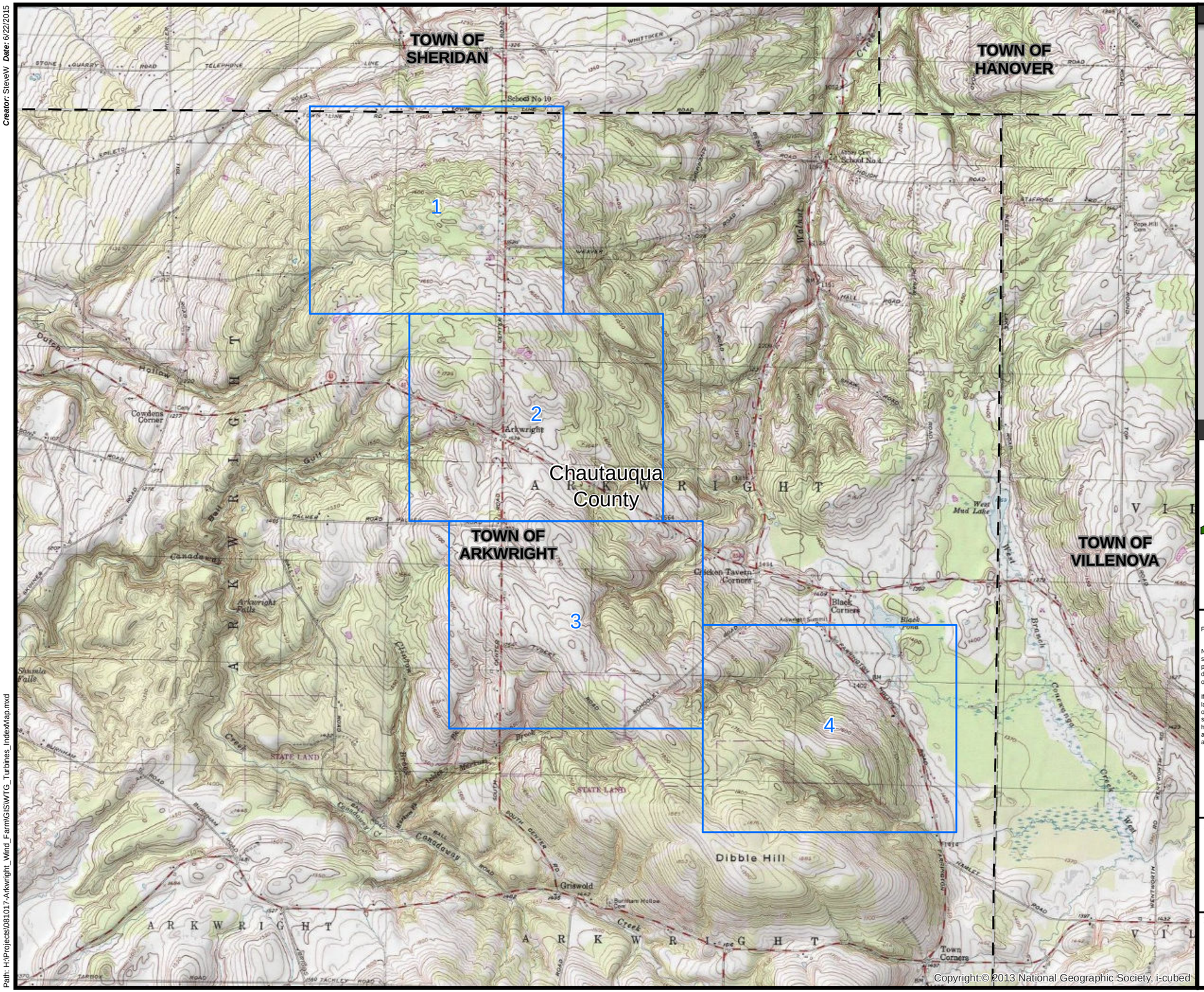
Town of Arkwright, Chautauqua County, New York

Test Boring Number	Ground Surface Elevation (ft.)	Exploration Total Depth (ft.)	Topsoil	Glacial Drift				Glacial Till				Weathered Bedrock				Apparent Bedrock		
			Thickness (ft.)	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation of Top (ft.)	Recovery/ RQD
WTG-50		60.0	0.4	0.4		47.6	10 < N < 36	48.0		UNKNOWN	26 < N < 49	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-51		60.0	0.3	0.3		27.7	8 < N < 28	28.0		UNKNOWN	20 < N < 44	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-57		60.0	0.3	0.3		5.7	4 < N < 20	6.0		UNKNOWN	50 < N < 143	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-66		35.9	0.7	0.7		8.8	17 < N < 30	9.5		10.5	66 < N < 100	20.0		5.3	100++	NOT ENCOUNTERED		
WTG-69		38.3	0.8	0.8		10.2	9 < N < 15	11.0		11.8	34 < N < 100	23.0		5.3	100++	28.3		RUN 1: REC 93% RQD = 0 RUN 2: REC 94% RQD = 0 RUN 3: REC 100% RQD 0
WTG-93		42.0	0.5	0.5		17.0	10 < N < 31	17.5		UNKNOWN	100++	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-95		34.9	0.4	0.4		13.6	8 < N < 16	14.0		15.0	18 < N < 100	29.0		UNKNOWN	100++	NOT ENCOUNTERED		
WTG-96		31.3	0.3	0.3		23.7	5 < N < 36	NOT ENCOUNTERED				24.0		UNKNOWN	69 < N < 100++	NOT ENCOUNTERED		
WTG-97		31.6	0.4	0.4		17.1	5 < N < 29	17.5		UNKNOWN	50 < N < 100++	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-100		60.0	0.3	0.3		13.2	9 < N < 22	13.5		13.0	23 < N < 79	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-101		56.2	0.3	0.3		42.7	4 < N < 36	43.0			32 < N < 41	56.0		UNKNOWN	GREATER THAN 100	NOT ENCOUNTERED		
WTG-102		56.4	0.8	0.8		11.2	6 < N < 21	12.0		UNKNOWN	18 < N < 110	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-103		25.0	1.3	1.3		9.7	4 < N < 23	11.0		1.8	21	13.8		1.2	GREATER THAN 100	15		RUN 1: REC = 49% RQD = 0 RUN 2: REC = 94% RQD = 0
WTG-105		45.0	0.8	0.8		22.2	9 < N < 35	23.0		UNKNOWN	12 < N < 130	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-110		25.0	0.5	2.1		1.6	6	2.1		12.9	14 < N < 48	15.0		0.3	GREATER THAN 100	16.3		RUN 1: RQD = 0, REC = 54% RUN 2: RQD= 0, REC = 100%
WTG-111		60.0	0.3	0.3		52.7	6 < N < 34	53.0		UNKNOWN	32 < N < 38	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-112		43.7	0.2	0.2		9.2	12 < N < 29	9.4		33.6	25 < N < 97	43.0		UNKNOWN	GREATER THAN 100	NOT ENCOUNTERED		
WTG-114		35.2	0.4	0.4		5.6	16 < N < 19	6.0		UNKNOWN	23 < N < 97	NOT ENCOUNTERED				NOT ENCOUNTERED		
WTG-115		41.5	1.0	1.0		22.0	9 < N < 33	23.0		UNKNOWN	51 < N < 108	NOT ENCOUNTERED				NOT ENCOUNTERED		

Notes:

FIGURES

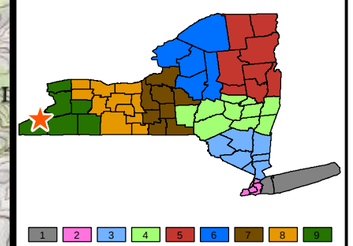
Creator: SteveW Date: 6/22/2015



LEGEND

- Map Tiles
- Municipal Boundary
- Project Location

NYSDEC REGIONS



USGS Quads:
Cassadaga
Dunkirk
Forestville
Hamlet

0 1,500 3,000 Feet

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PROJECT

ARKWRIGHT WIND FARM
CHAUTAUQUA COUNTY, NY

edp renewables
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TITLE

TURBINE
SITE LOCATIONS

TILE NO.

INDEX

Path: H:\Projects\081017-Arkwright_Wind_Farm\GIS\WTG_Turbines_IndexMap.mxd

Creator: alexandra Date: 6/23/2015

TOWN OF SHERIDAN

STRAIGHT ROAD

1300 1400

WTG 110
N: 886558.85
E: 967111.58
LAT: 42° 25' 52.739"
LON: -79° 15' 34.763"

110

WTG 49
N: 886201.01
E: 967666.13
LAT: 42° 25' 49.408"
LON: -79° 15' 8.663"

49

1500

WTG 111
N: 885596.76
E: 968728.02
LAT: 42° 25' 43.521"
LON: -79° 14' 54.440"

111

WTG 103
N: 886096.30
E: 972959.11
LAT: 42° 25' 48.779"
LON: -79° 13' 58.074"

103

WTG 69
N: 885344.18
E: 965840.20
LAT: 42° 25' 40.801"
LON: -79° 15' 32.919"

69

WTG 36
N: 885067.91
E: 973771.72
LAT: 42° 25' 38.682"
LON: -79° 13' 47.134"

36

51

WTG 51
N: 885244.72
E: 969600.86
LAT: 42° 25' 40.111"
LON: -79° 14' 42.765"

1600

TOWN OF ARKWRIGHT

Chautauqua County

CENTER ROAD

WTG 50
N: 884342.83
E: 965850.46
LAT: 42° 25' 30.910"
LON: -79° 15' 32.676"

50

WTG 47
N: 884125.48
E: 966896.01
LAT: 42° 25' 28.845"
LON: -79° 15' 18.713"

47

UNNAMED STREET

WTG 101
N: 883664.47
E: 968130.38
LAT: 42° 25' 24.388"
LON: -79° 15' 2.207"

101

WEAVER ROAD

WTG 43
N: 882586.63
E: 968103.93
LAT: 42° 25' 13.738"
LON: -79° 15' 2.446"

43

1500

UNNAMED STREET

WTG 112
N: 881759.34
E: 969421.79
LAT: 42° 25' 5.668"
LON: -79° 14' 44.790"

112

WTG 41
N: 881573.39
E: 968199.38
LAT: 42° 25' 3.737"
LON: -79° 15' 1.061"

41

UNNAMED STREET

1600

1700

TILE 2

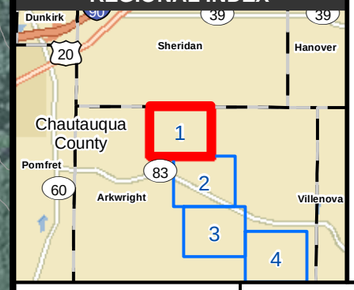
SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

Path: H:\Projects\081017-Arkwright_Wind_Farm\GIS\WTG_Turbines_MapSheets.mxd

LEGEND

- GDH - Transmission Line
- WTG - Turbine
- Met Tower
- Monitoring Well Site
- Contour 20ft
- Municipal Boundary
- Match Line

REGIONAL INDEX



0 350 700 Feet

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ARKWRIGHT WIND FARM
CHAUTAUQUA COUNTY, NY

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TITLE

TURBINE
SITE LOCATIONS

TILE NO.

1 OF 4

Creator: alexandra Date: 6/23/2015

TILE 1

TILE 3

GDH 475
N: 881318.57
E: 970246.55
LAT: 42° 25' 1.378"
LON: -79° 14' 33.749"

GDH 473
N: 881315.29
E: 972061.13
LAT: 42° 25' 1.484"
LON: -79° 14' 9.558"

GDH 177
N: 880908.58
E: 972413.21
LAT: 42° 24' 57.493"
LON: -79° 14' 4.823"

GDH 175
N: 880907.60
E: 972092.36
LAT: 42° 24' 57.459"
LON: -79° 14' 9.100"

GDH 176
N: 880879.85
E: 972237.85
LAT: 42° 24' 57.196"
LON: -79° 14' 7.157"

GDH 174
N: 880680.83
E: 972093.17
LAT: 42° 24' 55.219"
LON: -79° 14' 9.066"

WTG 115
N: 880540.96
E: 969756.08
LAT: 42° 24' 53.659"
LON: -79° 14' 40.207"

WTG 32
N: 881523.72
E: 974488.41
LAT: 42° 25' 3.726"
LON: -79° 13' 37.220"

WTG 100
N: 881021.86
E: 975480.37
LAT: 42° 24' 58.842"
LON: -79° 13' 23.945"

WTG 33
N: 880015.92
E: 973880.17
LAT: 42° 24' 48.786"
LON: -79° 13' 45.176"

WTG 29
N: 879753.62
E: 975313.20
LAT: 42° 24' 46.302"
LON: -79° 13' 26.046"

WTG 28
N: 878918.11
E: 976020.55
LAT: 42° 24' 38.101"
LON: -79° 13' 16.533"

WTG 30
N: 878941.07
E: 973253.87
LAT: 42° 24' 38.121"
LON: -79° 13' 53.416"

WTG 27
N: 878110.97
E: 976710.33
LAT: 42° 24' 30.179"
LON: -79° 13' 7.258"

WTG 22
N: 876563.38
E: 970345.60
LAT: 42° 24' 14.413"
LON: -79° 14' 31.937"

WTG 102
N: 876898.97
E: 976559.82
LAT: 42° 24' 18.196"
LON: -79° 13' 9.143"

Chautauqua County

TOWN OF ARKWRIGHT

ROUTE 83

CENTER ROAD

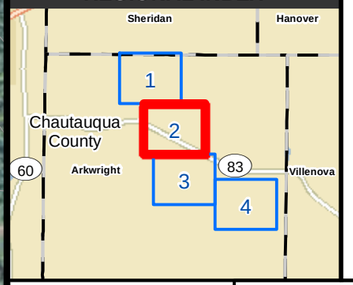
BALL ROAD

1700 1600 1500 1400

LEGEND

- GDH - Transmission Line
- WTG - Turbine
- Met Tower
- Monitoring Well Site
- Contour 20ft
- Municipal Boundary
- Match Line

REGIONAL INDEX



0 350 700 Feet

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CHAUTAUQUA COUNTY, NY

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TITLE

TURBINE
SITE LOCATIONS

TILE NO.

2 OF 4

Path: H:\Projects\081017-Arkwright_Wind_Farm\GIS\WTG_Turbines_MapSheets.mxd

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

Creator: alexandra Date: 6/23/2015

TILE 2

BALL ROAD

CENTER ROAD

MEADOWS ROAD

ROUTE 83

DRIVEWAY

TILE 4

TOWN OF ARKWRIGHT

Chautauqua County

WTG 19
N: 874250.57
E: 973230.40
LAT: 42° 25' 51.786"
LON: -79° 13' 53.251"

WTG 66
N: 873244.13
E: 973441.19
LAT: 42° 24' 41.860"
LON: -79° 13' 50.240"

WTG 21
N: 872902.77
E: 970481.35
LAT: 42° 23' 38.263"
LON: -79° 14' 29.750"

WTG 57
N: 873276.54
E: 975808.70
LAT: 42° 23' 42.357"
LON: -79° 13' 18.792"

WTG 105
N: 872783.07
E: 977401.39
LAT: 42° 23' 37.600"
LON: -79° 12' 57.517"

WTG 114
N: 871787.83
E: 975178.08
LAT: 42° 23' 27.604"
LON: -79° 13' 27.046"

WTG 10
N: 871666.59
E: 976999.05
LAT: 42° 23' 26.541"
LON: -79° 13' 2.768"

WTG 16
N: 870931.97
E: 975718.70
LAT: 42° 23' 19.190"
LON: -79° 13' 19.756"

MET TOWER
N: 870323.955761
E: 975329.488041
LAT: 42° 23' 13.155"
LON: -79° 13' 24.882"

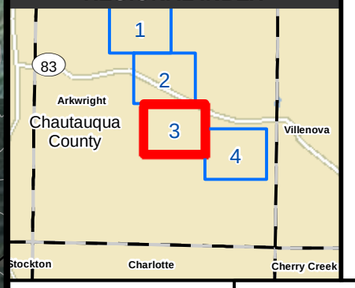
WTG 15
N: 870125.99
E: 976388.29
LAT: 42° 23' 11.278"
LON: -79° 13' 10.753"

WTG 93
N: 868468.90
E: 977766.15
LAT: 42° 22' 55.010"
LON: -79° 12' 52.229"

LEGEND

- GDH - Transmission Line
- WTG - Turbine
- Met Tower
- Monitoring Well Site
- Contour 20ft
- Municipal Boundary
- Match Line

REGIONAL INDEX



0 350 700 Feet

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ARKWRIGHT WIND FARM
CHAUTAUQUA COUNTY, NY

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TITLE

TURBINE
SITE LOCATIONS

TILE NO.

3 OF 4

Path: H:\Projects\081017-Arkwright_Wind_Farm\GIS\WTG_Turbines_MapSheets.mxd

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

Creator: alexandra Date: 6/23/2015

TILE 3

MEADOWS ROAD

FARRINGTON HOLLOW ROAD

DRIVEWAY

4WD ROAD

TOWN OF ARKWRIGHT

Chautauqua County

WTG 12
N: 868520.94
E: 979048.10
LAT: 42° 22' 55.618"
LON: -79° 12' 35.154"

WTG 11
N: 868420.60
E: 980123.53
LAT: 42° 22' 54.705"
LON: -79° 12' 20.815"

WTG 95
N: 868060.38
E: 981464.49
LAT: 42° 22' 51.243"
LON: -79° 12' 2.913"

WTG 96
N: 867490.17
E: 982397.45
LAT: 42° 22' 45.677"
LON: -79° 11' 50.427"

WTG 97
N: 867093.84
E: 983283.44
LAT: 42° 22' 41.825"
LON: -79° 11' 38.585"

12 11 95 96 97

1400 1500 1600 1700 1800

LEGEND

- GDH - Transmission Line
- WTG - Turbine
- Met Tower
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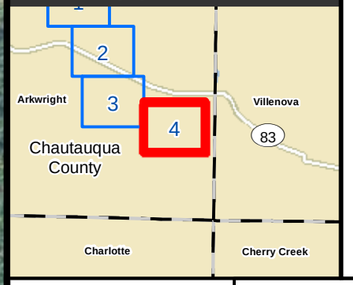
- Contour 20ft
- Municipal Boundary
- Match Line

REGIONAL INDEX



0 350 700 Feet

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ARKWRIGHT WIND FARM
CHAUTAUQUA COUNTY, NY

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TITLE

TURBINE
SITE LOCATIONS

TILE NO.

4 OF 4

Path: H:\Projects\081017-Arkwright_Wind_Farm\GIS\WTG_Turbines_MapSheets.mxd

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

APPENDIX A

Test Boring Logs
As prepared by Nature's Way, Inc. and Earth Dimensions, Inc.

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-10-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 871666.58590600000

Town of Arkwright, Chautauqua Co., NY Easting: 976999.05264900000

CLIENT Fisher Associates DATE STARTED 05/22/15 COMPLETED 05/22/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
	1	2						Extremely moist dark brown to black (MUCK) with organic fiber, very soft, granular soil structure, (OL). 0.2		(1) 4" LOCKING STEEL PROTECTIVE CASING
	20		2			6				(2) CONCRETE
				4						← 2.0'
					5					
	2	9						Moist faintly mottled brown (SAND-SILT-CLAY) with little sand and clay, firm, blocky soil structure, (ML-CL).		Note: WTG-10-15 drilled 12.0 feet southeast of staked location.
	24		10			20				
				10						Mucky organic surface to 0.2 feet over silty glacial drift with little sand and clay to 2.0 feet over silty glacial drift with trace gravel, little sand and clay to 4.0 feet over loamy glacial drift with trace to little gravel, little sand, trace clay to 6.0 feet over silty glacial drift with little gravel and clay, trace sand to 8.0 feet over silty glacial till to 11.5 feet over loamy glacial till to refusal.
					8					
	3	3						grades downward to 2.0		
5	16		4			8		Moist distinctly mottled olive brown (SAND-SILT-CLAY) with 3 to 5% gravel, little sand and clay, very stiff with nearly vertical gray desiccation cracks, (ML-CL).		
				4						
					3					
	4	2								
	20		4			12				
				8						
					12					
	5	13						grades downward to 4.0		
	24		24			51		Extremely moist faintly mottled olive brown gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand, trace clay, compact, massive soil structure, (ML).		
				27						
10					35					
	6	9						grades downward to 6.0		
	24		25			51		Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, little clay, trace sand, stiff with nearly vertical gray desiccation cracks, (ML-CL).		
				26						
					35					
	7	10								
	24		31			69				
				38						
					36					
	8	10						grades downward to 8.0		
	22		23			48		Moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 20% gravel, little clay, trace to little sand, hard, massive soil structure, (ML-CL).		
15				25						
					26					
	9	13						grades downward to 11.5		
	24		48			118		Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, dense, very dense below 18.0 feet with brittle consistence, massive soil structure, (ML).		
				70						
20					77					

WELL (1) (2) (3): 2" SCHEDULE 40 FJT PVC RISER; .010 SLOT 2" PVC SCREEN; CUTTINGS BACKFILL; .00N SIZE MORIE SAND PACK

← 10.0'

(3) BENTONITE CHIPS

← 13.0'

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 15.0 feet. Cored below with an NQ-2 size double tube core barrel and diamond bit to 25.0 feet. Installed a 2 inch PVC observation well in completed bore hole.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-10-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 871666.58590600000

Town of Arkwright, Chautauqua Co., NY Easting: 976999.05264900000

CLIENT Fisher Associates DATE STARTED 05/22/15 COMPLETED 05/22/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (ML).	.010 SLOT 2" PVC SCREEN; .00N-SIZE MORIE SAND PACK; CUTTINGS BACKFILL	← 25.0'
	10	29								
	8		100/3							
25										← 29.2'
	11	27								
	14		88					29.2		
				100/3				Split spoon refusal at 29.2 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 2 OF 2

NATURE'S WAY
ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC
3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: WTG 11

DATE: 3/31/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868420.5980, Easting: 980123.5250

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	2						Extremely moist, dark brown, mucky (SILT) topsoil with trace very fine size sand, very loose (0.3)	1.5'			Topsoil to 0.3 foot over silty lake sediment to 8.0 feet over water sorted and deposited sand with little silt to 10.0 feet over silty lake sediment to 13.0 feet over water sorted and deposited sand with little silt to 15.0 feet over water sorted and deposited sand with little gravel and silt to 22.5 feet over clayey glacial till to 24.3 feet over shale rock to refusal
		5			12						
			7								
				10				1.0'			
2	6						Moist, brown (SILT) with trace very fine size sand, compact to loose, weakly thinly bedded				
		4			9						
			5								
				8				1.2'		Soil Backfill	
3	5										
		4			8						
			4								
				5				1.0'		2" PVC Riser Pipe	
4	5										
		4			9						
			5								
				4			(8.0)	0.8'			
5	6						Extremely moist, faintly mottled, brown (SILTY-SAND) with very fine to fine size sand, little silt, loose, thinly bedded (10.0)		(9.5)	Bentonite Seal	
		5			10						
			5								
				4				1.5'			
6	4						Wet, brown (SILT) with trace very fine size sand, compact, thinly bedded				
		5			15						
			10								
				13				1.2'			
7	6										
		7			16		(13.0)				
			9				Wet, brown (SILTY-SAND) with very fine to fine size sand, little silt, compact, thinly bedded				
				11					(14.0)	# 2 Size Sand	
8	5							1.4'			
		10			25		(15.0)		(15.0)		
			15				Wet, brown, gravelly (SILTY-SAND) with 15 to 30% gravel, very fine to fine size sand, little silt, compact to dense, thinly bedded			2" Slotted PVC Screen	▼ Water Level at 15.7' BGS at Completion
				26							
9	9							0.2'			
		19									

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HOLE NUMBER: WTG 11

DATE: 3/31/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868420.5980, Easting: 980123.5250

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			21		40		Wet, brown, gravelly (SILTY-SAND) with 15 to 30% gravel, very fine to fine size sand, little silt, compact to dense, thinly bedded				
				25			22.5				
							Extremely moist, grayish brown, gravelly (CLAYEY-SILT) with 15 to 25% gravel, some clay, hard, massive soil structure			2" Slotted PVC Screen	
10	50/4"						24.3	0.3'		# 2 Size Sand	
							Shale rock, gray, soft, fissile				
25									25.0		
11	50/4"							0.1'			
30											
35											
40							32.5 Auger Refusal at 32.5' BGS				

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HOLE NUMBER: WTG 12

DATE: 4/1/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868520.9440, Easting: 979048.1000

SN	0/6	6/12	12/18	18/24	N	DESCRIPTION AND CLASSIFICATION	REC	REMARKS	COMMENTS
1	1					Extremely moist, dark brown (SILT) topsoil with trace very fine size sand, very loose, with fine size roots (0.4)	1.3'		Topsoil to 0.4 foot over silty lake sediment with trace sand to 4.0 feet over silty glacial drift to 10.0 feet over weathered shale rock to end of boring
		1			4				
			3						
				8					
2	3						1.5'		
		4			12				
			8						
				11					
						(4.0)	1.9'		
3	6					Moist, brown (SILT) with 5 to 15% gravel, trace very fine size sand, compact to dense, massive soil structure to weakly thinly bedded		Soil Backfill	
		8							
			9		17				
				15					
4	3						1.0'	2" PVC Riser Pipe	
		6							
			8		14				
				10					
5	8						1.3'		
		23							
			26		49				
				37					
						(10.0)	0.6'		
6	23					Shale rock, olive gray to gray, soft to moderately soft, weathered, fissile, wet			
		50/5"			>50				
7	41						0.6'	Bentonite Seal (12.0)	
		50/4"			>50				
							0.4'	# 2 Size Sand (14.5 / 15.0)	
8	50/5"							2" Slotted PVC Screen	▼ Water Level at 15.9' BGS at Completion
9	50/3"						0.2'		

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HOLE NUMBER: WTG 12

DATE: 4/1/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868520.9440, Easting: 979048.1000

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
10	50/3"						Shale rock, olive gray to gray, soft to moderately soft, weathered, fissile, wet	0.2'	25.0	2" Slotted PVC Screen # 2 Size Sand	
11	50/3"						30.0 Boring Completed at 30.0' BGS	0.2'			

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HOLE NUMBER: WTG 15

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870125.9870, Easting: 976388.2930

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	1						Extremely moist, dark brown (SILT) topsoil with trace very fine size sand, very loose (0.7)	1.4'			Topsoil to 0.7 foot over silty glacial drift with trace gravel to 10.0 feet over silty glacial till with little clay to 39.0 feet over silty glacial till with trace sand to end of boring
		1			8						
			7								
				12							
2	11						Moist to extremely moist, faintly mottled, brown (CLAYEY-SILT) with 5 to 15% gravel, little clay, loose to compact, weakly thinly bedded with one wet (SILTY-SAND) layer between 5.0' to 5.5'	1.0'			
		9			22						
			13								
				11							
3	3							1.3'			
		4			10						
			6								
				6							
4	5							1.5'			
		9			23						
			14								
				18							
5	8							1.3'			
		11			32						
			21								
				18			(10.0)				
6	19						Moist, gray, gravelly (CLAYEY-SILT) with 15 to 30% gravel, little clay, hard to very stiff, with brittle consistence, massive soil structure	2.0'	10.0	Bentonite Seal	
		16			38						
			22								
				21							
7	9							2.0'			
		13			28						
			15						13.5	# 2 Size Sand	
				15							
8	7							1.9'			
		9			21				15.0		
			12							2" Slotted PVC Screen	
				11							
9	50/5"							0.4'			

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HOLE NUMBER: WTG 15

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870125.9870, Easting: 976388.2930

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
10	50/3"						Moist, gray, gravelly (CLAYEY-SILT) with 15 to 30% gravel and occasional cobbles, little clay, hard with brittle consistence, massive soil structure	0.2'	2" Slotted PVC Screen; # 2 Size Sand; 25.0		
11	12	24			>74			1.1'			
			50/2"								
12	39	41			>91			1.0'			
			50/2"								
13	50/4"						39.0 See next sheet	0.3'			

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HOLE NUMBER: WTG 15

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870125.9870, Easting: 976388.2930

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
14	22	50/4"			>50		Moist, gray (SILT) with 10 to 15% gravel, trace very fine size sand, very dense with brittle consistence, massive soil structure	0.7'			
15	33	50/2"			>50		49.6 Boring Completed at 49.6' BGS	0.6'			No Water at Completion

45

50

55

60

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HOLE NUMBER: WTG 16

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870931.9700, Easting: 975718.6970

SN	0/6	6/12	12/18	18/24	N	DESCRIPTION AND CLASSIFICATION	REC	REMARKS
1	2					Moist, dark brown (SILT) topsoil with trace very fine size sand, loose, with fine size roots (0.7)	1.3'	2" PVC Riser Pipe
		2			4			
			2					
				8				
2	5					Extremely moist, distinctly mottled, brown (SILT) with trace clay, firm, blocky soil structure	1.4'	
		7						
			8		15			
				8		(4.0)		
3	5					Moist, faintly mottled, brown, gravelly (SILT) with 15 to 25% gravel, trace very fine size sand, compact to very dense, massive soil structure to weakly thinly bedded	1.4'	Soil Backfill
		7						
5			11		18			
				12			0.4'	
4	8							
		17						
			23		40			
				23				
5	13						1.3'	
		23						
			30		53			
				35				
6	17						1.8'	
		18						
			20		38			11.0 Bentonite Seal
				27		(12.0)		
7	9					Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel with occasional cobbles, little to some clay, hard, with brittle consistence, massive soil structure	1.6'	
		12						
			20		32			
				26				
8	13						1.6'	14.0 # 2 Size Sand
		21						
			25		46			
				27				16.0 2" Slotted PVC Screen
9	39						0.9'	
		19						

Topsoil to 0.7 foot over silty slack water sediment with trace clay to 4.0 feet over silty glacial drift to 12.0 feet over silty tending toward clayey glacial till to end of boring

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HOLE NUMBER: WTG 16

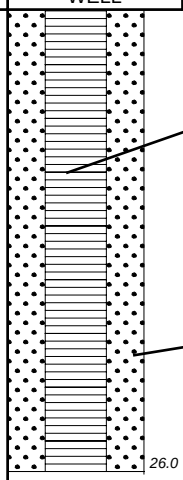
DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870931.9700, Easting: 975718.6970

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			22		41						
				27							
10	21							1.5'			
		26									
			31		57						
				35							
11	10						Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel with occasional cobbles, little to some clay, hard to very stiff, with brittle consistence, massive soil structure	1.8'			
		12									
			17		29						
				21							
12	13							1.2'			
		15									
			19		34						
				27							
13	10							1.3'			
		15									



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HOLE NUMBER: WTG 16

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870931.9700, Easting: 975718.6970

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			19		34						
				22							
14	6							1.3'			
		12									
			20		32						
				19							
15	6						Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel with occasional cobbles, little to some clay, hard, with brittle consistence, massive soil structure	1.4'			
		21									
			20		41						
				29							
16	10							1.5'			
		20									
			32		52						
				32							
17	3							1.5'			
		12									

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HOLE NUMBER: WTG 16

DATE: 3/17/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 870931.9700, Easting: 975718.6970

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			20		32		See Previous Sheet				
				24			61.0				No Water at Completion
							Boring Completed at 61.0' BGS				

65
70
75
80

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HOLE NUMBER: TB 19

DATE: 2/25/2013 ELEVATION: 1773.83

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	1	3	3	7	6		Moist, dark brown (SILT) topsoil with trace very fine size sand, loose with occasional very fine size roots (0.6)	1.2'		Cement / Bentonite Grout	Topsoil to 0.6 foot over clayey slack water sediment with some clay to 4.0 feet over clayey glacial till to 10.0 feet over silty glacial (lodgement) till to end of boring
2	2	6	7	8	13		Extremely moist, faintly mottled, brown (CLAYEY-SILT) with 3 to 5% mostly fine size gravel, some clay, firm to stiff, blocky soil structure (4.0)	1.7'			
3	4	8	12	17	20		Moist, faintly mottled, brown (CLAYEY-SILT) with 5 to 15% gravel, some clay, very stiff to hard with brittle consistence, massive soil structure	1.9'		2" PVC Riser Pipe	
4	8	15	18	18	33			1.5'			
5	4	24	30	28	54			2.0'			
6	9	17	19	19	36		(10.0) Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel, little clay, hard with brittle consistence, massive soil structure	1.8'	(10.0)		
7	6	19	27	28	46			1.9'	(13.0)	Bentonite Seal	
8	11	25	32	30	57			2.0'	(15.0)	#2 Size Sand	
9	48	38	37	40	75			2.0'		2" 10 Slot PVC Screen	

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HOLE NUMBER: T B 19

DATE: 2/25/2013 ELEVATION: 1773.83

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
							Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel, little clay, hard with brittle consistence, massive soil structure			2" 10 Slot PVC Screen	
10	18							2.0'		#2 Size Sand	
		28			66						
			38								
				36					25.0 / 25.5	Well Installation Completed at 25.0' BGS	
11	14							1.9'		Auger Cuttings	
		36			74						
			38								
				40							
12	24							1.7'			
		34			72						
			38								
				58							
13	24							1.5'			
		34			70						
			36								
				46							

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HOLE NUMBER: T B 19

DATE: 2/25/2013

ELEVATION: 1773.83

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
14	28						Moist, gray, gravelly (CLAYEY-SILT) with 15 to 25% gravel, little clay, hard with brittle consistence, massive soil structure	1.2'			
		38			70						
			32								
				36							
15	13							1.6'			
		22			54						
			32								
				36							
16	15							1.6'			
		25			48						
			23								
				32							
17	11							1.7'			
		21			42						
			21				Boring Completed at 60.0' BGS				
				22			60.0		60.0		

45 50 55 60

LOGGED BY: Dale M. Gramza / Senior Geologist

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(716) 655-1717 • FAX (716) 655-2915

10B13 HOLE NO. Bore Hole TB-21-13 SURF. ELEVATION 1712.22

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION Northing: 872908.02 Easting: 970485.25

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/07/13 COMPLETED 03/08/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with 0 to 3% gravel, little sand and organic matter, trace wood fiber, very loose, granular soil structure, (ML).		(1) 4 INCH LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
	18		1			6				← 1.5'
				5						Coarse silty topsoil with little sand and organic matter to 0.8 feet over coarse silty slack water sediment with little sand to 2.5 feet over loamy glacial till to 23.4 feet over apparent weathered shale bedrock to 28.5 feet over shale bedrock to 29.3 feet over siltstone bedrock to 30.0 feet over shale bedrock to end of coring.
					7					
	2	2						0.8		
	24		5			12		Extremely moist faintly mottled brown (SANDY-SILT) with some mostly very fine to fine size sand, trace clay, compact, blocky soil structure, (ML).		
				7						
					9					
	3	8								
5	17		10			19		clear transition to 2.5		
				9						
					16					
	4	7						Extremely moist to moist dark brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, occasional cobble, little sand, compact, massive soil structure, (SM).		
	20		7			16				
				9						
					14					
	5	10						grades downward to 8.0		
	24		14			33		Moist grayish brown gravelly (SANDY-SILT) with 5 to 15% gravel, little sand, dense, very dense below 9.0 feet with slight brittle consistence, massive soil structure, (ML).		
				19						
10					29					
	6	15								
	17		36			64				
				28						
					39					
	7	16						clear transition to 12.3		
	21		19			43		Moist gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, occasional cobble, little sand, trace to little clay, hard and very stiff with slight brittle consistence, massive soil structure, (SC).		
				24						
					32					
	8	11								
15	24		12			26				
				14						
					17					
	9	9								
	22		11			26				
				15						
20					19					

WELL (1)(2): 2 INCH SCHEDULE 40 PJT RISER; CUTTINGS BACKFILL; #00N SIZE MORIE SAND PACK; (3)

(2) CONCRETE
(3) BENTONITE SEAL

← 8.0'

← 11.0'

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet and 5 foot sampling to 28.5 feet. Continued below with a NQ-2 size double tube core barrel and diamond bit to 38.5 feet. A 2 inch PVC observation well installed in the completed bore hole.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13 HOLE NO. Bore Hole TB-21-13 SURF. ELEVATION 1712.22

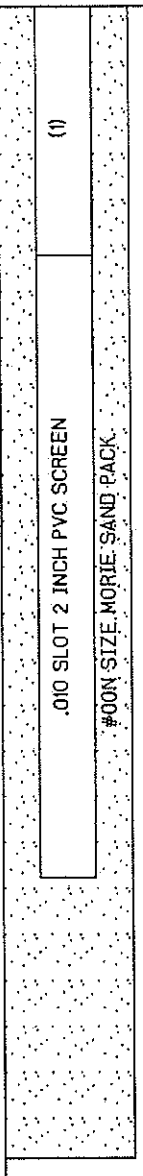
PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION Northing: 872908.02 Easting: 970485.25

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/07/13 COMPLETED 03/08/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION
								Moist gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, occasional cobble, little sand, trace to little clay, hard and very stiff with slight brittle consistence, massive soil structure, (SC).
								23.4
	10	39						Gray apparent shale bedrock, very
	10		100/4					soft and soft with occasional thin
25								layer of moderately soft rock.
								28.5
	11	100/1						Gray shale bedrock, moderately soft,
	1							highly fractured horizontally along
30								bedding planes, thinly bedded to
								banded, dense.
								clear transition to 29.3
		Run	#1					Gray siltstone bedrock, medium
								hardness, slightly fractured
								horizontally along bedding planes,
								slight iron stained and pyrite deposits,
								banded, slightly porous.
								30.0
								Gray shale bedrock, moderately soft
								with occasional thin layers of soft and
35								very soft rock, moderately to highly
								fractured horizontally with slight iron
		Run	#2					stains in some rock, very highly
								fractured 32.8 to 33.5 foot depth,
								occasional highly fractured and broken
								zone 1/2 to 3 inches thick, thinly
								bedded to banded, porous.
								38.5
								Coring completed at 38.5 feet.
40								

WELL



WATER TABLE AND REMARKS

(1) .010 SLOT 2 INCH PVC SCREEN

Note: Augers left in at 28.5 feet below ground surface, no water in bore hole morning of 3/8/13 prior to coring.

← 24.0'

Note: No water loss to formation during coring below 33.0 feet. Lost approximately 150 gallons of water to formation during coring.

EDI Bedrock Hardness Classification

- Very soft: can be easily crushed between fingers into soil material.
- Soft: can be crushed between fingers into soil material with some effort.
- Moderately soft: can be etched with fingernail.
- Medium hardness: can be easily etched with knife.

← 34.0'

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	28.5 to 34.5	6.0	5.8	97	31
2	34.5 to 38.5	4.0	3.7	93	38

← 38.5'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13 HOLE NO. Bore Hole TB-22-13 SURF. ELEVATION 1665.4

PROJECT Arkwright Summit Windfarm – Wind Turbine Project LOCATION N: 876575.39 E: 970354.73

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/01/13 COMPLETED 03/04/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil (disturbed) with 3 to 7% gravel, little sand and organic matter, very loose, weakly granular soil structure to blocky soil structure, (ML). 0.9		
	17		1			4				
				3						
					7					
	2	6								
	24		8			16				
				8						
					8					
	3	4								
5	16		5			10				
				5						
					6					
	4	4								
	24		5			11				
				6						
					11					
	5	3								
	19		5			16				
				11						
					20					
10	6	20								
	17		15			26				
				11						
					18					
	7	29								
	21		27			47				
				20						
					21					
	8	11								
15	20		14			31				
				17						
					18					
	9	25								
	24		46			103				
				57						
20					63					

Extremely moist to wet faintly mottled brown (SANDY-SILT) with 5 to 10% gravel, little mostly very fine to fine size sand, trace clay, very loose, weakly blocky soil structure, (ML). 1.5

Extremely moist to moist distinctly mottled brown (SAND-SILT-CLAY) with 3 to 7% gravel, little sand and clay, stiff, blocky soil structure, (ML-CL).

grades downward to 2.0

Extremely moist brown (SANDY-SILT) with 5 to 15% gravel and flat sided stone fragments, little sand, trace clay, compact, massive soil structure, (ML).

grades downward to 6.0

Extremely moist to wet brown (SAND-SILT-CLAY) with 5 to 15% gravel and flat sided stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL). 9.5

Extremely moist to wet grayish brown gravelly (SILTY-SAND) with 15 to 25% gravel, very fine to very coarse size sand, little silt, compact and dense, stratified, (SM).

clear transition to 14.4

See next sheet.

WELL (1)(2): 2 INCH SCHEDULE 40 FJT RISER; .010 SLOT 2 INCH PVC SCREEN; CUTTINGS BACKFILL; #00N SIZE MORIE SAND PACK; (3)

← 1.5'

(1) 4 INCH LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
(2) CONCRETE
(3) BENTONITE SEAL

← 6.0'

← 9.0'

Note: augers left at 23.0 feet for two days, water level at 11.0 feet below ground surface morning of 3/4/13.

← 14.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Barron, Geologist, (mw)

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10813 HOLE NO. Bore Hole TB-22-13 SURF. ELEVATION 1665.4 0

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 876575.39 E: 970354.73

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/01/13 COMPLETED 03/04/13

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet to extremely moist gray (SANDY-SILT) with 5 to 15% gravel, little sand, trace clay, compact, massive soil structure, (ML). grades downward to 18.0	(1) .010 SLOT 2 INCH PVC SCREEN (2) #00N SAND MORIE SAND PACK	
	10	67						Extremely moist gray gravelly (SANDY-SILT) with 15 to 40% gravel, occasional cobble, little sand, very dense with brittle consistence, massive soil structure, (SM).		← 24.0'
	10		100/5							
25										Coarse silty topsoil with little sand and organic matter to 0.9 feet over coarse silty slack water sediment with little sand, trace gravel to 1.5 feet over silty slack water sediment with little sand and clay, trace gravel to 2.0 feet over loamy glacial drift with trace to little gravel and flat sided stone fragments to 9.5 feet over water sorted and deposited sand with little to some gravel, little silt to 14.4 feet over loamy glacial till to end of boring.
	11	61								
	20		70			153				
				83						
30					100/4					
	12	19								
	24		35			78				
				43						
35					47					Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet and 5 foot interval sampling to 60.0 feet. A 2 inch PVC observation well was installed in completed bore hole.
	13	27								
	22		33			62				
				29						
40					35					

(1) (2) CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13 HOLE NO. Bore Hole TB-22-13 SURF. ELEVATION 1665.4 0

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 876575.39 E: 970354.73

Town of Arkwright, Chautauqua Co., NY

CLIENT Eisher Associates DATE STARTED 03/01/13 COMPLETED 03/04/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist gray gravelly (SANDY-SILT) with 15 to 40% gravel, occasional cobble, little sand, very dense with brittle consistence, massive soil structure, (SM).		
	14	100/5								
	6									
45										
	15	25								
	24		32			73				
				41						
50					47					
	16	24								
	24		36							
				19		55				
55					45					
	17	23								
	22		29							
				41		70				
60					39			Boring completed at 60.0 feet.	60.0	← 60.0'

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13a HOLE NO. WTG-27-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878074.95842800000
Town of Arkwright, Chautauqua Co., NY Easting: 976628.66398300000

CLIENT Fisher Associates DATE STARTED 05/19/15 COMPLETED 05/20/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist mixed black and reddish brown (MUCK), granular soil structure, (OL).		← 0.5'
	16		3			7		0.4		← 2.0'
				4				Extremely moist highly mottled brown (SANDY-SILT) with little sand, loose, blocky soil structure, (ML).		(1) TOPSOIL FILL
					6			1.0		(2) CONCRETE
	2	6						Extremely moist faintly mottled brown (SILTY-SAND) with 3 to 7% gravel, very fine to very coarse size sand, little silt, loose, blocky soil structure, (SM).		Note: WTG-27-15 drilled 12.0 feet east of new staked location.
	20		7			14		grades downward to 2.5		
				7				Extremely moist brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, very fine to very coarse size sand, little silt and clay, compact, stratified, (SC).		Organic muck surface to 0.4 feet over coarse silty slack water sediment with little sand to 1.0 feet over water sorted and deposited sand with little silt, trace gravel to 2.5 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 13.0 feet over water sorted and deposited coarse silt with little to some gravel and silt to 15.0 feet over loamy glacial till to 18.0 feet over water sorted and deposited coarse silt and gravel, some sand to 28.0 feet over water sorted and deposited sand with some gravel, little to some silt to 33.0 feet over silty slack water sediment to 43.5 feet over water sorted and deposited sand and gravel to 48.5 feet over silty slack water sediment with little clay to 53.0 feet over water sorted and deposited sand and gravel to 58.0 feet over water sorted and deposited sand and gravel with little clay, trace sand to end of boring.
					12			clear transition to 4.5		
	3	9						Extremely moist faintly mottled brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little silt and clay, very stiff, stiff below 8.0 feet, weakly stratified, (SC).		
5	18		9			18		clear transition to 13.0		
				9				Extremely moist to wet faintly mottled olive grayish brown gravelly (SANDY-SILT) with 15 to 40% gravel, little to some silt, compact, weakly stratified, (SM).		
					9			grades downward to 15.0		
	4	10						Extremely moist faintly mottled olive grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, massive soil structure, (SC).		
	8		6			13		grades downward to 18.0		
				7						
					5					
	5	2								
	20		4			8				
				4						
10					4					
	6	5								
	16		5			11				
				6						
					11					
	7	8								
	12		9			13				
				4						
					6					
	8	3								
	18		6			17				
15				11						
					13					
	9	22								
	15		45			89				
				44						
20					46			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-27-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 878074.95842800000
Town of Arkwright, Chautauqua Co., NY Easting: 976628.66398300000

CLIENT Fisher Associates DATE STARTED 05/19/15 COMPLETED 05/20/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled olive brown very gravelly (SANDY-SILT) with 40 to 60% mostly subrounded gravel and occasional cobble, some sand, dense and very dense, stratified, (SM), (GM).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	10	11								
	8		51			80				
				29						
25					19					
								grades downward to 28.0		Augers left in bore hole over night at 31.0 feet, water level the next morning was 26.9 feet below ground surface.
	11	10						Extremely moist to wet faintly mottled olive gravelly (SILTY-SAND) with 20 to 40% mostly subrounded gravel, very fine to very coarse size sand, little to some silt, compact, stratified, (SM).		
	11		13			26				
				13						
30					15					
								grades downward to 33.0		
	12	13						Extremely moist olive gray (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
	22		12			29				
				17						
35					19					
	13	9								
	24		10			25				
				15						
40					18					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-27-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 878074.95842800000
Town of Arkwright, Chautauqua Co., NY Easting: 976628.66398300000

CLIENT Fisher Associates DATE STARTED 05/19/15 COMPLETED 05/20/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
								grades downward to 43.5		
	14	7								
	24		13			31		Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, fine to very coarse size sand, dense, stratified, (SW), (GW).		
				18						
45					19					
								grades downward to 48.5		
	15	21								
	24		10			21		Extremely moist olive gray (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
				11						
50					13					
								grades downward to 53.0		
	16	23								
	18		29			55		Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, fine to very coarse size sand, very dense, stratified, (SW), (GW).		
				26						
55					31					
								grades downward to 58.0		
	17	18								
	14		20			47				
				27						
60					34			See next sheet.	CUTTINGS, BACKFILL	← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-27-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878074.95842800000

Town of Arkwright, Chautauqua Co., NY Easting: 976628.66398300000

CLIENT Fisher Associates DATE STARTED 05/19/15 COMPLETED 05/20/15

DEPTH IN FT	SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray very gravelly (CLAYEY-SAND) with 40 to 60% mostly subrounded gravel, very fine to very coarse size sand, little clay, trace silt, dense, stratified, (SC), (GC).		
								60.0		
								Boring completed at 60.0 feet.		
65										
70										
75										
80										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 4 OF 4

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10B13a HOLE NO. WTG-28-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878892.06456300000
Town of Arkwright, Chautauqua Co., NY Easting: 975917.87107000000

CLIENT Fisher Associates DATE STARTED 05/14/15 COMPLETED 05/15/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist dark reddish brown (MUCK), granular soil structure, (OL). 0.2		← 0.5'
	24		4			10				
				6						← 2.0'
					10					
	2	10						Extremely moist distinctly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, trace clay, loose, blocky soil structure, (ML).		(1) TOPSOIL FILL
	22		11			19				(2) CONCRETE
				8						
					9			grades downward to 0.7		
	3	5						Extremely moist faintly mottled olive brown (SAND-SILT-CLAY) with 10 to 15% gravel, little sand and clay, stiff, blocky soil structure, (ML-CL) tending towards (SC).		Note: WTG-28-15 drilled 14.0 feet west, southwest of staked location.
5	12		3			8				
				5						Mucky surface to 0.2 feet over coarse silty glacial drift with little sand, trace clay to 0.7 feet over silty glacial drift with little gravel, sand and clay to 1.8 feet over silty glacial drift with little to some gravel, little clay, trace sand to 3.0 feet over silty glacial drift with little to some gravel, little to some clay, little sand to 5.5 feet over silty glacial drift with little to some gravel, little sand and clay to 8.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 11.0 feet over silty glacial drift with little to some gravel, little sand and clay to 13.5 feet over silty glacial till to 28.0 feet over loamy glacial till to 33.0 feet over clayey glacial till to end of boring.
					5					
	4	3								
	14		4			10				
				6						
					5			grades downward to 1.8		
	5	2						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL).		
	16		2			5				
				3						
10					2			grades downward to 3.0		
	6	2						Extremely moist distinctly mottled olive grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little to some clay, little sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL) tending towards (CL).		
	16		3			8				
				5						
					9			grades downward to 5.5		
	7	2						Extremely moist distinctly mottled olive brownish gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, stiff, massive soil structure, (ML-CL) tending towards (SC).		
	20		3			8				
				5						
					8			grades downward to 8.0		
	8	5								
15	18		9			21				
				12						
					12					
	9	2								
	18		9			19				
				10						
20					13			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-28-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 878892.06456300000
Town of Arkwright, Chautauqua Co., NY Easting: 975917.87107000000

CLIENT Fisher Associates DATE STARTED 05/14/15 COMPLETED 05/15/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist to wet distinctly mottled brown gravelly (SANDY-SILT) with 15 to 40% gravel, some sand, loose, weakly stratified, (SM).		
								grades downward to 11.0		
	10	3						Extremely moist faintly mottled olive brownish gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		
	19		14			32				
				18						
25					25					
								grades downward to 13.5		
								Extremely moist faintly mottled olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, hard below 23.0 feet, massive soil structure, (ML-CL).		
	11	9								Water level at 28.0 feet below ground surface at completion.
	18		22			38		grades downward to 28.0	CUTTINGS BACKFILL	
				16				Extremely moist to wet olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, some sand, dense, massive soil structure, (SM).		
30					9					
								grades downward to 33.0		
	12	3						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, hard below 38.0 feet, massive soil structure, (CL).		Augers left in bore hole over night at 38.0 feet, water level the next morning was 33.4 feet below ground surface.
	17		6			18				
				12						
35					15					
										Noticed harder drilling at 36.5 foot depth.
	13	20								
	6		31			75				
				44						
40					49					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-28-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 878892.06456300000
Town of Arkwright, Chautauqua Co., NY Easting: 975917.87107000000

CLIENT Fisher Associates DATE STARTED 05/14/15 COMPLETED 05/15/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, hard below 38.0 feet, massive soil structure, (CL).	CUTTINGS BACKFILL	
	14	13								
	17		18							
				26		44				
45					30					
	15	11								
	22		15							
				24		39				
50					27					
	16	3								
	24		18							
				27		45				
55					33					
	17	11								
	10		18							
				22		40				
60					29			Boring completed at 60.0 feet.	60.0	← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. WTG-29-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautauqua Co., NY Easting: 975325.27511400000

CLIENT Fisher Associates DATE STARTED 05/13/15 COMPLETED 05/13/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black (MUCK) topsoil, granular soil structure, (OL). 0.2		← 0.5'
	22		2			4				
				2						← 2.0
					4					
	2	7						Extremely moist faintly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, very loose, blocky soil structure, (ML).		(1) TOPSOIL FILL
	18		7			12				(2) CONCRETE
				5						
					6			grades downward to 1.0		
	3	3						Extremely moist faintly mottled olive brown (SAND-SILT-CLAY) with 5 to 10% gravel, little sand and clay, soft, blocky soil structure, (ML-CL).		Note: WTG-29-15 drilled 0.5 feet west of staked location.
5	18		4			7				
				3						
					6			grades downward to 2.0		
	4	3						Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, stiff with nearly vertical gray desiccation cracks, (ML-CL).		Organic rich topsoil to 0.2 feet over coarse silty glacial drift with little sand, trace gravel to 1.0 feet over silty glacial drift with little sand and clay, trace gravel to 2.0 feet over silty glacial drift with little to some gravel, little sand and clay to 4.5 feet over silty glacial drift with little to some gravel, little clay, trace sand to 8.5 feet over water sorted and deposited sand with little gravel to 9.0 feet over silty glacial drift with little to some gravel, little sand and clay to 23.5 feet over water sorted and deposited sand and gravel with some silt to 28.0 feet over water sorted and deposited sand and gravel to 38.0 feet over loamy glacial till to 43.0 feet over silty glacial till to 53.0 feet over clayey glacial till to end of boring.
	14		8			14				
				6						
					8			grades downward to 4.5		
	5	7						Extremely moist distinctly mottled olive grayish brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, firm, stiff below 6.0 feet with nearly vertical gray desiccation cracks, (ML-CL).		
	22		6			12				
				6						
					4			grades downward to 8.5		
10	6	5						Wet faintly mottled olive grayish brown (SAND) with 10 to 15% gravel, very fine to very coarse size sand, loose, stratified, (SW). 9.0		
	20		10			51				
				41						
					86					
	7	16						Extremely moist to wet distinctly mottled olive grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, hard below 10.5 feet, massive soil structure, (ML-CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	21		18			34				
				16						
					18			clear transition to 12.5		
	8	5								
15	20		10			23				
				13						
					15					
	9	5								
	12		13			27				
				14						
20					19			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 1 OF 3

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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-29-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautauqua Co., NY Easting: 975325.27511400000

CLIENT Fisher Associates DATE STARTED 05/13/15 COMPLETED 05/13/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).		
								grades downward to 23.5		
	10	18								
	24		28			58		Wet distinctly mottled olive brown very gravelly (SILTY-SAND) with 40 to 60% mostly subrounded gravel and occasional cobble, very fine to very coarse size sand, some silt, very dense, stratified, (SM), (GM).		
				30						
25					32					
								grades downward to 28.0		
	11	8								
	22		12			25		Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, medium to coarse size sand, compact, dense below 33.0 feet, stratified, (SW), (GW).	CUTTINGS BACKFILL	
				13						
30					15					
	12	16								
	13		16			33				
				17						
35					16					
								grades downward to 38.0		
	13	6								
	19		12			35		Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, dense, massive soil structure, (ML).		
				23						
40					41					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-29-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautauqua Co., NY Easting: 975325.27511400000

CLIENT Fisher Associates DATE STARTED 05/13/15 COMPLETED 05/13/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, dense, massive soil structure, (ML).		
								grades downward to 43.0		
	14	5						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and occasional channer, little sand and clay, hard, massive soil structure, (ML-CL).		
	22		22			62				
				40						
45					39					
	15	27								
	11		100/5							
50										
								grades downward to 53.0		
	16	5						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		
	14		12			38				
				26						
55					47					
	17	8								
	18		21			54				No water at completion.
				33						
60					54			Boring completed at 60.0 feet. 60.0	CUTTINGS BACKFILL	← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-30-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878937.56650800000
Town of Arkwright, Chautauqua Co., NY Easting: 973257.56541700000

CLIENT Fisher Associates DATE STARTED 04/06/15 COMPLETED 04/07/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2								← 0.5'
	22		2			9		Extremely moist dark brown mucky (SAND-SILT-CLAY) topsoil with some organic matter, little sand and clay, soft, granular soil structure, (ML-CL) tending towards (OL).		← 2.0'
				7				0.6		
					9			Extremely moist faintly mottled olive brown (SAND-SILT-CLAY) with little sand and clay, stiff, blocky soil structure, (ML-CL).		Augers left in bore hole over night at 25.0 feet, water level the next morning was 1.2 feet below ground surface.
	2	8						1.7		
	15		7			12		Extremely moist faintly mottled olive brown gravelly (CLAYEY-SAND) with 15 to 40% mostly subrounded gravel, fine to very coarse size sand, little clay, trace silt, stiff, weakly blocky soil structure, (SC).		(1) TOPSOIL FILL (2) CONCRETE
				5				4.0		
					10			Wet faintly mottled olive brown gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, little sand, trace clay, compact, weakly stratified, (SM) tending towards (ML).		Note: WTG-30-15 drilled 1.0 foot east of staked location.
	3	2						6.5		
5	16		3			9		Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subrounded gravel, little sand and clay, very stiff, weakly stratified, (SC).		Silty topsoil with some organic matter, little sand and clay to 0.6 feet over silty glacial drift with little sand and clay to 1.7 feet over water sorted and deposited sand with little to some gravel, little clay, trace silt to 4.0 feet over water sorted and deposited coarse silt with little to some gravel, little sand, trace clay to 6.5 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 8.0 feet over coarse silty water sorted and deposited sediment with little to some gravel and sand, trace silt to 12.5 feet over silty glacial till to 23.0 feet over loamy glacial till to end of boring.
				6				grades downward to 8.0		
					8			Extremely moist distinctly mottled olive brown gravelly (SANDY-SILT) with 15 to 30% mostly subrounded gravel, little to some sand, trace clay, compact and dense, stratified, (SM).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	4	9						12.5		
	6		11			24				
				13						
					10					
	5	5								
	22		7			18				
				11						
10					13					
	6	7								
	16		25			39				
				14						
					18					
	7	10								
	20		12			24				
				12						
					25					
	8	9								
	12		8			16				
15				8						
					10					
	9	3								
	19		6			19				
				13						
20					14			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-30-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878937.56650800000
Town of Arkwright, Chautauqua Co., NY Easting: 973257.56541700000

CLIENT Fisher Associates DATE STARTED 04/06/15 COMPLETED 04/07/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, massive soil structure, (ML-CL) tending towards (SC).		
								grades downward to 18.0		
	10	16						Extremely moist to wet olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, massive soil structure, (ML-CL) tending towards (SC).		
	20		86			149				
				63						
25					65					
								grades downward to 23.0		
	11	42						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand, trace clay, very dense with brittle consistence, very dense, massive soil structure, (ML) tending towards (SM).		
	17		78							
				100/5						
30									CUTTINGS BACKFILL	
	12	68								
	11		100/5							
35										
	13	85								
	12		100/4							
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-30-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 878937.56650800000

Town of Arkwright, Chautauqua Co., NY Easting: 973257.56541700000

CLIENT Fisher Associates DATE STARTED 04/06/15 COMPLETED 04/07/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand, trace clay, very dense with brittle consistence, very dense, massive soil structure, (ML) tending towards (SM).	CUTTINGS BACKFILL	
	14	25								
	11		100/5							
45										
	15	35								
	15		89							
				100/3						
50										
	16	26								
	24		49			101				
				52						
55					58					
	17	19								
	22		41			114				
				73						
60					66			Boring completed at 60.0 feet.		← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-30a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/08/15 COMPLETED 04/08/15

DEPTH IN FT / BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
									(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL
									Note: WTG-30a-15 drilled 1.5 feet east southeast of staked location.
									← 10.0'
									← 13.0'
									← 15.0'

5 10 15 20

2" SCHEDULE 40 FJT PVC RISER

CUTTINGS BACKFILL

.010 SLOT 2" PVC SCREEN

#00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist (mw)

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10B13a HOLE NO. WTG-30a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/08/15 COMPLETED 04/08/15

DEPTH IN FT | BLOWS ON SAMPLER | SN | 0/6 | 6/12 | 12/18 | 18/24 | N | LITH | DESCRIPTION AND CLASSIFICATION | WELL | WATER TABLE AND REMARKS

Advanced bore hole without split spoon sampling to 25.5 feet.

25.5

Boring completed at 25.5 feet.

WELL: .010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK

← 25.0'

← 25.5'

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist (mw)

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10B13a HOLE NO. WTG-32-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881523.72180600000

Town of Arkwright, Chautauqua Co., NY Easting: 974488.41480000000

CLIENT Fisher Associates DATE STARTED 05/12/15 COMPLETED 05/12/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black muck (SANDY-SILT) topsoil with some organic matter, little sand, very loose, granular soil structure, (ML) tending towards (OL).		← 0.5'
	18		1			5		0.2		← 2.0'
				4				Extremely moist faintly mottled dark brown (SANDY-SILT) topsoil with trace to little organic matter, little sand, granular soil structure, (ML).		(1) TOPSOIL FILL
					7			0.5		(2) CONCRETE
	2	8						Extremely moist brown gravelly (SANDY-SILT) with 15 to 20% mostly subangular gravel, little sand, trace clay, very loose, weakly thinly bedded, (ML).		
	18		8			18		grades downward to 1.0		Note: WTG-32-15 drilled 1.5 feet north of staked location.
				10				Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, stiff and very stiff with nearly vertical gray desiccation cracks, (ML-CL).		
					12			grades downward to 8.0		Coarse silty topsoil with some organic matter, little sand to 0.2 feet over coarse silty topsoil with trace to little organic matter, little sand to 0.5 feet over water sorted and deposited coarse silt with little gravel and sand, trace clay to 1.0 feet over silty glacial drift with little to some gravel, little clay, trace sand to 8.0 feet over silty glacial drift with little to some gravel to 28.0 feet over loamy glacial drift with little to some gravel to 38.0 feet over water sorted and deposited sand with little to some gravel, trace clay to 43.0 feet over silty to clayey glacial till to refusal.
	3	5						Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff and hard, massive soil structure, (SC) tending towards (ML-CL).		
5	18		7			15		clear transition to 15.5		
				8				Extremely moist gray gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 53.7 feet.
					7					
	4	4								
	24		3			8				
				5						
					5					
	5	5								
	24		10			23				
				13						
10					17					
	6	17								
	22		21			51				
				30						
					22					
	7	19								
	12		11			22				
				11						
					10					
	8	7								
	17		12			21				
15				9						
					9					
	9	4								
	16		7			14				
				7						
20					7					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-32-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881523.72180600000
Town of Arkwright, Chautauqua Co., NY Easting: 974488.41480000000

CLIENT Fisher Associates DATE STARTED 05/12/15 COMPLETED 05/12/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist gray gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		
	10	3								
	24		5			10				
				5						
25					5					
								grades downward to 28.0		
	11	3						Extremely moist to wet gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, massive soil structure, (SC).		
	24		9			14				
				5						
30					6				CUTTINGS, BACKFILL	
	12	8								
	20		7			13				
				6						
35					5					
								grades downward to 38.0		
	13	15						Wet olive gray gravelly (SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW).		
	16		10			20				
				10						
40					13					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-32-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881523.72180600000

Town of Arkwright, Chautauqua Co., NY Easting: 974488.41480000000

CLIENT Fisher Associates DATE STARTED 05/12/15 COMPLETED 05/12/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray gravelly (SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW).		
								grades downward to 43.0		
	14	2						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little to some clay, little sand, very stiff, massive soil structure, (ML-CL) tendinig towards (CL).		Water level at 43.7 feet below ground surface at completion.
	20		8			22				
				14						
45					18					
	15	2								
	22		8			18				
				10						
50					26					
	16	51						53.7		← 53.7'
			100/2					Split spoon refusal at 53.7 feet.		
55										
60										

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 3 OF 3

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10B13a HOLE NO. WTG-33-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880015.92266700000

Town of Arkwright, Chautauqua Co., NY Easting: 973880.17432100000

CLIENT Fisher Associates DATE STARTED 04/24/15 COMPLETED 04/27/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	WH						Extremely moist to wet brownish gray mucky (SANDY-SILT) topsoil with some organic matter, little sand, very loose, granular soil structure, (ML) tending towards (OL).		← 0.5'
	14		2			5				
				3						← 2.0'
					7					
	2	10								
	20		7			12				Augers left in bore hole over weekend at 12.0 feet, water level Monday morning was at ground surface.
				5				0.3		
					11			Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand, little to some clay, stiff, very stiff below 5.0 feet with nearly vertical gray desiccation cracks, (ML-CL) tending towards (SC).		
	3	11								
5	15		12			26				WH: Sampler penetration with weight of rods and hammer.
				14						
					15					(1) TOPSOIL FILL
	4	8								(2) CONCRETE
	23		10			20		clear transition to 5.5		
				10						
					11			Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace to little sand, very stiff and hard, massive soil structure, (CL).		Organic rich coarse silty topsoil with some organic matter, little sand to 0.3 feet over silty glacial drift with little to some gravel and clay, little sand to 5.5 feet over clayey glacial drift with little to some gravel, trace to little sand to 14.0 feet over water sorted and deposited silt with little to some clay and gravel to 38.0 feet over silty to clayey glacial till to refusal.
	5	5								
	24		10			21				
				11						
10					10					
	6	7								
	21		20			38				
				18						
					21					
	7	8								
	20		12			25				
				13						
					15			grades downward to 14.0		
	8	4								
	18		9			19		Wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, very stiff, weakly stratified, (ML-CL) tending towards (CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 49.4 feet.
15				10						
					25					
	9	8								
	22		12			25				
				13						
20					15					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-33-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880015.92266700000

Town of Arkwright, Chautauqua Co., NY Easting: 973880.17432100000

CLIENT Fisher Associates DATE STARTED 04/24/15 COMPLETED 04/27/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, very stiff, weakly stratified, (ML-CL) tending towards (CL).	CUTTINGS BACKFILL	
	10	9								
	18		13			27				
				14						
25					15					
	11	4								
	22		7			17				
				10						
30					12					
	12	3								
	17		8			23				
				15						
35					17					
								grades downward to 38.0		
	13	8								
	17		27			76				
				49						
40					47			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-33-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880015.92266700000

Town of Arkwright, Chautauqua Co., NY Easting: 973880.17432100000

CLIENT Fisher Associates DATE STARTED 04/24/15 COMPLETED 04/27/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel and occasional channer, little to some clay, trace sand, hard, massive soil structure, (ML-CL) tending towards (CL).	CUTTINGS/BACKFILL	
	14	15								
	22		82			145				
				63						
45					100/3					
	15	12								
	16		65							
				100/5				49.4		← 49.4'
50								Split spoon refusal at 49.4 feet.		
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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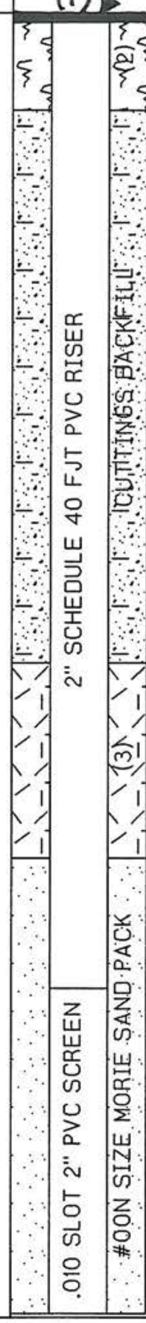
10B13a HOLE NO. WTG-33a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/27/15 COMPLETED 04/27/15

DEPTH IN FT	BLOWS ON SAMPLER: SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
0–20								Advanced bore hole without split spoon sampling to 25.5 feet.	(1) (2)	← 1.5' (1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-33a-15 drilled 7.0 feet west of staked location. ← 10.0' ← 13.0' ← 15.0'



N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 1 OF 2

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10B13a HOLE NO. WTG-33a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/27/15 COMPLETED 04/27/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 2 OF 2

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1091 Jamison Road • Elma, NY 14059

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10B13a HOLE NO. WTG-36-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 885067.90841600000

Town of Arkwright, Chautauqua Co., NY Easting: 973771.71816500000

CLIENT Fisher Associates DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black (MUCK), very soft, granular soil structure, (OL). 0.5		← 0.5'
	20		2			7				← 2.0'
				5				Extremely moist distinctly mottled brown gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand and clay, firm, blocky soil structure, (ML-CL).		(1) TOPSOIL FILL
					8					(2) CONCRETE
	2	5						grades downward to 1.0		
	14		22			34				Note: WTG-36-15 drilled 7.5 feet west of staked location.
				12						
					13					
	3	4								
5	22		5			8		Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, little sand, hard, massive soil structure, (ML-CL) tending towards (CL).		
				3						
					5					
	4	5								
	24		8			33				
				25						
					19					
	5	11						grades downward to 4.0		
	24		13			27		Extremely moist to wet distinctly mottled olive grayish brown (SANDY-SILT) with little sand, loose, tends to liquefy when disturbed, thinly bedded, (ML).		
				14						
10					10					
	6	5						grades downward to 6.0		
	20		10			20				
				10				Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).		
					14					
	7	10								
	20		12			26				
				14						
					25					
	8	26						grades downward to 8.5		
15	20		14			25				
				11				Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure with 1/8 to 2 inches thick gravelly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths.		
					12					
	9	6								
	18		8			19				
				11						
20					10					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw) SHEET 1 OF 4

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10B13a HOLE NO. WTG-36-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885067.90841600000
Town of Arkwright, Chautauqua Co., NY Easting: 973771.71816500000

CLIENT Fisher Associates DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure with 1/8 to 2 inches thick gravelly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths.		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 58.9 feet.
	10	10								
	6		14			25				
				11						
25					12					
								grades downward to 28.0		
	11	2								
	14		6			17		Extremely moist to wet olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, some sand, compact, weakly stratified, (SM).		
				11						
30					11					
								grades downward to 33.0		
	12	7								
	16		9			20		Extremely moist to wet distinctly mottled olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little sand and clay, very stiff, weakly stratified, (ML-CL) tending towards (SC).		
				11						
35					11					
								grades downward to 38.0		
	13	7								
	8		15			35				
				20						
40					21			See next sheet.		

CUTTINGS, BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-36-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 885067.90841600000

Town of Arkwright, Chautauqua Co., NY Easting: 973771.71816500000

CLIENT Fisher Associates DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, very fine to very coarse size sand, trace to little silt, dense, stratified, (SW), (GW) tending towards (SM), (GM).		
								grades downward to 43.0		
	14	28						Wet olive gray gravelly (SILTY-SAND) with 20 to 40% mostly subrounded gravel, very fine to very coarse size sand, some silt, very dense, stratified, (SM), (GM).		
	10		100/5							
45										Water level at 45.2 feet below ground surface at completion.
								grades downward to 48.0		
	15	36						Wet olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little sand, very dense, dense below 53.0 feet, massive soil structure, (ML).		
	4		67			102				
				35						
50					32					
	16	3								
	8		9			33				
				24						
55					26					
								grades downward to 58.0		
	17	43								
	10		100/5							← 58.9'
60								See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-36-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 885067.90841600000
Town of Arkwright, Chautauqua Co., NY Easting: 973771.71816500000

CLIENT Fisher Associates DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL WATER TABLE AND REMARKS
								Wet olive gray gravelly (SAND-SILT-CLAY) with 20 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).	
								58.9	
								Split spoon refusal at 58.9 feet.	
65									
70									
75									
80									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw) SHEET 4 OF 4

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-41-15 SURF. ELEVATION —

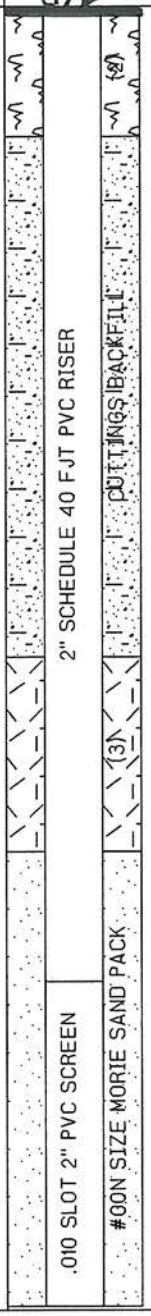
PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881573.39434500000

Town of Arkwright, Chautauqua Co., NY Easting: 968199.87761800000

CLIENT Fisher Associates DATE STARTED 04/14/15 COMPLETED 04/15/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N
	1	1				
	17		1			7
				6		
					6	
	2	5				
	22		10			25
				15		
					11	
	3	5				
5	20		3			6
				3		
					4	
	4	3				
	16		2			6
				4		
					6	
	5	3				
	17		7			15
				8		
10					8	
	6	6				
	22		6			13
				7		
					8	
	7	3				
	19		4			11
				7		
					10	
	8	5				
15	14		12			28
				16		
					11	
	9	2				
	19		2			5
				3		
20					6	

LITH	DESCRIPTION AND CLASSIFICATION	
	Extremely moist black (MUCK), granular soil structure, (OL).	0.2
	Extremely moist dark brown (SAND-SILT-CLAY) topsoil with little organic matter, sand and clay, very soft, granular soil structure, (ML-CL).	1.0
	Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, some clay, trace sand, stiff, very stiff below 2.5 feet with nearly vertical gray desiccation cracks, (CL).	3.4
	Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little silt and clay, very stiff, firm below 4.0 feet, stratified, (SC). grades downward to	5.0
	Extremely moist distinctly mottled olive brown (SANDY-SILT) with some very fine size sand, loose, thinly bedded, (ML).	6.0
	Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, firm, massive soil structure, (ML-CL). grades downward to	9.0
	Extremely moist faintly mottled olive grayish brown gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, some sand, compact, stratified, (SM). grades downward to	13.0
	See next sheet.	



WELL (1)(2)

WATER TABLE AND REMARKS

(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD

(2) CONCRETE

← 2.0'

Organic muck surface to 0.2 feet over silty topsoil with little organic matter, sand and clay to 1.0 feet over clayey glacial drift with little gravel to 3.4 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 5.0 feet over coarse silty slack water sediment with some sand to 6.0 feet over silty glacial drift with little to some gravel, little sand and clay to 9.0 feet over coarse silty slack water sediment with little to

(Continued below)

← 10.0'

(3) BENTONITE CHIPS

← 13.0'

← 15.0'

some gravel, some sand to 13.0 feet over clayey slack water sediment to 15.0 feet over loamy glacial till to 19.8 feet over silty to clayey glacial till to 32.5 feet over shale bedrock to refusal.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. WTG-41-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 881573.39434500000
Town of Arkwright, Chautauqua Co., NY Easting: 968199.87761800000

CLIENT Fisher Associates DATE STARTED 04/14/15 COMPLETED 04/15/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brownish gray (CLAYEY-SILT) with some clay, stiff, thinly laminated, (CL).	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	Note: WTG-41-15 drilled 1.0 feet south of staked location.
								grades downward to 15.0		
	10	8						Extremely moist faintly mottled olive grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, firm below 18.0 feet, massive soil structure, (SC).		Augers left in bore hole over night at 25.0 feet, water level the next morning was 16.9 feet below ground surface.
	14		11			20				
				9						
25					9					← 25.0'
								clear transition to 19.8		← 25.5'
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, very stiff, massive soil structure, (ML-CL) tending towards (CL).	BENTONITE CHIPS	Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 34.1 feet.
	11	8								
	16		13			29				
				16						
30					15					← 30.0'
								grades downward to 32.5	CUTTINGS BACKFILL	
								Olive gray shale bedrock, very soft, can be easily crushed between fingers into soil material, bedded.		
	12	47								
			100/5							
								34.1		← 34.1'
35								Auger refusal at 34.1 feet.		
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 2 OF 2

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10B13a HOLE NO. WTG-43-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 882586.62741400000

Town of Arkwright, Chautauqua Co., NY Easting: 968103.92792900000

CLIENT Fisher Associates DATE STARTED 04/16/15 COMPLETED 04/17/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N
	1	1				
	20		2			3
				1		
					2	
2	2	3				
	22		2			6
				4		
					4	
	3	2				
5	22		3			7
				4		
					6	
	4	6				
	21		6			12
				6		
					6	
	5	5				
	17		7			19
				12		
10					20	
	6	7				
	24		12			24
				12		
					14	
	7	9				
	23		13			25
				12		
					11	
	8	8				
15	22		7			17
				10		
					12	
	9	7				
	24		7			19
				12		
20					9	

LITH

DESCRIPTION AND CLASSIFICATION

Extremely moist black mucky (SANDY-SILT) topsoil with some organic matter, little sand, very loose, granular soil structure, (ML) tending towards (OL). 0.3

Wet distinctly mottled olive grayish brown (SILT) with 5 to 10% gravel, trace sand and clay, very loose, blocky soil structure, (ML).

grades downward to 1.9

Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, firm, blocky soil structure, (SC). 3.0

Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with some clay, firm, very stiff with nearly vertical gray desiccation cracks, (CL).

grades downward to 7.0

Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, stratified, (SC).

grades downward to 7.5

Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with some clay, firm, thinly laminated, (CL).

clear transition to 8.0

Extremely moist faintly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL).

clear transition to 10.0

See next sheet.

WELL (1) (2) CUTTINGS BACKFILL

WATER TABLE AND REMARKS

← 0.5'

← 2.0'

Augers left in bore hole over night at 40.0 feet, water level the next morning was 1.0 feet below ground surface.

(1) TOPSOIL FILL
(2) CONCRETE

Coarse silty topsoil with some organic matter, little clay to 0.3 feet over coarse silty glacial drift with trace gravel and sand to 1.9 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 3.0 feet over clayey slack water sediment to 7.0 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 7.5 feet over clayey slack water sediment to 8.0 feet over silty glacial drift with little gravel and clay, trace sand to 10.0 feet over silty to clayey glacial drift with little to some gravel to 12.0 feet over silty glacial drift with little to some gravel to 18.0 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 23.0 feet over clayey glacial till to 34.5 feet over apparent shale bedrock to refusal.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-43-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 882586.62741400000

Town of Arkwright, Chautauqua Co., NY Easting: 968103.92792900000

CLIENT Fisher Associates DATE STARTED 04/16/15 COMPLETED 04/17/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL) tending towards (SC).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 39.2 feet.
								grades downward to 12.0		
	10	5						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL).		EDI Bedrock Hardness Classification
	12		9			22				
				13						
25					16			grades downward to 18.0		Soft: can be crushed between fingers into soil material with some effort.
								Extremely moist to wet olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, stratified, (SC).		Moderately soft: can be etched with fingernail.
								grades downward to 23.0		Medium hardness: can be easily etched with knife.
	11	25						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, trace sand, very stiff, hard below 28.0 feet, massive soil structure, (ML-CL) tending towards (CL).	CUTTINGS BACKFILL	
	17		19			37				
				18						
30					20					
	12	16						clear transition to 34.5		
			17			40				
				23						
35					100/5			Olive gray apparent shale bedrock, soft, moderately soft and medium hardness.		
	13	150/4						39.2		← 39.2'
	4							Auger refusal at 39.2 feet.		
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-43a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/17/15 COMPLETED 04/17/15

DEPTH IN FT | BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)(3)	WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
									(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL
									Note: WTG-43a-15 drilled 6.0 feet south of staked location.
									← 10.0'
									← 13.0'
									← 15.0'

5 10 15 20

2" SCHEDULE 40 FJT PVC RISER

1" CUTTINGS BACKFILL

.010 SLOT 2" PVC SCREEN

#00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist (mw)

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10B13a HOLE NO. WTG-43a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/17/15 COMPLETED 04/17/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	
25								25.5	← 25.0' ← 25.5'	
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist (mw) SHEET 2 OF 2

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10B13a HOLE NO. WTG-47-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884125.47640300000
Town of Arkwright, Chautauqua Co., NY Easting: 966896.01142700000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark reddishh brown (MUCK), (OL). 0.2		← 0.2'
	15		2			5				← 1.5'
				3						(1) TOPSOIL FILL
					10					(2) CONCRETE
	2	9						Extremely moist dark brown (SANDY-SILT) topsoil with little organic matter and sand, very soft, granular soil structure, (ML). 0.4		Note: WTG-47-15 drilled 9 feet southeast of staked location.
	24		16			31				
				15						
					17					
	3	8						Extremely moist faintly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, firm, hard below 2.5 feet, blocky soil structure, (ML-CL).		Organic surface to 0.2 feet over coarse silty topsoil with little organic matter and sand to 0.4 feet over silty glacial drift with little to some gravel, little clay, trace sand to 4.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace silt to 6.0 feet over water sorted and deposited silt with little to some gravel, little silt and clay to 12.0 feet over coarse silty glacial drift with little to some gravel, little sand, trace clay to 14.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 18.0 feet over water sorted and deposited sand with little to some gravel, little to some silt to 23.0 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 28.0 feet over silty glacial till to 33.0 feet over loamy glacial till to 38.0 feet over water sorted and deposited sand with little silt to 43.0 feet over water sorted and deposited sand with little to some gravel, trace silt to 48.0 feet over water sorted and deposited sand with little gravel and silt to 58.0
5	20		8			19				
				11						
					7					
	4	5								
	20		8			17				
				9						
					5					
	5	9								
	14		6			12				
				6						
10					8					
	6	3								
	18		4			10				
				6						
					7					
	7	3								
	8		43			91				
				48						
					11					
	8	5								
15	16		4			8				
				4						
					5					
	9	4								
	22		9			17				
				8						
20					8			See next sheet.		(Continued on next sheet)

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-47-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884125.47640300000
Town of Arkwright, Chautauqua Co., NY Easting: 966896.01142700000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled olive brownish gray gravelly (SILTY-SAND) with 15 to 40% mostly subangular gravel, little to some silt, compact, stratified, (SM).		feet over water sorted and deposited silt with little to some gravel, little sand and clay to end of boring.
								grades downward to 23.0		
	10	9						Extremely moist faintly mottled olive brownish gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little sand and clay, hard, stratified, (SC).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	16		15			35				
				20						
25					24					
								grades downward to 28.0		
	11	8						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
	12		12			29				
				17						
30					19					
								grades downward to 33.0		
	12	5						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little silt and clay, very stiff, massive soil structure, (SC).		
	14		8			18				
				10						
35					17					
								grades downward to 38.0		
	13	WR						Wet olive gray (SILTY-SAND), very fine size sand with little silt, loose, liquefies when disturbed, thinly bedded, (SM).		WR: Sampler penetration with weight of rods.
	24		1			10				
				9						
40					10					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-47-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884125.47640300000
Town of Arkwright, Chautauqua Co., NY Easting: 966896.01142700000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray (SILTY-SAND), very fine size sand with little silt, loose, liquefies when disturbed, thinly bedded, (SM).		
								grades downward to 43.0		
	14	1						Wet olive gray gravelly (SAND) with 15 to 25% mostly subrounded gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW).		
	8		4			14				
				10						
45					13					
								grades downward to 48.0		
	15	WR						Wet olive gray (SILTY-SAND) with 10 to 15% gravel, very fine to very coarse size sand, little silt, compact, stratified, (SM).		WR: Sampler penetration with weight of rods.
	20		7			16				
				9						
50					8					
									CUTTINGS BACKFILL	
								grades downward to 58.0		
	16	7								
	12		9			24				
				15						
55					16					
								Wet olive gray gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subrounded gravel, little sand and clay, hard, weakly stratified, (SC).		
	17	6								
	10		13			32				
				19						
60					24					← 60.0'
								Boring completed at 60.0 feet. 60.0		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-47a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/18/15 COMPLETED 03/18/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5										(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-47a-15 drilled 9 feet southeast of staked location.
10										← 10.0'
15										← 13.0' ← 15.0'
20										

2" SCHEDULE 40 FJT PVC RISER
CUTTINGS BACKFILL
.010 SLOT 2" PVC SCREEN
#00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-47a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/18/15 COMPLETED 03/18/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13 HOLE NO. Bore Hole TB-49-13 SURF. ELEVATION 1469.6

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 886201.0131 E: 967666.13

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/25/13 COMPLETED 02/25/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
	1	2						Extremely moist dark brown (SANDY-SILT) topsoil (disturbed) with 0 to 3% gravel, little sand and organic matter, very loose, granular soil structure, (ML). 0.7		← 1.5'
	13		3			6				
				3						
					6					
	2	11								(1) 4 INCH LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
	6		6			12				(2) CONCRETE
				6						(3) BENTONITE SEAL
					4					(4) #00N SIZE MORIE SAND PACK
	3	3								
5	14		3			7		Extremely moist faintly mottled brown (SANDY-SILT) with 5 to 10% gravel and flat sided stone fragments, some mostly very fine to fine size sand, trace clay and organic matter, loose, blocky soil structure, (ML). 2.0		Coarse silty topsoil with little sand and organic matter to 0.7 feet over coarse silty slack water sediment with some sand, trace gravel to 2.0 feet over water sorted and deposited sand with some silt, little to some gravel to 5.0 feet over loamy glacial drift with little to some gravel to 6.7 feet over water sorted and deposited coarse silt with some sand, trace to little gravel to 11.5 feet over loamy glacial till to 34.4 feet over apparent weathered shale bedrock to 35.5 feet over shale bedrock to 37.6 feet over siltstone bedrock to 39.7 feet over shale bedrock to end of coring.
				4						
					6					
	4	3								
	20		5			10				
				5						
					5					
	5	1								
	18		2			5		Moist brown to olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel and flat sided shale stone fragments, little sand and clay, stiff, very soft, massive soil structure, (ML-CL) tending towards (SC). clear transition to 6.7		
				3						
10					4					
	6	2								
	16		3			6				
				3						
					4					
	7	2								
	15		4			8		Extremely moist brown (SANDY-SILT) with 5 to 15% gravel, some very fine to very coarse size sand, trace clay, loose, weakly stratified, (ML). clear transition to 11.5		
				4						
					4					
	8	3								
15	10		5			11				
				6						
					12					
	9	8								
	18		8			18		Extremely moist grayish brown (SAND-SILT-CLAY) with 5 to 15% gravel and flat sided stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL). clear transition to 15.5		← 16.0'
				10						
					10					← 18.0'
	10	5								
	13		8			17		Extremely moist gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel and flat sided stone fragments, little sand, trace to little clay, compact, massive soil structure, (SM).		
				9						
20					15					

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13 HOLE NO. Bore Hole TB-49-13 SURF. ELEVATION 1469.6

PROJECT Arkwright Summit Windfarm – Wind Turbine Project LOCATION N: 886201.0131 E: 967666.13

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/25/13 COMPLETED 02/25/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel and flat sided stone fragments, little sand, trace to little clay, compact, massive soil structure, (SM).	(1)	(1) 2" SCHEDULE 40 FJT RISER
	11	8								← 23.0'
	11		9			20				
				11						
25					7					
	12	5								
	20		6			17				
				11						
30					19					
	13	19								← 33.0'
	16		11			32				EDI Bedrock Hardness Classification
				21				34.4		
35					100/3			Dark brownish gray apparent weathered shale bedrock, very soft and soft.		Very soft: can be easily crushed between fingers into soil material.
								35.5		Soft: can be crushed between fingers into soil material with some effort.
		Run	#1					Gray shale bedrock, moderately soft, moderately to slightly fractured horizontally along bedding planes, banded, dense.		Moderately soft: can be etched with fingernail.
								37.6		
40								See next sheet.		

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	35.5 to 40.3	4.8	4.8	100	77
2	40.3 to 45.3	5.0	4.9	98	60

Note: Auger left in at 23.0 feet below ground surface for 1/2 hour, water level at 18.0 feet.

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13 HOLE NO. Bore Hole TB-49-13 SURF. ELEVATION 1489.6

PROJECT Arkwright Summit Windfarm – Wind Turbine Project LOCATION N: 886201.0131 E: 967666.13

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/25/13 COMPLETED 02/25/13

DEPTH IN FT | BLOWS ON SAMPLER | SN | 0/6 | 6/12 | 12/18 | 18/24 | N | LITH | DESCRIPTION AND CLASSIFICATION | WELL | WATER TABLE AND REMARKS

Run #2

45

50

55

60

Gray siltstone bedrock, medium hardness, non fractured, thinly bedded to banded, slightly porous.

39.7

Gray shale bedrock, moderately soft with occasional thin beds of soft rock, moderately fractured horizontally along bedding planes, vertical fracture 42.2 though 42.5 foot depth, banded dense.

45.3

Coring completed at 45.3 feet.

BENTONITE SEAL

← 45.3'

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	35.5 to 40.3	4.8	4.8	100	77
2	40.3 to 45.3	5.0	4.9	98	60

EDI Bedrock Hardness Classification

Soft: can be crushed between fingers into soil material with some efort.

Moderately soft: can be etched with fingernail.

Medium hardness: can be easily etched with knife.

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 20.0 feet and invertal 5 foot sampling to 35.5 feet. Continued below with NQ-2 size double tube core barrel and diamond bit. A 2 inch PVC observation well was installed in completed bore hole.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13a HOLE NO. WTG-50-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884342.83313000000
Town of Arkwright, Chautauqua Co., NY Easting: 965850.45872200000

CLIENT Fisher Associates DATE STARTED 03/19/15 COMPLETED 03/20/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N
	1	1				
	22		2			5
				3		
					7	
	2	11				
	24		11			21
				10		
					10	
	3	6				
5	18		5			10
				5		
					5	
	4	3				
	22		7			17
				10		
					11	
	5	5				
	18		7			17
				10		
10					11	
	6	6				
	24		7			16
				9		
					9	
	7	9				
	24		9			26
				17		
					16	
	8	12				
15	12		6			12
				6		
					6	
	9	6				
	14		4			10
				6		
20					9	

LITH

DESCRIPTION AND CLASSIFICATION

Extremely moist black (MUCK), (OL). 0.4

Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with little clay, trace sand, soft, blocky soil structure, (ML-CL).

grades downward to 1.0

Extremely moist faintly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 30% gravel, little clay, trace sand, blocky soil structure, (ML-CL).

grades downward to 2.0

Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, blocky soil structure, (ML-CL).

grades downward to 4.0

Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, little clay, trace sand, stiff with nearly vertical gray desiccation cracks, very stiff below 6.0 feet, (ML-CL). 8.5

Extremely moist olive gray (CLAYEY-SILT) with 5 to 10% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). 9.0

Extremely moist faintly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 30% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). 10.0

See next sheet.

WELL (1) (2) CUTTINGS BACKFILL

WATER TABLE AND REMARKS

← 0.4'

← 1.5'

(1) TOPSOIL FILL
(2) CONCRETE

Note: WTG-50-15 drilled 4 feet west of staked location.

Organic muck mantle to 0.4 feet over silty slack water sediment with little clay, trace sand to 1.0 feet over silty glacial drift with little to some gravel, little clay, trace sand to 2.0 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 4.0 feet over silty slack water sediment with little clay, trace gravel and sand to 8.5 feet over silty slack water sediment with little clay, trace gravel and sand to 9.0 feet over silty glacial drift, little to some gravel with little clay, trace sand to 10.0 feet over water sorted and deposited sand with little silt to 12.0 feet over water sorted and deposited sand with little clay, trace gravel and silt to 14.0 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 23.0 feet over water sorted and deposited coarse silt with little to some gravel and sand to 24.0 feet over water sorted and deposited sand with trace gravel and silt to 28.0 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 48.0 feet over silty

(Continued on next sheet)

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-50-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884342.83313000000
Town of Arkwright, Chautauqua Co., NY Easting: 965850.45872200000

CLIENT Fisher Associates DATE STARTED 03/19/15 COMPLETED 03/20/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown (SILTY-SAND), very fine to medium size sand, little silt, compact, thinly bedded, (SM). grades downward to 12.0		glacial till to 53.0 feet over water sorted and deposited sand and gravel with little silt to 58.0 feet over water sorted and deposited sand with some silt to end of boring.
	10	5						Extremely moist distinctly mottled olive brown (CLAYEY-SAND) with 5 to 10% gravel, very fine to very coarse size sand, little clay, trace silt, very stiff, stratified, (SC). 14.0		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	18		6			12				
				6						
25					7					
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little silt and clay, stiff, stratified, (SC). grades downward to 23.0		
	11	7						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% mostly subrounded gravel, little to some sand, weakly stratified, (SM). 24.0		
	19		8			17				
				9						
30					14					
								Wet olive gray (SAND) with 5 to 10% gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW). grades downward to 28.0		
	12	11						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little silt and clay, very stiff, stratified, (SC).		
	18		15			27				
				12						
35					22					
	13	11								Water level at 38.3 feet below ground surface at completion.
	16		17			36				
				19						
40					20					

CUTTINGS, BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-50-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 884342.83313000000
Town of Arkwright, Chautauqua Co., NY Easting: 965850.45872200000

CLIENT Fisher Associates DATE STARTED 03/19/15 COMPLETED 03/20/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little silt and clay, very stiff, stratified, (SC).		
	14	10								
	20		10			22				
				12						
45					18					
								grades downward to 48.0		
	15	13						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, hard, massive soil structure, (ML-CL).		
	20		23			49				
				26						
50					26					
								grades downward to 53.0		
	16	13						Wet olive gray very gravelly (SILTY-SAND) with 40 to 60% mostly subrounded gravel, very fine to very coarse size sand, little silt, dense, stratified, (SM), (GM).		
	22		22			40				
				18						
55					24					
								grades downward to 58.0		
	17	4						Wet olive gray (SILTY-SAND), very fine size sand, some silt, compact, thinly bedded, (SM).		
	24		12			26				
				14						
60					15			Boring completed at 60.0 feet. 60.0	CUTTINGS BACKFILL	← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-50a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/20/15 COMPLETED 03/20/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5										(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-50a-15 drilled 3 feet south of staked location.
10										← 10.0'
										← 13.0'
15										← 15.0'
20										

WELL: 2" SCHEDULE 40 FJT PVC RISER; CUTTINGS BACKFILL; .010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 1 OF 2

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10B13a HOLE NO. WTG-50a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/20/15 COMPLETED 03/20/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-51-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885244.71635300000

Town of Arkwright, Chautauqua Co., NY Easting: 969600.86040300000

CLIENT Fisher Associates DATE STARTED 04/01/15 COMPLETED 04/02/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Moist dark brown (CLAYEY-SILT) topsoil with little organic matter and clay, very soft, granular soil structure, (ML-CL).		← 0.5'
	15		3			8		0.3		← 2.0'
				5				Extremely moist highly mottled, distinctly mottled below 1.0 feet, olive brown (CLAYEY-SILT) with little clay, stiff, blocky soil structure, (ML-CL).		(1) TOPSOIL FILL
					8			grades downward to 2.0		(2) CONCRETE
	2	10						Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).		Note: WTG-51-15 drilled 3.0 feet south of staked location.
	20		12			28		7.0		
				16				Extremely moist faintly mottled olive brown (SANDY-SILT) with little very fine size sand, compact, weakly thinly bedded, (ML).		Silty topsoil with little organic matter and clay to 0.3 feet over silty slack water sediment with little clay to 2.0 feet over silty glacial drift with little to some gravel, little sand and clay to 7.0 feet over coarse silty slack water sediment with little sand and sand interbeds to 10.0 feet over coarse silty slack water sediment with trace sand to 12.5 feet over silty slack water sediment with little clay to 18.0 feet over loamy glacial drift with little to some gravel to 28.0 feet over silty glacial till to 38.0 feet over loamy glacial till to 58.0 feet over water sorted and deposited silt with little sand and clay to end of boring.
					14			9.0		
	3	7						Extremely moist faintly mottled olive brown (SANDY-SILT) with little very fine size sand, loose, thinly bedded with sand interbeds, (ML) with (SW) interbeds.		
5	22		9			18		10.0		
				9				Extremely moist faintly mottled olive brown (SANDY-SILT) with trace sand, compact, thinly bedded, (ML).		
					9			12.5		
	4	5						Extremely moist olive gray (CLAYEY-SILT) with little clay, stiff, thinly laminated, (ML-CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	23		6			14		grades downward to 18.0		
				8				Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little to some sand, compact, massive soil structure, (SM).		
					8					
	5	4								
	18		3			8				
				5						
10					6					
	6	5								
	24		6			14				
				8						
					12					
	7	3								
			5			13				
				8						
					8					
	8	4								
15	20		5			11				
				6						
					9					
	9	6								
	18		3			12				
				9						
20					11					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-51-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885244.71635300000
Town of Arkwright, Chautauqua Co., NY Easting: 969600.86040300000

CLIENT Fisher Associates DATE STARTED 04/01/15 COMPLETED 04/02/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little to some sand, compact, massive soil structure, (SM).		
	10	6								
	22		9			22				
				13						
25					20					
								grades downward to 28.0		
	11	4						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, hard below 38.0 feet, massive soil structure, (ML-CL).		
			8							
				12		20				
30					12					
	12	8								
	15		12							
				16		28				
35					18					
								grades downward to 38.0		
	13	9						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little to some sand, dense, massive soil structure, (SM).		
	22		16			33				
				17						
40					17					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-51-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885244.71635300000

Town of Arkwright, Chautauqua Co., NY Easting: 969600.86040300000

CLIENT Fisher Associates DATE STARTED 04/01/15 COMPLETED 04/02/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little to some sand, dense, massive soil structure, (SM).		
	14	8								
	18		18			44				
				26						
45					19					Note: noticed harder drilling below 45.0 feet.
								grades downward to 48.0		
	15	1						Wet olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, some sand, compact, massive soil structure, (SM).		
	24		7			21				
				14						
50					13					
								grades downward to 53.0		
	16	5						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little sand, trace clay, compact, massive soil structure, (ML) tending towards (SM).		
	18		11			29				
				18						
55					24					
								grades downward to 58.0		
	17	4						Extremely moist olive gray (SAND-SILT-CLAY) with little very fine size sand and clay, very stiff, weakly thinly laminated, (ML-CL).		
	22		9			22				
				13						
60					17			Boring completed at 60.0 feet. 60.0		← 60.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-51a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/03/15 COMPLETED 04/03/15

DEPTH IN FT | BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)(3)	WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
									(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL
									Note: WTG-51a-15 drilled 3.5 feet east of staked location.
									← 10.0'
									← 13.0'
									← 15.0'

WELL (1)(2)(3): 2" SCHEDULE 40 FJT PVC RISER; CUTTINGS BACKFILL; .010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-51a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/03/15 COMPLETED 04/03/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-52-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883762.53434100000
Town of Arkwright, Chautauqua Co., NY Easting: 970041.71744700000

CLIENT Fisher Associates DATE STARTED 03/12/15 COMPLETED 03/13/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Wet orangish brown (PEAT), very loose, granular soil structure, (OL). 0.2		← 0.2'
	18		1			4				← 1.5'
				3						(1) TOPSOIL FILL
					11					(2) CONCRETE
	2	11						Wet black (MUCK), very loose, granular soil structure, (OL). 0.3		
	18		9			27				Note: WTG-52-15 drilled 22 feet southwest of staked location.
				18						
					26					
	3	12						Extremely moist gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand, very loose, massive soil structure, (ML). 1.0		
5	18		34			49				
				15						
					12					
	4	4						Extremely moist dark brown gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand and organic matter, very loose, massive soil structure, (ML). 1.1		
	12		7			13				
				6						
					6					
	5	4						Extremely moist highly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very loose, massive soil structure, (SC).		
	20		9			20				
				11						
10					12					
	6	6						clear transition to 1.5		
	20		8			16				
				8						
					9					
	7	4						Moist olive brown very gravelly (SANDY-SILT) with 40 to 60% mostly subrounded gravel and occasional cobble, little to some sand, compact, weakly stratified, (SM), (GM).		
	18		5			13				
				8						
					9					
	8	3						grades downward to 4.0		
15	18		5			15				
				10						
					8					
								Moist faintly mottled olive brown gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel and occasional cobble, little to some sand, trace clay, dense, massive soil structure, (SM).		
								clear transition to 6.0		
	9	5								
	10		6			13				
				7						
20					7			See next sheet.		(Continued on next sheet)

CUTTINGS BACKFILL

Organic peat to 0.2 feet over organic muck to 0.3 feet over coarse silty glacial drift with little to some gravel, little sand to 1.0 feet over coarse silty glacial drift with little to some gravel, little sand and organic matter to 1.1 feet over silty glacial drift with little to some gravel, little sand and clay to 1.5 feet over water sorted and deposited gravel with occasional cobble and silt with little to some sand to 4.0 feet over loamy glacial drift with little to some gravel to 6.0 feet over silty glacial drift with little to some gravel, little clay, trace to little sand to 8.0 feet over coarse silty glacial drift with little to some gravel, little sand, trace clay to 10.0 feet over silty glacial drift with little to some gravel, little clay, trace to little sand to 14.0 feet over coarse silty slack water sediment with little sand, trace gravel to 18.0 feet over silty glacial drift with little to some gravel, little clay to 23.0 feet over coarse silty glacial drift with little to some gravel, little sand to 28.0 feet over silty glacial drift with little gravel, sand and clay to 29.5

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-52-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883762.53434100000

Town of Arkwright, Chautauqua Co., NY Easting: 970041.71744700000

CLIENT Fisher Associates DATE STARTED 03/12/15 COMPLETED 03/13/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled grayish olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace to little sand, stiff, massive soil structure, (ML-CL). 8.0		feet over water sorted and deposited sand with little to some gravel, little silt to 33.0 feet over silty glacial drift with little clay, trace gravel to 34.0 feet over water sorted and deposited sand with little to some gravel, little silt to 38.0 feet over silty glacial till to 44.0 feet over silty glacial drift with little to some gravel, little clay, trace sand to 48.0 feet over water sorted and deposited sand with little to some gravel, little silt to 48.5 feet over water sorted and deposited sand and gravel to 53.0 feet over water sorted and deposited sand with little silt and gravel to 58.0 over silty glacial till to 58.3 feet over apparent siltstone bedrock to refusal.
		10	2							
		8		5		11				
					6					
25					6					
								Extremely moist faintly mottled grayish olive brown gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, trace clay, compact, massive soil structure, (ML). grades downward to 10.0		
								Extremely moist faintly mottled grayish olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace to little sand, very stiff, massive soil structure, (ML-CL). grades downward to 14.0		
		11	1							
		18		4		10				
					6					
30					6					
								Wet brown (SANDY-SILT) with 5 to 10% gravel, little sand, compact, weakly thinly bedded, (ML). grades downward to 18.0		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). grades downward to 23.0		
		12	4							
		20		5		12				
					7					
35					8					
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% mostly subangular gravel, little sand, loose, massive soil structure, (ML). grades downward to 28.0		
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 20% mostly subangular gravel, little sand and clay, firm, massive soil structure, (ML-CL). grades downward to 29.5		
		13	17							
		10		18		41				
					23					
40					20			See next sheet.		

CUTTINGS BACKFILL

Augers left in bore hole at 50.0 feet over night, water level at 12.5 feet below ground surface the next morning.

Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 59.6 feet.

Note: noticed augering change at 36.5 feet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-52-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883762.53434100000
Town of Arkwright, Chautauqua Co., NY Easting: 970041.71744700000

CLIENT Fisher Associates DATE STARTED 03/12/15 COMPLETED 03/13/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray gravelly (SILTY-SAND) with 15 to 30% gravel, little silt, loose, weakly stratified, (SM). grades downward to 33.0		
	14	5						Extremely moist faintly mottled olive gray (CLAYEY-SILT) with 5 to 10% gravel, little clay, stiff, massive soil structure, (ML-CL). 34.0		
	24		6			16				
				10						
45					11			Wet faintly mottled olive gray gravelly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, very fine to coarse size sand, little silt, compact, weakly stratified, (SM). grades downward to 38.0		
								Extremely moist faintly mottled olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace to little sand, hard, massive soil structure, (ML-CL).		
	15	8								
	12		8			18				
				10						
50					13			grades downward to 44.0		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 30% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). grades downward to 48.0		
	16							Wet olive gray gravelly (SILTY-SAND) with 15 to 30% mostly subrounded gravel, very fine to very coarse size sand, little silt, compact, weakly stratified, (SM). 48.5		
55										
								Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, very fine to very coarse size sand, compact, stratified, (SW), (GW). grades downward to 53.0		
	17	100/4								
	4									
60	18	100/1						See next sheet.		

CUTTINGS BACKFILL

Note: noticed hard drilling below 58.3 feet.

← 59.6'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-52-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883762.53434100000
Town of Arkwright, Chautauqua Co., NY Easting: 970041.71744700000

CLIENT Fisher Associates DATE STARTED 03/12/15 COMPLETED 03/13/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray gravelly (SILTY-SAND) with 15 to 20% gravel, very fine to very coarse size sand, little to some silt, compact, weakly stratified, (SM).		
								grades downward to 58.0		
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).		
65								clear transition to 58.3		
								Olive gray apparent siltstone bedrock, moderately hard, bedded, can be etched with knife with some effort.		
								59.6		
								Split spoon refusal at 59.6 feet.		
70										
75										
80										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 4 OF 4

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10B13a HOLE NO. WTG-52a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/13/15 COMPLETED 03/13/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5										(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-52a-15 drilled 26 feet southwest of staked location.
10										← 10.0'
15										← 13.0' ← 15.0'
20										

2" SCHEDULE 40 FJT PVC RISER
CUTTINGS BACKFILL
.010 SLOT 2" PVC SCREEN
#0ON SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 1 OF 2

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10B13a HOLE NO. WTG-52a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/13/15 COMPLETED 03/13/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 2 OF 2

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10B13a HOLE NO. WTG-57-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 873276.53679100000

Town of Arkwright, Chautauqua Co., NY Easting: 975808.70358500000

CLIENT Fisher Associates DATE STARTED 04/08/15 COMPLETED 04/10/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist black (MUCK), granular soil structure, (OL). 0.3		← 0.5'
	18		1			4		Extremely moist faintly mottled brown (SANDY-SILT) with little sand, very loose, weakly blocky soil structure, (ML).		← 2.0'
				3				clear transition to 1.0		(1) TOPSOIL FILL
					8			Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, firm, blocky soil structure, (ML-CL).		(2) CONCRETE
	2	11						grades downward to 2.0		Note: WTG-57-15 drilled 10.0 feet east of staked location.
	20		10			20		Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, very stiff with nearly vertical gray desiccation cracks, (ML-CL).		Water level at 7.1 feet below ground surface at completion.
				10				grades downward to 4.0		
					10			Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, stiff, nearly vertical gray desiccation cracks, (ML-CL) tending towards (SC).		Organic muck surface to 0.3 feet over coarse silty glacial drift with little sand to 1.0 feet over silty glacial drift with little to some gravel, little clay, trace sand to 2.0 feet over silty glacial till to 6.0 feet over loamy glacial till to 28.0 feet over silty glacial till to end of boring.
	3	3						grades downward to 6.0		
	10		4			11		Extremely moist distinctly mottled olive brown gravelly (SANDY-SILT) with 15 to 25% mostly subangular gravel, little sand, trace clay, dense, very dense below 10.0 feet, massive soil structure with brittle consistence, (ML).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
5				7						
					10					
	4	14								
	22		17			39				
				22						
					25					
	5	11								
	24		23			50				
				27						
10					36					
	6	35								
	24		70			143				
				73						
					78					
	7	38								
	24		48			88				
				40						
					46					
	8	52								
	23		34			63				
15				29						
					40					
	9	28								
	18		40			87				
				47						
20					46					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-57-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 873276.53679100000

Town of Arkwright, Chautauqua Co., NY Easting: 975808.70358500000

CLIENT Fisher Associates DATE STARTED 04/08/15 COMPLETED 04/10/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown gravelly (SANDY-SILT) with 15 to 25% mostly subangular gravel, little sand, trace clay, dense, very dense below 10.0 feet, massive soil structure with brittle consistence, (ML).		
	10	33								
	24		49			99				
				50						
25					63					
								grades downward to 28.0		
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and occasional cobble, little sand and clay, hard, massive soil structure, (ML-CL).		
	11	28								
	20		25							
				100/4						
30									CUTTINGS, BACKFILL	
	12	23								
	20		44			88				
				44						
35					52					
	13	20								
	17		28			65				
				37						
40					40					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-57-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 873276.53679100000
Town of Arkwright, Chautauqua Co., NY Easting: 975808.70358500000

CLIENT Fisher Associates DATE STARTED 04/08/15 COMPLETED 04/10/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and occasional cobble, little sand and clay, hard, massive soil structure, (ML-CL).		
	14	24								
	22		51			98				
				47						
45					44					
	15	29								
	22		32			65				
				33						
50					41					
	16	25								
	12		47			95				
				48						
55					52					
	17	17								
			24			71				
				47						
60					46			Boring completed at 60.0 feet.		← 60.0'

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-57a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/13/15 COMPLETED 04/13/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5									2" SCHEDULE 40 FJT PVC RISER; CUTTINGS BACKFILL	(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-57a-15 drilled 11.0 feet east of staked location.
10										← 10.0'
										← 13.0'
15									.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 15.0'
20										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-57a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/13/15 COMPLETED 04/13/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	
25								25.5		← 25.0'
								Boring completed at 25.5 feet.		← 25.5'
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-60-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 483, Northing: 880377.184258

Town of Arkwright, Chautauqua Co., NY Easting: 964995.181058

CLIENT Fisher Associates DATE STARTED 04/22/15 COMPLETED 04/22/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black (MUCK), granular soil structure, (OL). 0.2		← 0.5'
	16		2			11				
				9						← 2.0'
					14					
	2	6						Extremely moist highly mottled brown (SANDY-SILT) with 5 to 10% gravel, little sand, very loose, blocky soil structure, (ML).		(1) TOPSOIL FILL
	18		7			17				(2) CONCRETE
				10						
					13			clear transition to 0.8		
	3	7						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL).		Note: GLP-60-15 drilled 7.0 feet north of staked location.
5	24		6			13				
				7						
					12					
	4	8								
	22		12			24				
				12						
					16			grades downward to 4.0		
	5	2						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below 6.0 feet with nearly vertical gray desiccation cracks, (CL).		Organic rich mucky surface to 0.2 feet over coarse silty glacial drift with trace gravel, little sand to 0.8 feet over silty glacial drift with little to some gravel, little clay, trace sand to 4.0 feet over clayey glacial drift with little to some gravel, trace sand to 8.0 feet over water sorted and deposited silt with little to some gravel, little sand and clay to 18.0 feet over water sorted and deposited sand with some silt to 18.5 feet over water sorted and deposited sand with some gravel to 18.8 feet over water sorted and deposited sand with some silt to 23.0 feet over water sorted and deposited sand to 28.0 feet over water sorted and deposited sand with little to some gravel, little silt and clay to 29.0 feet over clayey glacial till to end of boring.
	18		3			6				
				3						
					3					
10	6	3								
	18		4			10				
				6						
					6					
	7	4						Extremely moist faintly mottled olive grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, firm and stiff, weakly stratified, (SC).		
	16		4			8				
				4						
					3					
	8	3								
15	16		3			6				
				3						
					4					
								grades downward to 18.0		
	9	1								
	17		2			6				
				4						
20					4			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. GLP-60-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 483, Northing: 880377.184258

Town of Arkwright, Chautauqua Co., NY Easting: 964995.181058

CLIENT Fisher Associates DATE STARTED 04/22/15 COMPLETED 04/22/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled grayish brown (SILTY-SAND), very fine size sand with some silt, very loose, thinly bedded, (SM). 18.5		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 40.0 feet.
	10	10						Wet gray gravelly (SAND) with 20 to 40% mostly subrounded gravel, fine to very coarse size sand, very loose, stratified, (SW). 18.8		
	21		12			25				
				13						
25					15			Extremely moist faintly mottled grayish brown (SILTY-SAND), very fine size sand with some silt, very loose, thinly bedded, (SM).		
								grades downward to 23.0		
	11	13						Extremely moist brownish gray (SAND), very fine to coarse size, compact, stratified, (SW).		
	24		20			42				
				22				grades downward to 28.0		
30					21			Extremely moist faintly mottled olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, little silt and clay, hard, stratified, (SC). 29.0		
	12	10						Extremely molist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		
	24		16			33				
				17						
35					17					
	13	12								
	18		15			37				No water at completion.
				22						
40					20			Boring completed at 40.0 feet. 40.0		← 40.9'

CUTTINGS, BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-62-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project · LOCATION Survey ID 482, Northing: 881076.686859

Town of Arkwright, Chautauqua Co., NY Easting: 965021.564962

CLIENT Fisher Associates DATE STARTED 04/21/15 COMPLETED 04/21/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black (SANDY-SILT) topsoil with little organic matter and sand, very loose, granular soil structure, (ML).		← 0.5'
	20		3			7		0.3		← 2.0'
				4				Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, weakly blocky soil structure, (CL).		Note: GLP-62-15 drilled 1.0 foot southeast of staked location.
					6			clear transition to 2.0		
	2	10						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (CL).		(1) TOPSOIL FILL (2) CONCRETE
	24		9			17				
				8						
					7					
	3	4								
5	22		5			15				Coarse silty topsoil with little organic matter and sand to 0.3 feet over clayey glacial drift with little to some gravel, trace sand to 15.5 feet over loamy glacial drift with little to some gravel, little sand and clay to 23.0 feet over water sorted and deposited coarse silt with trace gravel and clay, little to some sand to 23.5 feet over clayey glacial drift with little to some gravel, trace sand to 28.0 feet over silty glacial drift with little to some gravel, little sand and clay to 28.8 feet over water sorted and deposited sand and gravel with little silt and clay to 33.0 feet over water sorted and deposited sand with trace gravel and silt to 38.0 feet over clayey glacial till to end of boring.
				10						
					8					
	4	5								
	24		8			17				
				9						
					14					
	5	8								
	8		11			25				
				14						
					17					
10								clear transition to 10.5		
	6	10						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 40.0 feet.
	22		15			29				
				14						
					16					
	7	6								
	24		10			24				
				14						
					16					
	8	7								
15	24		14			31				
				17						
					20					
								clear transition to 15.5		
								Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, weakly stratified, (SC).		
	9	11								
	12		10			19				
				9						
20					13					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-62-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Survey ID 482. Northing: 881076.686859

Town of Arkwright, Chautauqua Co., NY Easting: 965021.564962

CLIENT Fisher Associates DATE STARTED 04/21/15 COMPLETED 04/21/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, weakly stratified, (SC).		
								grades downward to 23.0		
	10	3						Extremely moist distinctly mottled brownish olive gray (SANDY-SILT) with 5 to 10% gravel, little to some sand, trace clay, loose, weakly stratified, (ML).		
	17		6			12				
				6						
25					9					
								grades downward to 23.5		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, massive soil structure, (CL).		
	11	11								
	24		15							
				23		38				
30					40					
								grades downward to 28.0		
								Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		
								clear transition to 28.8		
								Extremely moist faintly mottled brownish gray very gravelly (SAND-SILT-CLAY) with 40 to 60% mostly subrounded gravel, little silt and clay, hard, weakly stratified, (SC).		
	12	24								
	24		70							
				91		161				
35					76					
								grades downward to 33.0		
								Extremely moist highly mottled brownish gray (SAND) with 5 to 10% gravel, very fine to very coarse size sand, trace silt, very dense, stratified, (SW).		
								grades downward to 38.0		
	13	22						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		No water at completion.
	23		34			63				
				29						
40					46					← 40.0'
								Boring completed at 40.0 feet. 40.0		

CUTTINGS, BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-64-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 480, Northing: 881054.260773

Town of Arkwright, Chautauqua Co., NY Easting: 965984.851068

CLIENT Fisher Associates DATE STARTED 04/23/15 COMPLETED 04/23/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black (MUCK), granular soil structure, (OL).		← 0.5'
	12		2			4		0.4		
				2				Extremely moist brown (SANDY-SILT) with 3 to 5% gravel, little sand, trace clay, very loose, blocky soil structure, (ML).		← 2.0'
					4					
	2	4								(1) TOPSOIL FILL
	16		6			16				(2) CONCRETE
				10						
					12			grades downward to 1.5		
	3	6								
5	16		9			17		Extremely moist faintly mottled brown gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, trace clay, compact with brittle consistence, massive soil structure, (SM).		Note: GLP-64-15 drilled 5.0 feet northwest of staked location.
				8						
					10					
	4	4								
	10		8			13				
				5						
					4			grades downward to 8.0		
	5	2								
	8		3			8		Extremely moist distinctly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little silt and clay, stiff, massive soil structure, (SC).		Organic rich mucky surface to 0.4 feet over coarse silty slack water sediment with trace gravel and clay, little sand to 1.5 feet over loamy glacial drift with little to some gravel dominated by silt, little sand, trace gravel to 8.0 feet over sandy glacial drift with little to some gravel, little silt and clay to 12.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 13.0 feet over silty slack water sediment with little clay to 14.0 feet over water sorted and deposited sand with some gravel, trace silt and clay to 23.5 feet over coarse silty slack water sediment with little sand to 28.0 feet over clayey glacial drift with trace gravel and sand to 33.0 feet over clayey glacial till to end of boring.
				5						
10					4					
	6	6								
	20		5			10				
				5						
					5			12.0		
	7	3								
	22		6			11		Extremely moist faintly mottled grayish brown gravelly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, little silt, trace clay, compact, stratified, (SM).		
				5						
					7					
	8	2								
15	16		5			10				
				5						
					6			13.0		
								Extremely moist faintly mottled grayish brown (CLAYEY-SILT) with little clay, stiff, thinly laminated, (ML-CL).		
								14.0		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 41.0 feet.
	9	4								
	20		9			26				
				17						
20					14			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. GLP-64-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Survey ID 480, Northing: 881054.260773
Town of Arkwright, Chautauqua Co., NY Easting: 965984.851068

CLIENT Fisher Associates DATE STARTED 04/23/15 COMPLETED 04/23/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist brownish gray gravelly (SAND) with 20 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt and clay, loose, compact below 18.5 feet, stratified with occasional thin coarse silt seam below 18.0 feet, (SW).		
	10	4								
	22		13					23.5		
				15		28		Extremely moist olive gray (SANDY-SILT) with little sand, compact, thinly bedded, (ML).		
25					12					
								grades downward to 28.0		
	11	1						Extremely moist olive gray gravelly (CLAYEY-SILT) with 5 to 10% gravel, some clay, trace sand, stiff, massive soil structure, (CL).	CUTTINGS BACKFILL	
	12		4			11				
				7						
30					8					Water level at 29.9 feet below ground surface at completion.
								grades downward to 33.0		
	12	5						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, very stiff, hard below 39.5 feet, massive soil structure, (CL).		
	16		7			17				
				10						
35					11					
	13	5								
40	16		21							

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-64-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 480, Northing: 881054.260773

Town of Arkwright, Chautauqua Co., NY Easting: 965984.851068

CLIENT Fisher Associates DATE STARTED 04/23/15 COMPLETED 04/23/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	13			25		46		Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, hard, massive soil structure, (CL).		← CUTTINGS BACKFILL
	16				36			41.0		← 41.0'
								Boring completed at 41.0 feet.		
45										
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: TB 66

DATE: 2/27-28/2013 ELEVATION:

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	1	2	3	4	5		Moist, dark brown (SILT) topsoil with trace very fine size sand, loose with fine size roots (0.7)	1.0'		Cement / Bentonite Grout	Topsoil to 0.7 foot over silty glacial drift to 9.5 feet over silty glacial till to 20.0 feet over weathered shale rock to 25.9 feet over alternating Siltstone and Shale bedrock to end of coring
2	2	4	13	23	17		Moist to extremely moist, brown (CLAYEY- SILT) with 3 to 5% gravel, little clay, very stiff to hard, blocky soil structure	1.2'			
3	8	17	13	10	30			0.3'		2" PVC Riser Pipe	
4	6	9	10	15	19			1.4'			
5	15	33	40	50/3"	73		(9.5)	0.4'			
6	19	29	47	27	76		Moist, gray, gravelly (CLAYEY-SILT) with 15 to 30% gravel, little clay, hard with brittle consistence, massive soil structure	2.0'	(10.0)		
7	17	33	48	43	81			1.9'	(13.0)	Bentonite Seal	
8	19	31	35	42	66			1.7'	(15.0)	#2 Size Sand	
9	50/3"				>50		(20.0)	0.1'		2" 10 Slot PVC Screen	

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 1

3553 Crittenden Road
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HOLE NUMBER: TB 66

DATE: 2/27-28/2013 ELEVATION:

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
							Shale rock, gray, very soft to soft, fissile, weathered, wet			2" 10 Slot PVC Screen	
10	150									#2 Size Sand	
									25.0		
									25.5	Well Installation Completed at 25.0' BGS	
		RUN#1									
							25.9 Alternating Siltstone and Shale bedrock, gray to medium gray, very thinly bedded 1/2" to 4" thick, moderately hard, can be easily etched with a knife, encountered very soft (CLAYEY-SILT) layer between 32.5' to 32.9' and vertical soil filled fracture from 34.9' to 35.7'			Auger Cuttings	
		RUN#2									
							35.9 Coring Completed at 35.9' BGS		35.9		

CORE DATA

Run#	Interval (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	25.9 to 30.9	5	4.1	82	8
2	30.9 to 35.9	5	3.9	78	0

LOGGED BY: Dale M. Gramza / Senior Geologist

3553 Crittenden Road
Alden, NY 14004
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www.natureswayenvironmental.com

HOLE NUMBER: TB 67

DATE: 3/1/2013 ELEVATION:

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	1						Extremely moist, dark brown (SILT) topsoil with trace very fine size sand, loose with fine size roots (0.9)	1.3'			Topsoil to 0.9 foot over silty slack water sediment with little clay to 6.0 feet over water sorted and deposited sand with little to some silt to 9.5 feet over water sorted and deposited sand with little gravel and silt to 12.0 feet over silty glacial drift to 15.5 feet over weathered shale rock to 19.7 feet over Siltstone bedrock to 21.4 feet over Shale bedrock to end of boring
		3			8					2" PVC Riser Pipe	
			5								
				8							
2	2						Moist, distinctly mottled, brown (CLAYEY-SILT) with little clay, firm to stiff, blocky soil structure	0.7'		Cement / Bentonite Grout	
		3			9						
			6								
				6							
3	2							0.7'			
		3			5					5.0	
			2								
				1			(6.0)				
4	2						Wet, brown (SILTY-SAND) with very fine size sand, little to some silt, thinly bedded	1.6'		Bentonite Seal	
		2			3						
			1								
				1						8.0	A second boring was advanced to 20.0 feet without sampling offset from TB 67 to allow for the installation of a monitoring well
5	WH							1.7'			
		WH			>7						
			7								
				12			(9.5)				
6	14						Wet, brown, gravelly (SILTY-SAND) with 15 to 25% gravel, very fine size sand sand, little silt, thinly bedded	1.2'		10.0 #2 Size Sand	
		7									
			6		13						
				5			(12.0)				WH = Sampler Penetration with Weight of Rods and Hammer
7	3						Extremely moist, brown to gray (SILT) with 5 to 10% gravel, trace very fine size sand and trace clay, compact, massive soil structure to weakly thinly bedded	1.3'			
		8									
			8		16						
				9							
8	5							1.7'		2" 10 Slot PVC Screen	
		8									
			8		16						
				10			(15.5)				
9	5						Shale rock, olive gray to gray, soft to moderately soft, fissile, fractured, weathered	1.8'			
		27									
			26		53						
				34							
10	29							1.0'		Well Installation Completed at 20.0 feet	
		50/3"			>50						
		RUN#1					(20.0)				

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 1

3553 Crittenden Road
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HOLE NUMBER: TB 67

DATE: 3/1/2013 ELEVATION:

PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR: Fisher Associates

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
							Siltstone bedrock, olive gray, very hard, can be etched with a knife with effort, very thinly bedded 1/2" to 3" thick 21.4				
11	50/5"						Shale bedrock, gray, moderately hard, can easily be etched with a knife to very soft, can be crushed between fingers into (CLAYEY-SILT) soil material, thinly bedded 1/2" to 2" thick	0.3'			
12	50/5"							0.4'			
13	50/3						34.0 Auger Refusal at 34.0' BGS				

CORE DATA

Run#	Interval (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	19.7 to 23.2	3.5	3.5	100	10

LOGGED BY: Dale M. Gramza / Senior Geologist

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10B13a HOLE NO. WTG-69-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885344.17970800000

Town of Arkwright, Chautauqua Co., NY Easting: 965840.20149700000

CLIENT Fisher Associates DATE STARTED 03/23/15 COMPLETED 03/27/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (CLAYEY-SILT) topsoil with 3 to 5% gravel, little organic matter and clay, very soft, granular soil structure, (ML-CL). 0.8		(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
	17		1			5				(2) CONCRETE
				4						← 2.0'
					8					Silty topsoil with little organic matter and clay to 0.8 feet over silty glacial drift with little to some gravel, trace sand to 2.0 feet over clayey glacial drift with little to some gravel, trace sand to 4.0 feet over silty glacial drift with little gravel and clay, trace sand to 6.0 feet over loamy glacial drift with little to some gravel to 8.5 feet over water sorted and deposited sand with trace silt to 10.0 feet over water sorted and deposited sand with little to some gravel, trace silt to 11.0 feet over loamy glacial
	2	6								
	16		8			15				
				7						
					7					
	3	4								
5	21		4			9				
				5						
					6					
	4	4								
	20		4			10				
				6						
					4					
	5	9								
	16		6			12				
				6						
10					4					
	6	2								
	20		7			34				
				27						
					36					
	7	21								
	14		40							
				100/5						
	8	17								
15	16		58			100				
				42						
					33					
	9	13								
	18		26			51				
				25						
20					25					

Extremely moist faintly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, little clay, trace sand, stiff, blocky soil structure, (ML-CL).

grades downward to 2.0

Extremely moist highly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, some clay, trace sand, stiff, blocky soil structure, (CL).

grades downward to 4.0

Extremely moist, becoming wet below 5.0 feet, distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% mostly subangular gravel, little clay, trace sand, firm with nearly vertical gray desiccation cracks, (ML-CL).

grades downward to 6.0

Wet distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, massive soil structure, (SC).

clear transition to 8.5

Wet olive gray (SAND), very fine and fine size, trace silt, loose, liquefies when disturbed, thinly bedded, (SP).

clear transition to 10.0

Wet olive gray gravelly (SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, very loose, stratified, (SW). 11.0

See next sheet.

2" SCHEDULE 40 FJT PVC RISER

CUTTINGS BACKFILL

.010 SLOT 2" PVC SCREEN

#00N SIZE MORIE SAND PACK

← 10.0'

(3) BENTONITE CHIPS

← 13.0'

← 15.0'

till to 23.0 feet over apparent siltstone rock to 28.0 feet over apparent shale bedrock to 28.3 feet over shale bedrock to 32.8 feet over siltstone bedrock to 33.5 feet over shale bedrock to 35.4 feet over siltstone bedrock to 35.9 feet over shale bedrock to 36.2 feet over siltstone bedrock to end of coring.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-69-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885344.17970800000

Town of Arkwright, Chautauqua Co., NY Easting: 965840.20149700000

CLIENT Fisher Associates DATE STARTED 03/23/15 COMPLETED 03/27/15

DEPTH IN FT | BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little sand, trace clay, dense, massive soil structure, (ML).		Note: WTG-69-15 drilled 5.0 feet southeast of staked location.
							grades downward to 23.0		Water level at 8.4 feet below ground surface at completion.
10 3	100/3						Olive gray apparent siltstone rock, moderately hard.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0' ← 25.5'
							grades downward to 28.0		
11 3	100/3						Olive gray apparent shale bedrock, soft and very soft, bedded.		
	Run	#1					grades downward to 28.3		
							Olive gray shale bedrock, very soft, bedded. 28.6	BENTONITE CHIPS	
							Olive gray shale bedrock, medium hardness, softer interbeds 1/8 to 1/4" thick.		
	Run	#2					32.8		
							Olive gray siltstone bedrock, medium hardness, core separated into 1/2 to 2" lengths. 33.5		
							Olive gray shale bedrock, moderately soft, thin softer interbeds. 35.4		
	Run	#3					Olive gray siltstone bedrock, medium hardness, core separated into 1/2 to 3" lengths. 35.9		
							See next sheet.		← 38.3'

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	28.3 to 29.8	1.5	1.4	93	0
2	29.8 to 36.2	6.4	6.0	94	0
3	36.2 to 38.3	2.1	2.1	100	0

EDI Bedrock Hardness Classification

Very soft: can be easily crushed between fingers into soil material.
Soft: can be crushed between fingers into soil material with some effort.
Moderately soft: can be etched with fingernail.
Medium hardness: can be easily etched with knife.
Moderately hard: can be etched with knife with some effort.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-69-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885344.17970800000
Town of Arkwright, Chautauqua Co., NY Easting: 965840.20149700000

CLIENT Fisher Associates DATE STARTED 03/23/15 COMPLETED 03/27/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Olive gray shale bedrock, moderately soft, thin softer interbeds. 36.2		EDI Bedrock Hardness Classification Moderately soft: can be etched with fingernail. Medium hardness: can be easily etched with knife.
								Olive gray siltstone bedrock, medium hardness, core separated into 1 to 3" lengths. 38.3		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 38.3 feet.
								Coring completed at 38.3 feet.		
45										
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-70-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Survey ID 477, Northing: 881360.298842

Town of Arkwright, Chautauqua Co., NY Easting: 968575.582833

CLIENT Fisher Associates DATE STARTED 04/20/15 COMPLETED 04/20/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)	WATER TABLE AND REMARKS
	1	2						Extremely moist dark brown (SAND-SILT-CLAY) topsoil with 5 to 10% gravel, little organic matter, sand and clay, firm, granular soil structure, (ML-CL).		← 0.5'
	13		3			6			(2)	
				3						← 2.0
					4					
	2	7								
	20		8			16				
				8						(1) TOPSOIL FILL
					7					(2) CONCRETE
	3	3								
5	18		4			9				Silty topsoil with little organic matter, sand and clay, trace gravel to 1.0 feet over clayey glacial drift with little to some gravel, trace sand to 6.0 feet over silty glacial drift with little to some gravel, little sand and clay to 15.0 feet over clayey glacial drift with little to some gravel, trace sand to 34.5 feet over shale rock to refusal.
				5						
					8					
	4	4						1.0		
	22		5			12		Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, stiff below 4.0 feet with nearly vertical gray desiccation cracks, (CL).		
				7						
					6			grades downward to 6.0		
	5	3								
	16		5			15		Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, stiff and very stiff, massive soil structure, (ML-CL).		
				10						
10					8					
	6	5								
	22		8			19				
				11						
					18					
	7	8								
	12		10			21				
				11						
					17					
	8	4								
15	24		5			13		grades downward to 15.0		
				8						
					9			Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, massive soil structure, (CL).		
	9	3								
	22		6			13				
				7						
20					15					

CUTTINGS BACKFILL

Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 34.9 feet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-70-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 477, Northing: 881360.298842

Town of Arkwright, Chautauqua Co., NY Easting: 968575.582833

CLIENT Fisher Associates DATE STARTED 04/20/15 COMPLETED 04/20/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, massive soil structure, (CL).	CUTTINGS BACKFILL	EDI Rock Hardness Classification --- Medium hardness: can be easily etched with knife.
	10	4								
	23		6			14				
				8						
25					9					
	11	4								
	24		6							
				9		15				
30					10					
	12	3								
	20		5							
				7		12		34.5		No water at completion.
35					100/5			Olive gray shale rock, medium hardness.		← 34.9'
								34.9		
								Split spoon refusal at 34.9 feet.		
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw) SHEET 2 OF 2

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1091 Jamison Road • Elma, NY 14059

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10B13 HOLE NO. Bore Hole TB-70-ALT-13 SURF. ELEVATION 1398.71

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 886460.471 E: 966621.757

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/26/13 COMPLETED 02/26/13

DEPTH IN FT | BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
1	2						Extremely moist dark brown (SANDY-SILT) topsoil (disturbed) with 0 to 3% gravel, little sand and organic matter, very loose, massive soil structure, (ML).		(1) 4 INCH LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
14		2			7		0.4		(2) BENTONITE SEAL
			5				Extremely moist faintly mottled brown gravelly (SILTY-SAND) with 15 to 25% gravel, very fine to very coarse size sand, some silt, compact, weakly blocky soil structure to stratified, (SM).		← 4.0'
				11			grades downward to 4.0		
2	12						Extremely moist faintly mottled brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		← 6.0'
18		10			20		clear transition to 7.5		
			10				Extremely moist gray (SANDY-SILT) with 5 to 10% gravel, little sand, firm, massive soil structure, (ML).		← 8.0'
				7			clear transition to 10.6		
3	3						Gray apparent weathered shale bedrock, very soft and soft.		Coarse silty topsoil with little sand and organic matter to 0.4 feet over water sorted and deposited sand with little to some gravel, some silt to 4.0 feet over loamy glacial drift with trace to little gravel to 7.5 feet over loamy glacial drift with trace gravel to 10.6 feet over apparent weathered shale bedrock to 14.0 feet over siltstone bedrock to 14.7 feet over shale bedrock to end of coring.
21		5			8		11.5		
			3				Gray apparent weathered shale bedrock, moderately soft with occasional thin layer of very soft and soft rock.		
				4			14.0		
4	7						Gray siltstone bedrock, medium hardness, highly fractured horizontally along bedding planes, thinly bedded, slightly porous.		Note: no water in bore hole until pulling rods to take split sample #7 at 12.0 to 14.0 foot depth, water level at 9.0 feet.
15		5			12		14.7		
			7						← 18.0'
				4					
5	2								
18		2			6				
			4						
				7					
6	8								
22		9			27				
			18						
				43					
7	45								
11		100/5							
	Run	#1							
	Run	#2							

2 INCH SCHEDULE 40 FJT RISER

.010 SLOT 2 INCH PVC SCREEN

BENTONITE SEAL

#00N SIZE MORIE SAND PACK

See next sheet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

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10813 HOLE NO. Bore Hole TB-70-ALT-13 SURF. ELEVATION 1398.71

PROJECT Arkwright Summit Windfarm – Wind Turbine Project LOCATION N: 886460.471 E: 966621.757

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/26/13 COMPLETED 02/26/13

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
		Run	#2					Gray shale bedrock moderately soft, highly fractured horizontally along bedding planes with occasional highly broken and fractured zones with occasional mudseams and beds of very soft and soft rock, thinly bedded to banded, dense. 17.9	(1)	(1) #00N SIZE MORIE SAND PACK
		Run	#3					Gray shale bedrock, moderately soft, highly fractured horizontally along bedding plances, thinly bedded to banded, dense. 23.5		← 23.5'
25								Coring completed at 23.5 feet.		
30										
35										
40										

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	14.0 to 18.5	4.5	2.5	56	0
2	18.5 to 20.5	2.0	2.0	100	0
3	20.5 to 23.5	3.0	3.0	100	0

EDI Bedrock Hardness Classification

Very soft: can be easily crushed between fingers into soil material.
Soft: can be crushed between fingers into soil material with some effort.
Moderately soft: can be etched with fingernail.
Medium hardness: can be easily etched with knife.

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 14.0 feet. Continued below with NQ-2 size double tube core barrel and diamond bit to 23.5 feet. Installed a 2 inch PVC observation well in completed bore hole.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13a HOLE NO. GLP-75-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 475, Northing: 881333.616189

Town of Arkwright, Chautauqua Co., NY Easting: 970318.967759

CLIENT Fisher Associates DATE STARTED 04/23/15 COMPLETED 04/24/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Extremely moist black mucky (SANDY-SILT) topsoil with some organic matter, little sand, very loose, granular soil structure, (ML) tending towards (OL).		← 0.5'
	17		2			8		0.2		← 2.0'
				6				Moist faintly mottled orangish brown (SANDY-SILT) with 5 to 10% gravel, little sand, very loose, weakly blocky soil structure, (ML).		(1) TOPSOIL FILL
					10			clear transition to 1.5		(2) CONCRETE
	2	8						Extremely moist faintly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 20% mostly subangular gravel, some clay, trace sand, very stiff, blocky soil structure, (CL).		Note: GLP-75-15 drilled 7.5 feet south of staked location.
	21		9			18		grades downward to 2.0		
				9				Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff with nearly vertical gray desiccation cracks, (ML-CL) tending towards (SC).		Augers left in bore hole over night at 40.0 feet, water level the next morning was 10.2 feet below ground surface.
					11			grades downward to 5.0		
	3	7						Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, little clay, trace sand, stiff, massive soil structure, (ML-CL).		Organic rich coarse silty topsoil with some organic matter, little sand to 0.2 feet over coarse silty glacial drift with little sand, trace gravel to 1.5 feet over clayey glacial drift with little gravel, trace sand to 2.0 feet over loamy glacial drift with little to some gravel to 5.0 feet over silty glacial drift with little gravel to 10.0 feet over loamy glacial drift with little to some gravel to 10.5 feet over silty glacial drift with little to some gravel to 18.0 feet over loamy glacial drift with little to some gravel to 34.0 feet over clayey glacial till to end of boring.
5	8		7			14		grades downward to 6.0		
				7				Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, stiff, very stiff below 8.0 feet, massive soil structure, (ML-CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 40.0 feet.
					7			grades downward to 10.0		
	4	2								
	18		5			10				
				5						
					6					
	5	8								
	8		11			23				
				12						
10					16					
	6	9								
	18		16			31				
				15						
					12					
	7	5								
	24		9			17				
				8						
					7					
	8	3								
15	22		7			17				
				10						
					12					
	9	5								
	23		9			18				
				9						
20					10			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-75-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Survey ID 475, Northing: 881333.616189

Town of Arkwright, Chautauqua Co., NY Easting: 970318.967759

CLIENT Fisher Associates DATE STARTED 04/23/15 COMPLETED 04/24/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, hard, very stiff below 12.0 feet, massive soil structure, (ML-CL) tending towards (SC).		
	10	3						clear transition to 10.5		
	18		6			16		Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, trace to little sand and clay, very stiff, massive soil structure, (ML-CL).		
				10				grades downward to 18.0		
25					11			Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff, massive soil structure, (SC).		
	11	4								
	19		9			24				
				15						
30					18					
	12	3								
	20		7					grades downward to 34.0		
				13		20		Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		
35					17					
	13	5								
	18		11			27				
				16						
40					23			Boring completed at 40.0 feet. 40.0	CUTTINGS BACKFILL	← 40.0'

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-80-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Survey ID 473, Northing: 881307.118584
Town of Arkwright, Chautauqua Co., NY Easting: 972050.262077

CLIENT Fisher Associates DATE STARTED 04/24/15 COMPLETED 04/24/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist to wet dark gray mucky (SANDY-SILT) topsoil with little to some organic matter, little sand, very loose, granular soil structure, (ML) tending towards (OL).		← 0.5'
	14		2			7		0.2		← 2.0'
				5				Extremely moist faintly mottled dark gray (CLAYEY-SILT) topsoil with 5 to 10% gravel, little organic matter and clay, soft, granular soil structure, (ML-CL).		(1) TOPSOIL FILL
					6			0.7		(2) CONCRETE
	2	9						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, hard below 13.5 feet with nearly vertical gray desiccation cracks, (CL).		Organic rich coarse silty topsoil with little to some organic matter, little sand to 0.2 feet over silty topsoil with little organic matter and clay to 0.7 feet over clayey glacial till to 13.0 feet over water sorted and deposited sand with little to some gravel, little silt to 14.0 feet over coarse silty slack water sediment with little sand to 15.5 feet over silty slack water sediment with little clay to 19.5 feet over clayey glacial till to 23.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 29.0 feet over silty glacial till to refusal.
	21		9			19				
				10						
					10					
	3	3								
5	24		9			22				
				13						
					14					
	4	4								
	24		7			20				
				13						
					15					
	5	13								
	24		19			42				
				23						
10					29					
	6	7								
	24		22			45				
				23						
					23					
	7	12								
	24		19			38		grades downward to 13.0		
				19				Extremely moist faintly mottled olive brown gravelly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, little silt, dense, stratified, (SM).		
					17			14.0		
	8	5						Extremely moist faintly mottled brown (SANDY-SILT) with little very fine size sand, compact, thinly bedded, (ML).		
15	22		9			19				
				10						
					16					
								grades downward to 15.5		
	9	7								
	24		11			24				
				13						
20					27			See next sheet.		

CUTTINGS BACKFILL

Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 35.2 feet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. GLP-80-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Survey ID 473, Northing: 881307.118584

Town of Arkwright, Chautauqua Co., NY Easting: 972050.262077

CLIENT Fisher Associates DATE STARTED 04/24/15 COMPLETED 04/24/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled olive brown (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
								grades downward to 19.5		
	10	4						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, hard, massive soil structure, (CL).		
	8		22			78				
				56						
25					63			grades downward to 23.0		
								Extremely moist faintly mottled grayish brown gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, some sand, very dense, stratified, (SM).		
								grades downward to 29.0		
	11	6						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and occasional channer, little sand and clay, hard, massive soil structure, (ML-CL).		
	12		17							
30				100/5						
	12	27								
	15		55							
				100/4						
35								35.2		No water at completion. ← 35.2'
								Auger refusal at 35.2 feet.		
40										

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing,Geologist, (mw)

NATURE'S WAY
ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC
3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: WTG 93

DATE: 4/1/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868468.9020, Easting: 977766.1480

SN	0/6	6/12	12/18	18/24	N	DESCRIPTION AND CLASSIFICATION	REC	REMARKS
1	3					Wet, dark brown, mucky (SILT) with trace very fine size sand, loose with fine size roots (0.5)	0.5'	2" PVC Riser Pipe
		3			6			
			3					
				4				
2	6					Wet, faintly mottled, brown, gravelly (SILT) with 15 to 25% gravel, trace very fine size sand, loose to compact, weakly thinly bedded	1.4'	
		6			13			
			7					
				15				
3	4						1.2'	Soil Backfill
		7			15			
			8					
				14		(6.0)		
4	4					Extremely moist, olive gray (SILT) with 3 to 5% gravel, trace very fine size sand, loose, weakly thinly bedded	1.5'	
		4			10			
			6					
				8		(8.0)		
5	5					Wet, brown, very gravelly (SILTY-SAND) with 40 to 50% gravel, very fine to medium size sand, little silt, compact to dense, stratified	0.8'	
		6			12			
			6					
				6				
6	9						1.0'	10.2 Bentonite Seal
		19			27			
			8					
				16				
7	12						1.0'	13.2
		15			31			
			16					
				22				
8	15						0.8'	14.5 2" Slotted PVC Screen
		12			29			
			17					
				29		(17.5)		
						Extremely moist, gray, gravelly (SANDY- SILT) with 15 to 25% gravel, little very fine size sand, compact to very dense, massive soil structure	0.3'	# 2 Size Sand
9	40							
		50/3"						

COMMENTS: Topsoil to 0.5' over silty glacial drift to 6.0 feet over silty slack water sediment with trace sand to 8.0 feet over water sorted and deposited sand and gravel with little silt to 17.5 feet over silty glacial till with little gravel to 29.0 feet over silty glacial till with trace gravel to refusal

LOGGED BY: Dale M. Gramza / Senior Geologist

NATURE'S WAY
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Alden, NY 14004
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www.natureswayenvironmental.com

HOLE NUMBER: WTG 93

DATE: 4/1/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868468.9020, Easting: 977766.1480

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
					>50						
10	39	50/3"			>50		Extremely moist, gray, gravelly (SANDY- SILT) with 15 to 25% gravel, little very fine size sand, very dense, massive soil structure	0.5'	2" Slotted PVC Screen; #2 Size Sand; 24.5; 25.0		
11	50/5"						29.0 Extremely moist, gray (SILT) with 5 to 8% gravel, trace very fine size sand, very dense, massive soil structure	0.4'			
12	29	50/3"			>50			0.6'			
13	50/5"							0.4'			

LOGGED BY: Dale M. Gramza / Senior Geologist

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HOLE NUMBER: WTG 93

DATE: 4/1/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868468.9020, Easting: 977766.1480

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
							See previous sheet				
							42.2 Auger Refusal at 42.0' BGS				No Water at Completion

45
50
55
60

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 3 of 3

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HOLE NUMBER: WTG 95

DATE: 3/23/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868060.3800, Easting: 981464.4940

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	2						0.4 Extremely moist, dark brown, mucky (SILT) topsoil with trace very fine size sand, loose	1.0'			Topsoil to 0.4 foot over silty slack water sediment with trace clay to 6.0 feet over silty slack water sediment with trace gravel to 10.0 feet over water sorted and deposited sand and gravel with little silt to 14.0 feet over silty glacial till to 29.0 feet over shale rock to refusal
		2			5		Extremely moist, highly mottled, brown (SILT) with trace clay, loose, blocky soil structure	0.9'			
			3								
				5							
2	3										
		4			8			1.4'		Soil Backfill	
			4								
				6							
3	4										
		4			9						
			5								
				5			6.0				
4	2						Extremely moist, brown (SILT) with 5 to 8% gravel, trace clay, compact, thinly bedded	1.8'		2" PVC Riser Pipe	
		5			11						
			6								
				8							
5	4							1.7'	8.0	Bentonite Seal	
		6			13						
			7								
				10			10.0				
6	2						Wet, brown, very gravelly (SILTY-SAND) with 40 to 50% gravel, very fine to fine size sand, little silt, loose to compact, stratified	1.0'			
		3			10						
			7								
				3							
7	2							0.5'	12.5	# 2 Size Sand	
		7			16						
			9								
				10			14.0		14.0		
8	4						Moist, gray, gravelly (SANDY-SILT) with 15 to 25% gravel, trace to little very fine size sand, compact with brittle consistence, massive soil structure	1.0'		2" Slotted PVC Screen	
		7			18						
			11								
				14							
								0.9'			
9	9										
		9									

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 1 of 2

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HOLE NUMBER: WTG 95

DATE: 3/23/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 868060.3800, Easting: 981464.4940

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			30		39		Moist, gray, gravelly (SANDY-SILT) with 15 to 25% gravel, trace to little very fine size sand, compact with brittle consistence, massive soil structure			2" Slotted PVC Screen	
				50/5"							
10	36							0.8'		# 2 Size Sand	
		50/5"									
25					>50				25.0		
							29.0				
11	50/5"						Shale rock, gray, moderately soft to moderately hard, fissile, dry	0.3'			
30											
12	50/3"							0.2'			
35							34.9 Auger Refusal at 34.9' BGS				No Water at Completion
40											

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 2 of 2

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HOLE NUMBER: WTG 96

DATE: 3/23/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 867490.1710, Easting: 982397.4520

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
1	3						0.3 Extremely moist, black, mucky (SILT) topsoil with trace very fine size sand, loose	1.0'			Topsoil to 0.3 foot over loamy glacial drift to 7.0 feet over water sorted and deposited sand with some gravel to 13.0 feet over loamy glacial drift to 24.0 feet over apparent weathered shale rock to refusal
		3			6		Extremely moist, faintly mottled, brown, gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little clay and very fine size sand, loose to compact, weakly thinly bedded	1.3'			
			3								
				7							
2	3										
		5			11			1.5'		Soil Backfill	
			6								
				6							
3	5										
		5			11						
5			6								
				6				1.2'		2" PVC Riser Pipe	
4	4										
		4			7		7.0				
			3				Wet, brown, gravelly (SILTY-SAND) with 20 to 40% gravel, very fine to fine size sand, little silt, loose, thinly bedded				
				2				0.7'			
5	3										
		2			5						
			3								
				2							
10											
6	1							1.4'	10.0	Bentonite Seal	
		1			5						
			4								
				6							
7	1							1.2'			
		2			9		13.0		12.8	# 2 Size Sand	
			7				Moist, brown (SAND-SILT-CLAY) with 10 to 15% gravel, little clay and very fine size sand, dense, massive soil structure to weakly thinly bedded				
				7							
8	7								14.0	2" Slotted PVC Screen	
		11			15			0.8'			
15			25		36						
				37							
9	14							1.0'			
		11									
20											

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 1 of 2

3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: WTG 96

DATE: 3/23/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 867490.1710, Easting: 982397.4520

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			17		28		Moist, brown (SAND-SILT-CLAY) with 10 to 15% gravel, little clay and very fine size sand, dense, massive soil structure to weakly thinly bedded			2" Slotted PVC Screen	▼ Water Level at 22.5' BGS at Completion
				19						# 2 Size Sand	
							24.0		24.0		
10	24						Shale rock, gray, soft to moderately soft, fissile, weathered, wet	0.8'			
		30									
25			39		69						
				50/3"							
11	50/5"							0.4'			
30							31.3				
							Auger Refusal at 31.3' BGS				
35											
40											

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 2 of 2

NATURE'S WAY
ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC
3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: WTG 97

DATE: 3/25/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 867093.8360, Easting: 983283.4400

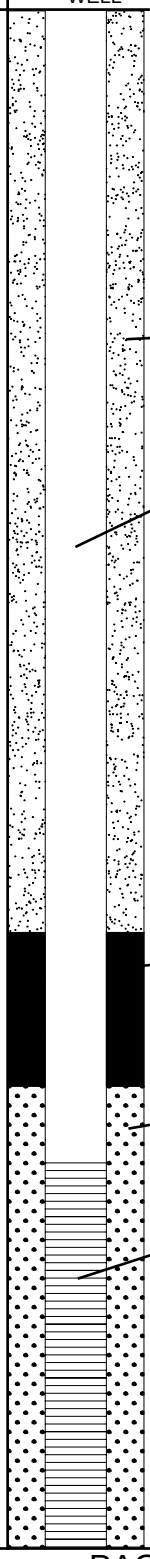
SN	0/6	6/12	12/18	18/24	N
1	3				
		1			3
			2		
				5	
2	2				
		5			10
			5		
				4	
3	12				
		7			16
			9		
				12	
4	4				
		2			5
			3		
				3	
5	4				
		7			15
			8		
				21	
6	5				
		9			19
			10		
				14	
7	6				
		7			15
			8		
				13	
8	10				
		11			29
			18		
				27	
9	25				
		23			

LITH: Extremely moist, dark brown (SANDY-SILT) topsoil with little very fine size sand, very loose, with fine size roots (0.0 – 0.4)

Moist to extremely moist, faintly mottled, brown (SILT) with 5 to 15% gravel, trace very fine size sand, loose to compact, weakly thinly bedded (0.4 – 17.5)

Moist, gray, very gravelly (CLAYEY-SILT) with 40 to 50% mostly shale gravel, little to some clay, hard, massive soil structure (17.5 – 20.0)

REC: 0.8', 0.6', 0.9', 0.4', 1.3', 1.3', 1.5', 1.5', 1.0'



COMMENTS: Topsoil to 0.4 foot over silty glacial drift with trace gravel to 17.5 feet over silty tending toward clayey glacial till to refusal

LOGGED BY: Dale M. Gramza / Senior Geologist

NATURE'S WAY
ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC
3553 Crittenden Road
Alden, NY 14004
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HOLE NUMBER: WTG 97

DATE: 3/25/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 867093.8360, Easting: 983283.4400

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
			27		50					2" Slotted PVC Screen	
				50/4"							
10	39						Moist, gray, very gravelly (CLAYEY-SILT) with 40 to 50% mostly shale gravel, little to some clay, hard, massive soil structure	1.0'		# 2 Size Sand	
		33									
			50/5"		>83				25.0		
11	50/4"							0.3'			
							31.0 Auger Refusal at 31.0' BGS				No Water at Completion

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 2 of 2

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-100-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 881021.85621900000

Town of Arkwright, Chautauqua Co., NY Easting: 975480.36826400000

CLIENT Fisher Associates DATE STARTED 05/11/15 COMPLETED 05/11/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist black (MUCK), granular soil structure, (OL). 0.3		← 0.5'
	18		1			3				
				2						← 2.0
					3					
	2	15						Extremely moist highly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, trace clay, very loose, weakly blocky soil structure, (ML). clear transition to 1.0		(1) TOPSOIL FILL
	17		13			22				(2) CONCRETE
				9						
					9					
	3	5								
5	18		7			12		Extremely moist faintly mottled olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, blocky soil structure, (ML-CL). grades downward to 2.0		Note: WTG-100-15 drilled 16.0 feet northwest of staked location.
				5						
					5					
	4	2								
	17		4			9				Organic surface to 0.3 feet over coarse silty glacial drift with little sand, trace gravel and clay to 1.0 feet over silty glacial drift with little to some gravel, little sand and clay to 2.0 feet over water sorted and deposited sand with little to some gravel, little silt to 5.0 feet over water sorted and deposited sand with little to some gravel, trace silt to 6.0 feet over silty glacial drift with little to some gravel, little sand and clay to 12.0 feet over water sorted and deposited sand with some gravel, little silt to 13.5 feet over silty glacial till to 23.0 feet over water sorted and deposited sand with little to some gravel, trace silt to 29.5 feet over water sorted and deposited sand and gravel, trace silt to 39.5 feet over water sorted and deposited coarse silt with little to some gravel and sand, trace clay to 49.3 feet over coarse silty slack water sediment with little sand to 53.0 feet over silty glacial till to end of boring.
				5						
					7					
	5	2								
	13		6			12		Extremely moist faintly mottled olive grayish brown gravelly (SILTY-SAND) with 15 to 25% mostly subrounded gravel, very fine to very coarse size sand, little silt, compact with brittle consistence, prismatic soil structure, (SM). grades downward to 5.0		
				6						
10					4					
	6	4								
	24		8			16				
				8						
					7					
	7	12						Extremely moist faintly mottled olive grayish brown gravelly (SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, loose, stratified, (SW). clear transition to 6.0		
	14		20			47				
				27						
					15					
	8	13								
15	22		19			37		Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little sand and clay, stiff, massive soil structure, (ML-CL). grades downward to 12.0		
				18						
					17					
	9	6								
	16		10			25				
				15						
20					15			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

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10B13a HOLE NO. WTG-100-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881021.85621900000

Town of Arkwright, Chautauqua Co., NY Easting: 975480.36826400000

CLIENT Fisher Associates DATE STARTED 05/11/15 COMPLETED 05/11/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist faintly mottled grayish brown gravelly (SILTY-SAND) with 20 to 40% mostly subangular gravel, very fine to very coarse size sand, little silt, stratified, (SM). clear transition to 13.5		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
	10	5								
	20		10			23				
				13						
25					17			Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL). clear transition to 14.5		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff and hard, massive soil structure, (ML-CL). grades downward to 23.0		
	11	5								
	18		10			27				
				13				Extremely moist faintly mottled olive brownish gray gravelly (SAND) with 15 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW). clear transition to 29.5		
30					18					
								Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded gravel, very fine to very coarse size sand, trace silt, dense, stratified, (SW), (GW).		
	12	7								
	16		15			38				
				23						
35					22					
	13	7								
	20		28			48				
				20				39.5		
40					29			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-100-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881021.85621900000
Town of Arkwright, Chautauqua Co., NY Easting: 975480.36826400000

CLIENT Fisher Associates DATE STARTED 05/11/15 COMPLETED 05/11/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, little to some sand, trace clay, very dense, stratified, (SM).		
	14	8								
	14		24			60				
				36						
45					27					Water level at 45.3 feet below ground surface at completion.
	15	10								
	24		16			33		49.3		
				17				Extremely moist olive gray (SANDY-SILT) with little sand, dense, thinly bedded, (ML).		
50					19					
								grades downward to 53.0		
	16	20						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
	14		21			79				
				58						
55					63					
	17	13								
	18		21			55				
				34						
60					40			Boring completed at 60.0 feet. 60.0		← 60.0'

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-101-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883664.47289100000

Town of Arkwright, Chautauqua Co., NY Easting: 968130.37913200000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark reddish brown muck (PEAT), (OL).		← 0.3'
	14		1			2		0.3		← 1.5'
				1				Extremely moist faintly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, little clay, trace sand, firm, blocky soil structure, (ML-CL).		(1) TOPSOIL FILL
					3					(2) CONCRETE
	2	11								
	24		18			36				
				18						
					16			grades downward to 2.0		Note: WTG-101-15 drilled 6 feet southeast of staked location.
	3	10								
5	14		8			13		Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, little clay, trace sand, hard, blocky soil structure, (ML-CL).		
				5						
					3					
	4	6								
	18		5			11		grades downward to 4.0		
				6						
					5			Moist olive brown gravelly (CLAYEY-SAND) with 15 to 40% mostly subrounded gravel, little clay, trace silt and organic matter, firm, weakly stratified, (SC).		Organic rich organic matter to 0.3 feet over silty glacial drift with little clay, trace sand and gravel to 2.0 feet over silty glacial drift with little to some gravel, little clay, trace sand to 4.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace silt and organic matter to 10.0 feet over water sorted and deposited sand with some gravel, trace silt and clay to 18.0 feet over water sorted and deposited sand with trace gravel to 18.5 feet over water sorted and deposited sand with little silt to 23.0 feet over water sorted and deposited sand, trace silt to 28.0 feet over silty slack water sediment with little sand and clay, trace gravel to 33.0 feet over silty glacial drift with little gravel and clay, trace sand to 43.0 feet over silty glacial till to 56.0 feet over apparent siltstone rock to refusal.
	5	4								
	16		5			9				
				4						
					3			grades downward to 10.0		
10	6	4								
	16		4			10		Moist olive brown gravelly (SAND) with 30 to 40% mostly fine size subrounded gravel, very fine to very coarse size sand, trace silt and clay, loose, compact below 12.0 feet, stratified, (SW).		
				6						
					7					
	7	8								
	24		9			19				
				10						
					10					
	8	8								
15	24		9			18				
				9						
					9					
								grades downward to 18.0		
	9	4								
	20		4			9				
				5						
20					6			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 1 OF 3

EARTH DIMENSIONS, INC.

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-101-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883664.47289100000

Town of Arkwright, Chautauqua Co., NY Easting: 968130.37913200000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet gray (SAND) with 5 to 10% fine size gravel, fine to very coarse size sand, loose, stratified, (SW). 18.5		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 56.2 feet.
	10	2						Extremely moist faintly mottled olive grayish brown (SILTY-SAND), very fine size sand with little silt, loose, thinly bedded, (SM).		
	24		2			4				
				2				grades downward to 23.0		
25					2			Wet olive gray (SAND), very fine size, trace silt, loose, tends to liquefy when disturbed, thinly bedded, (SP).		
								grades downward to 28.0		
	11	7						Wet olive gray (SAND-SILT-CLAY) with 5 to 10% fine size gravel, little sand and clay, very stiff, weakly thinly laminated with occasional gravelly (SILTY-SAND) lens, (ML-CL).		
	20		11			22				
				11						
30					12					Augers left in bore hole over night, water level the next morning was 30.5 feet below ground surface.
								grades downward to 33.0		
	12	2						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 20% gravel, little clay, trace sand, stiff, very stiff below 38.0 feet, massive soil structure, (ML-CL).		
	20		4			12				
				8						
35					13					
	13	6								
	22		9			19				
				10						
40					10					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-101-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 883664.47289100000
Town of Arkwright, Chautauqua Co., NY Easting: 968130.37913200000

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 20% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL).		
								grades downward to 43.0		
	14	9						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
	22		15			32				
				17						
45					22					
	15	10								
	20		15			33				
				18						
50					23					
	16	11								
	22		18			41				
				23						
55					33					
								grades downward to 56.0		
	17	100/2						Olive gray apparent siltstone rock, moderately hard, can be etched with knife with some effort.		← 56.2'
								56.2		
								Split spoon refusal at 56.2 feet.		
60										

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-101a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/17/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
0								Advanced bore hole without split spoon sampling to 25.5 feet.	(1) (2)	← 1.5'
5									2" SCHEDULE 40 FJT PVC RISER; CUTTINGS BACKFILL	(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-101a-15 drilled 2 feet southeast of staked location.
10									(3)	← 10.0'
15									.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 13.0' ← 15.0'
20										

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 1 OF 2

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10B13a HOLE NO. WTG-101a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/17/15 COMPLETED 03/17/15

DEPTH IN FT | BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
							25.5		← 25.5'
							Boring completed at 25.5 feet.		

25
30
35
40

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-102-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 876898.97433900000

Town of Arkwright, Chautauqua Co., NY Easting: 976559.81915800000

CLIENT Fisher Associates DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist black (SANDY-SILT) topsoil with 0 to 3% gravel, little organic matter and sand, trace clay, very loose, granular soil structure, (ML).		← 0.5'
	18		1			7		0.2		← 2.0'
				6				Extremely moist dark brown (SANDY-SILT) topsoil with 3 to 5% gravel, trace to little organic matter, little sand, very loose, granular soil structure, (ML).		(1) TOPSOIL FILL
					7			0.8		(2) CONCRETE
	2	10						Extremely moist distinctly mottled brown (SANDY-SILT) with 5 to 15% gravel, little sand, trace clay, compact with brittle consistence with nearly vertical gray desiccation cracks, (ML).		Note: WTG-102-15 drilled 10.5 feet southeast of staked location.
	0		6			12		grades downward to 4.0		
				6				Extremely moist, wet below 6.0 feet, distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 20% mostly subangular gravel, little to some clay, trace sand, firm, massive soil structure, (ML-CL) tending towards (CL).		Augers left in bore hole at 12.0 feet over night, water level at 4.9 feet below ground surface the next morning.
					6			grades downward to 5.5		
	3	2						Wet distinctly mottled olive grayish brown gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, little to some sand, loose, stratified, (SM).		Note: no recovery for samples #2, 2.0 to 4.0 and sample #11, 28.0 to 30.0 foot depths.
5	16		4			8		grades downward to 8.0		
				4				Extremely moist distinctly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, compact, thinly bedded, (ML).		Coarse silty topsoil with little organic matter and sand, trace gravel to 2.0 feet over coarse silty topsoil with little sand, trace to little organic matter, trace gravel to 0.8 feet over coarse silty glacial drift with trace to little gravel, little sand, trace clay to 4.0 feet over silty to clayey glacial drift with little gravel, trace sand to 5.5 feet over coarse silty slack water sediment with little to some sand and gravel to 8.0 feet over coarse silty slack water sediment with little sand, trace gravel to 10.0 feet over loamy glacial till to 12.0 feet over silty glacial till to 14.0 feet over clayey glacial till to 38.0 feet over coarse silty slack water sediment with some sand to 43.0 feet over silty glacial till to 48.0 feet over loamy glacial till to end of boring.
					5			grades downward to 10.0		
	4	5						Extremely moist distinctly mottled brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, hard, massive soil structure, (SC).		
	12		4			6				
				2						
					1					
	5	1								
	20		6			21				
				15						
10					19					
	6	19								
	14		35			56				
				21						
					17					
	7	16								
	3		17			43				
				26						
					34					
	8	22								
15	22		15			36				
				21						
					56					
	9	45								
	22		29			43				
				14						
20					15					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 1 OF 3

EARTH DIMENSIONS, INC.

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-102-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 876898.97433900000
Town of Arkwright, Chautauqua Co., NY Easting: 976559.81915800000

CLIENT Fisher Associates DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, hard, massive soil structure, (SC).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 56.4 feet.
								grades downward to 12.0		
	10 18	3	8			20		Wet, extremely moist below 12.0 feet, olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
				12						
25					13			grades downward to 14.0		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, very stiff below 28.0 feet, massive soil structure, (CL).		
	11 0	5	9			20				
				11						
30					15					
	12 16	6	8			18				
				10						
35					53					
								grades downward to 38.0		
	13 18	8	19			36		Wet olive gray (SANDY-SILT) with some very fine size sand, dense, tends to liquefy when disturbed, thinly bedded, (ML).		
				17						
40					23				CUTTINGS BACKFILL	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-102-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 876898.97433900000

Town of Arkwright, Chautauqua Co., NY Easting: 976559.81915800000

CLIENT Fisher Associates DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet olive gray (SANDY-SILT) with some very fine size sand, dense, tends to liquefy when disturbed, thinly bedded, (ML).		
								grades downward to 43.0		
	14	6						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
	22		16			44				
				28						
45					22					
								grades downward to 48.0		
	15	4						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (ML) tending towards (SM).		
	22		21			69				
				48						
50					49					
	16	6								
	24		52			110				
				58						
55					77					
								56.4		← 56.4'
								Boring completed at 56.4 feet.		
60										

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10813 HOLE NO. Bore Hole TB-103-13 SURF. ELEVATION 1495.74

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 886094.5568 E: 972958.9101
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/27/13 COMPLETED 02/27/13

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% gravel, little sand and organic matter, very loose, granular soil structure, (ML). 1.3		(2) CONCRETE
	18		2			5				← 1.5'
				3						(1) 4 INCH LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
					6					(3) BENTONITE SEAL
	2	5								(4) 2 INCH SCH. 40 FJT RISER
	10		5			9				← 4.0'
				4						
					5					← 5.0'
	3	3								
5	12		2			4				Coarse silty topsoil fill with little sand and organic matter to 1.3 feet over silty slack watar sediment with little sand and clay to 1.9 feet over loamy glacial drift with little to some gravel to 4.2 feet over water sorted and deposited sand with little to some gravel to 6.7 feet over loamy glacial drift with little sand and clay, trace to little gravel to 11.0 feet over loamy glacial till to 13.8 feet over apparent weathered shale bedrock to 15.0 feet over shale and siltstone bedrock to 18.7 feet over shale bedrock with occasional thin siltstone interbeds to end of coring.
				2						
					2					
	4	1								
	14		2			6				
				4						
					10					
	5	7								
	18		10			23				
				13						
10					18					
	6	8								
	20		15			32				
				17						
					20					
	7	8								
	11		9			21				
				12						
					25					
	8	36								
15			00/2							← 15.0'
										Run # / Depth (ft) / Length (ft) / Rec (ft) / Rec % / RQD %
		Run	#1							1: 15.0 to 18.7 — 3.7 — 1.8 — 49 — 0
										2: 18.7 to 25.0 — 6.3 — 5.9 — 94 — 0
		Run	#2							
20								See next sheet.		

#OON SIZE MORIE SAND PACK
.010 SLOT 2 INCH PVC SCREEN
BENTONITE SEAL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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(716) 655-1717 • FAX (716) 655-2915

10B13 HOLE NO. Bore Hole TB-103-13 SURF. ELEVATION 1495.74

PROJECT Arkwright Summit Windfarm - Wind Turbine Project LOCATION N: 886094.5568 E: 972958.9101

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 02/27/13 COMPLETED 02/27/13

DEPTH IN FT | BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Extremely moist gray gravelly (SANDY-SILT) with 15 to 40% gravel, little sand, trace clay, dense with brittle consistence, massive soil structure, (SM). 12.5	BENTONITE SEAL	
	Run	#2					Extremely moist to wet brownish gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel and flat sided shale stone fragments, little sand and clay, very stiff and hard, massive soil structure, (SC). 13.8		← 25.0'
25							Gray apparent weathered shale bedrock, very soft and soft with occasional thin layers of moderately soft rock. 15.0		EDI Bedrock Hardness Classification
							Alternating layers of light gray siltstone bedrock, medium hardness and gray shale bedrock, moderately soft with occasional thin layers of very soft and soft shale rock, core completely broken and fractured 18.7		Very soft: can be easily crushed between fingers into soil material.
30							Gray shale bedrock, moderately soft, highly fractured horizontally along bedding planes with numerous broken and fractured zones, occasional slight gray siltstone interbeds 1/4 inch to 3 inches thick, thinly bedded to banded, dense. 25.0		Soft: can be crushed between fingers into soil material with some effort.
							Coring completed at 25.0 feet.		Moderately soft: can be etched with fingernail.
									Medium hardness: can be easily etched with knife.
35									
40									

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	15.0 to 18.7	3.7	1.8	49	0
2	18.7 to 25.0	6.3	5.9	94	0

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 15.0 feet. Continued below with a NQ-2 size double tube core barrel and diamond bit to 25.0 feet. A 2 inch PVC observation well was installed in completed bore hole.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian R. Bartron, Geologist, (mw)

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)	WATER TABLE AND REMARKS
	1	2						Wet dark brown mucky (CLAYEY-SILT) topsoil with little to some organic matter, little clay, very soft, granular soil structure, (ML-CL) tending towards (OL).		← 0.5'
	22		1			3		0.2		← 2.0'
				2				Extremely moist faintly mottled dark brownish gray (SANDY-SILT) topsoil with 5 to 10% gravel, little organic matter and sand, very loose, granular soil structure, (ML).		(1) TOPSOIL FILL
					4			0.8		(2) CONCRETE
	2	6						Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, little clay, trace to little sand, firm, blocky soil structure, (ML-CL).		
	24		7			15		grades downward to 2.0		Note: WTG-105-15 drilled 39.0 feet south of staked location.
				8				Extremely moist distinctly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, massive soil structure, (SC).		
					11			grades downward to 6.0		Organic rich silty topsoil with little to some organic matter, little clay to 0.2 feet over coarse silty topsoil with little organic matter and sand to 0.8 feet over silty glacial drift with little gravel and clay, trace to little sand to 2.0 feet over silty glacial drift with little to some gravel, little sand and clay to 6.0 feet over clayey slack water sediment to 8.0 feet over clayey glacial till to 23.0 feet over loamy glacial till to 24.0 feet over loamy glacial drift with little to some gravel to 33.0 feet over loamy glacial till to 38.0 feet over clayey glacial till to end of boring.
	3	5						Extremely moist faintly mottled brown (CLAYEY-SILT) with some clay, stiff, thinly laminated, (CL).		
5	24		5			9		8.0		
				4				Extremely moist faintly mottled grayish brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		
					5			clear transition to 10.0		
	4	4						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff and hard, massive soil structure, (CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 45.0 feet.
	18		8			17				
				9						
					13					
	5	7								
	24		16			35				
				19						
10					21					
	6	8								
	24		12			27				
				15						
					17					
	7	8								
	19		12			27				
				15						
					28					
	8	8								
15	12		16			35				
				19						
					18					
	9	2								
	22		8			18				
				10						
20					10					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 1 OF 3

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 872783.07165200000
Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff and hard, massive soil structure, (CL).		
								grades downward to 23.0		
	10	5						Extremely moist highly mottled olive brown gravelly (SILTY-SAND) with 15 to 30% gravel, some silt, dense with brittle consistence, massive soil structure, (SM).		
	24		19			39				
				20						
25					19					
								grades downward to 24.0		
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% gravel, little sand, compact, massive soil structure, (SM).		
	11	1								
	22		5			12				
				7						
30					14					
								grades downward to 33.0		
	12	9						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (SM).		
	20		27			64				
				37						
35					46					
								grades downward to 38.0		
	13	8								
	20		18			34				
				16						
40					100/4			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel and occasional cobble, trace sand, hard, massive soil structure, (CL).	CUTTINGS BACKFILL	
	14	16								
	22		64			130				
				66						
45					84			45.0		No water at completion. ← 45.0'
								Boring completed at 45.0 feet.		
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 3 OF 3

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	2						Wet dark brown mucky (CLAYEY-SILT) topsoil with little to some organic matter, little clay, very soft, granular soil structure, (ML-CL) tending towards (OL).		← 0.5'
	22		1			3		0.2		← 2.0'
				2				Extremely moist faintly mottled dark brownish gray (SANDY-SILT) topsoil with 5 to 10% gravel, little organic matter and sand, very loose, granular soil structure, (ML).		(1) TOPSOIL FILL
					4			0.8		(2) CONCRETE
	2	6						Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 10 to 15% gravel, little clay, trace to little sand, firm, blocky soil structure, (ML-CL).		
	24		7			15		grades downward to 2.0		Note: WTG-105-15 drilled 39.0 feet south of staked location.
				8				Extremely moist distinctly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, stiff, massive soil structure, (SC).		
					11			grades downward to 6.0		Organic rich silty topsoil with little to some organic matter, little clay to 0.2 feet over coarse silty topsoil with little organic matter and sand to 0.8 feet over silty glacial drift with little gravel and clay, trace to little sand to 2.0 feet over silty glacial drift with little to some gravel, little sand and clay to 6.0 feet over clayey slack water sediment to 8.0 feet over clayey glacial till to 23.0 feet over loamy glacial till to 24.0 feet over loamy glacial drift with little to some gravel to 33.0 feet over loamy glacial till to 38.0 feet over clayey glacial till to end of boring.
	3	5						Extremely moist faintly mottled brown (CLAYEY-SILT) with some clay, stiff, thinly laminated, (CL).		
5	24		5			9		8.0		
				4				Extremely moist faintly mottled grayish brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		
					5			clear transition to 10.0		
	4	4						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff and hard, massive soil structure, (CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 45.0 feet.
	18		8			17				
				9						
					13					
	5	7								
	24		16			35				
				19						
10					21					
	6	8								
	24		12			27				
				15						
					17					
	7	8								
	19		12			27				
				15						
					28					
	8	8								
15	12		16			35				
				19						
					18					
	9	2								
	22		8			18				
				10						
20					10					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 1 OF 3

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff and hard, massive soil structure, (CL).		
								grades downward to 23.0		
	10	5						Extremely moist highly mottled olive brown gravelly (SILTY-SAND) with 15 to 30% gravel, some silt, dense with brittle consistence, massive soil structure, (SM).		
	24		19			39				
				20						
25					19					
								grades downward to 24.0		
								Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% gravel, little sand, compact, massive soil structure, (SM).		
	11	1								
	22		5			12				
				7						
30					14					
								grades downward to 33.0		
	12	9						Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (SM).		
	20		27			64				
				37						
35					46					
								grades downward to 38.0		
	13	8								
	20		18			34				
				16						
40					100/4			See next sheet.		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. WTG-105-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautauqua Co., NY Easting: 977401.38813300000

CLIENT Fisher Associates DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel and occasional cobble, trace sand, hard, massive soil structure, (CL).	CUTTINGS/BACKFILL	
	14	16								
	22		64			130				
				66						
45					84			45.0		No water at completion. ← 45.0'
								Boring completed at 45.0 feet.		
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 3 OF 3

EARTH DIMENSIONS, INC.

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-105a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 05/01/15 COMPLETED 05/01/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)(3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5										(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-105a-15 drilled 36.0 feet southwest of staked location.
10										← 10.0'
										← 13.0'
15										← 15.0'
20										

2" SCHEDULE 40 FJT PVC RISER
CUTTINGS BACKFILL
.010 SLOT 2" PVC SCREEN
#00N SIZE MORIE SAND PACK

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-105a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 05/01/15 COMPLETED 05/01/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 2 OF 2

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

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10B13a HOLE NO. WTG-110-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 886460.42466300000

Town of Arkwright, Chautauqua Co., NY Easting: 966621.71670300000

CLIENT Eisher Associates DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N
	1	1				
	15		2			6
				4		
					5	
	2	17				
	20		20			28
				8		
					10	
	3	7				
5	24		9			22
				13		
					16	
	4	15				
	24		23			48
				25		
					24	
	5	3				
	24		6			14
				8		
10					10	
	6	10				
	24		17			37
				20		
					29	
	7	12				
	24		17			40
				23		
					83	
	8	58				
15	10		100/4			
		Run	#1			
20						

DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
Extremely moist dark brown (CLAYEY-SILT) with little organic matter and clay, very soft, granular soil structure, (ML-CL). 0.5		(1) 4" LOCKING STEEL PROTECTIVE CASING
Extremely moist distinctly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 20% gravel, little sand and clay, stiff, blocky soil structure, (SC). 2.1		(2) CONCRETE ← 1.5'
Extremely moist distinctly mottled brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (CL).		Silty topsoil with little organic matter and clay to 0.5 feet over silty glacial drift with little gravel, sand and clay to 2.1 feet over clayey glacial till to 15.0 feet over shale bedrock to end of coring.
grades downward to 7.5		Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 15.0 feet. Cored below with an NQ-2 size double tube core barrel and diamond bit to 25.0 feet. Installed a 2 inch PVC observation well in completed bore hole.
Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, hard below 10.0 feet, massive soil structure, (CL).	2" SCHEDULE 40 PVC RISER	← 10.0'
	CUTTINGS BACKFILL	(3) BENTONITE CHIPS
		← 13.0'
	#0 SIZE MORIE SAND PACK	← 15.0'
grades downward to 15.0		Augers left in bore hole over night at 15.0 feet, no water in bore hole the next morning.
Olive gray shale bedrock, very soft, can be easily crushed between fingers into soil material. 15.3	.010 SLOT 2" PVC SCREEN	
Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife.		

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	15.0 to 20.0	5.0	2.7	54	0

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. WTG-110-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 886460.42466300000

Town of Arkwright, Chautauqua Co., NY Easting: 966621.71670300000

CLIENT Fisher Associates DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH IN FT / BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife.	.010 SLOT 2" PVC SCREEN; .00N SIZE MORIE SAND PACK.	Run # / Depth (ft) / Length (ft) / Rec (ft) / Rec % / RQD % 2 / 20.0 to 25.0 / 5.0 / 5.0 / 100 / 0
	Run	#2					grades downward to 23.0		
							Olive gray shale bedrock, medium hardness with siltstone interbeds 1/8 to 1/4 inch thick that are moderately hard, medium hard rock can be easily etched with knife, moderately hard rock can be etched with knife with some effort.		← 25.0'
							25.0 Coring completed at 25.0 feet.		

25 30 35 40

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-110-15 SURF. ELEVATION _

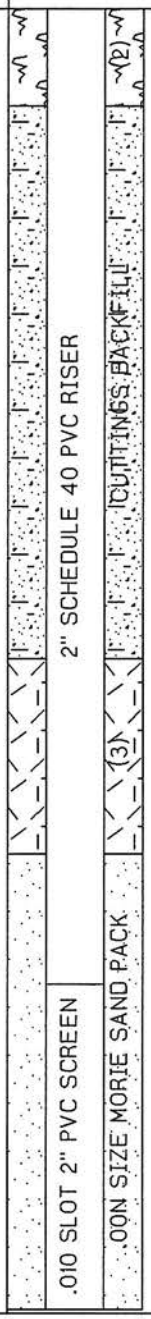
PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 886460.42466300000

Town of Arkwright, Chautauqua Co., NY Easting: 966621.71670300000

CLIENT Fisher Associates DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N
	1	1				
	15		2			6
				4		
					5	
	2	17				
	20		20			28
				8		
					10	
	3	7				
5	24		9			22
				13		
					16	
	4	15				
	24		23			48
				25		
					24	
	5	3				
	24		6			14
				8		
10					10	
	6	10				
	24		17			37
				20		
					29	
	7	12				
	24		17			40
				23		
					83	
	8	58				
15	10		00/4			
		Run	#1			
20						

LITH	DESCRIPTION AND CLASSIFICATION
	Extremely moist dark brown (CLAYEY-SILT) with little organic matter and clay, very soft, granular soil structure, (ML-CL).
	0.5
	Extremely moist distinctly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 20% gravel, little sand and clay, stiff, blocky soil structure, (SC).
	2.1
	Extremely moist distinctly mottled brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (CL).
	grades downward to 7.5
	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, hard below 10.0 feet, massive soil structure, (CL).
	grades downward to 15.0
	Olive gray shale bedrock, very soft, can be easily crushed between fingers into soil material.
	15.3
	Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife.



WELL

WATER TABLE AND REMARKS

(1) 4" LOCKING STEEL PROTECTIVE CASING

(2) CONCRETE

← 1.5'

Silty topsoil with little organic matter and clay to 0.5 feet over silty glacial drift with little gravel, sand and clay to 2.1 feet over clayey glacial till to 15.0 feet over shale bedrock to end of coring.

Note: Advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 15.0 feet. Cored below with an NQ-2 size double tube core barrel and diamond bit to 25.0 feet. Installed a 2 inch PVC observation well in completed bore hole.

← 10.0'

(3) BENTONITE CHIPS

← 13.0'

← 15.0'

Augers left in bore hole over night at 15.0 feet, no water in bore hole the next morning.

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	15.0 to 20.0	5.0	2.7	54	0

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-110-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 886460.42466300000
Town of Arkwright, Chautauqua Co., NY Easting: 966621.71670300000

CLIENT Fisher Associates DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH IN FT | BLOWS ON SAMPLER

SN / REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife.	.010 SLOT 2" PVC SCREEN .00N SIZE MORIE SAND PACK.	Run # / Depth (ft) / Length (ft) / Rec (ft) / Rec % / RQD %
							grades downward to 23.0		2 / 20.0 to 25.0 / 5.0 / 5.0 / 100 / 0
	Run	#2					Olive gray shale bedrock, medium hardness with siltstone interbeds 1/8 to 1/4 inch thick that are moderately hard, medium hard rock can be easily etched with knife, moderately hard rock can be etched with knife with some effort.		← 25.0'
25							25.0		
							Coring completed at 25.0 feet.		
30									
35									
40									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens, CPSS; Kyle Shearing, Geologist, (mw) SHEET 2 OF 2

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10B13a HOLE NO. WTG-111-15 SURF. ELEVATION —

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 885657.40870900000

Town of Arkwright, Chautauqua Co., NY Easting: 968694.39090200000

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1)(2)	WATER TABLE AND REMARKS
	1	1						Extremely moist black (MUCK), granular soil structure, (OL).		← 0.3'
	17		2			4		0.3		← 1.5'
				2				Extremely moist brown (SAND-SILT-CLAY) with 10 to 15% gravel, little sand and clay, soft, blocky soil structure, (ML-CL).		(1) TOPSOIL FILL
					2					(2) CONCRETE
	2	5						grades downward to 2.0		
	23		18			34		Extremely moist faintly mottled olive brown (SANDY-SILT) with 10 to 15% gravel, little sand, trace clay, dense with brittle consistence, compact below 4.0 feet, massive soil structure, (ML).		Note: WTG-111-15 drilled 4.0 feet north of staked location.
				16						
					18					
	3	8								
5	24		10			23				
				13						
					16					
	4	9								
	20		18			28				
				10						
					10			grades downward to 8.0		
	5	4						Extremely moist distinctly mottled olive brown (SAND-SILT-CLAY) with 10 to 15% gravel, little sand and clay, stiff, massive soil structure, (ML-CL).		
	24		4			10				
				6						
10					12					
	6	9						grades downward to 10.0		
	24		7			16		Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).		
				9						
					10					
	7	6								
	6		11			23				
				12						
					12			grades downward to 14.0		
	8	6						Extremely moist distinctly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, loose, compact below 18.0 feet, weakly thinly bedded with occasional medium to coarse size sand interbed 1/8 to 1/4" thick, (ML) with (SW) interbeds.		
15	22		7			13				
				6						
					5					
	9	5								
	23		6			14				
				8						
20					10					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-111-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885657.40870900000

Town of Arkwright, Chautauqua Co., NY Easting: 968694.39090200000

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist distinctly mottled olive brown (SANDY-SILT) with 5 to 10% gravel, little sand, compact, weakly thinly bedded with occasional medium to coarse size sand interbed 1/8 to 1/4" thick, (ML) with (SW) interbeds.		Augers left in bore hole over night at 33.0 feet, water level the next morning was 22.1 feet below ground surface.
	10	3								
	22		8			14				Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
				6						
25					7					
								grades downward to 28.0		
	11	3						Extremely moist to wet olive gray (SANDY-SILT) with 10 to 15% gravel, little sand, trace clay, compact, weakly thinly bedded, (ML).		
	18		7			14				
				7						
30					9					
								grades downward to 33.0		
	12	4						Extremely moist olive gray (SAND-SILT-CLAY) with 5 to 10% gravel, little sand and clay, weakly thinly laminated, (ML-CL).		
	17		8			15				
				7						
35					7					
								grades downward to 38.0		
	13	3						Extremely moist olive gray (SANDY-SILT) with 5 to 10% gravel, little sand, trace clay, compact, massive soil structure, (ML).		
	10		11			24				
				13						
40					15					

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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10B13a HOLE NO. WTG-111-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885657.40870900000

Town of Arkwright, Chautauqua Co., NY Easting: 968694.39090200000

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray (SANDY-SILT) with 5 to 10% gravel, little sand, trace clay, compact, massive soil structure, (ML).		
								grades downward to 43.0		
	14	2						Wet olive gray (SANDY-SILT) with little very fine size sand, very loose, liquefies when disturbed, thinly bedded, (ML).		WH: Sampler penetration with weight of rods and hammer.
	24		WH			<7				
				6						
45					24					
								grades downward to 48.0		
	15	8						Wet olive gray (SANDY-SILT) with 5 to 10% gravel, little very fine size sand, compact, weakly thinly bedded, (ML).		
	20		15			27				
				12						
50					11					
								grades downward to 53.0		
	16	8						Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).		
	12		12			38				
				26						
55					25					
								58.5		
	17	5								
	20		12			32				
				20						
60					18			See next sheet.		← 60.0'

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-111-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm – Wind Turbine Project LOCATION Northing: 885657.40870900000

Town of Arkwright, Chautauqua Co., NY Easting: 968694.39090200000

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL WATER TABLE AND REMARKS
								Wet olive gray (SAND) with 5 to 10% fine size gravel, fine to very coarse size sand, compact, stratified, (SW). 59.0	
								Extremely moist olive gray (SANDY-SILT) with little to some very fine size sand, dense, thinly bedded, (ML). 60.0	
								Boring completed at 60.0 feet.	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

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(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-111a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	BLOWS ON SAMPLER SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5										(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-111a-15 drilled 1.0 feet east of staked location.
10										← 10.0'
										← 13.0'
15										← 15.0'
20										

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-111a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-112-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881759.34404100000

Town of Arkwright, Chautauqua Co., NY Easting: 969421.78989600000

CLIENT Fisher Associates DATE STARTED 04/15/15 COMPLETED 04/16/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2)	WATER TABLE AND REMARKS
	1	1						Extremely moist black (MUCK), granular soil structure, (OL).		← 0.5'
	22		4			9		0.2		
				5				Extremely moist faintly mottled brown (SAND-SILT-CLAY) with 3 to 5% gravel, little sand and clay, stiff, blocky soil structure, (ML-CL).		← 2.0'
					7			clear transition to 0.8		Augers left in bore hole over night at 40.0 feet, water level the next morning was 4.5 feet below ground surface.
	2	5						Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 20% gravel, some clay, trace to little sand, stiff, very stiff below 6.0 feet with nearly vertical gray desiccation cracks, (CL).		(1) TOPSOIL FILL
	17		6			12				(2) CONCRETE
				6						Organic rich mucky surface to 0.2 feet over silty glacial drift with trace gravel, little sand and clay to 0.8 feet over clayey drift with little gravel, trace to little sand to 9.0 feet over water sorted and deposited sand with little to some gravel, little silt to 9.4 feet over clayey glacial till to 43.0 feet over shale rock to refusal.
					5					
	3	2								
5	24		5			14				
				9						
					9					
	4	6								
	24		10			27				
				17						
					26					
	5	11								
	24		14			29		9.0		
				15				Extremely moist faintly mottled olive brownish gray gravelly (SILTY-SAND) with 15 to 30% mostly subrounded gravel, very fine to very coarse size sand, little silt, compact, stratified, (SM).		
10					24					
	6	19								
	22		82			97				
				15						
					20					
	7	14								
	6		19			35				
				16						
					20					
	8	9								
15	16		13			57				
				44						
					17					
	9	9								
	18		12			25				
				13						
20					14					
								Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		
								clear transition to 10.5		
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		
								grades downward to 18.0		
								Extremely moist to wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		

CUTTINGS BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-112-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881759.34404100000

Town of Arkwright, Chautauqua Co., NY Easting: 969421.78989600000

CLIENT Fisher Associates DATE STARTED 04/15/15 COMPLETED 04/16/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist to wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, trace sand, very stiff, hard below 38.0 feet, massive soil structure, (CL).	CUTTINGS, BACKFILL	
	10	13								
	6		14			30				
				16						
25					18					
	11	6								
	19		12			29				
				17						
30					18					
	12	5								
	23		12			24				
				12						
35					25					
	13	15								
	22		27			56				
				29						
40					57					

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-112-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 881759.34404100000
Town of Arkwright, Chautauqua Co., NY Easting: 969421.78989600000

CLIENT Fisher Associates DATE STARTED 04/15/15 COMPLETED 04/16/15

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist to wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, trace sand, very stiff, massive soil structure, (CL).	CUTTINGS BACKFILL	EDI Rock Hardness Classification
								clear transition to 43.0		Medium hardness: can be easily etched with knife.
	14 1/4	100/1						Olive gray shale rock, medium hardness.		← 43.7'
								43.7		
45								Auger refusal at 43.7 feet.		
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Don Owens,CPSS.; Kyle Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-112a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/16/15 COMPLETED 04/16/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL (1) (2) (3)	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5'
5									2" SCHEDULE 40 FJT PVC RISER; CUTTINGS BACKFILL	(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-112a-15 drilled 11.0 feet northeast of staked location.
10										← 10.0'
										← 13.0'
15									.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 15.0'
20										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-112a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/16/15 COMPLETED 04/16/15

DEPTH IN FT | BLOWS ON SAMPLER | SN | 0/6 | 6/12 | 12/18 | 18/24 | N | LITH | DESCRIPTION AND CLASSIFICATION | WELL | WATER TABLE AND REMARKS

Advanced bore hole without split spoon sampling to 25.5 feet.

25.5

Boring completed at 25.5 feet.

WELL: .010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK

← 25.0'
← 25.5'

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; KA Shearing,Geologist, (mw)

NATURE'S WAY
ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC
3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

HOLE NUMBER: WTG 114

DATE: 3/19/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 871787.8350, Easting: 975178.0770

SN	0/6	6/12	12/18	18/24	N	DESCRIPTION AND CLASSIFICATION	REC
1	2					Wet, dark gray, mucky (SILT) topsoil with trace very fine size sand, very loose, with partially decomposed organic material (0.4)	1.0'
		1			2		
			1				
				7			1.4'
2	5					Extremely moist, faintly mottled, olive brown (SILT) with trace very fine size sand, very loose. weakly thinly bedded (1.5)	
		8			16		
			8				
				8			1.0'
3	7					Moist, faintly mottled, olive brown (CLAYEY-SILT) with 5 to 15% gravel, little clay, very stiff, massive soil structure to weakly thinly bedded (6.0)	
		9			19		
			10				
				9			0.9'
4	27					Moist, gray, gravelly (CLAYEY-SILT) with 15 to 30% gravel with occasional cobbles, some clay, hard, massive soil structure	
		50			88		
			38				
				42			0.4'
5	5						
		7			34		
			27				
				31			0.3'
6	4						
		47			>97		
			50/3"				
							0.6'
7	4						
		8			31		
			23				
				26			1.1'
8	8						
		11			23		
			12				
				19			
9	24						0.2'
		27					

MONITORING WELL: 2" PVC Riser Pipe; Soil Backfill; 10.0 Bentonite Seal; 13.0 # 2 Size Sand; 16.0 2" Slotted PVC Screen

REMARKS:

COMMENTS: Topsoil to 0.4 foot over silty slack water sediment with trace sand to 1.5 feet over silty glacial drift with trace gravel to 6.0 feet over clayey glacial till to end of boring

LOGGED BY: Dale M. Gramza / Senior Geologist

3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.naturesswayenvironmental.com

NATURE'S WAY ENVIRONMENTAL CONSULTANTS & CONTRACTORS, INC

HOLE NUMBER: WTG 114

DATE: 3/19/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm
Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Northing: 871787.8350, Easting: 975178.0770

Depth	SN	0/6	6/12	12/18	18/24	N	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
20				24	31	51				2" Slotted PVC Screen	
24–26	10	6	23	26	50/5"	49	Moist, gray, gravelly (CLAYEY-SILT) with 15 to 30% gravel with occasional cobbles, some clay, hard, massive soil structure	1.3'	26.0	# 2 Size Sand	
29–31	11	10	17	26	32	43		1.3'			
34–35.2	12	10	20	50/3"		>70		1.3'			
35.2							Boring Completed at 35.2' BGS				No Water at Completion

LOGGED BY: Dale M. Gramza / Senior Geologist PAGE 2 of 2

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10B13a HOLE NO. WTG-115-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880540.95916700000

Town of Arkwright, Chautauqua Co., NY Easting: 969756.07839200000

CLIENT Fisher Associates DATE STARTED 04/03/15 COMPLETED 04/06/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	1	4						Wet black (MUCK), (OL). 0.1	(1) (2) CUTTINGS BACKFILL	← 0.5'
	17		4			13		Extremely moist faintly mottled olive brown (CLAYEY-SILT) with little clay, trace organic matter, firm, weakly thinly laminated, (ML-CL).		← 2.0'
				9				grades downward to 1.0		(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD
					9			Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, some clay, very stiff with nearly vertical gray desiccation cracks, (CL).		(2) CONCRETE
	2	9						grades downward to 2.0		Note: WTG-115-15 drilled 10.0 feet northeast of staked location.
	22		6			14		Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff and hard below 4.0 feet with nearly vertical gray desiccation cracks, (CL).		Organic muck to 0.1 feet over silty glacial drift with little clay, trace organic matter to 1.0 feet over clayey glacial drift with trace gravel to 2.0 feet over clayey glacial till to 13.5 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 15.0 feet over silty glacial drift with little to some gravel, trace sand to 18.0 feet over water sorted and deposited sand with little silt and clay and silt intra strata to 23.0 feet over clayey glacial till to refusal.
				8				clear transition to 9.5		
					10			Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, very stiff, massive soil structure, (CL).		
	3	7						grades downward to 13.5		Augers left in bore hole over weekend at 40.0 feet, water level at 13.3 feet below ground surface Monday morning. Also noticed surface water running down bore hole.
5	18		8			20		Extremely moist olive gray gravelly (SILTY-SAND) with 15 to 40% gravel, very fine to very coarse size sand, little silt, trace clay, compact, stratified, (SM).		
				12				grades downward to 15.0		
					00/4			Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 41.5 feet.
	4	9						grades downward to 18.0		
	24		13			24				
				16						
					20					
	5	8								
	24		15			33				
				18						
10					22					
	6	6								
	22		10			20				
				10						
					12					
	7	6								
	18		7			17				
				10						
					12					
	8	7								
15	16		7			16				
				9						
					14					
	9	2								
	16		3			8				
				5						
20					10			See next sheet.		

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 1 OF 3

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10B13a HOLE NO. WTG-115-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880540.95916700000
Town of Arkwright, Chautauqua Co., NY Easting: 969756.07839200000

CLIENT Fisher Associates DATE STARTED 04/03/15 COMPLETED 04/06/15

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Wet faintly mottled grayish olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little silt and clay, stiff, weakly stratified with silt intra strata, (SC) with (ML) intra strata.		
								grades downward to 23.0		
	10	3						Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, hard below 28.0 feet, massive soil structure, (CL).		
	12		4			9				
				5						
25					9					
	11	12								
	22		22			51				
				29						
30					37					
	12	29								
	24		48			108				
				60						
35					71					
	13	19								
	24		40			84				
				44						
40					53					

WELL: CUTTINGS, BACKFILL

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw)

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10B13a HOLE NO. WTG-115-15 SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 880540.95916700000

Town of Arkwright, Chautauqua Co., NY Easting: 969756.07839200000

CLIENT Fisher Associates DATE STARTED 04/03/15 COMPLETED 04/06/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		(1) CUTTINGS BACKFILL
								41.5		← 41.5'
								Auger refusal at 41.5 feet.		Note: noticed harder drilling below 41.0 feet.
45										
50										
55										
60										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY DW Owens,Cert.Prof.SS; KA Shearing,Geologist, (mw) SHEET 3 OF 3

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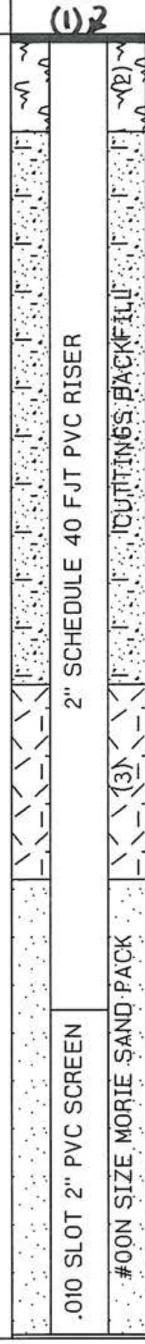
10B13a HOLE NO. WTG-115a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/06/15 COMPLETED 04/06/15

DEPTH IN FT / BLOWS ON SAMPLER

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.		← 1.5' (1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL Note: WTG-115a-15 drilled 11.0 feet northeast of staked location. ← 10.0' ← 13.0' ← 15.0'

Depth scale: 5, 10, 15, 20

N=NUMBER OF BLOWS TO DRIVE N/A SPOON N/A" WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; KA Shearing, Geologist, (mw)

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10B13a HOLE NO. WTG-115a-15 (Well) SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION _
Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates DATE STARTED 04/06/15 COMPLETED 04/06/15

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN; #00N SIZE MORIE SAND PACK	← 25.0'
25								25.5		← 25.5'
								Boring completed at 25.5 feet.		
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE N/A " SPOON N/A " WITH N/A lb. WT. FALLING N/A " PER BLOW

LOGGED BY Don Owens, CPSS; KA Shearing,Geologist, (mw)

APPENDIX B

Laboratory Test Results
As prepared by Glynn Group

GGE

a member of the GLYNN GROUP

Civil • Structural • Geotechnical • Materials Testing • Consulting

June 23, 2015

Nature's Way Environmental Consultants and Contractors, Inc.
3553 Crittenden Road
Alden, New York 14004

Attn: Mr. Dale Gramza

Subject: **Arkwright Wind Turbines**
Laboratory Testing
GGE 15-1090

Dear Mr. Gramza:

Enclosed you will find moisture content (ASTM D-2216), grain size/hydrometer analysis (ASTM D-422) and plasticity index (ASTM D-4318) test results for samples delivered to the GGE office from the Arkwright project. Select tests were performed on individual samples in accordance with direction from Nature's Way, Fisher Associates and Kinney Geotechnical. Please contact GGE if you should have any questions regarding the test results.

Sincerely,

G. Edward Lover
Senior Geologist

/gel

encl. Test Results 15-01 through 15-86

GLYNN GEOTECHNICAL ENGINEERING

415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com

Arkwright
Nature's Way Environmental Consultants Contractors, Inc.
15-1090
Natural Moisture Content ASTM D-2216

June 16, 2015

Natural Moisture Content ASTM D-2216

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GGE Lab No		Boring No.	Sample No.	Moisture (%)
15	1	WTG-115	S-4	**12.3**
15	2	WTG-115	S-7	**8.7**
15	3	WTG-115	S-9	**8.4**
15	4	WTG-115	S-10	**9.8**
15	5	WTG-111	S-3	**12.1**
15	6	WTG-111	S-4	**15.0**
15	7	WTG-111	S-5	**15.4**
15	8	WTG-111	S-14	**16.4**
15	9	WTG-69	S-3	**14.8**
15	10	WTG-69	S-5	**14.8**
15	11	WTG-57	S-3	No Sample
15	12	WTG-51	S-3	**18.5**
15	13	WTG-51	S-4	**18.5**
15	14	WTG-51	S-11	**9.4**
15	15	WTG-101	S-4	**11.8**
15	16	WTG-101	S-6	**7.6**
15	17	WTG-52	S-4	**13.0**
15	18	WTG-52	S-10	**12.9**
15	19	WTG-50	S-3	**17.7**
15	20	WTG-50	S-5	**10.8**
15	21	WTG-50	S-9	**7.8**
15	22	WTG-50	S-10	**11.0**
15	23	WTG-47	S-3	**13.0**
15	24	WTG-47	S-4	**11.0**
15	25	WTG-47	S-5	**12.1**
15	26	WTG-47	S-8	**11.4**

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15-1090
Natural Moisture Content ASTM D-2216

June 16, 2015

GGE Lab No		Boring No.	Sample No.	Moisture (%)
15	27	174	S-2	**13.0**
15	28	174	S-3	**14.0**
15	29	174	S-4	**12.7**
15	30	TL 485	S-3	**18.4**
15	31	TL 485	S-4	**17.1**
15	32	TL 485	S-5	**15.2**
15	33	TL 487	S-2	**11.5**
15	34	TL 487	S-3	**14.4**
15	35	TL 487	S-4	**10.1**
15	36	TL 490	S-7	**12.6**
15	37	TL 490	S-8	**20.9**
15	38	TL 490	S-9	**15.6**
15	39	TL 491	S-6	**10.1**
15	40	TL 491	S-7	**5.8**
15	41	TL 491	S-8	**10.1**
15	42	TL 493	S-2	**27.0**
15	43	TL 493	S-3	**13.6**
15	44	TL 493	S-4	**10.7**
15	45	TL 494	S-4	**24.5**
15	46	TL 494	S-5	**9.5**
15	47	TL 494	S-6	**18.6**
15	48	TL-495	S-1	**26.1**
15	49	TL-495	S-2	**19.0**
15	50	TL-495	S-3	**23.3**
15	51	TL 496	S-3	**9.8**
15	52	TL 496	S-4	**12.3**
15	53	TL 496	S-5	**11.1**
15	54	TL 497	S-3	**17.1**

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15-1090
Natural Moisture Content ASTM D-2216

June 16, 2015

GGE Lab No		Boring No.	Sample No.	Moisture (%)
15	55	TL 497	S-4	**26.9**
15	56	TL 497	S-5	**23.4**
15	57	TL 498	S-4	**15.0**
15	58	TL 498	S-5	**22.2**
15	59	TL 498	S-6	**28.6**
15	60	TL 499	S-3	**24.8**
15	61	TL 499	S-4	**25.4**
15	62	TL 499	S-5	**20.7**
15	63	TL 500	S-3	**14.3**
15	64	TL 500	S-4	**19.1**
15	65	TL 500	S-5	**12.4**
15	66	TL 502	S-6	**16.9**
15	67	TL 502	S-7	**14.7**
15	68	TL 502	S-8	**13.9**
15	69	TL 503	S-2	**12.2**
15	70	TL 503	S-3	**13.0**
15	71	TL 503	S-4	**12.8**
15	72	TL 505	S-2	**42.3**
15	73	TL 505	S-3	**10.4**
15	74	TL 505	S-4	**14.5**
15	75	TL 509	S-4	**17.0**
15	76	TL 509	S-5	**18.3**
15	77	TL 509	S-6	**16.8**
15	78	TL 511	S-2	**9.3**
15	79	TL 511	S-3	**19.9**
15	80	TL 511	S-4	**24.1**
15	81	TL 517	S-2	**19.7**
15	82	TL 517	S-3	**11.9**

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15-1090
Natural Moisture Content ASTM D-2216

June 16, 2015

GGE Lab No		Boring No.	Sample No.	Moisture (%)
15	83	TL 517	S-4	**10.9**
15	84	TL 520	S-4	**11.2**
15	85	TL 520	S-5	**10.0**
15	86	TL 520	S-6	**11.9**

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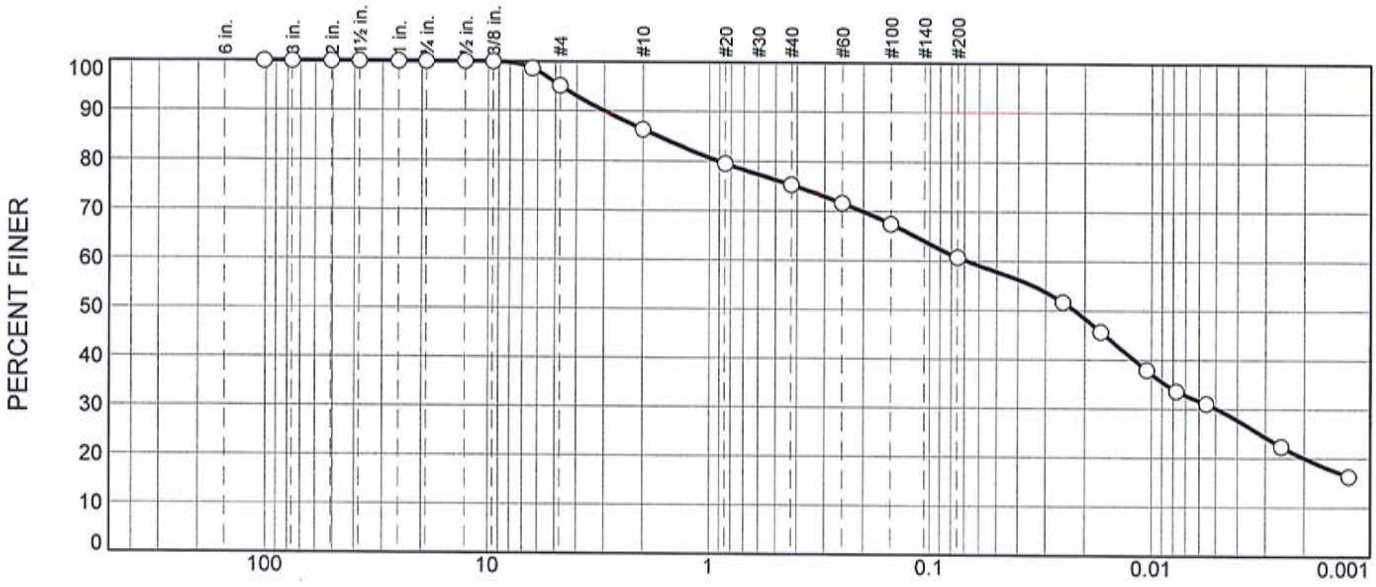
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S4)
Sample Number: 15-01 **Depth:** 6 - 8 ft **Date:** 06.09.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.8	8.8	11.1	14.6	30.6	30.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	98.6		
#4	95.2		
#10	86.4		
#20	79.5		
#40	75.3		
#60	71.6		
#100	67.4		
#200	60.7		

* (no specification provided)

Material Description

sandy silty clay

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D_{85}= 1.7095 D_{60}= 0.0682 D_{50}= 0.0222
D_{30}= 0.0050 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

Figure

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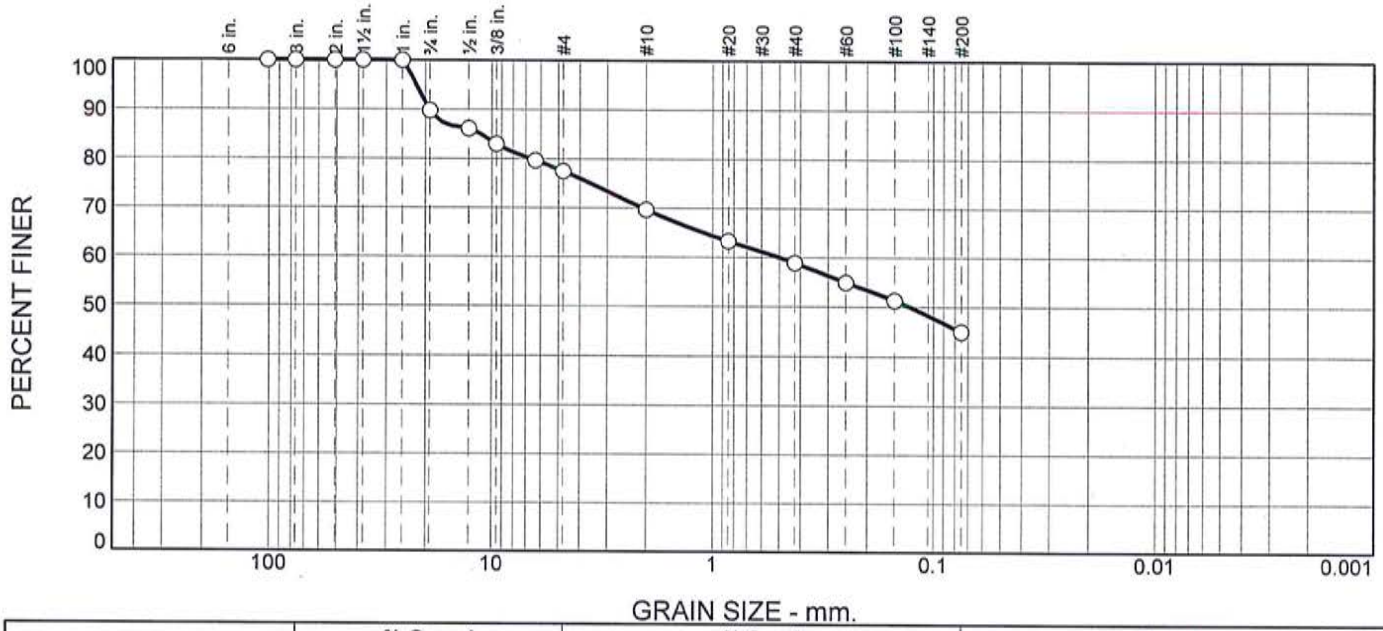
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S7)
Sample Number: 15-02 **Depth:** 12 - 14 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.1	12.4	7.8	10.8	13.9	45.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	89.9		
1/2"	86.1		
3/8"	83.0		
1/4"	79.7		
#4	77.5		
#10	69.7		
#20	63.3		
#40	58.9		
#60	55.0		
#100	51.4		
#200	45.0		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 11.2324 D_{60}= 0.5000 D_{50}= 0.1274
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Figure

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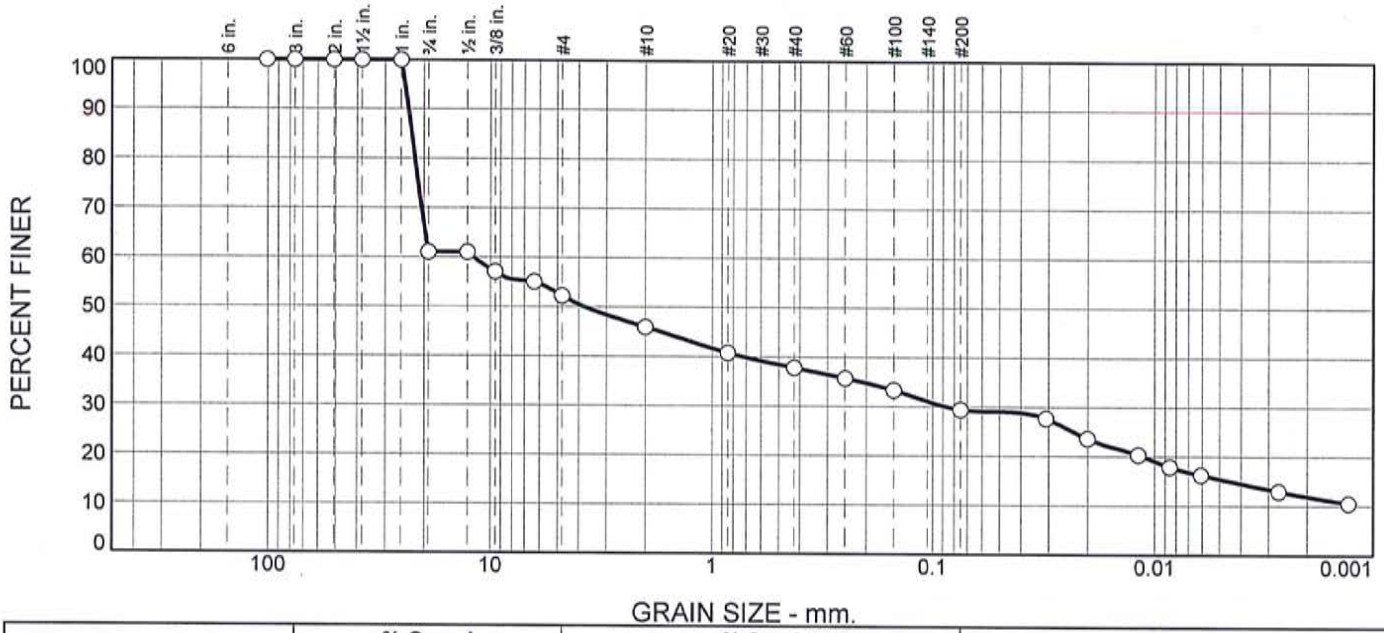
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S9)
Sample Number: 15-03 **Depth:** 18 - 20 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	39.0	8.8	6.2	8.2	8.4	14.0	15.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	61.0		
1/2"	61.0		
3/8"	57.1		
1/4"	55.0		
#4	52.2		
#10	46.0		
#20	40.8		
#40	37.8		
#60	35.7		
#100	33.3		
#200	29.4		

* (no specification provided)

Material Description

silty clayey gravel with sand

Atterberg Limits

PL= 14 LL= 20 PI= 6

Coefficients

D_{85}= 22.6562 D_{60}= 11.9209 D_{50}= 3.7592
D_{30}= 0.0873 D_{15}= 0.0045 D_{10}=
C_u= C_c=

Classification

USCS= GC-GM AASHTO= A-2-4(0)

Remarks

Figure

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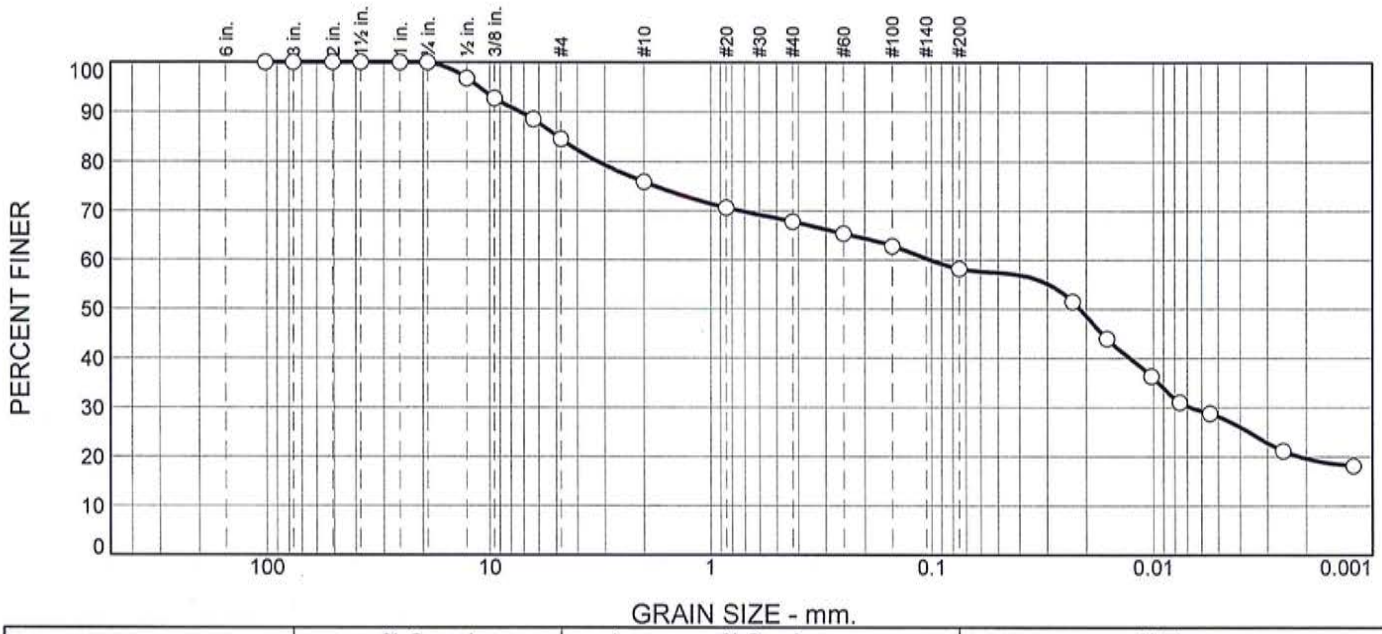
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S10)
Sample Number: 15-04 **Depth:** 23 - 25 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.4	8.7	8.1	9.6	30.1	28.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	96.8		
3/8"	92.8		
1/4"	88.6		
#4	84.6		
#10	75.9		
#20	70.7		
#40	67.8		
#60	65.4		
#100	62.9		
#200	58.2		

* (no specification provided)

Material Description

sandy lean clay with gravel

Atterberg Limits

PL= 14 LL= 22 PI= 8

Coefficients

D_{85}= 4.9009 D_{60}= 0.1012 D_{50}= 0.0214
D_{30}= 0.0068 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Figure

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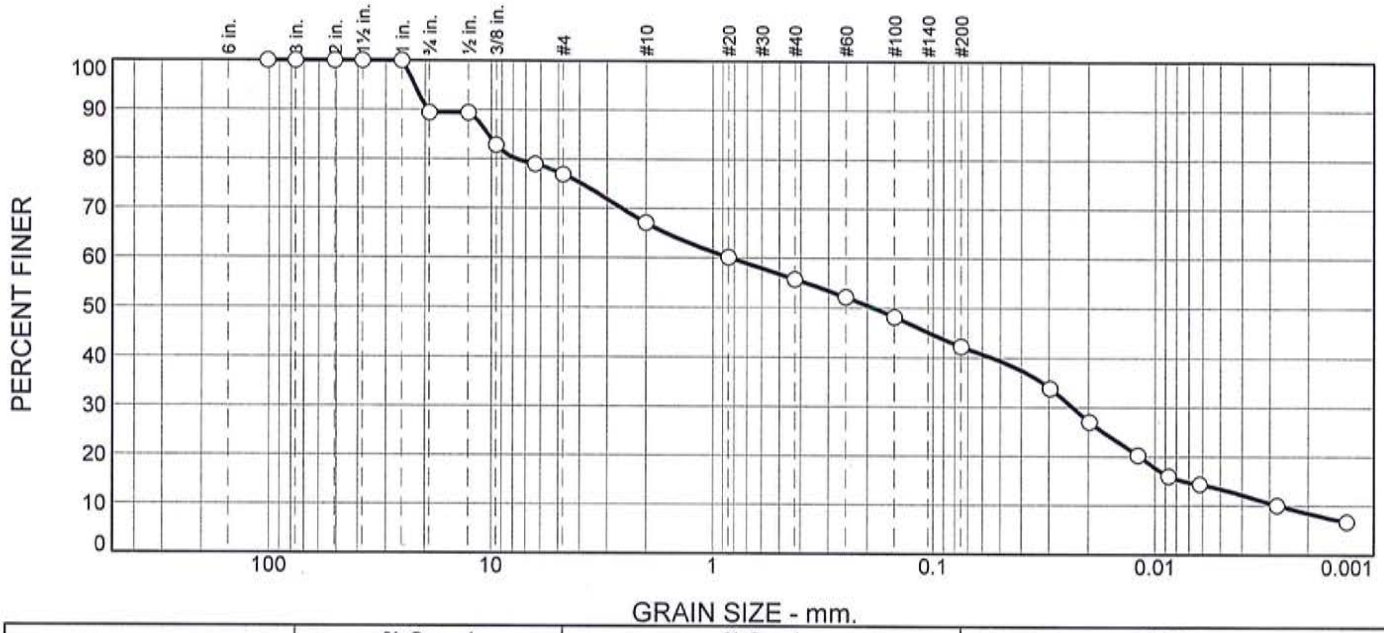
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S3)
Sample Number: 15-05 **Depth:** 4 - 6 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	12.6	9.8	11.3	13.5	28.9	13.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	89.5		
1/2"	89.5		
3/8"	82.9		
1/4"	79.0		
#4	76.9		
#10	67.1		
#20	60.1		
#40	55.8		
#60	52.2		
#100	48.2		
#200	42.3		

* (no specification provided)

Material Description

silty, clayey sand with gravel

Atterberg Limits

PL= 16 LL= 21 PI= 5

Coefficients

D_{85}= 10.3469 D_{60}= 0.8313 D_{50}= 0.1875
D_{30}= 0.0236 D_{15}= 0.0075 D_{10}= 0.0027
C_u= 305.41 C_c= 0.25

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Figure

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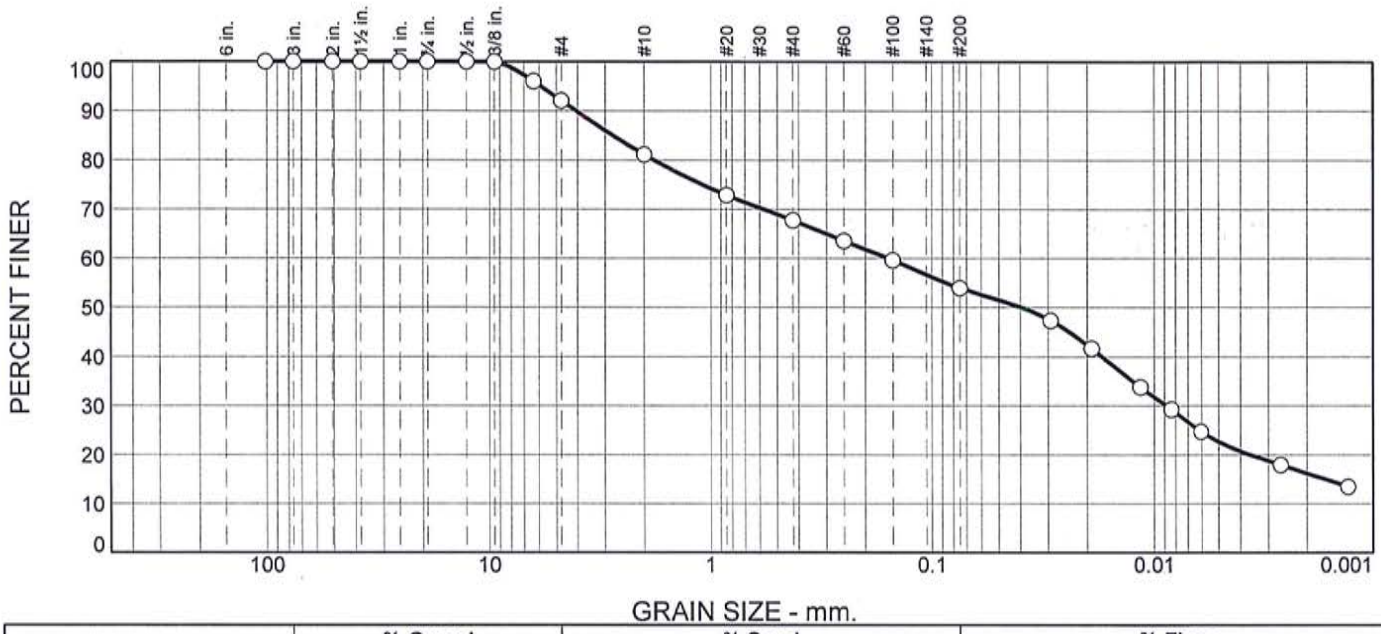
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S5)
Sample Number: 15-07 **Depth:** 8 - 10 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.9	11.0	13.3	13.8	31.4	22.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	96.1		
#4	92.1		
#10	81.1		
#20	72.9		
#40	67.8		
#60	63.5		
#100	59.6		
#200	54.0		

* (no specification provided)

Material Description

sandy silty clay

Atterberg Limits

PL= 16 LL= 22 PI= 6

Coefficients

D_{85}= 2.7631 D_{60}= 0.1574 D_{50}= 0.0395
D_{30}= 0.0088 D_{15}= 0.0017 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Figure

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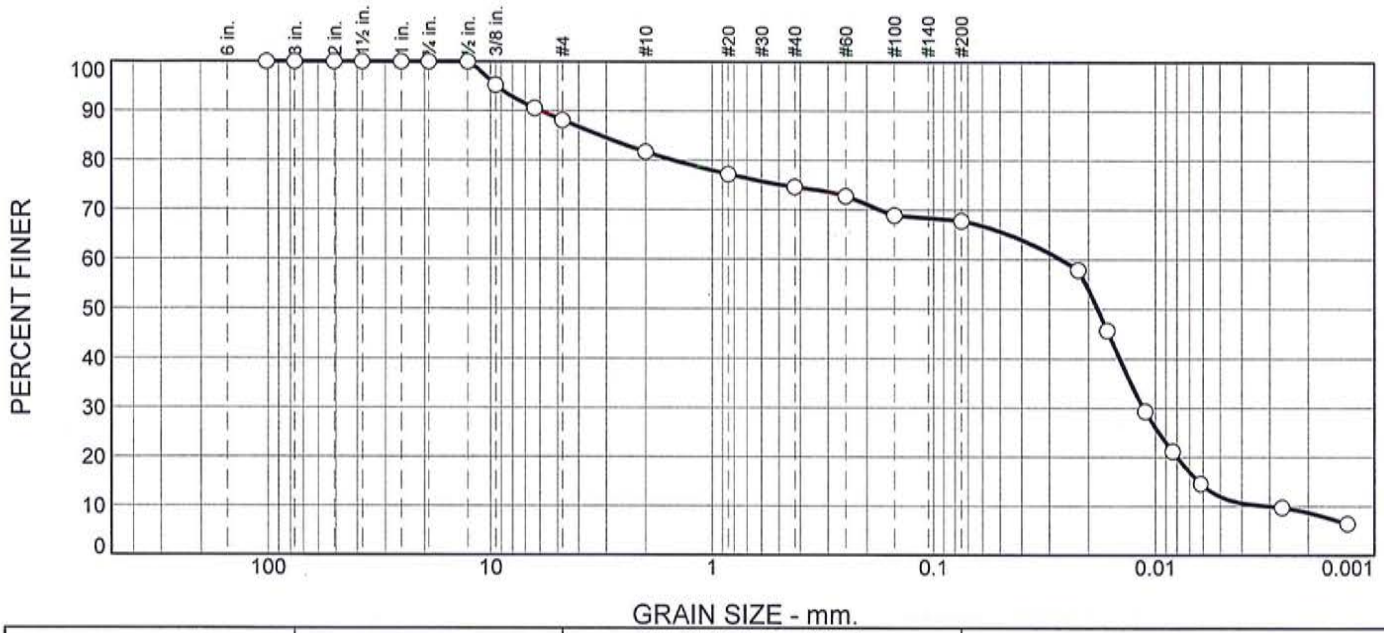
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S14)
Sample Number: 15-08 **Depth:** 43 - 45 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.9	6.4	7.1	6.8	55.8	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	95.3		
1/4"	90.6		
#4	88.1		
#10	81.7		
#20	77.2		
#40	74.6		
#60	72.7		
#100	68.8		
#200	67.8		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= 21 LL= 22 PI= 1

Coefficients

D_{85}= 3.2029 D_{60}= 0.0266 D_{50}= 0.0182
D_{30}= 0.0113 D_{15}= 0.0063 D_{10}= 0.0030
C_u= 8.79 C_c= 1.60

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Figure

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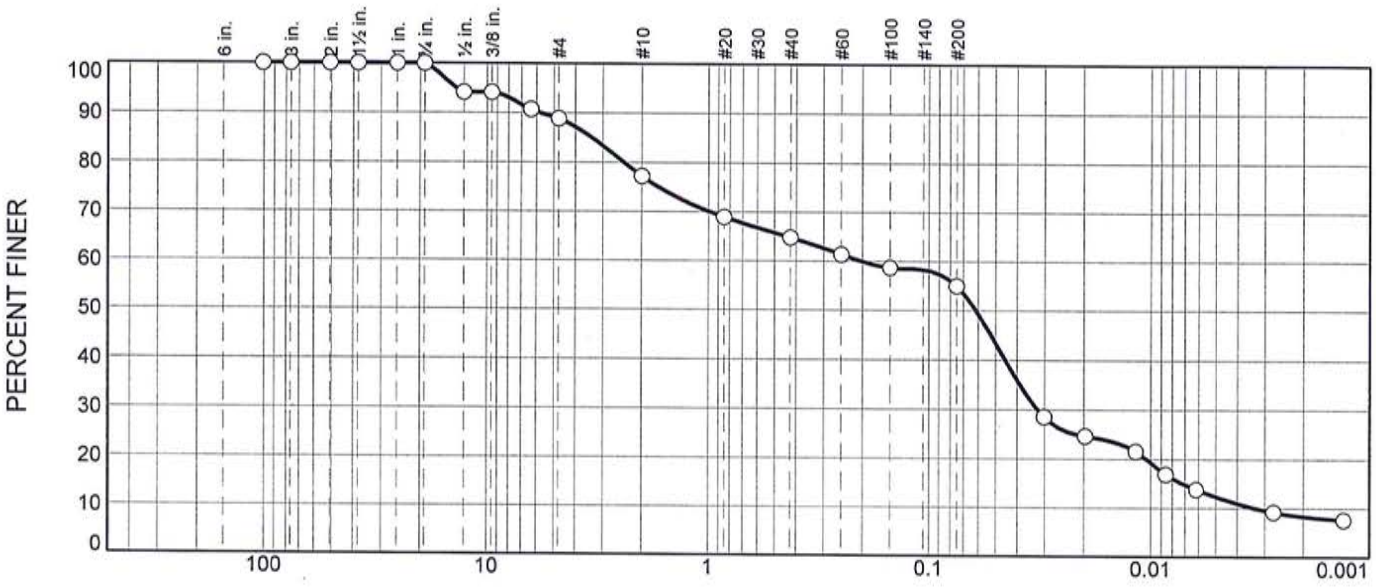
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-69 (S3)
Sample Number: 15-09 **Depth:** 4 - 6 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.1	11.7	12.4	9.8	42.6	12.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	94.2		
3/8"	94.2		
1/4"	90.7		
#4	88.9		
#10	77.2		
#20	68.9		
#40	64.8		
#60	61.4		
#100	58.7		
#200	55.0		

* (no specification provided)

Material Description

sandy silty clay

Atterberg Limits

PL= 17 LL= 22 PI= 5

Coefficients

D_{85}= 3.3588 D_{60}= 0.2021 D_{50}= 0.0612
D_{30}= 0.0324 D_{15}= 0.0072 D_{10}= 0.0033
C_u= 61.14 C_c= 1.57

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

Figure

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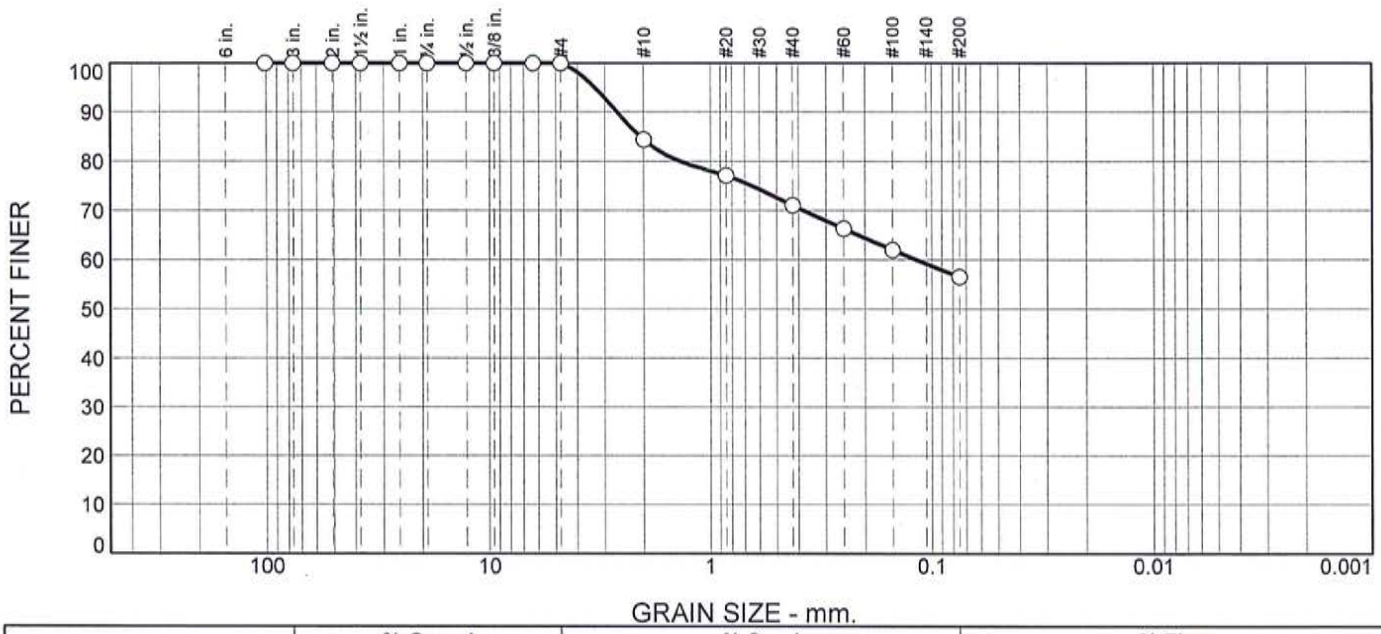
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-69 (S5)
Sample Number: 15-10 **Depth:** 8 - 10 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	15.6	13.4	14.5	56.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	100.0		
#4	100.0		
#10	84.4		
#20	77.1		
#40	71.0		
#60	66.3		
#100	62.0		
#200	56.5		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 2.0742 D_{60}= 0.1172 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Figure

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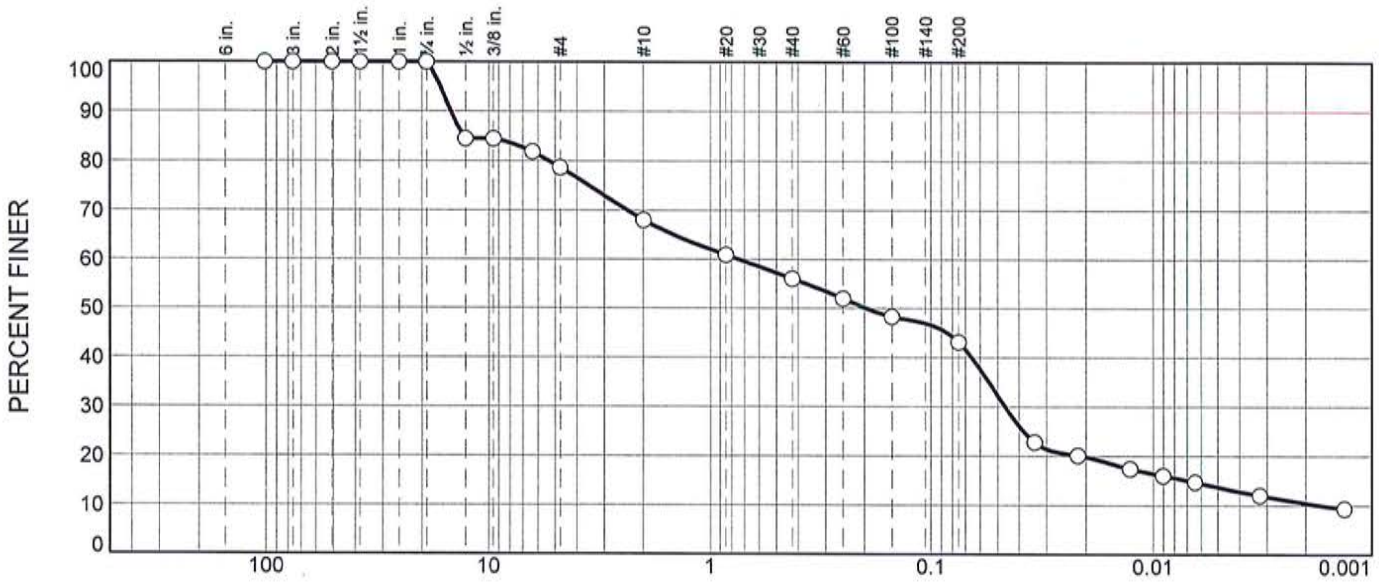
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S3)
Sample Number: 15-12 **Depth:** 4 - 6 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.3	10.7	11.9	13.0	29.4	13.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	84.5		
3/8"	84.5		
1/4"	81.9		
#4	78.7		
#10	68.0		
#20	60.9		
#40	56.1		
#60	52.0		
#100	48.3		
#200	43.1		

* (no specification provided)

Material Description

silty, clayey sand with gravel

Atterberg Limits

PL= 17 LL= 22 PI= 5

Coefficients

D_{85}= 12.9707 D_{60}= 0.7439 D_{50}= 0.1961
D_{30}= 0.0463 D_{15}= 0.0069 D_{10}= 0.0017
C_u= 438.57 C_c= 1.70

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Figure

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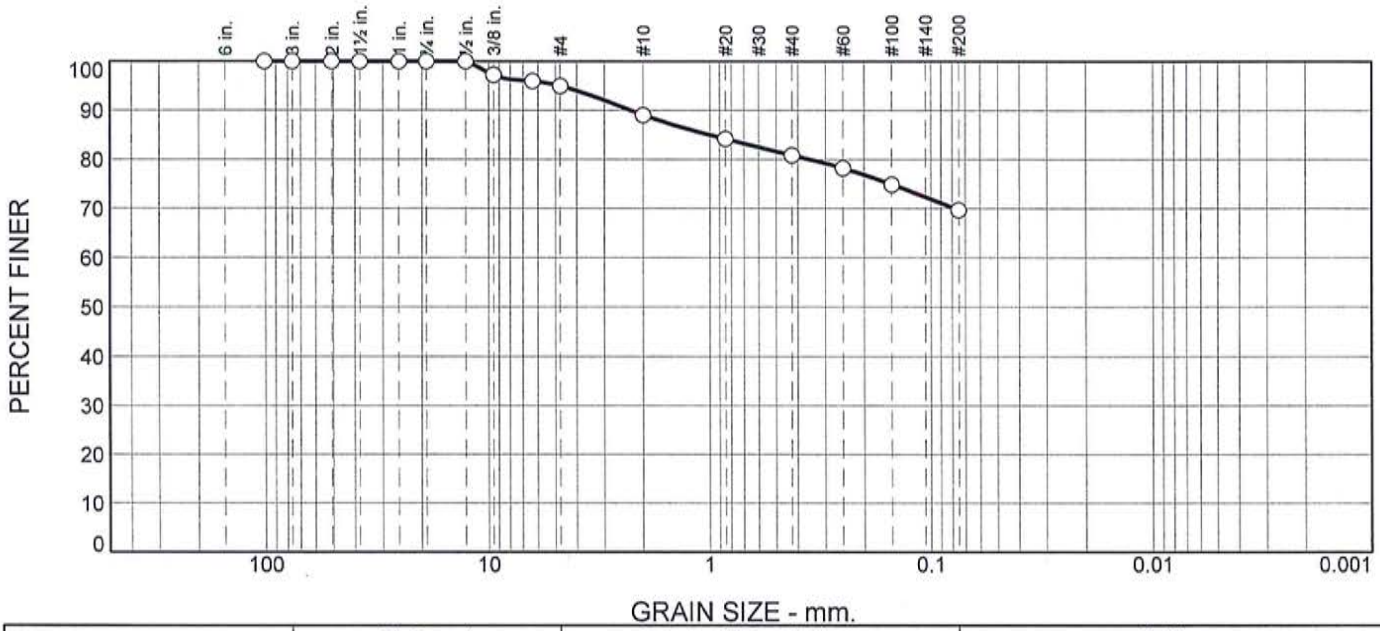
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S4)
Sample Number: 15-13 **Depth:** 6 - 8 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	5.9	8.3	11.1	69.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	97.2		
1/4"	96.0		
#4	95.0		
#10	89.1		
#20	84.2		
#40	80.8		
#60	78.2		
#100	74.9		
#200	69.7		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 1.0006 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Figure

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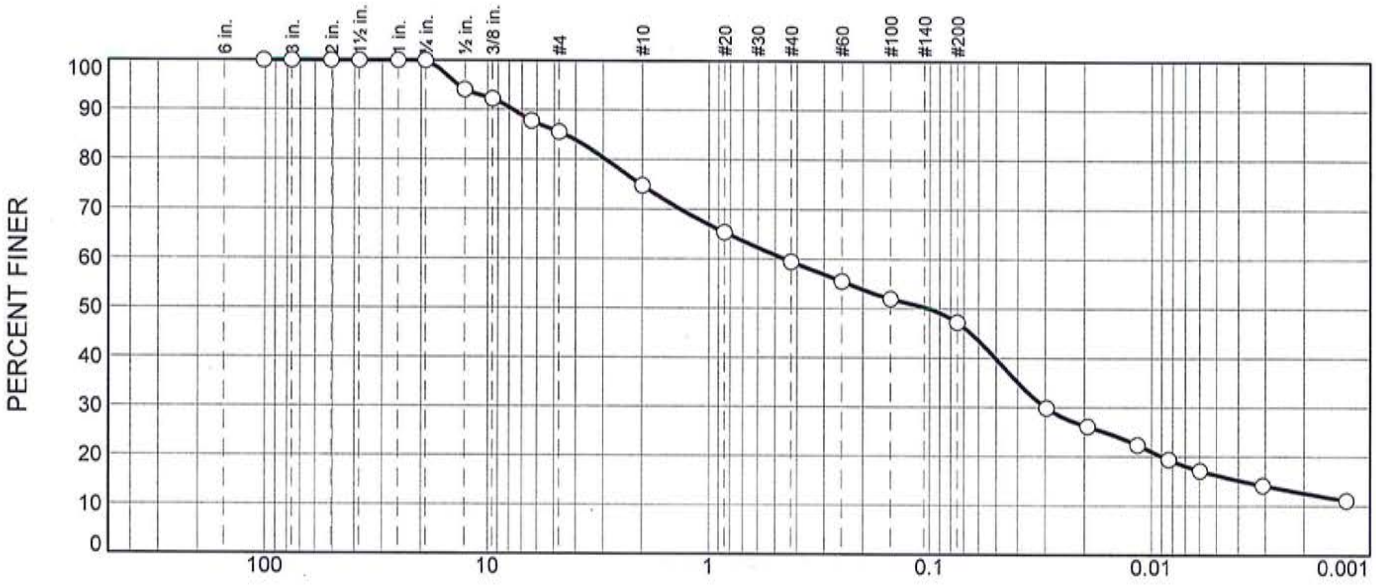
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright

Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S11)
Sample Number: 15-14 **Depth:** 28 - 30 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.5	10.7	15.3	12.3	31.0	16.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	94.1		
3/8"	92.2		
1/4"	87.8		
#4	85.5		
#10	74.8		
#20	65.4		
#40	59.5		
#60	55.5		
#100	52.0		
#200	47.2		

* (no specification provided)

Material Description

silty, clayey sand

Atterberg Limits

PL= 12 LL= 18 PI= 6

Coefficients

D_{85}= 4.4614 D_{60}= 0.4525 D_{50}= 0.1007
D_{30}= 0.0299 D_{15}= 0.0038 D_{10}=
C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Figure

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415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
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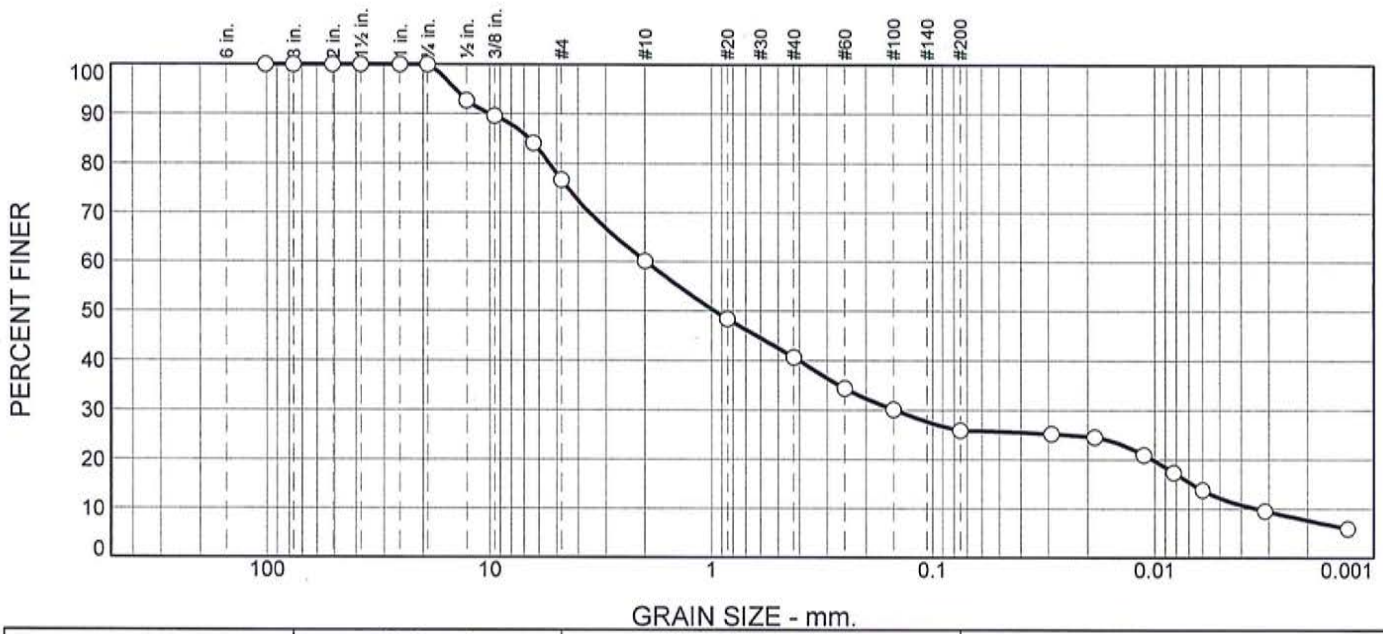
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-101 (S4)
Sample Number: 15-15 **Depth:** 6 - 8 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.3	16.5	19.6	14.7	13.7	12.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	92.8		
3/8"	89.6		
1/4"	84.1		
#4	76.7		
#10	60.2		
#20	48.4		
#40	40.6		
#60	34.4		
#100	30.1		
#200	25.9		

* (no specification provided)

Material Description

silty, clayey sand with gravel

Atterberg Limits

PL= 17 LL= 23 PI= 8

Coefficients

D_{85}= 6.6319 D_{60}= 1.9786 D_{50}= 0.9688
D_{30}= 0.1481 D_{15}= 0.0067 D_{10}= 0.0034
C_u= 576.99 C_c= 3.23

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

Figure

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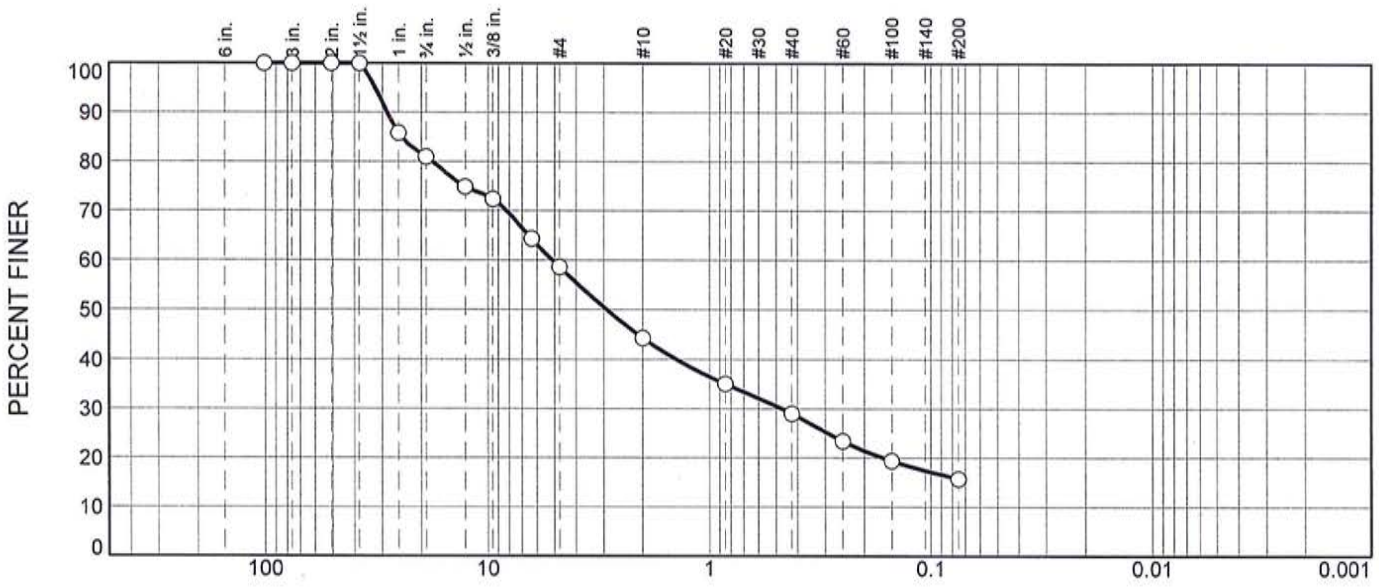
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-101 (S6)
Sample Number: 15-16 **Depth:** 10 - 12 ft **Date:** 06.10.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.0	22.4	14.3	15.3	13.3	15.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	85.8		
3/4"	81.0		
1/2"	74.8		
3/8"	72.4		
1/4"	64.3		
#4	58.6		
#10	44.3		
#20	35.0		
#40	29.0		
#60	23.4		
#100	19.4		
#200	15.7		

* (no specification provided)

Material Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 24.6197 D_{60}= 5.1155 D_{50}= 2.9074
D_{30}= 0.4715 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Figure

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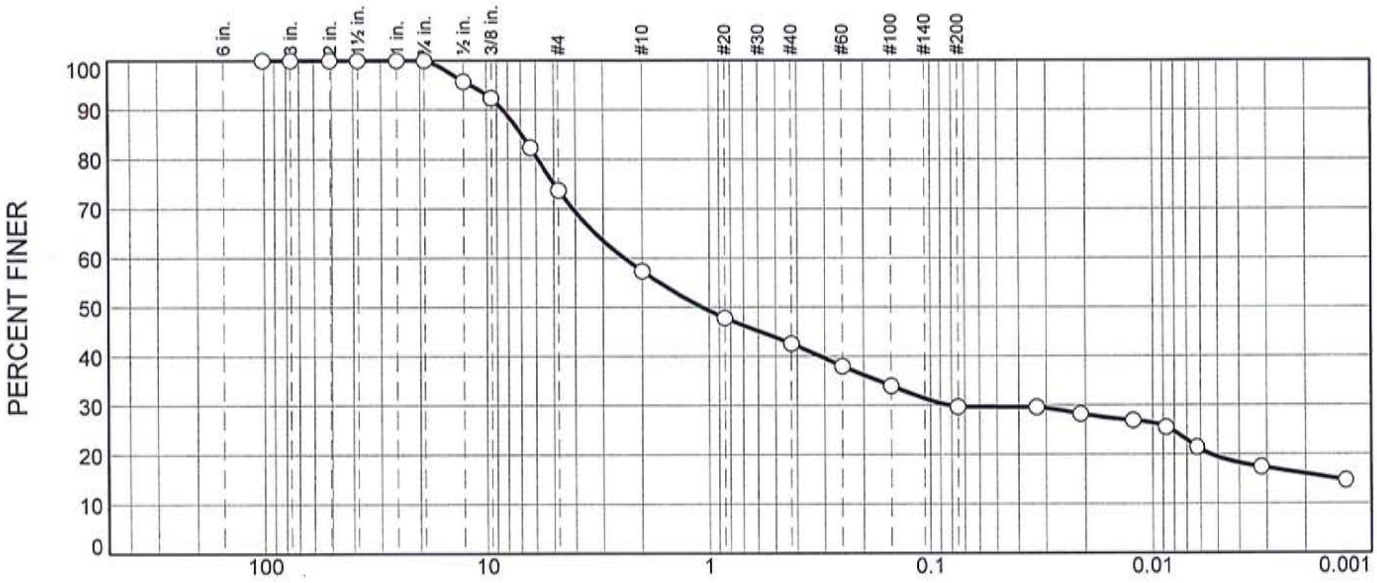
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-52 (S4)
Sample Number: 15-17 **Depth:** 6 - 8 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	26.2	16.4	14.9	12.8	10.3	19.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	95.8		
3/8"	92.4		
1/4"	82.3		
#4	73.8		
#10	57.4		
#20	47.8		
#40	42.5		
#60	38.0		
#100	33.9		
#200	29.7		

* (no specification provided)

Material Description

clayey sand with gravel

Atterberg Limits

PL= 16 LL= 24 PI= 8

Coefficients

D_{85}= 6.9517 D_{60}= 2.4019 D_{50}= 1.0742
D_{30}= 0.0826 D_{15}= 0.0014 D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

Figure

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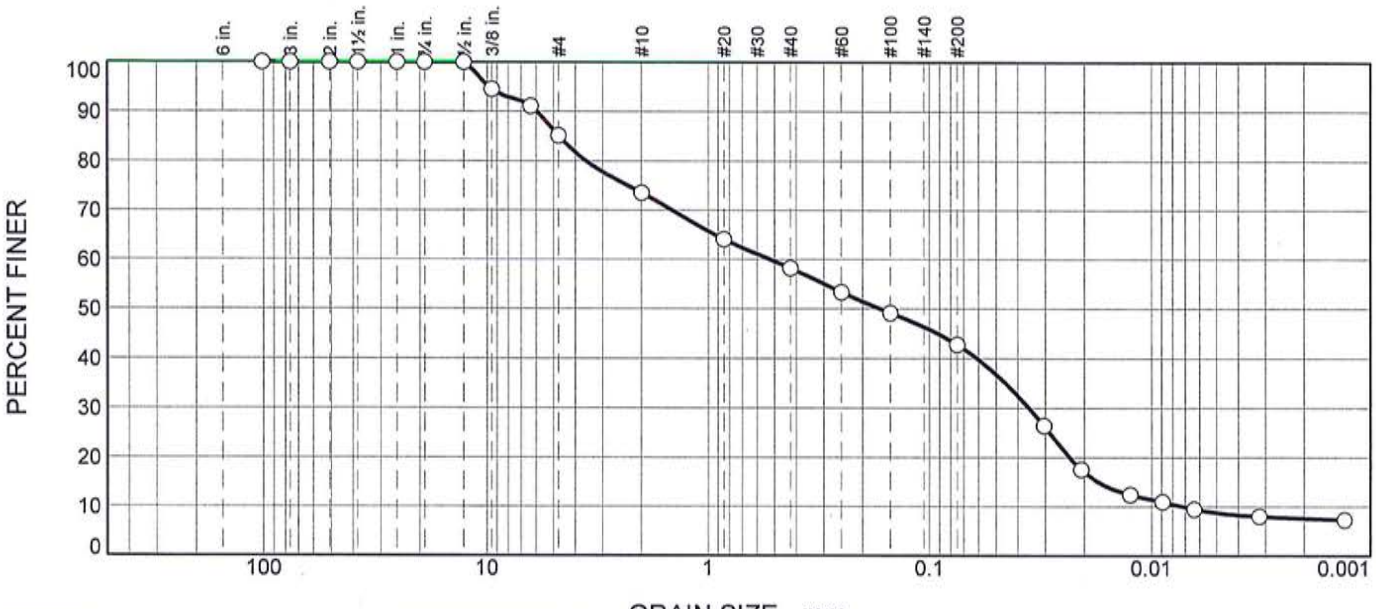
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Arkwright **Project No.:** 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-52 (S10)
Sample Number: 15-18 **Depth:** 23 - 25 ft **Date:** 06.13.15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.9	11.6	15.3	15.4	34.0	8.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	94.5		
1/4"	91.2		
#4	85.1		
#10	73.5		
#20	64.1		
#40	58.2		
#60	53.4		
#100	49.2		
#200	42.8		

* (no specification provided)

Material Description

silty, clayey sand

Atterberg Limits

PL= 16 LL= 20 PI= 4

Coefficients

D_{85}= 4.7178 D_{60}= 0.5250 D_{50}= 0.1664
D_{30}= 0.0356 D_{15}= 0.0174 D_{10}= 0.0072
C_u= 73.29 C_c= 0.34

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Figure

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