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:

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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 Reco	ommended			
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	e Text			
Seismic Site Class	С	n/a	Per IBC 2012			
Sds	0.12	g's	Per IBC 2012			
Sdl	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. <u>Please note *italicized* words are further defined in Exhibit A - Terms & Definitions.</u>

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 Reco	ommended			
Estimated Differential Settlement	0.5	inches	Assumes proper foundation preparation and stiff to hard glacial till			
Groundwater	See T	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	e Text			
Seismic Site Class	С	n/a	Per IBC 2012			
Sds	0.12	g's	Per IBC 2012			
Sdl	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 underdrain 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 $\pm 2\%$ 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	1 Second Period	5% Damped	5% Damped		
Response	Response	Design Spectral	Design Spectral		
		Response	Response		
S_{ms}	S_{M1}	$S_{ m DS}$	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

	Ground		Topsoil		Gla	cial Drift			G	Blacial Till		Weathered Bedrock			Apparent Bedrock			
Test Boring Number	Surface Elevation (ft.)	Exploration Total Depth (ft.)	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
								И	/ind Turbine I	Exploration Bo	rings							
WTG-10		29.2	0.2	0.2		7.8	8 < N < 20	8.0		UNKNOWN	48 < N < 110		NOT	ENCOUNTER	ED	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 ENCOL	NTERED
WTG-12		30.0	0.4	0.4		9.6	12 < N < 49		NOT E	NCOUNTERED)	10.0		UNKNOWN	GREATER THAN 100		NOT ENCOL	INTERED
WTG-15		49.6	0.7	0.7		9.3	10 < N < 32	10.0		UNKNOWN	21 < N < 100++		NOT	ENCOUNTER	ED		NOT ENCOL	NTERED
WTG-16		61.0	0.7	0.7		11.3	15 < N < 53	12.0		UNKNOWN	29 < N < 57		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
		60.0	0.6	0.6		3.4	13	4.0		UNKNOWN	20 < N < 86		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-19		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-21		60.0	0.9	0.9		13.5	11 < N < 18	14.4		UNKNOWN	16 < N < 163		NOT	ENCOUNTER	ED .	NOT ENCOUNTERED		
WTG-22		60.0	0.4	0.4		14.6	8 < N < 18	15.0		UNKNOWN	21 < N < 89		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-27		60.0	0.2	0.2		13.3	5 < N < 19	13.5		UNKNOWN	18 < N < 75		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-28		60.0	0.2	0.2		37.8	7 < N < 58	38.0		UNKNOWN	25 < N < 62		NOT	ENCOUNTER	ED	NOT ENCOUNTERED		
WTG-29		60.0	0.6	0.6		11.9	8 < N < 24	12.5		UNKNOWN	16 < N < 149		NOT	ENCOUNTER	ED		NOT ENCOL	NTERED
WTG-30		53.7	0.5	0.5		42.5	8 < N < 51	43.0		UNKNOWN	18 < N < 100		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-32		49.4	0.3	0.3		5.2	12, 26	5.5		43.9	17< N< 145		NOT	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-33		58.9	0.5	0.5		47.5	8 < N < 35	48.0		UNKNOWN	33 < N < 102		NO1	ENCOUNTER	ED		NOT ENCOL	INTERED
WTG-36		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 ENCOL	INTERED
WTG-41																		
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						
WTG-47		60.0	0.4	0.4		27.6	8 < N < 91	28.0		UNKNOWN	10 < N < 35				NOT ENCOL			
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

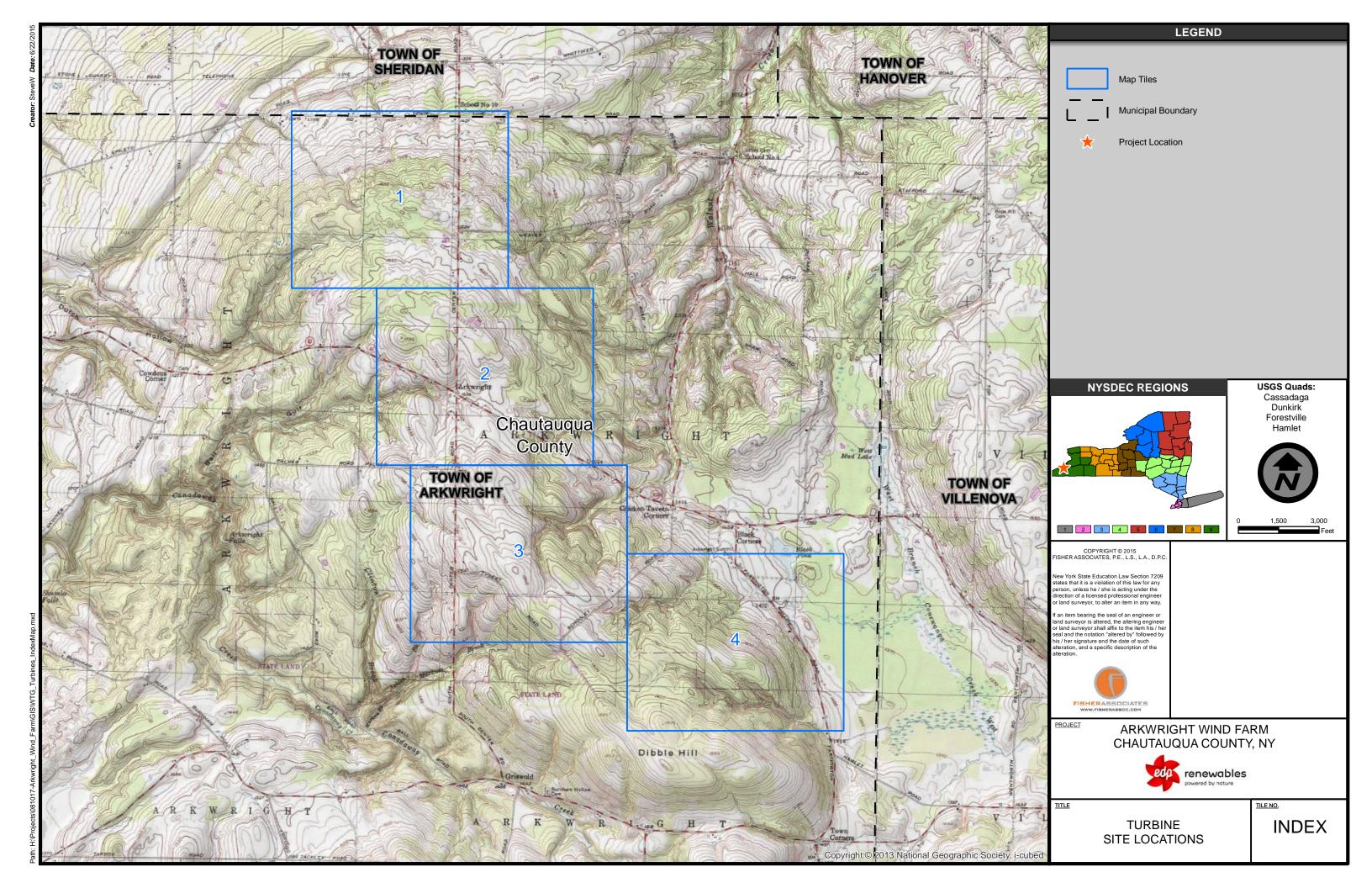
Table No. 1

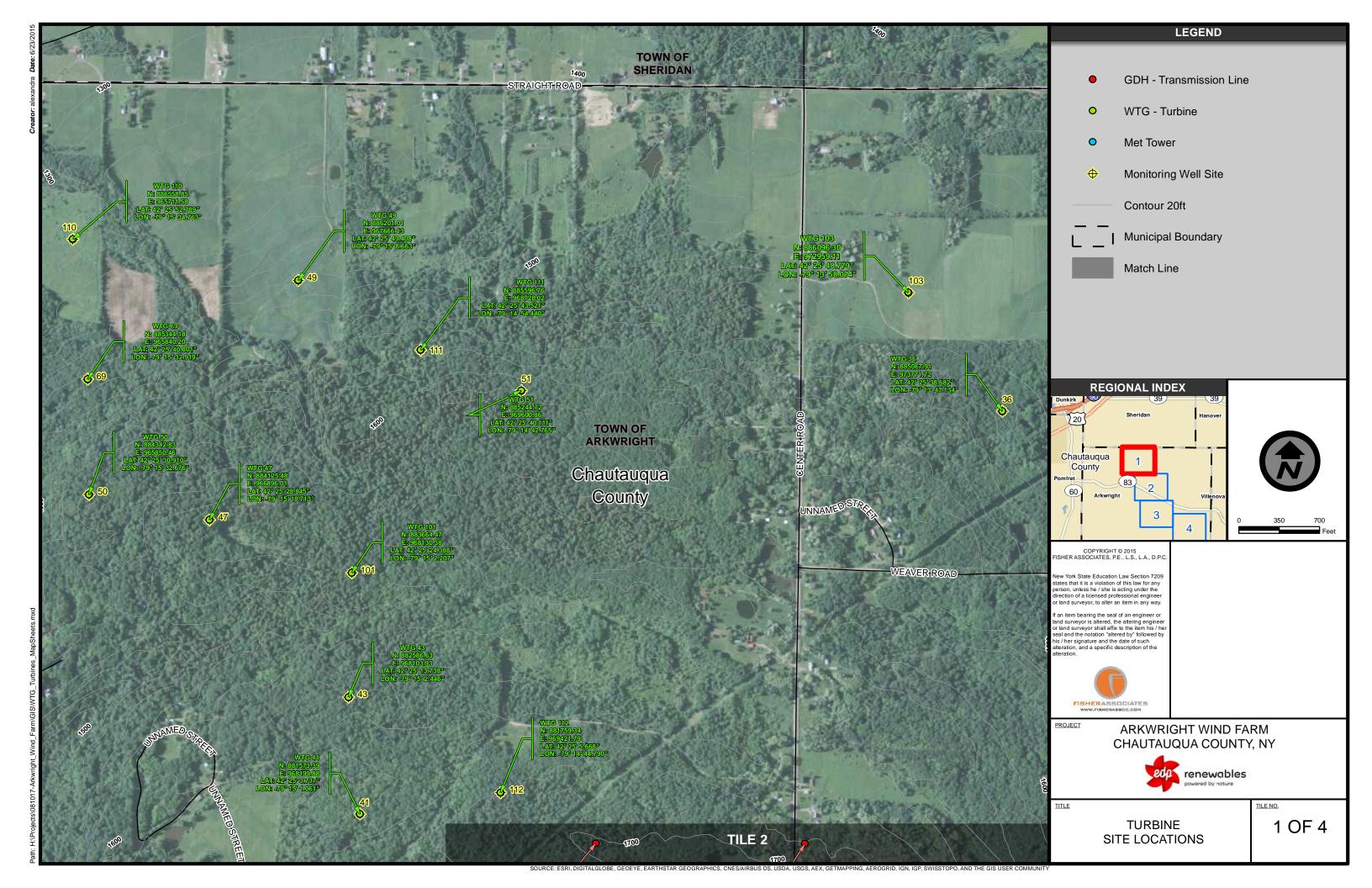
Summary of Subsurface Conditions
Arkwright Summit Wind Farm
Town of Arkwright, Chautauqua County, New York

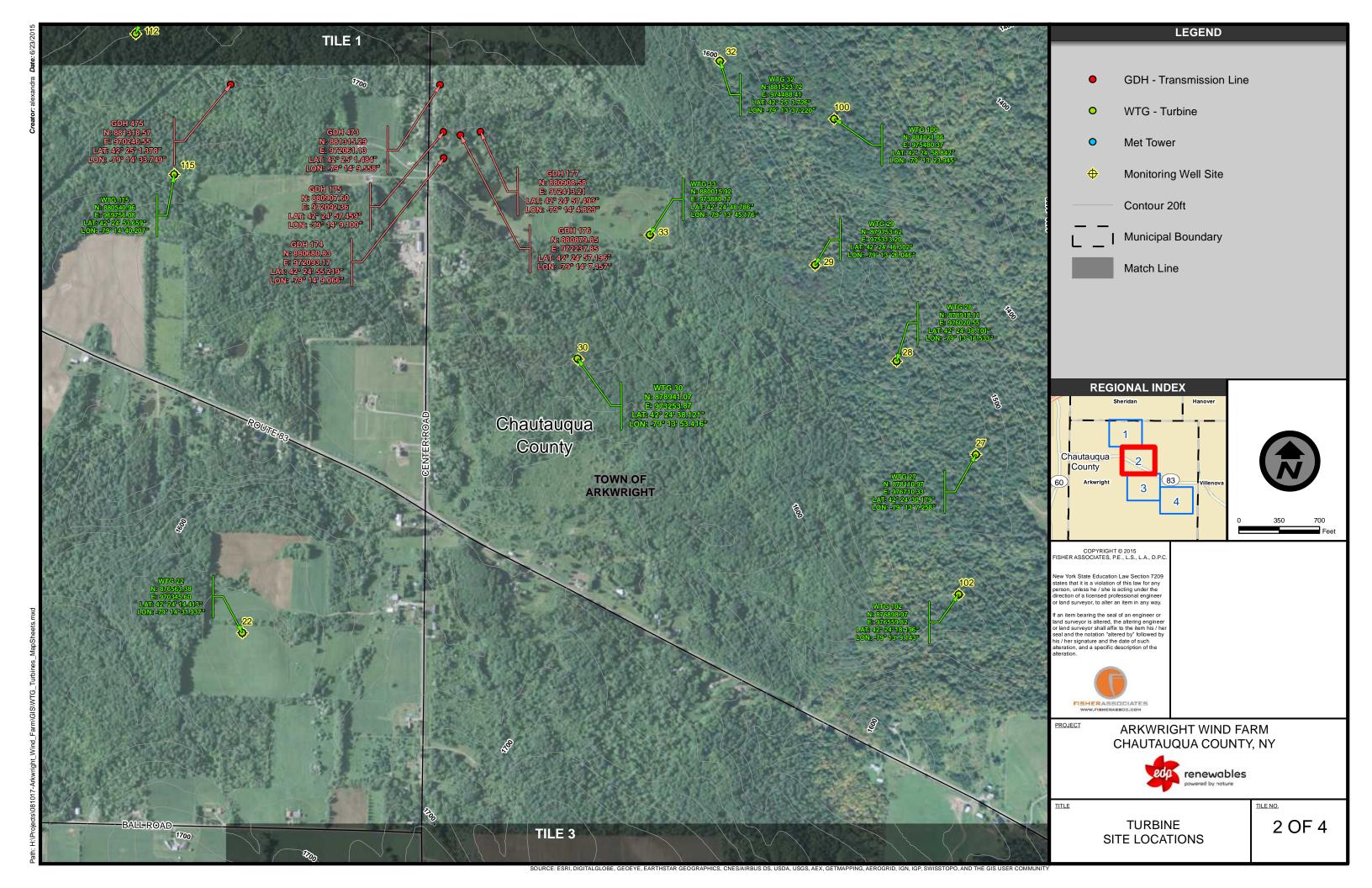
	Ground		Topsoil		Gla	cial Drift			G	lacial Till			We	athered Bedroo	ck .	Apparent Bedrock			
Test Boring Number	Surface Elevation (ft.)	Exploration Total Depth (ft.)	Thickness (ft.)	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	Depth to Top (ft.)	Elevation (ft.)	Thickness (ft.)	N-Values	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		NO	FENCOUNTER!	ED	NOT ENCOUNTERED			
WTG-51		60.0	0.3	0.3		27.7	8 < N < 28	28.0		UNKNOWN	20 < N < 44		NO	Γ ENCOUNTERI	ED	NOT ENCOUNTERED			
WTG-57		60.0	0.3	0.3		5.7	4 < N < 20	6.0		UNKNOWN	50 < N < 143		NO ⁻	F ENCOUNTER!	ED		NOT ENCOL	INTERED	
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 ENCOL	INTERED	
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++		NO ⁻	Γ ENCOUNTER!	ED		NOT ENCOL	INTERED	
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 ENCOL	INTERED	
WTG-96		31.3	0.3	0.3		23.7	5 < N < 36		NOT E	NCOUNTERED)	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++		NO	Γ ENCOUNTERI	ED		NOT ENCOL	INTERED	
WTG-100		60.0	0.3	0.3		13.2	9 < N < 22	13.5		13.0	23 < N < 79		NO	Γ ENCOUNTERI	ED	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		NO ⁻	Γ ENCOUNTERI	ED		NOT ENCOL	INTERED	
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		NO ⁻	Γ ENCOUNTERI	ED		NOT ENCOL	INTERED	
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 ENCOL	INTERED		
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 ENCOL	INTERED		
WTG-112		35.2	0.4	0.4		5.6	16 < N < 19	6.0		UNKNOWN	23 < N < 97	NOT ENCOUNTERED NOT ENCOUNTERED			INTERED				
WTG-114		41.5	1.0	1.0		22.0	9 < N < 33	23.0		UNKNOWN	51 < N < 108	108 NOT ENCOUNTERED NOT ENCOUNTERED			INTERED				
Notae:		1		1	ı	18.1		1	1	1	1								

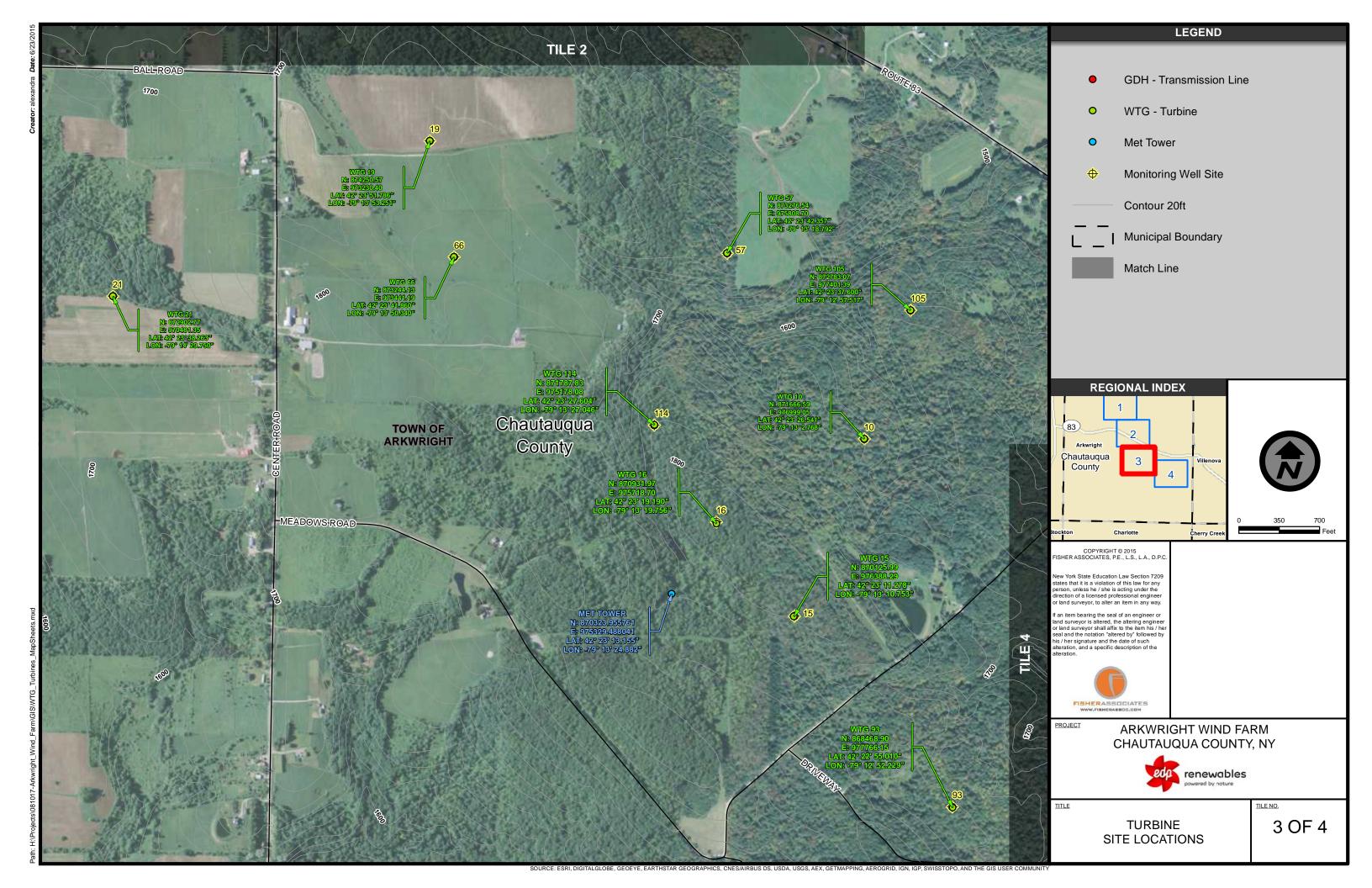
Notes:

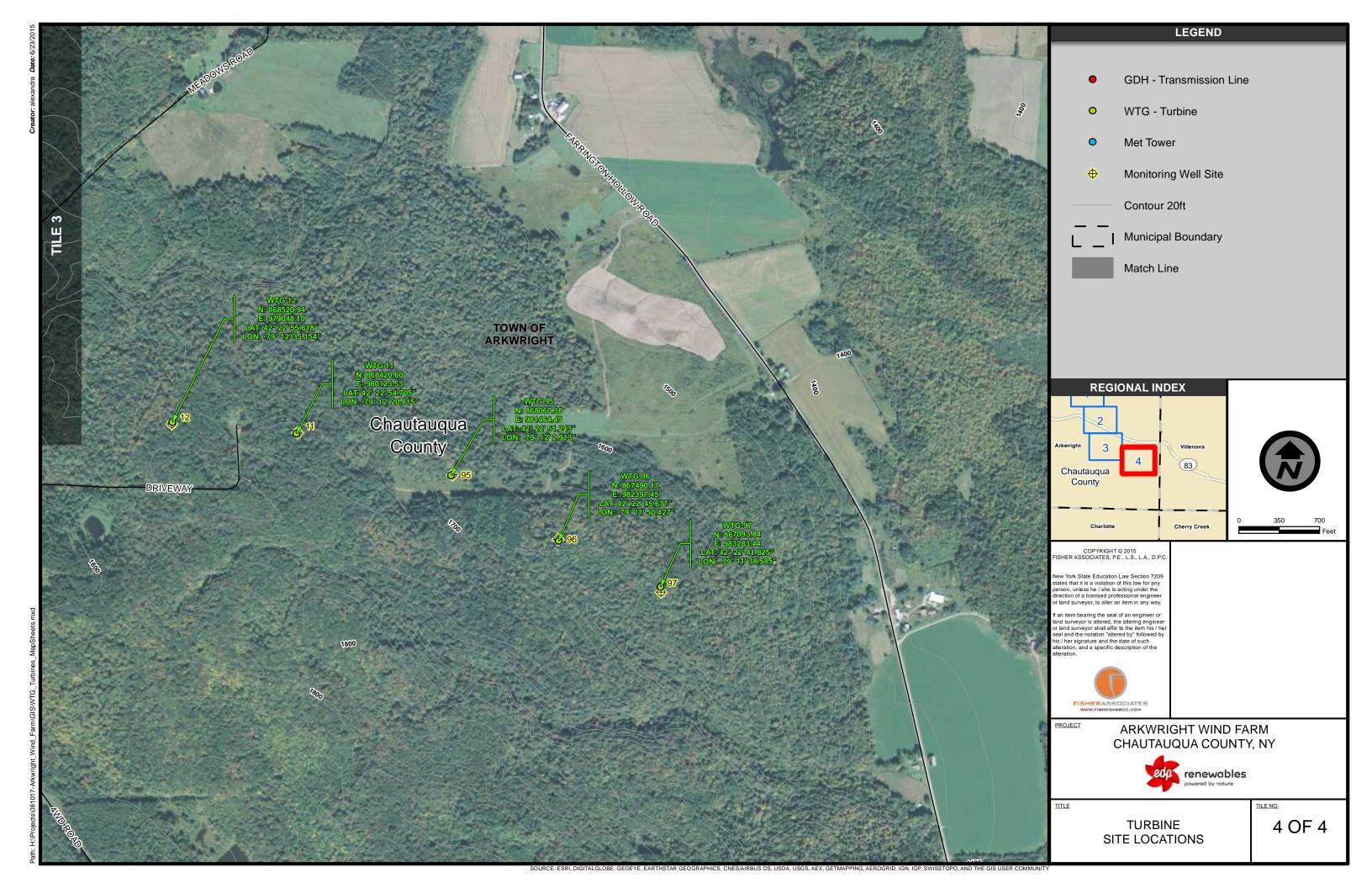
FIGURES





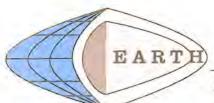






APPENDIX A

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



DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Welland Delineations

1091 Jamison Road . Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-10-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 871666,58590600000

Town of Arkwright, Chautaugua Co., NY

Easting: 976999.05264900000

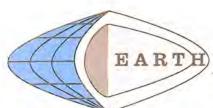
CLIENT Fisher Associates

DATE STARTED 05/22/15

COMPLETED 05/22/15

BLOWS ON DEPTH IN FT SAMPLER

	SN	0/ 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL		WATER TABLE AND REMARKS
ľ	1	2					Territoria	Todoson to blook	3		3	(1) 4" LOCKING STEEL
	20		2			6		Extremely moist dark brown to black (MUCK) with organic fiber, very soft,	5		(23)	PROTECTIVE CASING
T			1	4		0	+. +.	granular soil structure, (OL).	1		1 4	(2) CONCRETE
T					5		23.23	0.2	3		3	← 2.0*
1	2	9					<u>*</u>		-			- 2.0
7	24	-	10				* .	Moist faintly mottled brown				Note: WTG-10-15 drilled 12.0 feet
1		7.1	10	10		20	7. 7.	(SAND-SILT-CLAY) with little sand and clay, firm, blocky soil structure,				southeast of staked location.
t				10	8		<u>*</u> . *	(ML-CL).	-		÷.	
t	3	3			- 0		0	grades downward to 2.0		PVC RISER	9.4	Mucky organic surface to 0.2
t	16		4				0000	\—	5.0	RIS	=	feet over silty glacial drift with
+	10		4			8	0 0	Moist distinctly mottled olive brown	-	C	· ·	little sand and clay to 2.0 feet
+				4_	3	91	0000	(SAND-SILT-CLAY) with 3 to 5%	6.2	ТР	BAC	over silty glacial drift with trace gravel, little sand and clay to 4.0
+	4	2			3		e . e. e	gravel, little sand and clay, very stiff with nearly vertical gray desiccation	75	FJT	35	feet over loamy glacial drift with
+	20	2				9	2 4	cracks, (ML-CL).		40	PUTTINGS BACKFILL	trace to little gravel, little sand,
+	20		4	1.2		12	A . A .	grades downward to 4.0	100		E	trace clay to 6.0 feet over silty
+	-		-	8	2.40		0 00 0		7.	B	ਹ	glacial drift with little gravel and
+					12	9 1	5 25 T	Extremely moist faintly mottled olive	_	SCHEDULE		clay, trace sand to 8.0 feet over
1	5	13			-		0.00	h brown gravelly (SANDY-SILT) with 15				silty glacial till to 11.5 feet over
1	24		24			51	می م	to 30% mostly subangular gravel, little sand, trace clay, compact, massive soil	-	2	7	loamy glacial till to refusal.
+	-	-		27			0000	is structure, (ML).				
+	-				35		0.00	grades downward to 6.0				← 10.0'
-	6	9					F000		1		1	
1	24		25			51	000	Extremely moist distinctly mottled olive	1		14	
1				26			0	brown (CLAYEY-SILT) with 10 to 15%			(5)	(3) BENTONITE CHIPS
L					35		0000	gravel, little clay, trace sand, stiff with inearly vertical gray desiccation	1		1	
1	7	10					0 0	cracks, (ML-CL).	1		1	
L	24	-0	31			69	0000	grades downward to 8.0	1			← 13.0'
			120	38			0 0		1		28	
					36		0000	Moist distinctly mottled alive brown	1		33	Note: Advanced bore hole with 4
	8	10					000	gravelly (SAND-SILT-CLAY) with 15 to	1	7	· ·	1/4 inch ID x 8 inch OD hollow
1	22		23			48	0000	20% gravel, little clay, trace to little sand, hard, massive soil structure,	134	SCREEN	SAND PACK	stem auger casing with
t				25		40	000	(ML-CL).	1	CR	무	continuous split spoon sampling to 15.0 feet. Cored below with
					26		0 00	grades downward to 11.5	13	CS	S.	an NQ-2 size double tube core
							0000	presentations and a series and a		PVC	出	barrel and diamond bit to 25.0
1			17.5				0.0	Extremely moist olive gray gravelly	1	į.	MORIE	feet. Installed a 2 inch PVC
							0000	(SANDY-SILT) with 15 to 40% mostly	1	10.		observation well in completed
T			-		TO S		0 0	subangular gravel, little sand, dense, very dense below 18.0 feet with brittle	3	010 SLO	SIZ	bore hole.
1	9	13				1	0000	consistence, massive soil structure,	180	010	OON SIZE	
1	24	10	48				000	(ML).	1.3	-	ŏ	
+			40	70		118		40.70	-11		.33	
L				70	77		0 0		100		7:10	



DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-10-15</u>

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

BLOWS ON DEPTH IN FT SAMPLER

10B13a

	SN	0/ 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WEL	L	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	
	10	29					0000		+	OT 2" F	E MORI	
	10 8	78	100/3	3			000		* A	O SLI	SIZ	
							0 00			0.	8	
					V a		0 00		-	7		← 25.0'
1							0 00		-	-	FEUTTINGS BACKFULL IT	
			-				0000		-	-	ВАС	
							000				INGS	
	11	27					0000		-	-	au T	
	14		88	100/3			0 00	29.2	-		Ξ.	← 29.2'
				10073				Split spoon refusal at 29.2 feet.	1			
1		-										
1												
-		- 1										
1												
-												
-												
l			1-1									



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HOLE NUMBER: WTG 11

DATE: 3/31/15		ELEVATION:
PROJECT:	Subsurface Investigation for Arkwright Summir	Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

					$\Gamma \Delta$	IV. TION			orthing: 868420.5980, Easting: 980123.5250						
		\II \			<u> </u>			Northing. 806420.596	∪, ⊑a		3.5250				
0 —	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS			
U	1	2						Extremely moist, dark	1.5'			Topsoil to 0.3 foot over			
			5			12		brown, mucky (SILT) topsoil				silty lake sediment to 8.0			
				7		12		with trace very fine size sand, very loose				feet over water sorted and deposited sand with			
					10			Moist, brown (SILT) with				little silt to 10.0 feet over			
	2	6					×	trace very fine size sand,	1.0'			silty lake sediment to 13.0			
			4					compact to loose, weakly				feet over water sorted			
				5		9		thinly bedded				and deposited sand with			
				-	8							little silt to 15.0 feet over			
	_	_			•				1.2'		_Soil	water sorted and			
	3	5									Backfill	deposited sand with little gravel and silt to 22.5 feet			
5 —			4			8						over clayey glacial till to			
				4								24.3 feet over shale rock			
					5				4.01		0" D\ (O	to refusal			
	4	5							1.0'		2" PVC Riser Pipe				
			4			9					Kisei Fipe				
				5		9									
					4			8.0							
	5	6						Extremely moist, faintly	0.8'						
			5					mottled, brown (SILTY-							
				5		10		SAND) with very fine to fine			_				
					4			size sand, little silt, loose,		(<u>/ ()</u> 9.5	Bentonite				
10 —	6	4						thinly bedded 10.0 Wet, brown (SILT) with trace	1.5'		Seal				
	•	4	_					very fine size sand,							
			5			15	33.7.102	compact, thinly bedded							
				10			33.73	,,							
					13				4.01						
	7	6							1.2'						
			7			16	3 2 2	13.0							
				9		10		Wet, brown (SILTY-SAND)							
					11			with very fine to fine size		14.0)				
	8	5						sand, little silt, compact,	1.4'		# 2 Size				
			10					thinly bedded			Sand				
15 —				15		25		Wet, brown, gravelly (SILTY-		15.0					
					26			SAND) with 15 to 30%			2" Slotted	W Motor Lovel at 15 7			
							14514000	gravel, very fine to fine size			PVC	▼ Water Level at 15.7' BGS at Completion			
								sand, little silt, compact to			Screen	BOO at Completion			
								dense, thinly bedded							
										 :::					
									0.0'						
	9	9							0.2'						
20 —			19												
	LC)G	GĒ	ED	BY	: <u>D</u> a	ale M.	Gramza / Senior Geolo	gist	PAGE	<u>1</u> of	2			



35

3553 Crittenden Road Alden, NY 14004 (716) 937-6527

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THE PERSON NAMED IN	MUININ	LIVIA	IL UUI	TOULI	HITTO	X OUNTIN	AGTUNO, INC	HOLE NUMBER:	W	TG 11		
	TAC	E:		3/3	31/1	5					ELE\	/ATION:
	PRO							Subsurface Investigation	or Ark	wright Summ		
				-					right,			
F	PRE	EP/	٩RI	$E\overline{D}$	FO	R:		Fisher				
E	3OF	RIN	IG	LO	CA	\overline{ION}	:	Northing: 868420.598	0, Eas	sting: 980123	3.5250	
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	COMMENTS			
			12	21	24	40		Wet, brown, gravelly (SILTY-		WELL		
					25		7.0 2.0	SAND) with 15 to 30% gravel, very fine to fine size				
								sand, little silt, compact to				
								dense, thinly bedded				
								22.5			011 0 1 1	
								Extremely moist, grayish brown, gravelly (CLAYEY-			2" Slotted PVC	
								SILT) with 15 to 25% gravel,			Screen	
	_	50/						some clay, hard, massive	0.3'		# 2 Size	
	10	4"						soil structure	0.5		Sand	
25 –								Shale rock, gray, soft, fissile		25.0		
	11	50/ 4"							0.1'			
30 -												
								Auger Refusal at 32.5' BGS				
								/ tage: 1 to taga: at 02.0 200				
35 –												
35 -												
							1 1		I	Ī		

LOGGED BY: Dale M. Gramza / Senior Geologist



www.natureswayenvironmental.com WTG 12

DATE: 4/1/15		ELEVATION:
PROJECT:	Subsurface Investig	gation for Arkwright Summit Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

					$\Gamma \Omega$. ү. ГІОЙ			0.9440, Easting: 979048.1000				
L		\III\			CA			Northing: 868520.94	40, E	asung: 9790	48.1000		
0 —	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS	
U	1	1					, , , , , , , , , , , , , , , , , , ,	Extremely moist, dark brown 0.4	1.3'			Topsoil to 0.4 foot over	
			1			4		(SILT) topsoil with trace very				silty lake sediment with	
				3		4		fine size sand, very loose, with fine size roots				trace sand to 4.0 feet over silty glacial drift to	
					8		4	Extremely moist, distinctly				10.0 feet over weathered	
	2	3						mottled, brown (SILT) with	1.5'			shale rock to end of	
		Ť	4				 	trace very fine size sand,				boring	
			4			12		loose to compact, weakly				S	
				8				thinly bedded					
					11			4.0	4.0!		Cail		
	3	6						Moist, brown (SILT) with 5 to	1.9'		Soil Backfill		
5 —			8			17		15% gravel, trace very fine			Dackilli		
5				9		17	• •	size sand, compact to dense, massive soil					
					15			structure to weakly thinly					
	4	3						bedded	1.0'		_2" PVC		
			6								Riser Pipe		
				8		14							
				-	40								
					10				1.3'				
	5	8							1.5				
			23			49							
				26		10	2 ()						
40					37			10.0					
10 —	6	23						Shale rock, olive gray to	0.6'				
			50/ 5"					gray, soft to moderately soft,					
			_ 5 ``			>50		weathered, fissile, wet					
	7	41					FEE		0.6'	12.0	Bentonite		
	Ľ	41	50/						0.0		Seal		
			4"			>50							
							FEE						
	8	50/ 5"							0.4'	14.5	5		
45										15.0	# 2 Size		
15 —							F ==3				Sand		
											2" Slotted	▼ Water Level at 15.9'	
											/PVC	BGS at Completion	
											Screen		
							F==3		_				
	9	50/ 3"							0.2'				
20 —	LC	G	GE	D	BY	: <u>D</u> a	ale M.	Gramza / Senior Geolo	gist	PAGE	<u>1</u> of	2	



HOLE NUMBER: www.natureswayenvironmental.com

DATE: 4/1/15 PROJECT:												/ATION:		
F	PRC)JE	EC	Γ: ͺ				Subsurface Investigation			Vind F	arm		
	DE	: Б/	۸Ы	<u>-</u> _	FO	D.			vright,					
						TION:	Fisher Associates I:Northing: 868520.9440, Easting: 979048.1000							
			6/	12/	18/			_	COMMENTS					
	SN	0/ 6	12	18	24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	VVELL	MARKS Slotted	COMMENTS		
25 —	10	50/3"						Shale rock, olive gray to gray, soft to moderately soft, weathered, fissile, wet	0.2'	# 2	PVC creen			
30 —	111	50/3"						Boring Completed at 30.0'	0.2'					
35 —														
40 —	LC)G	GE	D	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE 2	of	2		



HOLE NUMBER: www.natureswayenvironmental.com

DATE: 3/17/15	ELEVATION:
PROJECT:	Subsurface Investigation for Arkwright Summit Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

					-ν-	r. TION		Northing: 870125.9870, Easting: 976388.2930					
D	Or	XIII	<u> </u>		CA	IION		Nortning: 870125.98	70, E	_	88.2930		
0 —	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS	
0 —	1	1					1.2.2.2.3.4 5.2.2.2.3.4	Extremely moist, dark brown	1.4'			Topsoil to 0.7 foot over	
			1			8	~ ~ ~	(SILT) topsoil with trace very 0.7 fine size sand, very loose			2" PVC	silty glacial drift with trace gravel to 10.0 feet over	
				7		Ü		Moist to extremely moist,			Riser Pipe	silty glacial till with little	
					12			faintly mottled, brown	1 0'			clay to 39.0 feet over silty	
	2	11						(CLAYEY-SILT) with 5 to	1.0'			glacial till with trace sand to end of boring	
			9			22		15% gravel, little clay, loose to compact, weakly thinly				to end of borning	
				13				bedded with one wet					
	_				11			(SILTY-SAND) layer	1.3'		∠ Soil		
	3	3	_					between 5.0' to 5.5'	1.0		Backfill		
5 —			4			10							
				6	6								
	4	5			•				1.5'				
	-	3	9										
			3	14		23							
					18								
	5	8							1.3'				
			11				,						
				21		32							
					18			10.0		10.0			
10 —	6	19						Moist, gray, gravelly	2.0'	70.0	Bentonite		
			16					(CLAYEY-SILT) with 15 to			Seal		
				22		38		30% gravel, little clay, hard to very stiff, with brittle					
					21			consistence, massive soil					
	7	9						structure	2.0'				
			13			28							
				15		20				13.5	" o o:		
					15				4.01		# 2 Size Sand		
	8	7							1.9'		Jana		
15 —			9			21				15.0			
				12							2" Slotted		
					11						/PVC		
											Screen		
	9	50/							0.4'				
		5"											
20 —	LC	G	GE	ED	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE	1 of	3	



www.natureswayenvironmental.com

HOLE NUMBER: WTG 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/ 1	2/ 18	/	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING	REMARKS	COMMENTS			
	6	12 1	18 24	-				WELL	2" Slotted PVC Screen # 2 Size				
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'	25.0	Sand				
11							1.1'						
30		50	0/2"	>74 									
35		11 50	0/2"				1.0'						
40	50/ 4"	SEI	D B	Υ: Γ	ale M	See next sheet Gramza / Senior Geolo	0.3' aist	PAGF	2 of	3			



www.natureswayenvironmental.com

								HOLE NUMBER:	VV	/IG 15		
	TAC				17/1	5						/ation:
F	PRO)JE	EC.	Τ: ͺ				Subsurface Investigation			nit Wind F	arm
				_					right,			
					FO					ciates		
Е	3OF	RIN	IG	LO	CA	TION	:	Northing: 870125.98	370, E	asting: 9763	88.2930	
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
45 —	14	222	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/					49.6	0.6'	-		No Water at Completion
50 —			2"			>50		Boring Completed at 49.6' BGS				No water at Completion
55 —												
60 —	LC	G	GE	D	BY	: Da	ale M	Gramza / Senior Geolo	gist	PAGE	<u>3</u> of	3



HOLE NUMBER: www.natureswayenvironmental.com

DATE: 3/17/15	ELEVATION:
PROJECT:	Subsurface Investigation for Arkwright Summit Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

BORING LOCATION: Fisher Associates Northing: 870931.9700, Easting: 975718.6970												
В	OF	SIV	1G	LO	CA	TION	:	Northing: 870931.97	700, E	asting: 975718.6	970	
0	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING REMA	ARKS	COMMENTS
0 —	1	2					A 24.4.4.4	Moist, dark brown (SILT)	1.3'			Topsoil to 0.7 foot over
			2			4	A A A A A	topsoil with trace very fine		2" F		silty slack water sediment
				2		4		size sand, loose, with fine size roots		Riser	Pipe	with trace clay to 4.0 feet over silty glacial drift to
					8			Extremely moist, distinctly				12.0 feet over silty
	2	5					33.7	mottled, brown (SILT) with	1.4'	<u> </u>		tending toward clayey
			7			4.5		trace clay, firm, blocky soil			į	glacial till to end of boring
				8		15		structure				
					8			4.0				
	3	5						Moist, faintly mottled, brown,	1.4'		oil	
_			7					gravelly (SILT) with 15 to) Bac	kfill	
5 —				11		18		25% gravel, trace very fine size sand, compact to very				
					12			dense, massive soil				
	4	8						structure to weakly thinly	0.4'			
			17					bedded				
				23		40						
					23					선 선		
	5	13							1.3'	프를 다 있다.		
			23									
				30		53						
					35							
10 —	6	17							1.8'			
			18							11.0		
				20		38				Bent		
					27			12.0		Se	eal	
	7	9						Moist, gray, gravelly	1.6'			
			12					(CLAYEY-SILT) with 15 to				
				20		32		25% gravel with occasional				
					26			cobbles, little to some clay, hard, with brittle		14.0		
	8	13						consistence, massive soil	1.6'	# 2		
			21					structure		Sa	ind	
15 —				25		46						
					27					16.0		
											otted	
							33			P\		
										Scri	een	
	9	39							0.9'			
00			19									
20 —	LC	G	GE	ΞD	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE 1	of 4	4



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							HOLE NUMBER:	VV	1G 16				
DA				17/1	5					/ation:			
PR	JJE	EC.	T: ˌ				Subsurface Investigation			arm			
			_					vright,					
PRI					_			Fisher Associates					
ВО	RIN	1G	LO	CA	TION	:	Northing: 870931.9700, Easting: 975718.6970						
SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING REMARKS	COMMENTS			
			22	27	41				2" Slotted PVC Screen				
25	21	26	31	35	57			1.5'	#2 Size Sand				
30	10	12	17	21	29		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'					
35	13	15	19	27	34			1.2'					
40	10 DG	15 GE	ED.	BY	: Da	ale M	Gramza / Senior Geolo	1.3'	PAGE 2 of	4			



HOLE NUMBER: www.natureswayenvironmental.com

DA		_		17/15	5					ELEV	/ATION:		
PR	JJI	EC.	T: ˌ				Subsurface Investigation			nit Wind F	arm		
								right,					
PRI					_				ciates				
BOI	RIN	١G	LO	CA	TION	:	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		
	0	12	19	24	34				WELL ,				
				22									
						-5		1.3'					
14	6	12						1.5					
45		12	20		32								
			20	19									
							Moist, gray, gravelly	1.4'					
15	6						(CLAYEY-SILT) with 15 to	1.4					
50		21	20		41		25% gravel with occasional						
			20	29			cobbles, little to some clay, hard, with brittle						
				23			consistence, massive soil						
						=	structure						
								4 5,					
16	10							1.5'					
55	-	20			52								
			32	32									
				32									
						- 4 -							
17	3							1.5'					
60		12						<u> </u>					
L(JG	GE	=D	BY	: Da	ale M.	Gramza / Senior Geolo	gıst	PAGE	3 of	4		



3553 Crittenden Road Alden, NY 14004 (716) 937- 6527

HOLE NUMBER: www.natureswayenvironmental.com

	TAC	E:	_	3/	17/1	5									/ATION:	
F	PRC)JE	EC.	T: ˌ			Subsurface Investigation for Arkwright Summit Wind Farm Arkwright, NY									
	DE	- D	۸Þ	ΕD	FO	D.										
							·	Fisher Associates Northing: 870931.9700, Easting: 975718.6970								
	SN	0/	6/ 12	12/	18/	N	LITH		AND CLASSIFICAT		REC	MONITOR	ING	REMARKS	COMMENTS	
		6	12	18 20	24			See Previo		1011	TEO	WELL	·	TCIVI) II (TO	GOIMMEITTO	
					24					<u>6</u> 1.0						
								Boring Con BGS	npleted at 61.0'	_					No Water at Completion	
								ВОЗ								
	-															
5 —																
o —																
O																
5 —																
	_															
0 —	LC	G	GE	ED.	BY	: Da	ile M.	Gramza	/ Senior Ge	eolo	gist	PA	AGE	4 of	4	



2/25/2013

Alden, NY 14004 (716) 937-6527

www.natureswayenvironmental.com

HOLE NUMBER:

TB 19

ELEVATION: 1773.83

3553 Crittenden Road

PROJECT:

DATE:

Subsurface Investigation for the Proposed Arkwright Summit

Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR:

Fisher Associates

BORING LOCATION:

						ION		· · · · · · · · · · · · · · · · · · ·				
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	KEWAKKS	COMMENTS
ı, l	1	1						Moist, dark brown (SILT)	1.2'		Cement /	Topsoil to 0.6 foot over
			3				7.5	ן topson with trace very line ו			Bentonite	
ľ	_			3		6		size sand, loose with			Grout	sediment with some clay
ŀ					7		200	occasional very fine size				to 4.0 feet over clayey
-			*****				ندوندون	roots	1.7'			glacial till to 10.0 feet over silty glacial (lodgement)
-	2	2						Extremely moist, faintly mottled, brown (CLAYEY-			:	till to end of boring
			6			13		SILT) with 3 to 5% mostly				tiii to end of borning
	.			7				fine size gravel, some clay,				
. [8		5	firm to stiff, blocky soil				
ľ	3	4					7.4.3	structure	1.9'		2" PVC	
1			8	\neg				Moist, faintly mottled, brown			Riser Pipe	
5-				12		20		(CLAYEY-SILT) with 5 to				
-				12			2.2	15% gravel, some clay, very				
-	_				17		244	stiff to hard with brittle	1.5'			
	4	8					是美国	consistence, massive soil	1.0			
			15	ļ	1	33	X Z	structure				
. [18		33	co - ve					
ľ					18			İ				
	5	4	-				卫兵科		2.01			
-			24				FE /E					
-			24		.,,	54	alar Marie Carr					
]_				30			2 4 4					
10-					28			10.0	4 ob	△	lo .	
``	6	9	ŀ					Moist, gray, gravelly	1.8			
. [\neg	17					(CLAYEY-SILT) with 15 to				İ
r		_		19		36	I A S	25% gravel, little clay, hard				
·		\dashv			19		322	with brittle consistence, massive soil structure				
-	7	6						massive son structure	1.9'		- Bentonite	
F	<u> </u>						_ *	in the state of th			Seal	
<u> </u>		_	19			46					io l	
				27			ĎŽĬ		-			
l.					28		·	•				
	8	11							2.0'	:: 	#2 Size	
ľ			25							15.	Sand	
15 +	7			32	\neg	57				l::===::1 ^{**}		
H	-				30		主意		:			
ļ												
F	+				—							
-	_						英型位					
]				27.25			:: 		
].
Γ	9	48							2.0'		2" 10 Slot	
		1	38		\neg				,		- PVC	
F	-			37		75					Screen	
-					40							<u> </u>
20	ㅗ	بلح			40			Crames / Saniar Casiar	~:~+			<u> </u>
L.	Ų.	()	عاد	U.	3Y.	υa	ie IVI.	Gramza / Senior Geolog	ગુારા	PAGE	<u> </u>	3



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

3553 Crittenden Road

HOLE NUMBER:

TB 19

ELEVATION: 1773.83

2/25/2013 Subsurface Investigation for the Proposed Arkwright Summit PROJECT:

Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR:

DATE:

Fisher Associates

SN	0/ 6	6/ 12	12/ 18	18/	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
	0	14	10	24			Moist, gray, gravelly			2" 10 Slot	
		-			•	un innerien	(CLAYEY-SILT) with 15 to			PVC	
							25% gravel, little clay, hard			Screen	
	-						with brittle consistence,				
		***************************************	~~~				massive soil structure		k:===::1		•
			Alma Tra area			ن عدد رُنْد. معارف		0.01		_#2 Size	
10	18							2.0'		Sand	
		28				र दं ह				Quild	
			38		66	X 2 2					
	1			36		4 300			25.0	,	
		·**				+ + 3			1	Well I	
	- -								WWW.	Installation	
	-									Completed at 25.0'	
						823				BGS	
	-										
	-					22.5					
			·			 		1.9'		Auger	
11	14							'		Cuttings	
		36		· · · · · · · · · · · · · · · · · · ·	74					1	
			38	inna marke		图 蒙 汇					
				40		4.44					
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,											
										1	
	<u> </u>					2.4%					-
M	1										
	 										
12	24			.,.,		122		1.7'			
		34				1.32		ļ	K()X()		
		34	20		72	٠, ٠,٠٠٠					
			38							-	
				-58							
	 			·							•
									KKKKK4		
	_					CAR					
13	24					7 7 7		1.5'			
	1	34									
	\top		36		70				K((X())	ļ	
	┼			46		4 - 4		1	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		



3553 Crittenden Road Alden, NY 14004 (716) 937- 6527

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HOLE NUMBER:

T B 19

ELEVATION: 1773.83

DATE: 2/25/2013 PROJECT:

Subsurface Investigation for the Proposed Arkwright Summit

Wind Farm, Arkwright, Chautauqua County, NY

PREPARED FOR:

Fisher Associates

BORING	LOCATION:
--------	-----------

SN	0/ 6	8/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
							Moist, gray, gravelly				
						3-1-1	(CLAYEY-SILT) with 15 to 25% gravel, little clay, hard				
							with brittle consistence,				
							massive soil structure				
						ria di Silanda Tanana					
						30		1.2		1	
14	28							1.2			
		38			70						
L	<u> </u>		32								
				36						-	
	1_										
	<u> </u>									ĺ	
	ļ										
-	\vdash										
	-										
<u> </u>	13			~~ 				1.6'			
-	113	22									
	├		32		54	\$ 5.5					
	 			36							
 	1	<u> </u>									
-	 		****								
	 			7		A 注:					
	1.										
								ļ			
						Ġ.		1.6'			
16	15							1.0			
		25			4,8	7					
	<u> </u>	_	23		,,5						
L.	ļ			32							
<u> </u> _	ļ			<u> </u>							
<u> </u>	<u> </u>										
<u> </u>	ļ		<u></u>	<u> </u>							
	-										
-	-	ļ		 -							
	1							1.7'			
17	11	21	 	<u> </u>		مار المطبق والمنا ماري المستقرف المنا					
	\vdash		21		42		Boring Completed at 60.0'				
-	+-			22			BGS 60.0	,	Sen of	,	
<u>Ļ</u>	7~		<u> </u>	BY	<u>, 6,</u>		. Gramza / Senior Geolo	raist	PAGE	3 of	3



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road * Elma, NY 14059

(716) 655-1717 * FAX (716) 655-2915 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, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/07/13 COMPLETED 03/08/13

DEPTH BLOWS ON IN FT SAMPLER

10B13

,	NFT		SAM	PLER				
	SN	0/	6/	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	REC	6	12	18	24			
	1	1						Extremely moist dark brown 3 (1) 4 INCH LOCKING STEEL
	16	,	1			6	×××××	SANDY-SILT) topsoil with 0 to 3% SANDY-SILT) topsoil with 0 to 3%
				5		В		gravel, little sand and organic matter, IN SMALL CONCRETE PAD
					7			trace wood fiber, very loose, granular
	2	2						soil structure, (ML). Coarse silty topsoil with little
	24		5				المراجع فراحا	0.8 sand and organic matter to 0.8
	27			7		12	N.O. 9	Extremely moist faintly mottled brown
					В		- 0	(DANDY STIT) with come mostly york
					1-2		6.40	fine to fine size sand, trace clay,
	-3-	8					000	compact, blocky soil structure, (ML).
5	_17		10_			19	[o` <u>`</u> o`]	clear transition to 2.5 Elect over shale bedrock to 29.3
	\vdash		ļ	9			 -0 a d	feet over all the body and the
					16		0. ¿ō	Extremely moist to moist dark brown gravelly (SAND-SILT-CLAY) with 15 to 30.0 feet over shale bedrock to
	4	7				ł	100 b-0	40% gravel, occasional cobble, little end of coring.
	20		7			16	0.0	sand, compact, massive soil structure,
				9_		ļ)	
					_14		2 (2)	(SM). grades downward to 8.0 Moist graylsh brown gravelly (SANDY-SILT) with 5 to 15% gravel, 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	5	10					9 (4)	3,555 tommard to
	24		14			33	O . P .	Moist grayish brown gravelly
				19			0	(SANDY-SILT) with 5 to 15% gravel, 0 (2) CDNCRETE (3) BENTONITE SEAL
10					29		. 6 6	9.0 feet with slight brittle consistence,
	6	15	<u> </u>				0 . 0 0 . 0	9.0 feet with slight brittle consistence, massive soil structure, (ML).
	17		36			64	0 . 0	[] ₹ [+ 11.0'
				28		•		
					39_		0. 00	clear transition to 12.3 S Note: Advanced bore hole with 4
	7	16					5	
	21		19			43	D:0 0:0	Moist gray gravelly (SAND-SILT-CLAY) with 15 to 40% 1/4 inch ID x 8 inch 0D hollow stem auger casing with
				24] "	0 0	(SAND-SILT-CLAY) with 15 to 40% stem auger casing with gravel, occasional cobble, little sand, trace to little clay, hard and very stiff to 18.0 feet and 5 foot sampling
					32		P 0 0:0	trace to little clay, hard and very stiff to 16.0 feet and 5 foot sampling
3.0	8	11						with slight brittle consistence, massive soil structure, (SC).
15	24	***************************************	12			26		soil structure, (SC). with a NG-2 size double tube
15			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	14		1 40	, o .	core barrel and diamond bit to 38.5 feet. A 2 inch PVC will be completed bore hole.
				1	17	1	0	38.5 feet, A 2 inch PVC
			<u> </u>		1	1	-02-0	observation well installed in the
			 	 		1	0.0	
				1		1	10000	No. 0 No. 0.
				┼──		1	a , jo	
			 	 	 	1	0.000	
	9	9_	<u> </u>	 	 	1	O . 50	
	22		11	<u> </u>		26	1000	
			 	15	ļ	-	O: 00	
20				<u> </u>	19		<u> </u>	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-21-13

SURF. ELEVATION 1712.22

10B13

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

LOCATION Northing: 872908.02 Easting: 970485.25

Town of Arkwright, Chautaugua Co., NY

CLIENT Eisher Associates

DATE STARTED 03/07/13 COMPLETED 03/08/13

DEPTH BLOWS ON IN FT SAMPLER

							,		· T ····								
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL		WATE	R TABL	E AND	REMAI	RKS	
}	15 Jake						<u> </u>	U-1-1 even errorally				(1)	10 SLO	T 2 INC	H PVC	SCR	FN
1							N 0 7	Moist gray gravelly				(1).0	NO SEC		,,,,	3011	
							- 50	(SAND-SILT-CLAY) with 15 to 40%	ļ	Ĵ.	1]	Note	: Augers	o laft in	af 28	5 for	.+
							0.000	gravel, occasional cobble, little sand,	10				, Augera v ground				
							P- 30	trace to little clay, hard and very stiff	1	. ≘]]						'
		ļ					200 d	with slight brittle consistence, massive	1.	.	1.54		re hole		1013/	0/13	
								soil structure, (SC).		١-		prior	to corii	ng.			
					-		10 0 O	23.4		4							
	_10	_39						O									
	10		10074					Gray apparent shale bedrock, very	$[\cdot]$.}—	[: .]	← 24	.0'				
								soft and soft with occasional thin									
								layer of moderately soft rock.	1.	.		Note	; No wa	ter loss	to fo	rmatic	חכ
25—							=====		1				g coring				
										·			approxi				
							F====			1	1:1		r to for				
									1.	1					_		
										ı in	Α, .						
									1	SCREEN	SAND PACK	EDI	Bedrack	k Hardr	ess Ci	assifi	cation
						1				ો	9.						
					-	ł		28.5		, S	퀻	Verv	soft: c	an be s	easiiv	crush	ed
	الم	100/1			 			, A.				. +013		en fing			-
	71					ļ		Gray shale bedrock, moderately soft,		- ₫	Ш.			ateriai.	CIO all		
								, highly fractured horizontally along		2 INCH PVC	9	Coff	can be		ad be	woon	
						1		bedding planes, thinly bedded to			2.	3011		s into s			
30-	-	 	-			1)\ banded, dense.		SLOT	#00N SIZE MORIE			ome ef		Collai	
						1		clear transition to 29.3	3 .	, <u>2</u>	S					- t - h -	
	Щ.				 	l			1.	용	g.	MOGE	erately			etone	·u
		Run	#1				E	Gray siltstone bedrock, medium	.		# .			ingerna			
							E	hardness, slightly fractured			1,,	Medi	um hard			easii	У
						1		horizontally along bedding planes,	1.		, ,		etche	d with I	inite.		
_						i		slight iron stained and pyrite deposits,		1	3.5						
	1					1	=====	banded, slightly porous.		1	· ·						
	<u> </u>		ļ		 	-		30.0) :	1	1.						
				<u> </u>				0 2 -1- 1- 1- 111	1	`—	٠٠٠	+ 34	1.0'				
	V		1	ļ	1		F	Gray shale bedrock, moderately soft	Ţ,								
	1		1			1	=====	with occasional thin layers of soft and				Run	Depth	Length	n Rec	Rec I	RGD
35—	\vdash	\vdash		_	+-	1		very soft rock, moderately to highly		·· ' ·	• •	#	(ft)	(ft)	(ft)	%	%
	 		 	 	-	4		fractured horizontally with slight iron									
				L		4	=====	staines in some rock, very highly	'	٠. ٠	٠		28.5				
		Run	#2		<u> </u>]	F====	fractured 32.8 to 33.5 foot depth,	1	4		1 1	to	6.0	5.8	97	31
			Ţ				FEET	occasional highly fractured and broken	· ·	٠, ٠,		'	34.5				
		 	1		1	1		zone 1/2 to 3 inches thick, thinly		· · · ·							
	 	 	 	 	 	1		bedded to banded, porous.	1.:		,		34.5				
		 	ļ		 	4		38,5	<u>.</u> .	• • • • • • • • • • • • • • • • • • • •		2	to	4.0	3.7	93	38
	×		<u> </u>		1	_	======		·		•••	1 2	38.5	4.0	5.1	93	JO
]		_		L	}		Coring completed at 38.5 feet.					20,0				
			T		1]			-								
	 	 	 	 	1	1			1			← 38	3.5'				
40		<u> </u>	<u> </u>	L		1		······································									

N=NUMBER OF BLOWS TO DRIVE 2 * SPOON 12 * WITH 140 1b. WT. FALLING 30 * PER BLOW LOGGED BY Brian R. Bartron, Geologist, (mw) SHEET 2 OF 2



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 * FAX (716) 655-2915 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, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/01/13 COMPLETED 03/04/13

BLOWS ON DEPTH SAMPLER IN FT

10B13

. [SN	0/ 6	8/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
Ľ	REC						***********	5 1000 5
Į	1	1					 	Extremely moist dark brown
	17		1					Extremely moist dark brown (SANDY-SILT) topsoil (disturbed) with
ľ						4	* ***********************************	3 to 7% gravel, little sand and organic
				3			4 0 4 0	matter, very loose, weakly granular soil
ļ					7_		0 0	76 1561 1563
	2	6					0	
	24		8				g v	(ML). PROTECTIVE CASING INSTALLED
				8		16		0.9 IN SMALL CONCRETE PAD
ŀ				B			0.00	The state of the second factority model and the second sec
					_8			Extremely moist to wet faintly motited (3) BENTONITE SEAL
	3	4_					0 . 0 0	brown (SANDY-SILT) with 5 to 10%
_ [16		5			1,5		gravel, little mostly very fine to fine
5—			V_	5		10	3 , 0 W, 10	size sand, trace clay, very loose,
				 -2 -	<u> </u>	1]) weakly blocky soil structure, (ML). [대한 토 전환]
				ļ	-6		4 6 6	1.5 📅 🖰 🖰 6.0'
, s	4	4					[e / e /	1.5
	24		5				2 0 0	Extremely moist to moist distinctly mottled brown (SAND-SILT-CLAY) with 3 to 7% gravel, little sand and clay, stiff, blocky soil structure,
				6		11	,	il mottled brown (SAND-SILT-CLAY) 기급 등[
				0			9 0 9 0	ik with 3 to 7% gravel, little sand and
			ļ		11	ļ		i; clay, stiff, blocky soil structure,
	5	3_		ļ		j	<u></u>	봅 (ML-CL)
	19		5			16		(ML-CL). Grades downward to 2.0 1
				11	Ĭ] ,	60.00	- (L
			 			1	100	Extremely moist brown (SANDY-SILT)
10					20	1	P. S. S. A.	with 5 to 15% gravel and flat sided Note; augers left at 23.0 feet
	6	20_		ļ		1	Log of	is stone fragments, little sand, trace
	17		15			26	6. 0. 1	l clay, compact, massive soil structure, feet below ground surface
				11		-	1000	(ML). morning of 3/4/13.
				 	18	1	0.00	grades downward to 6.0
		-	 		l C	1	0000	
	7	_29_	ļ	 		1	0.00	Extremely moist to wet brown.
	21		27			47	0000	(SAND-SILT-CLAY) with 5 to 15% [[] [] [] []
				20]	0.000	Extremely moist to wet brown (SAND-SILT-CLAY) with 5 to 15% grayel and flat sided stone fragments, [Ithle cond clay stiff massive soil
		ļ			21			
		7.	 	1	1	1	0000	L, structure, (ML-CL).
	8	11	 	 	 -	1	0.00.0	
15—	20	ļ	14_		 	31		9.5 Surprise to wet grayish brown Surprise to wet grayish brown Surprise to the state of the sta
		<u> </u>		17	<u> </u>	1	4 . 9	TExtremely moist to wet grayish brown G 🔀 🔀
	1 -	1	1		18		0 0	gravelly (SILTY-SAND) with 15 to 25%
				1]	6 6	gravel, very fine to very coarse size
		 	 	 	+	1	0.00	sand, little silt, compact and dense, 공 등 공 기계 등 기계 등 기계 등 기계 등 기계 등 기계 등 기계
		 	-	-	 	-{	6 . V	gravely (SILIY-SAND) with 15 to 25% gravel, very fine to very coarse size sand, little silt, compact and dense, stratified, (SM).
			1	.		1	0.00	
					<u> </u>	_		
	9	25				1		L SECTION TO SECTION T
	24	+ = -	140	\top	1	1		
	124	 	46	 	+	103		
			<u> </u>	57		4	1,000	
20	L		<u> </u>	<u></u>	63	┸	0.00	See next sheet.

* SPOON 12 * WITH 140 D. WT. FALLING 30 * PER BLOW N=NUMBER OF BLOWS TO DRIVE 2_ SHEET 1 OF 3 LOGGED BY Brian R. Bartron, Geologist. (mw)



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road « Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 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, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/01/13 COMPLETED 03/04/13

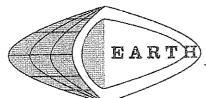
DEPTH IN FT

10913

BLOWS ON SAMPLER

	T34 L I		UAMI	LEN						
•	sn REC	0/ 8	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 soll structure, (ML). grades downward to 18.0	(1)	(1) .010 SLOT 2 INCH PVC SCREEN (2) #00N SAND MORIE SAND PACK
	_10 10	67	100/5					Extremely moist gray gravelly (SANDY-SILT) with 15 to 40% gravel, occasional cobble, little sand, very dense with brittle consistence, massive		← 24.0'
25—								soil structure, (SM).		Coarse slity topsoil with little sand and organic matter to 0.9 feet over coarse slity slack water sediment with little sand, trace gravel to 1.5 feet over slity
	11 20	61	70			153				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
30				83	100/4				TO THE TENTON	feet over water sorted and deposited sand with little to some gravel, little sllt to 14.4 feet over loamy glacial till to end of boring.
	12 24	19	35			78			Egyitatho.	Note: Advanced bore hole with 4 1/4 inch ID x 8 inch 0D hollow stem auger casing with continuous split spoon sampling
35—				43	47					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								
5	22		33	29	20	62				

N=NUMBER OF BLOWS TO DRIVE 2_ " SPOON 12 " WITH 140 Ib. WT. FALLING 30 * PER BLOW SHEET 2 OF 3 LOGGED BY Brian R. Bartron, Geologist. (mw)



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

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PROJECT Arkwright Summit Windfarm - Wind Turbine Project

LOCATION N: 876575.39 E: 970354.73

Town of Arkwright, Chautaugua Co., NY

CLIENT Eisher Associates

DATE STARTED 03/01/13 COMPLETED 03/04/13

DEPTH

10B13

BLOWS ON

IN FT SAMPLER

1	SN REC	0/ 8	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
<u></u>	110							Extremely moist gray gravelly		
							o vo	(SANDY-SILT) with 15 to 40% gravel,	P. A. A.	
							000	occasional cobble, little sand, very		
Γ							0 0	dense with brittle consistence, massive		
Ī							0.0.0	soil structure, (SM).	原 》并7.并7	
							0 0			
	14	100/5					000			
٦	5	14.11.12					0 0			
ı	<u></u>						0000			
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}	_15	25	ļ			ł	000		(A) (A) (基)	
-	24		32	<u> </u>		73	0.00		14. 4. 14. 14. 14. 14. 14. 14. 14. 14. 1	
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	16	24			<u> </u>]	0 00			
	24		36			55	0.00			
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	17	23	 	-	+	┨	0 0			
	22	 	29	-	+	70	000			
		 	 	41		-	0 0			+ 60.0'
30				<u>L</u>	39		ممصا	Boring completed at 60.0 feet, 60	.U <u>[\$1,285,285]</u>	1 + 00.0

* PER BLOW " SPOON 12 " WITH 140 15. WT. FALLING 30 N=NUMBER OF BLOWS TO DRIVE 2_ SHEET 3 OF 3 LOGGED BY Brian R. Bartron, Geologist, (mw)



Soil and Hydrogeologic Investigations * Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. WIG-27-15

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878074.95842800000

Town of Arkwright, Chautaugua Co., NY

Easting: 976628.66398300000

CLIENT Fisher Associates

DATE STARTED 05/19/15

COMPLETED 05/20/15

BLOWS ON DEPTH IN FT SAMPLER

	SN	0/ 6	6/ 12	12/	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(D) Z	WATER TABLE AND REMARKS
	1	2	1					7. Evilopment model wheat blook and		← 0.5'
	16		-3		1	7		Extremely moist mixed black and reddish brown (MUCK), granular soil	3-3-3	e 0.5
				4] '	0.00.0	structure, (OL).	~ ~ ~ (a)	
					6		0 60 6	H .	0.4 5 5	÷ 2.0'
	2	6					4. 4.			- 2.0
1	20		7			14	2000	Extremely moist highly mottled brown (SANDY-SILT) with little sand, loose,	200000	
1	LE 4			7		14	0.00	blocky soil structure, (ML).		(1) TOPSOIL FILL
1					12		0000	With the second		(2) CONCRETE
	3	9					0.0	1		
	18		9			18	200	Extremely moist faintly mottled brown		Note: WTG-27-15 drilled 12.0 feet
				9		1 10	0.00	(SILTY-SAND) with 3 to 7% gravel, very fine to very coarse size sand,		east of new staked location.
			-	-	9		000	li little silt, loose, blocky soil structure,		SSS. VI Hell Stated loodfoll
	4	10					0, 0	(SM).		
	8		6			1	0000	grades downward to	2.5	Organic muck surface to 0.4 feet
1				7		13	0-00	L		over coarse silty slack water
1					5	1	-00 O	Extremely moist brown gravelly (SAND-SILT-CLAY) with 15 to 40%	\$5.55	sediment with little sand to 1.0
1	5	2			1	1	0.00	gravel, very fine to very coarse size	- F3 #3 #3	feet over water sorted and deposited sand with little silt,
1	20		4				0.00	sand, little silt and clay, compact,		trace gravel to 2.5 feet over
1				4		8	- 0	stratified, (SC).		water sorted and deposited sand
1				-	4	1	0 0 9	clear transition to	4.5 一 一 章	with little to some gravel, little
1	6	5				1	ond	Extremely moist faintly mottled brown	4.5 THE STATE OF T	silt and clay to 13.0 feet over
1	16		5				0 0	gravelly (SAND-SILT-CLAY) with 15 to	₩.	water sorted and deposited
1			-	6		11	000 C	30% gravel, little silt and clay, very	59	coarse silt with little to some
1				-	11		0.00	stiff, stiff below 8.0 feet, weakly	TINGS.	gravel and silt to 15.0 feet over loamy glacial till to 18.0 feet over
1	7	8	-		1		-0 0 O	stratified, (SC).	5	water sorted and deposited
1	12	0	9				0.00	clear transition to	13.0	coarse silt and gravel, some sand
1			-	4		13	000	Extremely moist to wet faintly mottled		to 28.0 feet over water sorted
1				-4	6		0000	olive grayish brown gravelly		and deposited sand with some
1	8	3			0	1	0000	(SANDY-SILT) with 15 to 40% gravel,	T-17-75	gravel, little to some silt to 33.0
1	18	3	6				0 0	little to some silt, compact, weakly		feet over silty slack water sediment to 43.5 feet over water
1	.5		0	11		17	2 62	stratified, (SM).		sorted and deposited sand and
1				111	13		0.00	grades downward to	15.0	gravel to 48,5 feet over silty
1			-	-	13	1	2000	Extremely moist faintly mottled olive		slack water sediment with little
1						1	0.000	grayish brown gravelly		clay to 53.0 feet over water
1							1000	(SAND-SILT-CLAY) with 15 to 40%	Tarta ta	sorted and deposited sand and
+					-		0 0	mostly subangular gravel, little sand		gravel to 58.0 feet over water
1				-		1	V 60	and clay, very stiff, massive soil		sorted and deposited sand and
-	9	22			-		000	structure, (SC).		gravel with little clay, trace sand to end of boring.
1	12	-	45			89	0.00	grades downward to	18.0	to end of pointy.
				44			000	A. 1650 best 12 12 62		
					46		V OV	See next sheet.	11 14 14 14 14 14 14 14 14 14 14 14 14 1	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road + Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-27-15

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

SURF. ELEVATION __

LOCATION Northing: 878074,95842800000

Easting: 976628.66398300000

Town of Arkwright, Chautaugua Co., NY

DATE STARTED 05/19/15 COMPLETED 05/20/15

DEPTH BLOWS ON IN FT SAMPLER

CLIENT Fisher Associates

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							00000	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,		Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below
	10 8	11	51	29		80	0000	stratified, (SM), (GM).		with auger with 5 foot interval sampling to 60.0 feet.
				78	19		0000			
								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
	11	10	13	13	15	26	0000	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	BACKFTLUT	ground surface.
					15			some silt, compact, stratified, (SM).	CUTTINGS.	
							0000	grades downward to 33.0		
	22	13	12	17		29		Extremely moist olive gray (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
E					19					
			1-1							
	13 24	9	10	15		25	72 72 72 72			
İ				10	18		4849			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-27-15</u>

SURF, ELEVATION LOCATION Northing: 878074.95842800000

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

Town of Arkwright, Chautaugua Co., NY

Easting: 976628,66398300000

CLIENT Fisher Associates

DATE STARTED 05/19/15 COMPLETED 05/20/15

BLOWS ON DEPTH SAMPLER IN FT

	SN	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).			
								Still, thinly laminated, (ME-GE).			
	14	7						grades downward to	43.5		
	24		13	18		31	000	Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded			
				18.	19		0.00	gravel, fine to very coarse size sand, dense, stratified, (SW), (GW).			
							0.60	delise, stratifica, tany tany		+++	
	H						0.00				
							0.00				
	15	21					0.00		48.5 -		
	24		10	11		21		Extremely moist olive gray (CLAYEY-SILT) with little clay, very		<u>E</u>	
					13			stiff, thinly laminated, (ML-CL).		TINGS, BACK	
							7. 7.				
							T_ T_				
							7-7-		53.0		
	16 18	23	29			55	0.00	Wet olive gray very gravelly (SAND) with 40 to 60% mostly subrounded			
				26	31	00	0.00	gravel, fine to very coarse size sand, very dense, stratified, (SW), (GW).			
					- 31		0.00				
	744						0.00				
							0000	TOTAL AND AND SOUTH A LO			
	17	18					2000	grades downward to	58.0		
-	14	10	20			47	0.00				
				27	34		0.00	See next sheet.			← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-27-15</u>

10B13a HOLE NO. WI

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878074.95842800000

Town of Arkwright, Chautaugua Co., NY

Easting: 976628.66398300000

CLIENT Fisher Associates

DATE STARTED 05/19/15 COMPLETED 05/20/15

SN	0/ 6	6/	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.		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-28-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878892.06456300000

Town of Arkwright, Chautaugua Co., NY

Easting: 975917.87107000000

CLIENT Fisher Associates

DATE STARTED 05/14/15 COMPLETED 05/15/15

DEPTH BLOWS ON IN FT SAMPLER

SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(D)3	WATER TABLE AND REMARKS
-	2				9	0.0	V was the second second		1 mm
24			-		9	9 9	Extremely moist dark reddish brown	3 3 3	← 0.5'
		-4	8		10	a	(MUCK), granular soil structure, (OL).	< 3 < 3 Q3	
			- 0		4	0 2 0	0.2	1	
1.5	321			10		200	Extremely moist distinctly mottled olive		← 2.0'
2	10		-	-	6	200	brown (SANDY-SILT) with 5 to 10%		/N ====== == == == == == = = = = = = = =
22		- 11			19	505	gravel, little sand, trace clay, loose,		(I) TOPSOIL FILL
-			8	-	5	000	blocky soil structure, (ML).		(2) CONCRETE
-			_	9	1	ا می د	grades downward to 0.7		Note: WTG-28-15 drilled 14.0 fee
3	5				þ.	000	Extremely moist faintly mottled olive	H. A. A.	west, southwest of staked
12		3_			8	2.00	brown (SAND-SILT-CLAY) with 10 to	State Court	location.
			5		2	000	15% gravel, little sand and clay, stiff,		votoria.
				5	1	000	blocky soil structure, (ML-CL) tending	4.4.4	Mucky surface to 0.2 feet over
4	3				6	ر م د	towards (SC).	N	coarse silty glacial drift with
14		4			10	000	grades downward to 1.8	7-17-17	little sand, trace clay to 0.7 feet
7			6		10 8	Q .	<u> </u>	2000000000	over silty glacial drift with little
			-	5	1	000	"Extremely moist distinctly mottled olive "Drown gravelly (CLAYEY-SILT) with 15	17 77 78	gravel, sand and clay to 1.8 feet
5	2			-2	U.S	0	" to 40% mostly subangular gravel, little		over silty glacial drift with little
16		2			1	000	clay, trace sand, very stiff with nearly		to some gravel, little clay, trace
10		-2	2.1		5	00	" vertical gray desiccation cracks,		sand to 3.0 feet over silty
			3		2	000	iii (ML-CL).	4. 4. 量.	glacial drift with little to some gravel, little to some clay, little
			_	2		000	grades downward to 3.0	F. F. BAOKETHI	sand to 5.5 feet over silty glacia
6	2				2	000	jj	Đ	drift with little to some gravel,
16		3			8	0	"Extremely moist distinctly mottled olive	<u></u>	little sand and clay to 8.0 feet
			5		5.	000	grayish brown gravelly	7 - 7 111NG\$	over water sorted and deposited
				9	C	ا مے د	(SAND-SILT-CLAY) with 15 to 40%	一、一、 是。	coarse silt with little to some
7	2		-		5	000	mostly subangular gravel, little to some		gravel, some sand to 11.0 feet
20		3			8	00	riclay, little sand, very stiff with nearly vertical gray desiccation cracks,		over silty glacial drift with little
1077			5		1	000	(ML-CL) tending towards (CL).	4.4.4.	to some gravel, little sand and
100	11 -			8	2	0-0			clay to 13.5 feet over silty glacia
8	5					20.4	grades downward to 5.5	Terraria	till to 28.0 feet over loamy
18	- 0	9			2	0.00	Extremely moist distinctly mottled olive		glacial till to 33.0 feet over
		9	12		21	0	brownish gray gravelly		clayey glacial till to end of boring.
			12	10	3	000	(SAND-SILT-CLAY) with 15 to 40%	13 73 73	ourning.
				12	C	- 0	mostly subangular gravel, little sand		Note: advanced bore hole with 4
						000	and clay, stiff, massive soil structure, (ML-CL) tending towards (SC).		1/4 inch ID x 8 inch OD hollow
				-	Q	0	되게 되지 않는데 가게 가장이 얼마가 어느라지 않는데 가게 되었다.	+3.42.43	stem auger casing with
					3	00-0	grades downward to 8,0	100 mg	continuous split spoon sampling
		1			O	0 0	A STATE OF THE PARTY OF THE PAR		to 16.0 feet. Continued below
9	2				5	0.00		LE EXET	with auger with 5 foot interval
18	1	9	117		19	ا می د			sampling to 60.0 feet.
		1-14	10			00.0			
			-	13	ė	00	See next sheet.	2002000	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-28-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878892,06456300000

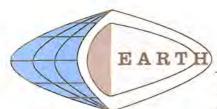
Town of Arkwright, Chautaugua Co., NY

Easting: 975917.87107000000

CLIENT Fisher Associates

DATE STARTED 05/14/15 COMPLETED 05/15/15

	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	14			32	ō;ō ≻o;o o;o ro;o	Extremely moist faintly mottled olive brownish gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand		
25—				18	25		0 0 0 0 0 0	and clay, stiff, massive soil structure, (ML-CL). 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		
	_11	9					0000	below 23.0 feet, massive soil structure, (ML-CL).		Water level at 28.0 feet below ground surface at completion.
	18		22	16		38	0000	grades downward to 28.0 Extremely moist to wet olive gray	F F F BACKF3LL	
30—					9		000	gravelly (SANDY-SILT) with 15 to 40% mostly subangular gravel, some sand, dense, massive soil structure, (SM).	T. T. T.	
									5 	
							LOAD	grades downward to 33.0		
	12 17	3	6			18	0-0-0	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		Augers left in bore hole over night at 38.0 feet, water level
				12	15	10	000	subangular gravel, some clay, trace sand, very stiff, hard below 38.0 feet,		the next morning was 33.4 feet below ground surface.
35—					10		000	massive soil structure, (CL).		
							0-0			
										Noticed harder drilling at 36.5 foot depth.
	13	20					000			
	6		31			75	0 0			
40				44	49		000			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-28-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878892.06456300000

Town of Arkwright, Chautaugua Co., NY

Easting: 975917.87107000000

CLIENT Fisher Associates

DATE STARTED 05/14/15 COMPLETED 05/15/15

DEPTH BLOWS ON IN FT SAMPLER

SN REC		6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
1 1-1						0	Extremely maint alive grow groupily	F25-F2	
5 6				-		200	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		
						000	subangular gravel, some clay, trace		
						0	sand, very stiff, hard below 38.0 feet,	EX EX EX	
						000	massive soil structure, (CL).		
1	_					0_0		13/5/5/	
	1 12					000			
14		7.5				00		\$ 1.00 m	
17	+	18			44	000		13/45/53	
_			26	100		0 0			
	4			30		000			
	-					0-0		134343	
				4		000			
						0_0			
		-				000		一种	
				1 1		200		38.08.08	
						200			
15	11					000			
22		15		-	20				
	-	10	24		39	000		一	
			- 24	27		0-0		BACK	
-				21		000		SS	
-	+	-				0 0		十. 一. 喜	
-	+		-			000			
_						0_0			
						0.0			
	_					0-0-			
						000		1000	
16						00			
24		18			45	TO OTO		350,350,350	
	1		27			0-0-			
1				33		7000			
						-0-			
					11,	240		F-1, F-1, F-1	
	-	1				000		17.37.37.75	
-						£ 5			
						000			
	1	-				0 0		2000	
£140	- 44					000			
17	11	6-	_			00-			
10	+	18			40	000			
-	-		22			0.0		一样多样的专 点	
				29		nan	Boring completed at 60.0 feet.	30.0	← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-29-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975325.27511400000

CLIENT Fisher Associates

DATE STARTED 05/13/15 COMPLETED 05/13/15

SN	0/	6/	12/	18/		LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
REC	6	12	18	24	N	LIII	(1) 3
NLC	2						
	7	_				4 4	Extremely moist black (MUCK) topsoil,
22		2	207		4	9 0 9 0	granular soil structure, (OL).
72			2			0 0	0.2 3 = 3 = 3
				4		0000	Extremely moist faintly mottled olive 2.0
2	7		-			00.0	Brown (SANDY-SILT) with 5 to 10%
18		7			12	من ۵	gravel, little sand, very loose, blocky (1) TOPSOIL FILL
			5		2750.	0000	soil structure, (ML). (2) CONCRETE
				6		0.00	grades downward to 1.0
3	3					0000	1 [N:VA:VA:VA:VA:VA:VA:VA:VA:VA:VA:VA:VA:VA:
18		4			7	702	Extremely moist faintly mottled olive brown (SAND-SILT-CLAY) with 5 to West of staked location.
			3		1	0 0	1 10% gravel, little sand and clay, soft,
				6		000	blocky soil structure, (ML-CL). Organic rich topsoil to 0.2 feet
4	3					ا مر م	grades downward to 2.0 over coarse silty glacial drift
14	7	8				Lond	with little sand, trace gravel to
14		- 0	6		14	0 0	Extremely moist distinctly mottled olive 1.0 feet over silty glacial drift
		-	0			-00-Q	brown gravelly (SAND-SILT-CLAY) with little sand and clay, trace
	_			8		0 00	with 15 to 40% mostly subangular gravel to 2.0 feet over silty
5	7					5.00	gravel, little sand and clay, stiff with
22		6			12	S. S.	nearly vertical gray desiccation gravel, little sand and clay to 4 gravel, (ML-CL).
			6			000),
				4_		0,60	grades downward to 4.5 little to some gravel, little clay,
6	5					0000	Extremely moist distinctly mottled olive Gravish brown gravelly Gravish brown gravelly Gravish brown gravelly
20		10			51	0.00	grayish brown gravelly with little gravel to 9.0 feet over
			41		700	-000 d	(CLAYEY-SILT) with 15 to 40% mostly silty glacial drift with little to
				86		0,00	subangular gravel, little clay, trace some gravel, little sand and clay
7	16		1153			F0 0 0	is sand, firm, stiff below 6.0 feet with
21		18			34	200	oracke (MI -CI)
			16		34	20.4	Mili some sit to 20.0 feet over
			10_	18	1	0000	grades downward to 8.5 water sorted and deposited sar
8	5			10		0.0	Wet faintly mottled olive grayish brown and gravel to 38.0 feet over
20	J	10				0000	(SAND) with 10 to 15% gravel, very fine loamy glacial till to 43.0 feet over silty glacial till to 53.0 fee
20		10	13		23	ō , o	to very coarse size said, loose,
			13	ir.		-0 A O	boring
				15	12	0.00	9.0
-						000	Extremely moist to wet distinctly
						0.00 0.0	mottled olive grayish brown gravelly Note: advanced bore hole with
			_			0.00	(SAND-SILT-CLAY) with 15 to 40% 1/4 inch ID x 8 inch OD hollow
						ا .00	gravel, little sand and clay, stiff, hard stem auger casing with
9	5					00.0	below 10.5 feet, massive soil structure, continuous split spoon sampling
12		13			27	0.00	(ML-CL). to 16.0 feet. Continued below
			14		- '		clear transition to 12.5 with auger with 5 foot interval
				19	1	0	sampling to 60.0 feet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-29-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975325.27511400000

CLIENT Fisher Associates

DATE STARTED 05/13/15 COMPLETED 05/13/15

DEPTH BLOWS ON SAMPLER IN FT

-	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
-							0.00	Extremely moist olive gray gravelly		
\vdash	\dashv		-	-			0,00	(SAND-SILT-CLAY) with 15 to 40%	F. F. F.	a
+		-					0000	gravel, little sand and clay, very stiff,		
H	\rightarrow	-					0-00	massive soil structure, (ML-CL).		
+							0- 0- Y		tartarta	
-	3420				_	ł	-0°+0	grades downward to 23	3.5	
	10 24	18	28				2000	Wet distinctly mottled olive brown very		
t	24		28	30		58	000	gravelly (SILTY-SAND) with 40 to 60%		
t				_50_	32	1	0000	mostly subrounded gravel and	+1.4.4	
\dagger					- 02	İ	0000	occasional cobble, very fine to very	这个这个这个	
						1	0000	coarse size sand, some silt, very dense, stratified, (SM), (GM).		
	3.5						0000	dense, stratified, 1011/1, 1011/1.		
]	0000		4,4,4,	
]	0000			
							500 d	grades downward to 28	"···	
	11	8					0.00	Wet olive gray very gravelly (SAND)	片 、片、有	
-	22		12			25	0:00:	with 40 to 60% mostly subrounded gravel, medium to coarse size sand,	~. 工 宣	
-	_			13			6.0.0	compact, dense below 33.0 feet,	I I BACKI	
4	_				15	-	0.00.	stratified, (SW), (GW).		
-						-	20.00			
-		_				1	0,00			160
+	\dashv	-				1	0:00:		[-: -: B·	
H	-	====		-		1	6.0.0		F. A.	
+	$\overline{}$	11-00	-		-	1	0.00.			
H	12	16				İ	55.05			
t	13	10	16			1	0.00			
	100		10	17		33	0:00:		PERFE	
					16	1	6.9.6			
						1	0.00.			
							50.5		F3.73.73	
							0.00			
							0:00:			
						ļ	6.9.0	grades downward to 38	30 5	
L						[0.00.			
	13	6					000	Extremely moist olive gray gravelly		
1	19		12			35	0 00	(SANDY-SILT) with 15 to 40% mostly subangular gravel, little sand, dense,		
-				23		1	0000	massive soil structure, (ML).	#3.#3.#3	
L					41		0.00	1,100	400 0 VO 0 VO	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 10B13a HOLE NO. <u>WTG-29-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 879800.62571900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975325.27511400000

CLIENT Fisher Associates

DATE STARTED 05/13/15 COMPLETED 05/13/15

	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,	0.7% 111 121 131		
							0 00	massive soil structure, (ML).	9		
9							000	grades downward to	43.0	H. H. H.	
	14	- 5					<u> </u>	Extremely moist olive gray gravelly		-, -, -,	
	22	.,	22			62	0.9	(SAND-SILT-CLAY) with 15 to 40%			
				40		02	000	mostly subangular gravel and	108		
45-				— PROBENIUS	39		0.00	occasional channer, little sand and clay, hard, massive soil structure,			
70							F000	(ML-CL).	į		
	_						-0 0 0				
					2.707.W		0 0				
							0000			f - f - f - f	
-			-		-	1	0.00				
		27					0.07				
	15 11	-21	100/5				000				
			10070				0. vo			-	
50-							F000			T. T. T. T. T. T. T. T. T. T. T. T. T. T. T. T. T	
							0.000			NGS	
							0.00				
							000			^- ^- 큥	
			-	_			0 0			-, -, -,	
> 				1000			0.0	grades downward to	53.0		
	16	5						Extremely moist olive gray gravelly			
	14	5	12			20		(CLAYEY-SILT) with 15 to 40% mostly			
			,,,	26		38	0000	subangular gravel, some clay, trace		-, -, -,	
55_					47		0_0	sand, hard, massive soil structure, (CL).	1		
-							000	(OL)			
							0 0 0				
							$\stackrel{\sim}{=}$			4.4.4.	
				_			000		3		
_	-						0.00				
	17		-						0		
8	17 18	8	21				000		į.	4.4.4.	
			- 21	33		54	0_0				No water at completion.
60					54		000	Boring completed at 60.0 feet.	60.0		← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-30-15</u>

HULE NU. WIG-30-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878937.56650800000

Town of Arkwright, Chautaugua Co., NY

Easting: 973257.56541700000

CLIENT Fisher Associates

DATE STARTED 04/06/15 COMPLETED 04/07/15

DEPTH BLOWS ON IN FT SAMPLER

	NFI		SAM	IPLEK						
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL WELL	WATER TABLE AND REMARKS
	1	2					·	Eutropoly moist dark brown mucky		← 0.5'
	22		2			_		Extremely moist dark brown mucky (SAND-SILT-CLAY) topsoil with some	3-3-3	. 0.5
				7		9		organic matter, little sand and clay,	(
					9		5 5 h	soft, granular soil structure, (ML-CL)	137518	. 0.01
	2	8			- 5		000	tending towards (OL).	中文中文学 《	← 2.0'
-	15	_8_	7				0.00	0.6		Augers left in bore hole over
	15			-		12	0.000	A 10 St 10 S		night at 25.0 feet, water level
				5			0.0	Extremely moist faintly mottled olive		the next morning was 1.2 feet
			-		10		man.	brown (SAND-SILT-CLAY) with little sand and clay, stiff, blocky soil		below ground surface.
	3	2	-	-			0000	structure, (ML-CL).	1-1	172
5-	16		3			9	0 00	1.7		(1) TOPSOIL FILL
				6			0000	1.7		(2) CONCRETE
					8		0 00	Extremely moist faintly mottled olive	<i></i>	
	4	9					000	brown gravelly (CLAYEY-SAND) with		Note: WTG-30-15 drilled 1.0 foot
	6		11			24	000	15 to 40% mostly subrounded gravel,		east of staked location.
				13			ا م م	fine to very coarse size sand, little	户,户,户 ,	Silty topsoil with some organic
					10		000	clay, trace silt, stiff, weakly blocky soil structure, (SC).		matter, little sand and clay to
	5	5			-38500		000	U. 1002 % 61		0.6 feet over silty glacial drift
	22		7			1,0	0000	4.0	L. L. L.	with little sand and clay to 1.7
				11		18	0000	Wet faintly mottled olive brown gravelly		feet over water sorted and
					13		0 00	(SANDY-SILT) with 15 to 40% mostly	L L L	deposited sand with little to
10—	_	7			13		0000	subrounded gravel, little sand, trace		some gravel, little clay, trace silt
	6						0 0	clay, compact, weakly stratified, (SM)	BA	to 4.0 feet over water sorted
	10	-	25	-		39	0000	tending towards (ML).	55.	and deposited coarse silt with
			_	14	7225	-	0 0	6.5	I	little to some gravel, little sand,
		-	_		18	1	000	Extremely moist distinctly mottled olive		trace clay to 6.5 feet over water
_	7	10		-			0-0-	brown gravelly (SAND-SILT-CLAY)	ರ.	sorted and deposited sand with little to some gravel, little silt
	20		12	-		24	0.00	with 15 to 30% mostly subrounded		and clay to 8.0 feet over coarse
				12			۵ کی	gravel, little sand and clay, very stiff,		silty water sorted and deposited
					25	ļ	0.00	weakly stratified, (SC).		sediment with little to some
	8	9					0-00	grades downward to 8.0		gravel and sand, trace silt to
15—	12		8			16	000 d	Extremely moist distinctly mottled olive	tototo	12.5 feet over silty glacial till to
.0				8] "	0.00	brown gravelly (SANDY-SILT) with 15		23.0 feet over loamy glacial till
					10		-0 0 Q	to 30% mostly subrounded gravel, little		to end of boring.
					, J		0.00	to some sand, trace clay, compact and	H. H. H.	
		_				1	50 O-0	dense, stratified, (SM).		Note: advanced bore hole with 4
		_	-			1	<u>o</u> : 20 0 0:0	12.5		1/4 inch ID x 8 inch OD hollow
		-		1		1	0.0.9		F. F. F.	stem auger casing with
						1	<u> </u>			continuous split spoon sampling to 16.0 feet. Continued below
	9	3_		-			0.0		13/13/13	with auger with 5 foot interval
	19		6			19	رمن و		[2],位为位于	sampling to 60.0 feet.
			_	13		1	0.000			32p9 10 00.0 10011
20					14		O_ \Q	See next sheet.	<u> Lineineil</u>	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-30-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878937.56650800000

Town of Arkwright, Chautaugua Co., NY

Easting: 973257.56541700000

CLIENT Fisher Associates

DATE STARTED 04/06/15 COMPLETED 04/07/15

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
							00 00 10 00 00 00 00 00 00	Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay, very stiff,
							0.00	massive soil structure, (ML-CL)
							0.00	tending towards (SC). grades downward to 18.0
	10	16					0000	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	20		86		_	149	0	Extremely moist to wet olive gray gravelly (SAND-SILT-CLAY) with 15 to
				63			1000	40% mostly subangular gravel, little
25-					65		0 0	sand and clay, very stiff, massive soil
		_					B . () . () . ()	structure, (ML-CL) tending towards
- }	-			-			000	(sc).
-		-	_				0 00	grades downward to 23.0
1	-						V. (.) W. (.)	Extremely moist olive gray gravelly
-			-				0 0	(SANDY-SILT) with 15 to 30% mostly
1							B . () . () . ()	subangular gravel, little sand, trace clay, very dense with brittle
1	11 17	42	70				0000	consistence, very dense, massive soil
1	-17		78	100/5			0 00	consistence, very dense, massive soil structure, (ML) tending towards (SM).
1			17.00	100/5			0000	4.7.4.7. 8 .7
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-30-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 878937.56650800000

Town of Arkwright, Chautaugua Co., NY

Easting: 973257.56541700000

CLIENT Fisher Associates

DATE STARTED 04/06/15 COMPLETED 04/07/15

BLOWS ON DEPTH SAMPLER 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		
							0 0	(SANDY-SILT) with 15 to 30% mostly		
- [000	subangular gravel, little sand, trace		
							0 0	clay, very dense with brittle		
							0000	consistence, very dense, massive soil structure, (ML) tending towards (SM).	F_{1},F_{2},F_{3}	
							0 00	structure, (ML) tending towards (SM).		
	14	25					0 00			
ļ	11		100/5			4	000		P. F. F.	
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		10000	-	-		-	000		Tarita in the	
	17	19	-			-			A PARAT	
9	22	-	41	-		114	0000		(KAKAK	
3		-	-	73		-	000			
60					66		1000	Boring completed at 60.0 feet.	(VIII.241).241).	← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-30a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/08/15 COMPLETED 04/08/15

DEPTH BLOWS ON SAMPLER IN FT

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WEL!		WATER TABLE AND REMARKS
5								Advanced bore hole without split spoon sampling to 25.5 feet.	Your And And And And And And And And And And		ACK	 ← 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—										PVC SCRE	#00N SIZE MORIE SAND PACK	← 15.0'



 $Soil\ and\ Hydrogeologic\ Investigations\ \bullet\ Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 10B13a HOLE NO. <u>WTG-30a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

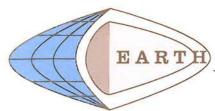
LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/08/15 COMPLETED 04/08/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WEL	L	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	CREEN	#00N SIZE MORIE SAND PACK	
									2" PVC SC	RIE SAN	
E									O SLOT	SIZE MO	
_								25.5		#000	← 25.0' ← 25.5'
								Boring completed at 25.5 feet.			
-											
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-32-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881523.72180600000

Town of Arkwright, Chautaugua Co., NY

Easting: 974488,41480000000

CLIENT Fisher Associates

DATE STARTED 05/12/15

COMPLETED 05/12/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	1	2					********	Extremely maint block much		← 0.5'
	18		1			5	000	Extremely moist black muck (SANDY-SILT) topsoil with some	3-3-3	- 0.5
				4		٦	200	organic matter, little sand, very loose,	2 2 2 3 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	
					7		2004	granular soil structure, (ML) tending	1, 5, 5, 4	2.01
	2	8		****		1	000	towards (OL).	F. F. S. F.	← 2.0'
	18		8			100	0,00	0.2		
	-10		-0	10		18	Logo			(1) TOPSOIL FILL
				10	12		0 0	Extremely moist faintly mottled dark brown (SANDY-SILT) topsoil with	4.4.4.	(2) CONCRETE
	_	5			12		-00-0	trace to little organic matter, little	(M. 1804)	
	3 18	_5_	7	-			0 00	sand, granular soil structure, (ML).		
5-	10	-			-	15	0-0	0.5	L	Note: WTG-32-15 drilled 1.5 feet
	-		-	8	2		0 00	ļ		north of staked location.
			-	-	7		000	Extremely moist brown gravelly	1: 7: 1:	
	4	4				-	0 00	(SANDY-SILT) with 15 to 20% mostly subangular gravel, little sand, trace		Coarse silty topsoil with some
	24	-	3		-	8	2000	clay, very loose, weakly thinly bedded,		organic matter, little sand to 0.2
				5			0.00	(ML).	(+3, +3, +3)	feet over coarse silty topsoil
					5		7000	T. Contraction		with trace to little organic
	5	5					000			matter, little sand to 0.5 feet
	24		10			23	ا می ه	Extremely moist distinctly mottled olive		over water sorted and deposited
				13			0000	brown gravelly (CLAYEY-SILT) with 15		coarse silt with little gravel and
اــاد					17		0_00	to 40% mostly subangular gravel, little	I I BACKETIL	sand, trace clay to 1.0 feet over
	6	17		/			0000	clay, trace sand, stiff and very stiff with nearly vertical gray desiccation	š.	silty glacial drift with little to
	22		21			51	0 0	cracks, (ML-CL).	€ .	some gravel, little clay, trace
				30		51	-0 o o	All and the second seco		sand to 8.0 feet over silty glacial drift with little to some
					22		0.00	grades downward to 8.0	[4.4. 種]	gravel to 28.0 feet over loamy
j	7	19					70 O-0	Extremely moist distinctly mottled olive	CUTTINGS	glacial drift with little to some
	12	10	11				0 0	brown gravelly (SAND-SILT-CLAY)	ا.ت	gravel to 38.0 feet over water
			-11	.,		22	0.00	with 15 to 40% gravel, little sand and		sorted and deposited sand with
				11	40		0.00	clay, very stiff and hard, massive soil		little to some gravel, trace clay
			-	-	10		0 0	structure, (SC) tending towards (ML-CL).	F. A. A.	to 43.0 feet over silty to clayey
. }	8	7					000	THE OCA		glacial till to refusal.
; -	17		12	2		21	ō , o	clear transition to 15.5		
	-		-	9	1700		200	Followed and all many and all many	-3-3-3	Note: advanced bare hale with 4
					9		00.d	Extremely moist gray gravelly		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow
							0,60	(SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand		stem auger casing with
							0000	and clay, stiff, massive soil structure,	4(4)	continuous split spoon sampling
							0- 50	(ML-CL).		to 16.0 feet. Continued below
							000 Q	MORE TIME	TS (TS (TS)	with auger with 5 foot interval
	9	4					0.00			sampling to 53.7 feet.
	16		7			14	-0 0 Q			
			01	7		171	<u>, 0 0</u> 0 0 ° 0 1 0 θ 0		1-1-1-1	
, [7		0.0-0			



 $Soil\ and\ Hydrogeologic\ Investigations\ *Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 10B13a HOLE NO. <u>WTG-32-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881523.72180600000

Town of Arkwright, Chautaugua Co., NY

Easting: 974488.41480000000

CLIENT Fisher Associates

DATE STARTED 05/12/15 COMPLETED 05/12/15

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
-							0.0	Extremely moist gray gravelly		
ł	-						0.00	(SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand		
ł			717				0.00	and clay, stiff, massive soil structure,	F, F, F,	
							FO 0 A	(ML-CL).		
							0.00			
	10	3					0 0			
-	24		5			10	0-0		+, +, +,	
				5	_		0.00			
5-					5		0.0			
-							00.0			
İ							0.00			
							7000		P. A. A.	
_							-000	grades downward to 28.0		
1							<u>o</u>			
1	11	_3_	_				0.0	Extremely moist to wet gray gravelly (SAND-SILT-CLAY) with 15 to 40%		
1	24		9_	5		14	0.00	gravel, little sand and clay, stiff,	答	
,					6		0.00	massive soil structure, (SC).	F F F F F F F F F F F F F F F F F F F	
0-							000 C		NGS	
							0.00		The second second second	
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}							0-0		P. P. P.	
-	_						0 0		2.4.4.	
1	12	8					0.0.9			
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							-000			
				-		-	0,00			
1						1	ρο σ-0 ο ο			
						ĺ	0 00	versioning the Type reserves and give	P. A. A.	
		M 1					0,00	grades downward to 38.0	1.4.4.	
	13	15					0.0.0	Wet olive gray gravelly (SAND) with 15		
	16		10	300		20		to 40% mostly subrounded gravel, very fine to very coarse size sand, trace		
				10			0.0.0	silt, compact, stratified, (SW).	1. 4. 4.	
o l					13	v	٠٠. ٩٠.	The state of the s	Proprint, with	



 $Soil\ and\ Hydrogeologic\ Investigations\ *Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-32-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881523.72180600000

Town of Arkwright, Chautaugua Co., NY

Easting: 974488,41480000000

CLIENT Fisher Associates

DATE STARTED 05/12/15 COMPLETED 05/12/15

	12	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		
2	8	14	18	22		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).	Adketue. It it it	Water level at 43.7 feet below ground surface at completion.
2	8	10	26	18		*	issnittop :	
51	100/2					53.7 Split spoon refusal at 53.7 feet.		← 53.7'
	2 51	2 8	2 8 10	8 14 18 18 2 8 10 26 51	8 14 18 22 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	2 8 14 18 22 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, compact, stratified, (SW). 2 8 14 18 18 10 20 21 22 22 23 24 25 26 27 28 28 29 20 20 20 20 20 20 20 20 20	to 40% mostly subrounded gravel, very from the to very coarse size sand, trace silt, compact, stratified, (SW). 2



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-33-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 880015.92266700000

Town of Arkwright, Chautaugua Co., NY

Easting: 973880.17432100000

CLIENT Fisher Associates

DATE STARTED 04/24/15 COMPLETED 04/27/15

BLOWS ON DEPTH SAMPLER IN FT

28	NFI		SAI	PLEK				
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
1	1	WH					*********	7.5.
t	14	W.	2				000	Extremely moist to wet brownish gray \$\frac{1}{2} \frac{1}{2} \cdot 0.5'
ł	14	_	2			5	0 0	mucky (SANDY-SILT) topsoil with some organic matter, little sand, very loose, granular soil structure, (ML)
ł	-		-	_3_			7000	some organic matter, little sand, very
-					7		6 6	loose, granular soil structure, (ML)
	2	10					000	tending towards (OL).
	20		7			12	5 V	0.3 Augers left in bore hole over
1		22		5		12	000	Extremely moist distinctly mottled olive weekend at 12.0 feet, water level
1					11	8	0.00	brown gravelly (SAND-SILT-CLAY) Monday morning was at ground
Ì							00-0	with 15 to 40% mostly subangular surface.
ł	3	_11		<u> </u>			0 0	gravel, little sand, little to some clay,
\dashv	15		12			26	200	stiff, very stiff below 5.0 feet with WH: Sampler penetration with
ļ				14_			1 × 0 × 9	nearly vertical gray desiccation weight of rods and hammer.
					15		2000	cracks. (ML-CL) tending towards
	4	8					0-0	(SC). Standard (I) TOPSOIL FILL
Ī	23		10			^^	000	clear transition to 5.5 (2) CONCRETE
Ì				10		20	0	
\dashv	-			10			-07-0	Extremely moist olive gray gravelly
1					11		0 :0	(CLAYEY-SILT) with 15 to 40% mostly Organic rich coarse silty topsoil
-	5	5					000	subangular gravel, some clay, trace to with some organic matter, little
ļ	24		10			21		little sand, very stiff and hard, massive sand to 0.3 feet over silty
Į				11_			000	soil structure, (CL). glacial drift with little to some
					10			gravel and clay, little sand to 5.5
П	6	7						gravel and clay, little sand to 5.5 feet over clayey glacial drift with little to some gravel, trace
Ì	21		20				E-0-1	with little to some gravel, trace
1	21		20		157 (25)	38	-0-	to little sand to 14.0 feet over
-			-	18	9399		Y	to little sand to 14.0 feet over water sorted and deposited silt with little to some clay and
-	-				21			
_	7	8					2.40.4	gravel to 38.0 feet over silty to
	20		12			25	-00	clayey glacial till to refusal.
				13			X VY	
		-			15		200	grades downward to 14.0
1	8	4	-		-,0			Wet olive gray gravelly Note: advanced bore hole with 4
1	18	-4_		_			TO CEN	(OLAYEN CTIT) with 15 to 40% months
4	10		9	100	-	19	0-0-	substitution of the same clay
				10			0.0	titt verlike stratified (MI CI)
1					25		0.00	to lot leet. Continued below
-							000	Francisco With a look little val
1							0_0	sampling to 49.4 feet.
		_					0-0-0	
+							0-0	
1				-	-		000	
	9	8					0.0	
	22		12			25	000	
				13		17.55¢	0-70-	
1					15		000	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-33-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 880015.92266700000

Town of Arkwright, Chautaugua Co., NY

Easting: 973880.17432100000

CLIENT Fisher Associates

DATE STARTED 04/24/15 COMPLETED 04/27/15

DEPTH BLOWS ON IN FT

SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							000	Wet olive gray gravelly	+. <i></i>	
							0-0	(CLAYEY-SILT) with 15 to 40% mostly	4.4.4.	
							000	subangular gravel, little to some clay,		
							0_00	very stiff, weakly stratified, (ML-CL) tending towards (CL).		
-	_				-		0.00	tending towards (CL).	+1.+1.+1	
		200			-		000			
	10	9					00			
	18		13		-	27	000			
				14	15		0		- , - , - ,	
25-					15		0-0-0			
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							000		L. L. L.	
							0.00			
	11	4					000		H. H. A.	
	22		7			17	0 0			
				10			000		BACK	
30—	_				12		0-0-		1, 18, 8, 89	
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	12	3					0 0			
	17		8			^2	000			
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35_					17		000			
,5—							0.00			
							0		# * * * * * * * * * * * * * * * * * * *	
							0.0			
							00			
							000	grades downward to 38.	ا ا	
	13	8					000			
	17		27			76	0-0-			
				49	47		000	See next sheet.	1. 4. 4.	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-33-15</u>

10B13a

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 BLOWS ON SAMPLER IN FT

- 1	SN REC	0/ 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
-				-			2020	Extremely moist olive gray gravelly		
t							0-0-0	(CLAYEY-SILT) with 15 to 40% mostly subangular gravel and occasional		
							000	channer, little to some clay, trace	-, -, -,	
1							000	sand, hard, massive soil structure, (ML-CL) tending towards (CL).		
-	March T		-				0.0	(ME OE) teriding towards (OE).		
ŀ	14 22	_15_	82				000		r r r r r r r r r r r duttingsibackfil	
t	22		82	63		145	000		AC .	
1					100/3		000		Ilse	
-							0-0		<u>Ž</u> .	
-				-			000		<u></u>	
1							000			
H						-				
Ť							200			
	15	12				[000		<u> </u>	
L	16		65				0_0	49.4		
-				100/5	-			Split spoon refusal at 49.4 feet.	<u> </u>	← 49.4'
+				-		1		Spitt spoon refuser at 40.4 reet.		
t										
1				_						
-				-						
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-33a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/27/15 COMPLETED 04/27/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL	2	WATER TABLE AND REMARKS
5-								Advanced bore hole without split spoon sampling to 25.5 feet.		40 FJT PVC RISER	F. F. T. TOUTTINGS BACKFILL F. F. F. F. T.	← 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-									1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2" SCHEDULE	(-)(3)(-)(1)(-)	← 10.0'
15—										PVC SCREEN	ZE MORIE SAND PACK	← 13.0° ← 15.0°
20										.010 SLOT 2" PV	#00N SIZE	



 $Soil\ and\ Hydrogeologic\ Investigations\ \bullet\ Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-33a-15 (Well)</u>

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

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
3								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK	
25—								25.5	010 #000	← 25.0' ← 25.5'
								Boring completed at 25.5 feet.		
2 -21-2										r.
30—										
()										
35—										
35—										
_										
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-38-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project LOCATION Northing: 885067,90841600000

Town of Arkwright, Chautaugua Co., NY

Easting: 973771.71816500000

CLIENT Fisher Associates

DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH BLOWS ON IN FT SAMPLER

Extremely moist black (MUCK), very soft, granular soil structure, (QL). Streen		SN REC	0/ 6	6/	12/	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) B	WATER TABLE AND REMARKS
soft, granular soil structure, (OL). Soft		1	2						Extremely moist black (MUCK) very		+ 0.5'
2 5 6 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		20		2			7	22-0		353536	0.0
2 5	Ì				5			000		2,2,5	
2 5 5 14 22 13 34 27 27 28 8 8 27 28 29 5 18 8 29 25 25 26 18 29 26 18 27 27 28 29 29 20 10 20 20 20 20 20 20 20 20 20 20 20 20 20						8		0-0-	Tutament milet distinctly matted	3 5 5	+ 2.0'
14 22 34 34 37 37 37 37 37 37		2	5					000		13.75.73	2.0
gravel, little sand and clay, firm, blocky soil structure, (ML-CL), grades downward to 1.0 Extremely moist distinctly motited olive brown gravelly (CLAYEY-SILT) with 15 to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, loose, tends to liquely when disturbed, thinly bedded, (ML). grades downward to 4.0 Extremely moist distinctly mottled olive grades downward to 6.0 Extremely moist distinctly mottled olive soil structure, (ML-CL). grades downward to 6.0 Extremely moist distinctive some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with littl		14		22			34	0 0	이게 보면 그 사이 되는 적으로 가게 되었다. 사이들은 그 경기를 가면 하면 모든 모든 사람이 되었다.		
grades downward to 1.0 — — Note: WTG-36-15 drilled 7.5 feet west of staked location. Stremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some gravel, little sand and clay, trace sand to 28.0 feet over silty gravel, little to some gravel, little sand to 6.0 feet over silty discial drift with little to some gravel, little sand to 4.0 consider the sand and clay to 1.0 feet over silty gradeal drift with little to some gravel, little sand to 4.0 feet over coarse silty slack water sediment with little to some gravel, little sand to 6.0 feet over silty gradeal drift with little to some gravel, little sand to 6.0 feet over silty with 15 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL), with 15 to 40% mostly subangular gravel, little clay, trace sand to 28.0 feet over water sorted and deposited sand with some gravel, some sand to 33.0 feet over with 18 to 2 inches thick gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, gravel, some sand to 33.0 feet over water sorted and deposited sand with some gravel, some sand to 33.0 feet over water sorted and deposited sand with some gravel and gravel with trace to little silt to 40.0 feet over water sorted and deposited sand with some gravel, some sand to 33.0 feet over water sorted and deposited sand with some gravel and gravel with trace to little silt to 50.0 feet over water sorted and deposited sand with some gravel and gravel with trace to little silt to 40.0 feet over water sorted and deposited sand with some gravel and gravel with trace to little silt to 50.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over loany gravel and silt to 48.0 feet over loany gravel and silt to 48.0 feet over loany gravel and silt to 48.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over loany gravel and silt to 48.0 feet over loany gravel and silt to 48.0 feet over loany gravel and silt to 48.0 fee					12		1	000			The state of the s
Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little sand and clay to 1.0 feet over silty glacial drift with little to some gravel, little sand and clay to 1.0 feet over silty glacial drift with little to some gravel, little sand to 4.0 feet over silty glacial drift with little sand and clay to 1.0 feet over silty slack water sediment with little sand to 4.0 feet over silty glacial drift with little to some gravel, little sand to 4.0 feet over silty slack water sediment with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand to 6.0 feet over silty glacial drift with little to some gravel, little sand and clay to 8.0 feet over silty gravel, little sand and clay, hard, massive soil structure, (ML-CL). 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). 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). 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). Extremely moist distinctly mottled olive brown gravelly (ILTY-SAND) with 15 to 40% mostly subangular gravel, little sand, and clay, hard, water sediment with little to some gravel, some sand to 33.0 feet over water sorted and deposited sand with some gravel, some sand to 3.0 feet over water sorted and deposited sand with some gravel and silt to 4.0 feet over water sorted and deposited sand with some gravel and silt to 4.0 feet over loany glacial till to foll feet over loany glacial till to foll feet over loany glacial till follows.	J	-				13		0-0	blocky soil structure, (ML-CL).		(2) CONCRETE
Extremely moist disturbuty motited of the sand, hard, massive soil structure, (ML-CL). A		3	4			-			grades downward to 1.0		
brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand, and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over sitty glacial drift with 18 to 40% mostly subangular gravel, little sand and clay to 1.0 feet over water sorted and deposited sand and clay to 1.0 feet over water sorted and deposited sand and clay to 1.0 feet over water sorted and deposited sand with some gravel, little sand sand, water sediment with little to some gravel, little sand sand and clay to 3.0 feet over water sorted and deposited sand with some gravel and it to 4.0 feet over water sorted and deposited sand with some gravel and sit to 4.0 feet over water sorted and deposited sand with some gravel and sit to 4.0 feet over water sorted and deposited sand with some gravel and sit to 4.0 feet over water sorted and deposited sand with some gravel and sit to 4.0 feet over water		22		5			8	A STATE OF	Extremely moist distinctly mottled alive		Note: WTG-36-15 drilled 7.5 feet
to 40% mostly subangular gravel, little sand, hard, massive soil structure, (ML-CL) tending to some clay, little sand, hard, massive soil structure, (ML-CL) tending towards (CL). grades downward to 4.0 Extremely moist to wet distinctly mottled olive grayes brown (SANDY-SILT) with little sand, loose, tends to liquefy when disturbed, thinly bedded, (ML). grades downward to 6.0 Extremely moist distinctly mottled olive brown graveli, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand to 4.0 feet over coarse sity slack water sediment with little to some gravel, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand and clay to 8.0 feet over sitty glacial drift with little to some gravel, little sand and clay, hard, massive soil structure, (ML-CL). grades downward to 8.5 Extremely moist distinctly mottled olive brown gravell, ittle sand and clay, hard, massive soil structure, (ML-CL). grades downward to 8.5 Extremely moist distinctly mottled olive brown gravel, little sand and clay, hard, massive soil structure, (ML-CL). grades downward to 8.5 Extremely moist distinctly mottled olive brown gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little to some gravel, little sand and clay to 8.0 feet over water sorted and deposited sand and day to 8.0 feet over water sorted and deposited sand with some gravel make the solution of the solution of the solution of the solution of the solution of the solution of the solution of the solution of the					3						
soil structure, (ML-CL) tending towards (CL). 25 19 25 27 27 27 27 27 27 27						5			to 40% mostly subangular gravel, little		
towards (CL). 19		_	5			14.54		00-0		18 N. S.	
grades downward to 4.0 11		24		8			33	م م	is soil structure, (ML-CL) tending		- BON
Extremely moist to wet distinctly mottled olive grayish brown (SANDY-SILT) with little sand, loose, tends to liquefy when disturbed, thinly bedded, (ML). To lo lo lo lo lo lo lo lo lo lo lo lo lo				III.	25		- 00	0000	II was a second of the second		
Extremely moist to wet distinctly mottled olive grayish brown (SANDY-SILT) with little sand, loose, tends to liquefy when disturbed, thinly bedded, (ML). 10		- 1	1-1	11.		19		0.00	grades downward to 4.0		
13		5	11					0000	Extremely moist to wet distinctly		
tends to liquefy when disturbed, thinly bedded, (ML). 20 10 10 20 20 20 20 20 20 20 20 20 20 20 20 20		24		13			27	0.00		4.4.4.	
Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay to 8.5 feet over silty glacial drift with little to some gravel, little clay, trace sand to 28.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 8.5 feet over water sorted and deposited coarse silt with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water sorted and deposited sand with little to some gravel, sittle clay, trace sand to 28.0 feet over water so					14		21	0 0	그들은 그 생물이 있는 이 이 이 있는데 이 그 사람은 이번 아들이 가지 않는데 아니는 아니는 아니는데 그 사람이 되어 있다면 가지 않는데 그렇게 되었다.		
Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, ittle sand and clay to 8.7 feet over silty glacial drift with little to some gravel, little clay, trace sand to 28.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 8.5 feet over water sorted and deposited coarse silt with little to some gravel, stitle some gravel, stitle to some gravel, stitle some gravel, stitle to some gravel, stitle to some gravel, stitle some gravel, stitle to some gravel, stitle some gravel, stitle some gravel, stitle to some gravel, stitle some gravel, stitle some gravel, stitle some gravel, stitle some gravel, stitle to some gravel, stitle some gravel, stitle some gravel, stitle some g						10		0000		生生 畫	
Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel, little sand and clay to 8.5 feet over silty glacial drift with little to some gravel, little clay, trace sand to 28.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 38.0 feet over water sorted and deposited sand and clay to 8.5 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over water sorted and deposited sand and clay to 8.5 feet over water sorted and deposited coarse silt with little to some gravel, sittle 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 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over water sorted and deposited sand with some gravel, ittle clay, trace sand to 20.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over water sorted and deposited sand with some gravel, little sand, (ML-CL) with 1/8 to 2 inches thick gravelly coarse silt with little to some gravel, siltle sand to 31.0 feet ove		6	5					0 00	11	š .	
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). 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). Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand to 28.0 feet over water sorted and deposited coarse silt with little to some gravel, some sand to 33.0 feet over silty slack water sediment with little to some gravel, some sand to 33.0 feet over silty slack water sediment with little to some gravel, ittle sand, very stiff, massive soil structure with 1/8 to 2 inches thick gravelly (SILTY-SAND) with 15 to 40% mostly (SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths.		20		10			20	1000	grades downward to 6.0	8	
With 15 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).					10		20	0		59	요즘 그 사람들은 아들이 없었다. 그렇다 게 하다 사람들이 하나요지를 가능한다면 하다 하나 요요?
With 15 to 40% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL).						14			 		
massive soil structure, (ML-CL). 14	1	7	10	- = 1						5	[[다리아 기계 전에 가입하다 사 그런 사람들이 되었다. 그리고 있는 것이 없는 것이 없는 것이다. [
grades downward to 8.5 8 26 20 14 25 11 25 12 25 8 26 20 14 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 11 25 8 26 12 30 13 30 feet over silty slack water sediment with little to some 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. 9 6 18 8 19 0000000000000000000000000000000	1	20		12			26				water sorted and deposited
Extremely moist olive gray gravelly 11 25 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. gravel, some sand to 33.0 feet over silty slack water sediment with little to some gravel, little sand and clay to 38.0 feet over water sorted and deposited sand and gravel with trace to little silt to 43.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over loamy glacial till to 58.0 feet over silty glacial till to refusal.	Ì			1	14		20	- o- 1		4.4.4	그렇게 그렇게 생생님, 어려고 사용이 어떻게 되었다고 있다면 그 아버지만 되었다.
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. Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths.	1	- +	1	HT.		25		C. J. and C. William V. L.	grades downward to 8.5		
20 14 25 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. (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand and clay to 38.0 feet over water sorted and deposited sand and gravel with trace to little silt to 43.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over loamy glacial till to 58.0 feet over silty glacial till to refusal.	1	8	26					0000			그 그림에 살아가 되면 가게 하는 그렇게 하면 하는데 하는데 하는데 그리지 않는데 아니라 모네 다음
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. 19 10 10 10 10 10 10 10	1	20	TEE !	14		- 1	25	00		F. F. F.	이 경우 아이들 다른 사람들이 많아 아니겠다면 하는 그렇게 이끌어 내고 있다면 하는 것이 되었다면 했다.
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. 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. and gravel with trace to little silt to 43.0 feet over water sorted and deposited sand with some gravel and silt to 48.0 feet over loamy glacial till to 58.0 feet over silty glacial till to refusal.	1				11		20	Sec. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10			
(SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths. (SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths. (SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths.	1					12		0 0			and gravel with trace to little silt
subrounded gravel, little sand, (ML-CL) with (SM) interbeds between 8.5 and 20.0 foot depths. 9 6 18 8 19	1			- 7	1	102		2000			
9 6 18 8 19 0 0 0	1				17			000		STORE SE	
20.0 foot depths. 9 6 18 8 19 0 0 0	İ	-1	-			- 2		0 0	with (SM) interbeds between 8.5 and		. # 1400000000000000000000000000000000000
9 6 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1							000	20.0 foot depths.		. 그리는 "보이스트 이루어는 "이 전 보고 "에어스 그리면 있는 " (이 " CO TO TO TO TO TO TO TO TO TO TO TO TO TO
18 8 19 0 0 C	1	a	6				1	0 0			over sitty gradial till to refusal.
	1		Ů.	R				000			
Harris Road Daniel	1	,,,		o_	31		19	0,0		4,4,4	
	1			-	JII-s	10	1				



Soil and Hydrogeologic Investigations • Wetland Delineations

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SURF. ELEVATION _

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LOCATION Northing: 885067,90841600000

Town of Arkwright, Chautaugua Co., NY

Easting: 973771.71816500000

CLIENT Fisher Associates

DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH BLOWS ON IN FT SAMPLER

SN		6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
						0000 0000	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		Note: advanced bore hole with 4
						0000	subangular gravel, little clay, trace		stem auger casing with
			-			o o o	sand, very stiff, massive soil structure with 1/8 to 2 inches thick gravelly		continuous split spoon sampling to 16.0 feet. Continued below
						0 0	(SILTY-SAND) with 15 to 40% mostly subrounded gravel, little sand, (ML-CL)		with auger with 5 foot interval sampling to 58.9 feet.
10	10					0000	with (SM) interbeds between 8.5 and		sampling to sole reet.
6		14	5		25	1 0 0-0	20.0 foot depths.	h. h. h.	
			-11	12		0 0			
						0.00			
						1.00 C			
-						rog c			
-						0 0			
						-00-Q	grades downward to 28.0		
11	2	-				0000	Extremely moist to wet olive gray		
14		6		0.0	17	0 0	gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel, some sand,	至	
			-11	11		0000	compact, weakly stratified, (SM).	I I I I I I I I I I I I I I I I I I I	
		150		- 11		0000		6.5	
						0			
						000		B	
-						0.0.0		4.4.4	
						0 0	grades downward to 33.0		
12	7		_			000-0	Extremely moist to wet distinctly		
16	- 14	9			20	ا می ه	mottled olive gray gravelly (SAND-SILT-CLAY) with 15 to 40%		
	-		11	1.22	1	0000	mostly subrounded gravel, little sand		
				-11		1000	and clay, very stiff, weakly stratified, (ML-CL) tending towards (SC).		
						0,0	(ME OL) tending towards (30).		
		1-1		-		0 00			
						0000			
						0 000	grades downward to 38.0		
13	7					0.00			
8		15			35	6:00			
			20			0.0.0			
				21		V.nV.	See next sheet.	国际建筑设施	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-36-15

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885067,90841600000

Town of Arkwright, Chautaugua Co., NY

Easting: 973771,71816500000

CLIENT Fisher Associates

DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH BLOWS ON IN FT SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							000000	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).		
	14	28		==	122		0000	grades downward to 43.	아~ ~	
5—	10		100/5					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).		Water level at 45.2 feet below ground surface at completion.
	1 10		1 1				0000	grades downward to 48.	.0	
	15	36				7.1	0000	Wet olive gray gravelly (SANDY-SILT)	一. 一. 夏.	
	4	11.7	67		/	102	0 00	with 15 to 40% gravel, little sand, very dense, dense below 53.0 feet, massive	F. F. BKCKFT	
0-				35	32			soil structure, (ML).	T CUTTINGS E	
							0000			
1	92.1					10	000			
1	16 8	3	9	-			0000		+. +. +.	
ł	Ü		9	24		33	0 0		联集第	
				24	26		0000			
							000			
							000	grades downward to 58.	0	
1	17	43					ž 65		7.7.7.	
1	10		100/5				0 0 0 5 80			← 58.9'
		100						47.000.000		120
1							11_	See next sheet.	1	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-36-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885067,90841600000

Town of Arkwright, Chautaugua Co., NY

Easting: 973771.71816500000

CLIENT Fisher Associates

DATE STARTED 05/28/15 COMPLETED 05/28/15

DEPTH BLOWS ON IN FT SAMPLER

-	SN	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.		
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-41-15</u>

10B13a HOLE NO. WTG-41-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881573,39434500000

Town of Arkwright, Chautaugua Co., NY

Easting: 968199,87761800000

CLIENT Fisher Associates

DATE STARTED 04/14/15 COMPLETED 04/15/15

	LINFI		JAN	FLEN		-						
	SN	0/	6/	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL		WATER TABLE AND REMARKS
1	REC	6	. 12	18	24	IN	E-SAL OCCUPED			(I)	?	
	1	•					*********	E	3		18	(1) 4" LOCKING STEEL
	17							Extremely moist black (MUCK), granular	5		(82)	PROTECTIVE CASING INSTALLED
	-11	-		6		7	0 0	soil structure, (OL).	7 4		1 4	IN SMALL CONCRETE PAD
				b	_			0.2	3		5	(2) CONCRETE
		5375		-	6	ė i	0	Extremely moist dark brown				← 2.0'
	2	_5_	93.1				0 0 0	(SAND-SILT-CLAY) topsoil with little			-	A TO TO THE DESCRIPTION OF
	22		10			25	· · · · · ·	organic matter, sand and clay, very				Organic muck surface to 0.2 feet
			_	15	_		200	soft, granular soil structure, (ML-CL).	_		_	over silty topsoil with little
					11		0.00	1.0	-		-	organic matter, sand and clay to
	3	5					0.00	Extremely moist distinctly mottled olive	- .		٠.	1.0 feet over clayey glacial drift
5—	20		3			6	0.00	brown (CLAYEY-SILT) with 10 to 15%		œ	E	with little gravel to 3.4 feet over water sorted and deposited sand
0				3		"		gravel, some clay, trace sand, stiff,		SE	Q.	with little to some gravel, little
İ					4		787838	very stiff below 2.5 feet with nearly	<u>-</u> .	PVC RISER	. I. DUTTINGS BACKFILL	silt and clay to 5.0 feet over
ĺ	4	3					2 0 0	vertical gray desiccation cracks,		200	9	coarse silty slack water sediment
1	16		2			_	0.0	(CL).	-	=		with some sand to 6.0 feet over
			-	4		6	0000	3.4		FJT	5	silty glacial drift with little to
-					6		0 0	Columnia maint distinctly mottled alive		40	o l	some gravel, little sand and clay
	752	-	-	-	0		1000	Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY)		SCHEDULE		to 9.0 feet over coarse silty
	5 17	_3_	-				ō o	with 15 to 40% mostly subrounded		133		slack water sediment with little to
	17		7_	_		15	000	gravel, little silt and clay, very stiff,		품		(Continued below)
			_	8		1	0000	firm below 4.0 feet, stratified, (SC).		S		
10-				k-me-r	8		0 00	grades downward to 5.0	7	7	1	← 10.0'
	6	6	-				0000	L	1		1	
	22		6		_	13	0 00	Extremely moist distinctly mottled olive	/		14	
				7			1 0 n u	brown (SANDY-SILT) with some very			(3)	(3) BENTONITE CHIPS
					8		0 00	fine size sand, loose, thinly bedded,	Vi		1	
	7	3					0000	(ML).	1		1.4	
	19		4			11	000	6.0	1		1	← 13.0'
				7				Extremely moist distinctly mottled olive				·
					10			brown gravelly (SAND-SILT-CLAY)				
	8	5					***	with 15 to 40% mostly subangular			S.	
er.	14		12			1 00		gravel, little sand and clay, firm,			SAND PACK	← 15.0'
15—			15-	16		28	2, 2	massive soil structure, (ML-CL).			물.	. 10.0
				10	11	1	0.0	grades downward to 9.0		SCREEN	SA	
		-			111	1	5000	Extremely moist faintly mottled olive		뽔	MORIE	some gravel, some sand to 13.0
		W	-		1100-	1	0 0	grayish brown gravelly (SANDY-SILT)		SC	10R	feet over clayey slack water
			-	-		1	0000	with 15 to 40% mostly subrounded		PVC	E I	sediment to 15.0 feet over loamy
70				_	-	1	1000 0- 0	gravel, some sand, compact, stratified,	12.5	2" P	ZIS	glacial till to 19.8 feet over silty
		1			_	1	0-00 0-00-0	(SM).			Z	to clayey glacial till to 32.5 feet
	9	2				-	0.0	grades downward to 13.0		SLOT	#00N SIZE	over shale bedrock to refusal.
	19		2			5	500-a			010		
				3			0.00		٠,٠,	o.		
20					6		0. YO.	See next sheet.	1.		1	



 $Soil\ and\ Hydrogeologic\ Investigations \bullet Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-41-15</u>

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881573,39434500000

Town of Arkwright, Chautaugua Co., NY

Easting: 968199.87761800000

SURF. ELEVATION _

CLIENT Fisher Associates

DATE STARTED 04/14/15 COMPLETED 04/15/15

DEPTH IN FT

10B13a

BLOWS ON SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	3-						0-0-0	Extremely moist distinctly mottled olive brownish gray (CLAYEY-SILT) with some clay, stiff, thinly laminated,	/C SCREEN SAND PACK	Note: WTG-41-15 drilled 1.0 feet south of staked location.
-								(CL). grades downward to 15.0 Extremely moist faintly mottled olive	2" P\	Augers left in bore hole over night at 25.0 feet, water level the next morning was 16.9 feet
	10	8	11	9		20		grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very stiff, firm below 18.0 feet, massive soil	O10 SLOT	below ground surface.
25					9		0-0-0	structure, (SC). clear transition to 19.8 Extremely moist olive gray gravelly		← 25.0' ← 25.5'
_							0 0 0 0 0 0 0 0 0	(CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little to some clay, very stiff, massive soil structure, (ML-CL) tending towards (CL).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D hollow stem auger casing with continuous split spoon sampling
	11 16	8	13	16		29				to 16.0 feet. Continued below with auger with 5 foot interval sampling to 34.1 feet.
30-					15		0-0-0-0		CKFTLL []	← 30.0'
								grades downward to 32.5 Olive gray shale bedrock, very soft,	ITINGS BACK	
	12	47	100/5					can be easily crushed between fingers into soil material, bedded.	3	← 34.1'
35_								Auger refusal at 34.1 feet.		
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-43-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 882586.62741400000

Town of Arkwright, Chautaugua Co., NY

Easting: 968103,92792900000

CLIENT Fisher Associates

DATE STARTED 04/16/15 COMPLETED 04/17/15

	INFI		SAM	IPLER					
	SN	0/	6/	12/	18/	N	LITH		R TABLE AND REMARKS
Ì	REC	6	12	18	24	200		(i) P	
	1	1					**********	1 Salaranta matal blank mata	9
9	20		2			127	4 4	Extremely moist black mucky	
ì	20		_			3	0 00 0	(SANDY-SILT) topsoil with some	
1		-		1		1	6. 6	(3	
ä			_		2		2 a		8
	2	_3_					0.00	towards (OL).	
	22		2			6	0,0	0.3 Augers	s left in bore hole over
Ì				4				Wet distinctly mottled olive grayish night a	at 40.0 feet, water level
1					4			brown (STLT) with 5 to 10% gravel	ext morning was 1.0 feet
	3	2			7	1		trace sand and clay, very loose, below	ground surface.
3							· · · · · ·	blocky soil structure, (ML).	
5—	22	-	3	-		7		D Developed (1) TO	PSOIL FILL
3				4				grades downward to 1.9 (2) CC	DNCRETE
					6			Extremely moist distinctly mottled olive	
	4	6			Answer (a				e silty topsoil with some
	21		6					with 15 to 40% gravel, little sand and	ic matter, little clay to 0.3
				6		12	2.0	clay, firm, blocky soil structure, (SC).	ver coarse silty glacial
			-	-0-	rien.	1	20-0	3.0 To To drift w	with trace gravel and sand
	- 27			-	6		2 0 2 0	[1.9 Explain to 1.9	feet over water sorted and
3	_5	5					* *	Extremely moist distinctly mottled olive depos	ited silt with little to some
	17		7	+		19	2 0 2 0	brown (CLAYEY-SILT) with some clay, gravel	, little sand and clay to 3.0
				12				firm, very stiff with nearly vertical feet o	ver clayey slack water
10					20	ĺ	0000	gray desiccation cracks, (CL).	ent to 7.0 feet over water
10—	6	7			-		2 00	grades downward to 7.0 sorted	d and deposited silt with
	24						0.00	grades downward to 7.0 Sorted	o some gravel, little sand
- 5	24	-	12	7/8640		24	2 60	# Extremely moist distinctly mottled olive and cl	ay to 7.5 feet over clayey
			_	12			0000	brown gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and with 15 to 40% gravel, little sand and	water sediment to 8.0 feet
					14		8-3	with 15 to 40% graver, little said and graver solve	ilty glacial drift with little
	7	9					0.00	g graver	and clay, trace sand to
	23		13			25	9 0	grades downward to 7.5 10.0 fe	eet over silty to clayey
				12	1	20	000	i Extremely moist distinctly mottled once	I drift with little to some
3				16	11		0,0	"brown (CLAYEY-SILT) with some clay, gravel	to 12.0 feet over silty
					- 11		Logo	!! firm, thinly laminated, (CL).	I drift with little to some
3	8	8	\$37				0-0	gravel	to 18.0 feet over water
15—	22		7			17	-OAO		d and deposited silt with
				10			0 0		o some gravel, little sand
					12		-07-0	그리지 않는 소문하는 경향 그렇게 하는 그 그들은 그리고 있다면 하는 사람이 되었다. 그리고 있는 사람이 하는 사람이 하는 사람이 되었다면 하는 것이다.	ay to 23.0 feet over
							0 0		glacial till to 34.5 feet
									apparent shale bedrock to
3		_			-		0.00	clear transition to 10.0 refusa	l.
-		-		-			-0-		
			- 1						
	9	7					on-d	- 1995年 第一	
	24		7			19	ا من ۵	[88.6868]	
				12	2-11-1		0000	######################################	
00					9		0.0	See next sheet.	
20			_		9		- A	OCC HEAR SHEER.	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-43-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 882586.62741400000

Town of Arkwright, Chautaugua Co., NY

Easting: 968103.92792900000

CLIENT Fisher Associates

DATE STARTED 04/16/15

COMPLETED <u>04/17/15</u>

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, 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
-	10	5						tending towards (SC). grades downward to 12.0 Extremely moist olive gray gravelly		to 16.0 feet. Continued below with auger with 5 foot interval sampling to 39.2 feet.
25—	12		9	13	16	22		(CLAYEY-SILT) with 15 to 40% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). grades downward to 18.0		EDI Bedrock Hardness Classificatio
								Extremely moist to wet olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% gravel, little sand and clay, very		Soft: can be crushed between fingers into soil material with some effort. Moderately soft: can be etched
_	50						000	stiff, stratified, (SC). grades downward to 23.0 Extremely moist olive gray gravelly		with fingernail. Medium hardness: can be easily etched with knife.
	17	25	19	18	20	37		(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)	I I I I BAICKFJ	
30—					20		00 00 00	tending towards (CL).	T T TUOI	
_										
	12	16	17	23		40	000	clear transition to 34.5		
35—					100/5			Olive gray apparent shale bedrock, soft, moderately soft and medium hardness.		
						8				
	13 4	150/4						39.2		← 39.2'
10								Auger refusal at 39.2 feet.		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-43a-15 (Well)</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/17/15

COMPLETED 04/17/15

[SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL		WATER TABLE AND REMARKS
5								Advanced bore hole without split spoon sampling to 25.5 feet.	www.linearchesternersensensensensensensensensensensensensens	2" SCHEDULE 40 FJT PVC RISER	PACK	 ← 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'
20									100	.010 SLOT 2" PVC SCREEN	#00N SIZE MORIE SAND PACK	€ 15.0



 $Soil\ and\ Hydrogeologic\ Investigations\ \bullet Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-43a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION __

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/17/15

COMPLETED 04/17/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	1	LL	WATER TABLE AND REMARKS
-								Advanced bore hole without split spoon sampling to 25.5 feet.	SLOT 2" PVC SCREEN	#00N SIZE MORIE SAND PACK	
25—								25.5 Boring completed at 25.5 feet.	010.	IS NOO#	← 25.0' ← 25.5'
30—											
5—											
0											



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-47-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 884125,47640300000

Town of Arkwright, Chautaugua Co., NY

Easting: 966896,01142700000

CLIENT Fisher Associates

DATE STARTED 03/17/15 COMPLETED 03/18/15

	SN	0/	6/	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	REC	0	12	10	24	200		(1) 3
	1	1_					· · · · · · · · · · · · · · · · · · ·	Extremely moist dark reddishh brown
	15		2			5	000	(MUCK), (OL).
				3		٦	0,0	0.2
					10		000	
	2	9				1	O 0	Extremely moist dark brown (SANDY SILT) topogli with little (1) TOPSOIL FILL
	24		16				1000	(SANDT-SILT) topsoil with little
	24		10_			31	0 00	organic matter and sand, very sort,
	-			15		ł	-00-Q	granular soil structure, (ML). Note: WTG-47-15 drilled 9 feet
				_	17	1	0.0	0.4 southeast of staked location.
	3	8	_				0000	Extremely moist faintly mottled olive
5—	20		8			19	0.00	brown gravelly (CLAYEY-SILT) with 15
							0.0.0	to 40% mostly subangular gravel, little Organic surface to 0.2 feet over
					7		0.00	clay, trace sand, firm, hard below 2.5 coarse silty topsoil with little
	4	5			- 10		200-0	feet, blocky soil structure, (ML-CL). organic matter and sand to 0.4
	20		8				600	clear transition to 4.0 feet over silty glacial drift with
				9		17	2000	i little to some gravel, little clay,
_				- 8	-	1	0.40	Extremely moist distinctly mottled olive trace sand to 4.0 feet over
		-			5	1	000	brown gravelly (CLAYEY-SAND) with water sorted and deposited sand
	_5	9			-	1	5 W	15 to 40% mostly subrounded gravel, with little to some gravel, little
	14	_	6		_	12	LOA0	little clay, trace silt, very stiff, weakly clay, trace silt to 6.0 feet over
Ж				6			0.0	blocky soil structure, (SC). water sorted and deposited silt
10—		1			8		000	blocky soil structure, (SC). grades downward to Extremely moist faintly mottled olive water sorted and deposited silt with little to some gravel, little silt and clay to 12.0 feet over coarse silty glacial drift with
28	6	3				}	0 0	Extremely moist faintly mottled olive
	18		4			10	00-0	
				6		10	0, 0	brown gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded Ittle to some gravel, little sand, trace clay to 14.0 feet over
					7		0000	gravel, little sand and clay, very stiff, water sorted and deposited sand
	7	3					0	、stiff below 8.0 feet, weakly stratified, with little to some gravel, little
_	8	-2	40				0000	(ML-CL) tending towards (SC). silt, trace clay to 18.0 feet over
	0		43			91	ره	grades downward to 12.0 water sorted and deposited sand
		-		48	155		0009	Extremely moist faintly mattled alive with little to some gravel, little to
	1455.00				- 11		J 20 0	Extremely moist faintly mottled olive brown gravelly (SANDY-SILT) with 15 to
	8	5				į.	0000	40% gravel little sand trace clay very
15—	16		4			8	0000	dense massive soil structure (MI)
152				4		E	0 0	and clay to 28.0 feet over sitty
					5	,	0000	grades downward to 14.0 glacial till to 33.0 feet over
							0 00 0	Extremely moist faintly mottled olive loamy glacial till to 38.0 feet
							0000	grayish brown gravelly (SILTY-SAND) over water sorted and deposited
		11 2000		-			0000	with 15 to 40% mostly subrounded sand with little silt to 43.0 feet
	-	-				8	0000	gravel, very fine to very coarse size over water sorted and deposited
			-	-			0000	sand, little silt, trace clay, loose, sand with little to some gravel,
	9	4					0000	stratified, (SM). trace silt to 48.0 feet over water sorted and deposited sand
	22		9	_		17	00.00	grades downward to 18.0 with little gravel and silt to 58.0
				8			0 0	Fig. 2. A with little graver and slit to 56.0
0 1					8		00.00	See next sheet. (Continued on next sheet)



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-47-15

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 884125,47640300000

Town of Arkwright, Chautaugua Co., NY

Easting: 966896.01142700000

CLIENT Fisher Associates

DATE STARTED 03/17/15

COMPLETED 03/18/15

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
1							0000	Extremely moist faintly mottled olive	tis tis tis	feet over water sorted and
						[0,000	brownish gray gravelly (SILTY-SAND)	PYYYY	deposited silt with little to some
							0000	with 15 to 40% mostly subangular		gravel, little sand and clay to
							0000	gravel, little to some silt, compact,	10000000	end of boring.
							0000	stratified, (SM).	47.47.47	3
							0000	grades downward to 2	3.0	Note: advanced bore hole with 4
	10	9					200-0	Extremely moist faintly mottled olive	Texterior	1/4 inch ID x 8 inch OD hollow
	16		15			35	0 0	brownish gray gravelly	《李泽文学》	stem auger casing with
				20		33	ond	(SAND-SILT-CLAY) with 15 to 40%		continuous split spoon sampling
					24		0 00	mostly subrounded gravel, little sand	to to to	to 16.0 feet. Continued below
1						1	000	and clay, hard, stratified, (SC).		with auger with 5 foot interval
Ī						1	0.00		48.048.048	sampling to 60.0 feet.
1						1	-0 0 0		13/13/13	
Ì						İ	0.00			
Ì						1	<u>-0</u> σ-0			1
7							2 2	grades downward to 2	8.0	
ł	11	8	-				57.367	Extremely moist olive gray gravelly		1
ł	12	_ 6	12			5000000	0000	(CLAYEY-SILT) with 15 to 40% mostly		Ì
ł	12		12	47		29	200	subangular gravel, little clay, trace		
ł	_	_		17			2000	sand, hard, massive soil structure,		1
+		-			19		000	(ML-CL).	S	
ł			_	-	(a)	1	0 0		一, 一, 差,	
ł						-	-0 A O			
ł			-	-	-	-	0 0		T-> T-> 'B'	
ŀ	-						TO 0-0			
4	_					ł	0 0	grades downward to 3	33.0	
ļ	-				_		SO VO			
1	12	5					000	Extremely moist olive gray gravelly	户关条关条)]
1	14		8			18	0 60	(SAND-SILT-CLAY) with 15 to 40%		
1				10			0000	mostly subangular gravel, little silt and clay, very stiff, massive soil structure,		
					17		0.00	(SC).		1
							F00 d	1771		1
							5.00			
ſ							P-0 0 0		47.47.4	1
1							-0-0		\$80.380.38]
							0 0-0			
7						1	0 0-0 0 0-0	grades downward to 3	8.0	WR: Sampler penetration with
Ì	13	WR				1	11.00	Wet olive gray (SILTY-SAND), very		weight of rods.
1	24	mix	1					fine size sand with little silt, loose,	F3.753.753	Neight of 1005.
ł	-	_	1	9		10		liquefies when disturbed, thinly		1
- }	-	_		9	10	1		bedded, (SM).		-



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-47-15</u>

SURF. ELEVATION __
LOCATION Northing: 884125,47640300000

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

Easting: 966896.01142700000

Town of Arkwright, Chautauqua Co., NY

DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH BLOWS ON IN FT SAMPLER

CLIENT Fisher Associates

10B13a

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
3								Wet olive gray (SILTY-SAND), very fine size sand with little silt, loose,		
ä								liquefies when disturbed, thinly bedded, (SM).		
								grades downward to 43.0		
107	14	1					0.0.0	Wet olive gray gravelly (SAND) with 15		
	8		_4_	10		14	0.00	to 25% mostly subrounded gravel, very fine to very coarse size sand, trace		
15—				107	13		0.00	silt, compact, stratified, (SW).		
3							0.00			
9		_					0.0.0			
_							0.00.0	grades downward to 48.0		=
	15	WR					.00.00	Wet olive gray (SILTY-SAND) with 10		WR: Sampler penetration with weight of rods.
	20	-	7	9		16		to 15% gravel, very fine to very coarse size sand, little silt, compact,	夏	
50-				9	8			stratified, (SM).	. r S. BACI	
		-					0 00 6		5	
							0.60.6			
	16	7					0.60.6			
-	12		9	15		24	0 60 6			
55-					16		0 60 6	W	4,4,4,	
							0 000			
							0 . 0 . 0			
4							0.00.0	grades downward to 58.0	÷. ÷. ÷.	
	17	6					00.0	Wet olive gray gravelly		
-	10		13	19		32		(SAND-SILT-CLAY) with 15 to 30% mostly subrounded gravel, little sand		
₃₀ [24		O 70	and clay, hard, weakly stratified, (SC). Boring completed at 60.0 feet, 60.0		← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-47a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/18/15 COMPLETED 03/18/15

Sh	0 / 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		(I) B	L !	WATER TABLE AND REMARKS
10	6		18	24			Advanced bore hole without split spoon sampling to 25.5 feet.	▼ (単純年級的報告報告報告報告報告報告報告文字/インインインインイン かっかっかった。	REEN 2" SCHEDULE 40 FJT PVC RISER	MORIE SAND PACK 1	
20									.010 SLOT 2" PVC S	#00N SIZE MOF	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-47a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY CLIENT Fisher Associates

DATE STARTED 03/18/15

COMPLETED 03/18/15

DEPTH

BLOWS ON

SAMPLER IN FT

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.	VC SCREEN SAND PACK	
								.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK	
							25.5 Boring completed at 25.5 feet.		← 25.0' ← 25.5'
			10						



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-49-13

SURF, ELEVATION 1469,6

10B13

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

LOCATION N: 886201.0131 E: 967666.13

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/25/13 COMPLETED 02/25/13

	DEPTH IN FT			WS ON PLER				
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	7	2					·	
	13		3					Extremely moist dark brown (SANDY-SILT) topsoil (disturbed) with
•	19			3		6	\$. 6	0 to 3% gravel, little sand and organic
				1	А		0	matter, very loose, granular soil
	2	11					0000	structure, (ML). (1) 4 INCH LOCKING STEEL
_	6		6				6 6 7	0.7 PROTECTIVE CASING INSTALLED
			-0-	ñ		12	0000	Extremely moist faintly mottled brown (a) CONCRETE PAD
					4		0.00	COLUMN CTI TO THE FEE HOW GROUND
		3			_4		0 0	(3) BENIUNITE SEAL
	<u>3</u> 14	3	3				000	mostly very fine to fine size sand, (4) #00N SIZE MORIE SAND PACK
5-	14		5_			7	2.2.1	trace clay and organic matter, loose,
		-		4_			P.0.9	blocky soil structure, (ML). Coarse silty topsoil with little
					6			2.0 sand and organic matter to 0.7
	4_	3.					1.0.0.0	Extremely moist to moist brown feet over coarse silty slack
	20	<u> </u>	_5_			10	4 6	15
-				_5_			0 . 0	gravelly (SILTY-SAND) with 15 to 25% gravel, very fine to fine size sand, some silt, loose, stratified, (SM). 50 Water sedment with some sand, trace gravel to 2,0 feet over water sorted and deposited sand with some silt, little to some
		-			5			some silt, loose, stratified, (SM).
	5	1_1_	ļ	ļ				5.0 gravel to 5.0 feet over loamy
	18		2			5	0 0 0	Moist brown to olive brown gravelly (SAND-SILT-CLAY) with 15 to 40% Gravel to 5.0 feet over loamy glacial drift with little to some gravel to 6.7 feet over water
		ļ	<u> </u>	3				Moist brown to olive brown gravelly SAND-SILT-CLAY) with 15 to 40% Gandle drift with little to some Gandle drift with little drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some Gandle drift with little to some
10-	-	<u> </u>			4	-	4	gravel and flat sided shale stone I fragments, little sand and clay, stiff, very soft, massive soil structure, 1 (III) Soil has the stand and stone Very soft, massive soil structure, Very soil structure, V
	6	2	<u> </u>				0.00.0	fragments, little sand and clay, stiff,
	16		_3_			6		very soft, massive soil structure, 조 공 명 gravel to 11.5 feet over loamy
			ļ	3_				(ML-CL) tending towards (SC).
		<u> </u>			4		0 0.	clear transition to 6.7 glacial till to 34.4 feet over
_	7_	2	ļ				0 0 0	Extremely moist brown (SANDY-SILT)
	15		4			8	4 . 4 .	with 5 to 15% gravel, some very fine to
				4	ļ	ļ	9. 9.	very coarse size sand, trace clay,
		<u> </u>		<u> </u>	4_		4.04.0	loose, weakly stratified, (ML).
	8	3					4 4 4	clear transition to 11.5 over shale bedrock to end of
15-	10	<u> </u>	5			11	9 9	Extremely moist grayish brown coring.
			ļ	6		1	9 0 9 0	(SAND-SILT-CLAY) with 5 to 15%
		<u> </u>			12		To fid	gravel and flat sided stone fragments, + 18.0'
	9	8			<u></u>	Į	0, 0	little sand and clay, stiff, massive soil
	16	<u> </u>	8	<u> </u>		18) 00 d	structure, (ML-CL).
				10	<u> </u>] ``	0- 0	clear transition to 15.5
					10		F0.0.d	Extremely moist gray gravelly + 18.0'
	10	5					U. ou	(SAND-SILT-CLAY) with 15 to 40%
	13		8			17	50.00	gravel and flat sided stone fragments,
5 -				9		"	F02-7	little sand, trace to little clay,

N=NUMBER OF BLOWS TD DRIVE 2 SPOON 12 WITH 140 Ib. WT. FALLING 30 PER BLOW LOGGED BY Brian R. Bartron, Geologist. (mw) SHEET 1 OF 3

compact, massive soil structure, (SM).



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 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, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/25/13 COMPLETED 02/25/13

DEPTH BLOWS ON IN FT SAMPLER

10B13

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		1	MELL		WATER TABLE AND REMARKS
	1940.02						<u> </u>	Extremely moist gray gravelly					(1) 2" SCHEDULE 40 FJT RISER
ļ							ວິ , ວັ	(SAND-SILT-CLAY) with 15 to 40%	ŀ				
							000	gravel and flat sided stone fragments,			Ξ		
							0.0	little sand, trace to little clay, compact, massive soil structure, (SM).		.			
							F 7 0 7	Compact, massive son structure, torry,	Ì				
							1-0 A O					:	← 23.0'
	11	_8_					0.00					$ \cdot $	
	- 11		8			20	1000					Ϋ́.	
ļ				11	7		2.0		ļ			SAND PACK	Run Depth Length Rec Rec RQD
25—					-		X 0.7					및	# (ft) (ft) (ft) % %
							0.00				Z	SA	200
							6 70				띭	出	35.5 1 to 4.8 4.8 100 77
							000				S	ğ	40.3
							Q. 00				2 INCH PVC SCREEN	#OON SIZE MORIE	
							-0 6 O			, .	H	IS.	40.3
	12	5					1027				Ē	g	2 to 5.0 4.9 98 60 45.3
	20		6			17	0 0				7	*	40.3
				11		"	0.0 d				SLOT	1	
30-					19		0.00				010		Note: Auger left in at 23.0 feet
00			<u> </u>				0.0:0				Ģ		below ground surface for 1/2
							0000						hour, water level at 18.0 feet.
							6 G			[]			
							POAD			٠,		3.3	
							0.00						
							000				\7	\	← 33.0 '
	13	19		ļ			P. 00			/ i	ŢŢ	71	CDI Badrack Uprdposs Classification
	16	-	11	 		32	LY COY	3	34.4	1	->/-	->/	EDI Bedrock Hardness Classification
		· · · · ·	ļ	21	100/5		F====	Dark brownish gray apparent		トノ	<u>\</u>	\\	Very soft: can be easily
35					100/3			weathered shale bedrock, very soft				ال	crushed between fingers
	\dashv			_				∖ and soft.		どに	-ン;-	-뗬.	into soil material.
	\dashv			 				3	35,5	<u> </u>	-)/-	-₩Ž	Soft: can be crushed between fingers into soil material
			<u> </u>	 			=====	Gray shale bedrock, moderately soft,		[]		Z/	with some effort.
				 				moderately to slightly fractured		1	7	Žί	Moderately soft; can be etched
		Run	#1	 				horizontally along bedding planes,		<u> </u>	->;	岁;	with fingernail.
		11911	<u>/** !</u>					banded, dense.	27 ^	卜	\	_	
		İ		T		1		3	37.6 				
						1				ンデ	->;	-ン;	1
40							=====	See next sheet.		<u> </u>	\ /	<u>\</u>	

N=NUMBER OF BLOWS TO DRIVE 2 SPOON 12 WITH 140 Ib. WT. FALLING 30 PER BLOW LOGGED BY Brian R. Bartron, Geologist, (mw). SHEET 2 OF 3



Soil and Hydrogeologic Investigations « Wetland Delineations

1091 Jamison Road * Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-49-13

SURF. ELEVATION 1489.6

10B13

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

LOCATION N: 886201.0131 E: 967666.13

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/25/13 COMPLETED 02/25/13

DEPTH BLOWS ON IN FT SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATE	ER TABI	E AND	REMAI	RKS	•
								Gray siltstone bedrock, medium hardness, non fractured, thinly bedded to banded, slightly porous.							
		Run	#2					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	-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/						
ŧ5—	#							dense. 45.3 Coring completed at 45.3 feet.		← 45					
										Run # 	Depth (ft)	Length (ft)	Rec (ft)		RGD %
										i	35.5 to 40.3	4,8	4.8	100	77
										2	40.3 to 45.3	5.0	4.9	98	60
50—]				EDI	Bedroc	k Hardn		lassif	icatio
											_	s into s ome efo	oll ma ort,	terial	
								•	a constant	Med	ium hard	ingerna Iness; c d with I	an be	easil	У
55—										1/4 ster	e: Adva Inch IO n auger	x 8 inct casing	i OD h with	oliow	
										to 2 sam belo	tinuous 0.0 fee pling to ow with I e barrel	t and in 35.5 fe NG-2 si	vertal et. C ze dol	i 5 fo ontinu uble t	ot ied ube
B∩						-					PVC ob alled in				



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-50-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 884342.83313000000

Town of Arkwright, Chautaugua Co., NY

Easting: 965850,45872200000

CLIENT Fisher Associates

DATE STARTED 03/19/15 COMPLETED 03/20/15

I	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
L	1	1_					SERVICE PROPERTY.	Extremely moist black (MUCK), (OL).
L	22		2			5		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-				_3_			000	3 3 3 415'
-					7		8 8	Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with little clay,
_	2	_11					000	trace sand soft blocky soil structure (1) TOPSOIL FILL
L	24		-11			21	ا می ہ	(2) CONCRETE
1				10		100	000	grades downward to 1.0 Note: WTG-50-15 drilled 4 feet
1					10		0.00	Note, W16-30-13 differ 4 feet
1	3	6					* *	Extremely moist faintly mottled olive west of staked location. brown gravelly (CLAYEY-SILT) with 15
54	18		5			10	0 0 0	to 30% gravel, little clay, trace sand, Organic muck mantle to 0.4 feet
L				5			0 0	blocky soil structure, (ML-CL).
L				0	5		* *	oracles downward to 2.0 with little clay, trace sand to 1.0
L	4	3					ف	feet over silty glacial drift with
	22		7			17	9	Extremely moist faintly mottled olive little to some gravel, little clay, brown gravelly (SAND-SILT-CLAY) trace sand to 2.0 feet over
				10		2.00	4 4	with 15 to 40% gravel, little sand and water sorted and deposited silt
L					11		e_	clay, very stiff, blocky soil structure, with little to some gravel, little
	5	5					à à	(ML-CL). sand and clay to 4.0 feet over
L	18		7			17	3 2	grades downward to 4.0 silty slack water sediment with
L				10		300	000	Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% Little clay, trace gravel and sand to 8.5 feet over silty slack water sediment with little clay, trace
\perp					- 11		0.0	brown (CLAYEY-SILT) with 5 to 10% brown (CLAYEY-SILT) with 5 to 10% continuous to 8.5 feet over silty slack water sediment with little clay, trace
L	6	6						gravel, little clay, trace sand, stiff with gravel and sand to 9.0 feet over
L	24		7			16		
				9				racks, very stiff below 6.0 feet, gravel with little clay, trace sand
1					9			(ML-CL). to 10.0 feet over water sorted
	7	9					A	8.5 and deposited sand with little silt
-	24		9			26	2 08 0	Extremely moist olive gray to 12.0 feet over water sorted and deposited sand with little
				17				(CLAYET-SILT) with 5 to 10% gravel,
L	_				16			feet over water sorted and
L	8	12					00.0	massive soil structure, (ML-CL). deposited sand with little to
54	12		6			12	0 0	9.0 some gravel, little silt and clay to
-	_			6		80000	000	Extremely moist faintly mottled olive 23.0 feet over water sorted and
					6	1	0.00	brown gravelly (CLAYEY-SILT) with 15 deposited coarse silt with little
L							500 d	to don gravely little dialy trade darial
							ο φ O	very stiff, massive soil structure, (ML-CL). Teet over water sorted and deposited sand with trace gravel
_						12	0.00	and silt to 28.0 feet over water
L							000	sorted and deposited sand with
	9	6					0.00	little to some gravel, little silt
	14		4			10	0.00	and clay to 48.0 feet over silty
				6			0 60	· · · · · · · · · · · · · · · · · · ·
L					9		0000	See next sheet. (Continued on next sheet)



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915

10B13a

HOLE NO. WTG-50-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 884342.83313000000

Town of Arkwright, Chautaugua Co., NY

Easting: 965850.45872200000

CLIENT Fisher Associates

DATE STARTED 03/19/15

COMPLETED 03/20/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	10 18	5	6	6		12		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 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).		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. Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with
25—								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		continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
30—	11 19	7	8	9	14	17		Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% mostly subrounded gravel, little to some sand, weakly stratified, (SM). 24.0	F F F F F F F F F F F F F F F F F F F	
-								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		
35—	12	11	15	12	22	27		Extremely moist olive gray gravelly (SAND-SILT-CLAY) with 15 to 40% mostly subrounded gravel, little silt and clay, very stiff, stratified, (SC).		
3										Water level at 38.3 feet below
40	13	11	17	19	20	36				ground surface at completion.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915

10B13a

HOLE NO. WTG-50-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 884342.83313000000

Town of Arkwright, Chautaugua Co., NY

Easting: 965850.45872200000

CLIENT Fisher Associates

DATE STARTED 03/19/15

COMPLETED 03/20/15

SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
-						0 0-0	Extremely moist olive gray gravelly	#3.#3.#3	
			L.,				(SAND-SILT-CLAY) with 15 to 40%	直外企外企外	
						0000	mostly subrounded gravel, little silt and		
						O 0	clay, very stiff, stratified, (SC).	一片 多次多次	
						000			
						0 00			
14	10					-0 0 O		1.5	80
20		10			22	-00-0			
			12		~~	0 0-4			
				18		0000		1345	
					1	ا مر ۵			
]	0000			
						0,00			
					1	000			
						0.00			
		3011117				-0 0 Q	grades downward to 48	.0	
15	13				Í	200	Extremely moist olive gray gravelly		
20	13	23				0.00	(SAND-SILT-CLAY) with 15 to 40%	□	
		20	26		49	00.0	mostly subangular gravel, hard, massive	一	
			20	26		0 0	soil structure, (ML-CL).	B.	
				20		000		SS	
					1	Ō- ¸⊙		一、一、青、	
						-000			
						0,0		5	
						00-0			
						2 0	grades downward to 53	.00	
-10	- 10					6 6 6 6 C	Wet olive gray very gravelly		
16 22	13		-			000	(SILTY-SAND) with 40 to 60% mostly		
- 22	-	22		_	40	0000	subrounded gravel, very fine to very		
_			18			0000	coarse size sand, little silt, dense,		
-				24		0000	stratified, (SM), (GM).	1.4.4.4	
-	-		-		è	0000			
					ē.	0000			
					9	0.00.0		一种公共公共公	
						0000			
					2	0000	grades downward to 58.	0	
17	4					2004	Wet olive gray (SILTY-SAND), very		
17 -24	4	10				77.5	fine size sand, some silt, compact,	全类角类角类	
44	-	12	14		26		thinly bedded, (SM).	\$5.25.25	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-50a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/20/15 COMPLETED 03/20/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WEL (I)		WATER TABLE AND REMARKS
5-								Advanced bore hole without split spoon sampling to 25.5 feet.	~ \~	2" SCHEDULE 40 FJT PVC RISER	TO TOUTHINGS BACKFILL TO TO THE TOWN TO THE TOWN TO THE TANK THE TANK TO THE TANK TH	← 1.5' (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—						37.000				2" SCHEDULE 40	(← 10.0°
15—								4		2" PVC SCREEN	#00N SIZE MORIE SAND PACK	← 13.0' ← 15.0'
20										.010 SLOT 2" PVC	S N00#	



 $Soil\ and\ Hydrogeologic\ Investigations \ \bullet \ Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-50a-15 (Well)</u>

SURF, ELEVATION _

PROJECT

Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/20/15

COMPLETED 03/20/15

	SN	0/ 6	6/	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.	C SCREEN	
2-11									.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK.	^
25—								25.5 Boring completed at 25.5 feet.	00 NO0#	← 25.0' ← 25.5'
30—										
35—										
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-51-15</u>

10B13a HOLE NO. <u>WTG-51-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885244.71635300000

Town of Arkwright, Chautaugua Co., NY

Easting: 969600.86040300000

CLIENT Fisher Associates

DATE STARTED 04/01/15 COMPLETED 04/02/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) B	WATER TABLE AND REMARKS
ľ	1	1					*********	(0,175, 0,17)		← 0.5'
t	15		3			122	(1-100 miles)	Moist dark brown (CLAYEY-SILT)	3-3-3	- 0.5
Ì	-10			5		8		topsoil with little organic matter and clay, very soft, granular soil structure,	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
ŀ	-	Uv-U-		_5_				(ML-CL).	15 5 5 5	0.22
H		755281			8_		2 0	0.3	PÉRÉE!	← 2.0'
+	2	_10_	500		-		0.00			(1) TOPSOIL FILL
ŀ	20		12			28	0.60	Extremely moist highly mottled,		(2) CONCRETE
ŀ	-			16			0000	distinctly mottled below 1.0 feet, olive		(2) CONONETE
-				-	14		0.00	brown (CLAYEY-SILT) with little clay, stiff, blocky soil structure, (ML-CL).		
-	_3	_7					C 00	M. V 577	h. h. h.	Note: WTG-51-15 drilled 3.0 feet
_	22		9			18	0.0	grades downward to 2.0		south of staked location.
-				9			0 0	Extremely moist distinctly mottled olive		
ļ					9		000	brown gravelly (SAND-SILT-CLAY)	(-, -, -, -, l	200 9 30 300 4000 9
Į	4	5					0 0	with 15 to 30% gravel, little sand and		Silty topsoil with little organic
	23		6	i		14	-00-d	clay, very stiff, massive soil structure,		matter and clay to 0.3 feet over silty slack water sediment with
				8		3.55		(ML-CL).	户 。2.2.2.1	little clay to 2.0 feet over silty
					8			7.0		glacial drift with little to some
Ī	5	4				13		Extremely moist faintly mottled olive		gravel, little sand and clay to 7.0
Ì	18		3			8		brown (SANDY-SILT) with little very	4.4.4.	feet over coarse silty slack
Ì				5		°	V. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	fine size sand, compact, weakly thinly		water sediment with little sand
Ì					6			bedded, (ML).	T T BA¢KFJIII	and sand interbeds to 10.0 feet
+	6	5					143111111111111111111111111111111111111	9.0	L. L. Š.	over coarse silty slack water
ł	24	_5_	6					Extremely moist faintly mottled clive	BA	sediment with trace sand to 12.5
ŀ	24		0	8		14		brown (SANDY-SILT) with little very	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	feet over silty slack water
ł		_		8	10			fine size sand, loose, thinly bedded	<u></u>	sediment with little clay to 18.0 feet over loamy glacial drift with
ł		_	-		12			with sand interbeds, (ML) with (SW)		little to some gravel to 28.0 feet
+	7	3	-					interbeds.	F 5.	over silty glacial till to 38.0 feet
ŀ		-	5			13		10.0		over loamy glacial till to 58.0
-	_			8				Extremely moist faintly mottled olive		feet over water sorted and
-	250 7		-		8	-		brown (SANDY-SILT) with trace sand,	H. H. H.	deposited silt with little sand and
-	8	4	-		-		7.7	compact, thinly bedded, (ML).	Stratte St.	clay to end of boring.
1	20		5			11	+_ +_	12.5		
				6					户(A)(A)	No personal control of the control o
1					9		14 (No. 1)	Extremely moist olive gray		Note: advanced bore hole with 4
) ======							(CLAYEY-SILT) with little clay, stiff,	15000000	1/4 inch ID x 8 inch OD hollow
								thinly laminated, (ML-CL).		stem auger casing with continuous split spoon sampling
Ì							14.174	grades devisited to 40.0		to 16.0 feet. Continued below
1							÷	grades downward to 18.0	tracta ta	with auger with 5 foot interval
1	9	6				1	000	Extremely moist olive gray gravelly		sampling to 60.0 feet.
	18		3			1 ,,	0000	(SANDY-SILT) with 15 to 40% mostly		2 T 1997 MM
1			1	9		12	0 00	subangular gravel, little to some sand,	1-1-1-1	
ł	-	-	-	9	11	1	0000	compact, massive soil structure, (SM).		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-51-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885244,71635300000

Town of Arkwright, Chautaugua Co., NY

Easting: 969600.86040300000

CLIENT Fisher Associates

DATE STARTED 04/01/15

COMPLETED 04/02/15

BLOWS ON DEPTH IN FT SAMPLER

	SN RFC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							0000	Extremely moist olive gray gravelly		
-	-			-			000	(SANDY-SILT) with 15 to 40% mostly		
ŀ					_	5	0000	subangular gravel, little to some sand, compact, massive soil structure, (SM).		
1							0000	Particular and Control of the Contro		
							0			
-	10	6					0 00			
-	22	_	9			22	0000			
-				_13	20		0 00		-, -, -,	
5-					20		0000			
[]	0000			
							0000			
-					-	-	0 00			
-					-		0000	grades downward to 28.0) <i></i>	
ŀ	11	4					20.0	Extremely moist olive gray gravelly		
			8			20		(SAND-SILT-CLAY) with 15 to 40%	F F F CULTINGS BACKFILL	
				12		-	0000	mostly subangular gravel, little sand and clay, very stiff, hard below 38.0	Š	
0-	_				12	ł	7000 9- 20	feet, massive soil structure, (ML-CL).	- 1. B	
}		-				1	0		- · - · <u>E</u>	
1							-0 0 0 0 0		<u>5</u> .	
							0.00			
						-	0 0			
-	02	-		-		1	0.0			
ł	12 15	8	12		-		0000			
Ì		ot	12	16		28	0, 0		F. F. F.	
5_					18		FO 0 0			
						-	-000 0			
-		_				1	0.00			
							0 0-0			
							0.0		<u></u>	
\neg							0.00	grades downward to 38.0		
	13	9					0000	Extremely moist olive gray gravelly		
	22		16			33	000	(SANDY-SILT) with 15 to 40% gravel, little to some sand, dense, massive soil		
-				17	17	1	0000	structure, (SM).		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. WIG-51-15

10B13a

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

BLOWS ON DEPTH SAMPLER IN FT

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							0000	Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, little to some sand, dense, massive soil structure, (SM).		
	14	8	18			44				
45—				26	19		000			Note: noticed harder drilling below 45.0 feet.
-							000	grades downward to 48	8.0	
	15 24	1	7_	14		21		Wet olive gray gravelly (SANDY-SILT) with 15 to 40% gravel, some sand, compact, massive soil structure, (SM).	F F F F F	
50—					13				CUTINGS BACKF	
1	16	5						grades downward to 53 Extremely moist olive gray gravelly	3.0	
55—	18		11	18	24	29		(SANDY-SILT) with 15 to 40% gravel, little sand, trace clay, compact, massive soil structure, (ML) tending towards (SM).		
							0 00		8.0	
	17 22	4	9	13		22		Extremely moist olive gray (SAND-SILT-CLAY) with little very fine size sand and clay, very stiff, weakly thinly laminated, (ML-CL).		
60					17 ·		73/73/		0.0	← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-51a-15 (Well)</u>

LOCATION _

Town of Arkwright, Chautaugua Co., NY

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

CLIENT Fisher Associates

DATE STARTED 04/03/15 COMPLETED 04/03/15

SURF. ELEVATION _

DEPTH BLOWS ON IN FT SAMPLER

10B13a

SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL		WATER TABLE AND REMARKS
5							Advanced bore hole without split spoon sampling to 25.5 feet.	2" SCHEDULE 40 FJT PVC RISER	PACK	 ← 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'
20								P	#00N SIZE MORIE SAND PACK	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-51a-15 (Well)</u>

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/03/15 COMPLETED 04/03/15

SURF. ELEVATION _

DEPTH BLOWS ON IN FT SAMPLER

10B13a

SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELI		WATER TABLE AND REMARKS
							Advanced bore hole without split spoon sampling to 25.5 feet.	H.	PACK	
				65				DS DAG	SAND	
					5			.0T 2".	MORIE	
								.010 SI	DN SIZE	
							25.5	·.L	0	← 25.0' ← 25.5'
							Boring completed at 25.5 feet.			
		AUCEUUI III			A No.					



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 883762.53434100000

Town of Arkwright, Chautaugua Co., NY

Easting: 970041.71744700000

CLIENT Fisher Associates

DATE STARTED 03/12/15

COMPLETED 03/13/15

SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) 3 WELL	WATER TABLE AND REMARKS
VEC	2						THE CONTRACT OF THE CONTRACT O	<u> </u>	← 0.2'
18					1 2990	000	Wet orangish brown (PEAT), very	15 5 5 5	
			3		4	<u> </u>	loose, granular soil structure, (OL).	15-5-5	· · · · · · · · · · · · · · · · · · ·
				11		V 0V	0.2	F. F. F.	← 1.5'
2	11					000	Wet black (MUCK), very loose, granular	SEASONS	(1) TOPSOIL FILL
18						000	soil structure, (OL).		(2) CONCRETE
10		9	40		27	200	0.3	L. L. L.	(E) CONONETE
	-		18_			0.00	Extremely moist gravelly		Note: WTG-52-15 drilled 22 feet
				26		200	(SANDY-SILT) with 15 to 30% mostly		southwest of staked location.
3	12	-		_		0000	subangular gravel, little sand, very	4.4.4.	
18		34			49	0 00	loose, massive soil structure, (ML).		Organic peat to 0.2 feet over
	1017		15			0009	1.0	tis tis tis	organic muck to 0.3 feet over
3/20				12		F-25-1	Extremely moist dark brown gravelly		coarse silty glacial drift with little to some gravel, little sand
4	_4_					000	(SANDY-SILT) with 15 to 30% mostly	18008008	to 1.0 feet over coarse silty
12		7			13	0 00	subangular gravel, little sand and	to to to	glacial drift with little to some
			6			0000	organic matter, very loose, massive soil		gravel, little sand and organic
			3.57	6		S 25	structure, (ML).	\$80,800.8E	matter to 1.1 feet over silty
5	_4_					0000	1.1	to to ta	glacial drift with little to some
20		9			20	0 00	Extremely moist highly mottled olive	4.4.4.	gravel, little sand and clay to 1.9 feet over water sorted and
	_		11			0000	brown gravelly (SAND-SILT-CLAY)	F F F F F F F F F F F F F F F F F F F	deposited gravel with occasiona
			_	12		5 25	with 15 to 40% mostly subangular	F- 7- 8-	cobble and silt with little to som
6	6		_			000	gravel, little sand and clay, very loose,		sand to 4.0 feet over loamy
20		8		-	16	0 00	massive soil structure, (SC).		glacial drift with little to some
			8			000	clear transition to 1.5	一. 一.	gravel to 6.0 feet over silty
			_	9		0.00	Moist olive brown very gravelly	L L LTINGS	glacial drift with little to some
7	_4_					7007	(SANDY-SILT) with 40 to 60% mostly	(A) (A) (A)	gravel, little clay, trace to little sand to 8.0 feet over coarse
18		5			13	CAC	subrounded gravel and occasional	terterte	silty glacial drift with little to
-4			8		59000	0 0	cobble, little to some sand, compact,	L.A.A.	some gravel, little sand, trace
				9		7000	weakly stratified, (SM), (GM).	\$800 B 0 8	clay to 10.0 feet over silty
8	3					4 6	grades downward to 4.0	tion to to	glacial drift with little to some
18		5			15	0 00 0	Moist faintly mottled olive brown	4.4.4.	gravel, little clay, trace to little
			10			0 0 0	gravelly (SANDY-SILT) with 15 to 40%	\$600 B008	sand to 14.0 feet over coarse
\sqcup			-11.63	8			mostly subangular gravel and	13/13/13	silty slack water sediment with little sand, trace gravel to 18.0
						0 00 0	cocasional cobble, little to some sand,	4.4.4	feet over silty glacial drift with
						0 0	trace clay, dense, massive soil structure, (SM).		little to some gravel, little clay t
							Process and the contract of the contract of	tis/tis/tis/	23.0 feet over coarse silty
						0 00 0	clear transition to 6.0	4.4.4.	glacial drift with little to some
9	5					000			gravel, little sand to 28.0 feet
10		6			13	6 0	4	To the teacher	over silty glacial drift with little
			7		1852	000		国,第7年7	gravel, sand and clay to 29.5
				7		0 0	See next sheet.		(Continued on next sheet)



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 883762,53434100000

Town of Arkwright, Chautaugua Co., NY

Easting: 970041.71744700000

CLIENT Fisher Associates

DATE STARTED 03/12/15

COMPLETED 03/13/15

BLOWS ON DEPTH SAMPLER IN FT

1	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	,_,						0.00	Extremely moist faintly mottled grayish	+, +, +,	feet over water sorted and
							o 00	olive brown gravelly (CLAYEY-SILT)		deposited sand with little to
							000	with 15 to 40% mostly subangular		some gravel, little silt to 33.0
						ĺ	0,0	gravel, little clay, trace to little sand,		feet over silty glacial drift with
-	\rightarrow							stiff, massive soil structure, (ML-CL).		little clay, trace gravel to 34.0
-	-	_					7000	8.0	性的性的性質	feet over water sorted and
_	-						0 00	il.		deposited sand with little to
	10	2					0000	Extremely moist faintly mottled grayish		some gravel, little silt to 38.0
	8		5			11	00.1	in olive brown gravelly (SANDY-SILT)		feet over silty glacial till to 44.0
				6		11	0	with 15 to 40% mostly subangular		feet over silty glacial drift with
				0	_	İ	0000	gravel, little sand, trace clay,		little to some gravel, little clay,
5—		-			6		0 0	il compact, massive soil structure, (ML).		trace sand to 48.0 feet over
-			-				0000	grades downward to 10.0	1.5.7.5.7.4	water sorted and deposited sand
L							000	Extremely maint faintly mattled gravish		with little to some gravel, little
							0000	Extremely moist faintly mottled grayish		silt to 48.5 feet over water
							0 00	olive brown gravelly (CLAYEY-SILT)		sorted and deposited sand and
							000	with 15 to 40% mostly subangular		gravel to 53.0 feet over water
-	-			_			0 00	gravel, little clay, trace to little sand,	P. P. P.	The control of the state of the
-							5000	ill very stiff, massive soil structure,		sorted and deposited sand with
-	11	1_					000	(ML-CL).	产。产。海·	little silt and gravel to 58.0 over
	18		4			10	0 0	grades downward to 14.0	PACKFTLÜ	silty glacial till to 58.3 feet over
				6		10	1000	Wet brown (SANDY-SILT) with 5 to	공	apparent siltstone bedrock to
					6		0000	1. 10% gravel, little sand, compact, weakly	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	refusal.
0+	-				-0			thinly bedded, (ML).		
- 1-	-	_		-			0000	grades downward to 18.0	CUTTINGS.	1
-	_						0 0	(il	2007年	Augers left in bore hole at 50.0
							0000	Extremely moist olive gray gravelly	l	feet over night, water level at
							0 00 0	(CLAYEY-SILT) with 15 to 40% mostly	直接直接查明	12.5 feet below ground surface
							0000	subangular gravel, little clay, trace		the next morning.
	$\neg \uparrow$						0000	is sand, very stiff, massive soil structure,	L. L. L.	
-							2 0 2 0	(ML-CL).		
	12	4						grades downward to 23.0	Harry Ha	Note: advanced bore hole with 4
	20		5			12	8 0 8 0	Extremely moist olive gray gravelly	2002	1/4 inch ID x 8 inch OD hollow
				7			0000	" (SANDY-SILT) with 15 to 30% mostly	73/73/73	stem auger casing with
5					8		0.00	ii subangular gravel, little sand, loose,		continuous split spoon sampling
٦							0000	massive soil structure, (ML).		to 16.0 feet. Continued below
							0000		FX	with auger with 5 foot interval
-	-	-			-	1	0000	grades downward to 28.0		sampling to 59.6 feet.
-			-				0000	! Extremely moist olive gray gravelly	计多件系统法	Note: noticed augering change
_							0 0	(SAND-SILT-CLAY) with 15 to 20%		at 36.5 feet.
							0000	mostly subangular gravel, little sand		
							0 00 0	and clay, firm, massive soil structure,		
	13	17				1	= 0-	ML-CL).		
	10	-1/	10			50605	000		医医疗医院	
H	10		18	12000	0 == 0	41	a- 0-	grades downward to 29.5		
L				23			000		性多性多性的	
٥L					20		or so	See next sheet.	会社の発売の発売。	k .



 $Soil\ and\ Hydrogeologic\ Investigations \ \bullet \ Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 883762.53434100000

Town of Arkwright, Chautaugua Co., NY

Easting: 970041,71744700000

CLIENT Fisher Associates

DATE STARTED 03/12/15

COMPLETED 03/13/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							7000	Wet olive gray gravelly (SILTY-SAND)	h.h.h.	
							0 0	with 15 to 30% gravel, little silt, loose,		
							000	weakly stratified, (SM).		
							O O	grades downward to 33.0	[1] (1) (1)	
							LODO	Extremely moist faintly mottled olive		
]	0 00	gray (CLAYEY-SILT) with 5 to 10%		
	14	5			()	1	-00-0	gravel, little clay, stiff, massive soil	F3.75.75.4	
	24		6			1	0 00	structure, (ML-CL).		
				10		16	200	34.0		
				10	11	1	2009	!! Wet faintly mottled olive gray gravelly	H. H. H.	
15—					111	1	4- 0-	!! (SILTY-SAND) with 15 to 40% mostly		
			-	-		1	0 0	!! subrounded gravel, very fine to coarse		
	-					1	OAC	size sand, little silt, compact, weakly	中文并文件为	
						ł	0 0	stratified, (SM).		se
		-				1	-0 A C	grades downward to 38.0		
			-			1	0 0	Extremely moist faintly mottled olive		
	Colorett		_	-		ł	5000	gray gravelly (CLAYEY-SILT) with 15		
	15	8				ł	188.9	to 40% mostly subangular gravel, little		
	12		8	_		18	0.00	clay, trace to little sand, hard, massive		
				10			0:00:	soil structure, (ML-CL).	A	
0-				_	13		0.00	grades downward to 44.0	g	
							0.00.	Extremely moist olive gray gravelly		
							0.00	(CLAYEY-SILT) with 15 to 30% mostly		
							0.00.	subangular gravel, little clay, trace	ਚ.	
							50.00	sand, very stiff, massive soil structure,		
							0.00	(ML-CL).		
]	2.02.	grades downward to 48.0	h. h. h.	
3	16]	0000	Wet olive gray gravelly (SILTY-SAND)		
						1	0 00 0	with 15 to 30% mostly subrounded		
						1	0000	gravel, very fine to very coarse size	户 、2007年7月	
_			-			1	0000	sand, little silt, compact, weakly		
5—						1	0 0	stratified, (SM).		
i i						1	0000	48.5		
	-						0000	Wet olive gray very gravelly (SAND)		
			_	-	-	1	0 00	with 40 to 60% mostly subrounded		
		-	-		-	1	0000	gravel, very fine to very coarse size		
_					_	1	0.00.0	sand, compact, stratified, (SW), (GW).		
3				-		1	2000	grades downward to 53.0	te te te	Note: noticed hard drilling below
		100/4				-				58.3 feet.
	4									
										← 59.6'
0	18	100/1						See next sheet.		00.0



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52-15</u>

10B13a

SURF. ELEVATION _

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

Town of Arkwright, Chautaugua Co., NY

Easting: 970041.71744700000

CLIENT Fisher Associates

DATE STARTED 03/12/15

COMPLETED 03/13/15

IN	FI		SAM	PLER				
S	SN	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
65								(SAND-SILT-CLAY) with 15 to 30% mostly subangular gravel, little sand and clay, hard, massive soil structure, (ML-CL). clear transition to 58.3
								Olive gray apparent siltstone bedrock, moderately hard, bedded, can be etched with knife with some effort. 59.8
								Split spoon refusal at 59.6 feet.
70								
75								
					- 11			
80								



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/13/15 COMPLETED 03/13/15

	 18	24	N	LITH	DESCRIPTION AND CLASSIFICATION		WEL (I)	L !	WATER TABLE AND REMARKS
					Advanced bore hole without split spoon sampling to 25.5 feet.	M. M. M. M. M. M. M. M. M. M. M. M.	2" SCHEDULE 40 FJT PVC RISER	L. F. F. PUTHINGS BACKFILL F. F. F. F. F. P. V.	← 1,5' (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.
						では、こととと	2" SCHEDUL	1(3)(-)([]	← 10.0'
								PACK	← 13.0°
							VC SCR		← 15.0'
									VC SCREEN WORIE SAND PACK



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-52a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/13/15

COMPLETED 03/13/15_

	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.	VC SCREEN SAND PACK	
•									.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK.	
25—								25.5	. L.J.	← 25.0' ← 25.5'
								Boring completed at 25.5 feet.		**************************************
30—										
9										
35—										
100										
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-57-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 873276.53679100000

Town of Arkwright, Chautaugua Co., NY

Easting: 975808.70358500000

CLIENT Fisher Associates

DATE STARTED 04/08/15 COMPLETED 04/10/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

- 1			07							
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) S METT	WATER TABLE AND REMARKS
1	KCL					-	3 1 N 1 N			=32
-	1				-		17.11.11.11.11	Extremely moist black (MUCK), granular	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	← 0.5'
-	18		_1_		-	4		soil structure, (OL).	1,2,2,4	
				3			000	0.3	[5 - 5 - 5]	
					8		0 0	1	3 3 3	← 2.0'
	2	11					200	Extremely moist faintly mottled brown	7. 7. 7.	
	20		10		-		2004	(SANDY-SILT) with little sand, very		(1) TOPSOIL FILL
1	20		_10_			20	- 0-	loose, weakly blocky soil structure,		(2) CONCRETE
-	-	-		10_			2004	(ML).		
		_			10		5 25 T	clear transition to 1.0		Note: WTG-57-15 drilled 10.0 feet
	3	3					000	Extremely moist distinctly mottled olive	1	east of staked location.
5_	10		4			11	می ۵	!! brown gravelly (CLAYEY-SILT) with 15		Section Control Contro
3		1 1 2 2 3		7			0000	!! to 40% mostly subangular gravel, little		
				33	10		0 0	clay, trace sand, firm, blocky soil	L. L. L.	Water level at 7.1 feet below
Ì	4	14			-10		000	is structure, (ML-CL).		ground surface at completion.
	22	_14_	17				0000	grades downward to 2.0		
	22	-	17			39	ا ه د	III Grades downward to 2.0		
			_	22	-		0000	Extremely moist distinctly mottled olive	TA TATA	Organic muck surface to 0.3 feet
					25		0 00	brown gravelly (CLAYEY-SILT) with 15		over coarse silty glacial drift
	5	11					0000	to 40% mostly subangular gravel, little		with little sand to 1.0 feet over
	24		23			50	0 00	clay, very stiff with nearly vertical	[-, -, -,]	silty glacial drift with little to
				27		30	000	gray desiccation cracks, (ML-CL).		some gravel, little clay, trace
				-	36	ĺ	0 00	grades downward to 4.0	T T	sand to 2.0 feet over silty glacial
10—	_				30	1	0000			till to 6.0 feet over loamy glacial
	6	35	5.774		-	1	000	Extremely moist distinctly mottled olive	3A	till to 28.0 feet over silty glacial
	24		70			143	0000	brown gravelly (SAND-SILT-CLAY)	to	till to end of boring.
				73		ļ	0 00	with 15 to 40% mostly subangular gravel, stiff, nearly vertical gray	III	
					78		0000	desiccation cracks, (ML-CL) tending	作· 在· 倡	
	7	38					0 00	towards (SC).		Note: advanced bore hole with 4
	24		48			88	0000	1	55. 57. 57.	1/4 inch ID x 8 inch 0D hollow
			10	40		00	0 00	grades downward to 6.0	[]	stem auger casing with
				40	46	1	0000	Extremely moist distinctly mottled olive		continuous split spoon sampling
			_	1	40	1	000	brown gravelly (SANDY-SILT) with 15		to 16.0 feet. Continued below
	8	52	-	-	-	1	0000	to 25% mostly subangular gravel, little		with auger with 5 foot interval
15—	23		34	-		63	0 00	sand, trace clay, dense, very dense		sampling to 60.0 feet.
				29		1	0000	below 10.0 feet, massive soil structure	H. H. H.	
					40		0 00	with brittle consistence, (ML).		
							0000		F	
						1	0 00			
						1	0000			
N			-	-		1	0 00		种类类类类	
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-57-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 873276.53679100000

Town of Arkwright, Chautaugua Co., NY

Easting: 975808.70358500000

CLIENT Fisher Associates

DATE STARTED 04/08/15 COMPLETED 04/10/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

SN	1 ^	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
4 Shas						0000	Extremely moist distinctly mottled olive	+. +. +.	
						0.00	brown gravelly (SANDY-SILT) with 15		
	-					0000	to 25% mostly subangular gravel, little		
-	+-			-			sand, trace clay, dense, very dense below 10.0 feet, massive soil structure		
+	+		-			0 0	with brittle consistence, (ML).		
10	33					0000			
24		49			99	0000			
			50			0 00			
				63		D V D V			
-	1					0 00			
					i.	0000		4,4,4,	
	-					0000			
						0000	No. 100 mo as them though and		
							grades downward to 28.	0	
11	28]	0.0	Extremely moist olive gray gravelly	h. h. h.	
20		25				می ۵	(SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and	CUPTINGS, BACKFILL	
			100/4		ł	0000	occasional cobble, little sand and clay,	3AC	
)——	-				1	F000 P000	hard, massive soil structure, (ML-CL).	38	
-					-	0-00		上,一个。看	
	_			1.122		-0 0 0		5	
					1	0.00			
						0 20			
						0.00			
12					-	0.60		-, -, -,	
20		44		-	88	0 0			
_			44	52	1	000			
5-				32	1	0.00			
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						0.00			
					1	0. 0			
					-	0.0			
		-			1	0000			
13					1	0, 00			
17		28	37		65	0000			
, $artriangle$	+	+	3/	40	1	0.00			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

10B13a HOLE NO. WTG-57-15

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

SURF. ELEVATION _
LOCATION Northing: 873276.53679100000

Town of Arkwright, Chautaugua Co., NY

Easting: 975808,70358500000

CLIENT Fisher Associates

DATE STARTED 04/08/15 COMPLETED 04/10/15

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
							0.0.0	Extremely moist olive gray gravelly		
							0.00	(SAND-SILT-CLAY) with 15 to 40% mostly subangular gravel and		
								occasional cobble, little sand and clay,	P. A. A.	
				n - 112.			000	hard, massive soil structure, (ML-CL).		
							0-00		\$50,800,80	
	14	24					F0 6 0			
	22		51			98	, 0 0 0 0 0 0 0 0 0 0 0		4,4,4,	
				47		00	0 20			
45—					44		0.00			
10							مي ه		P. P. P.	
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		-	24	Tyrace .	-	71				1
			-	47		1	0000		h. h. h.	00.01
60			l.		46		nan	Boring completed at 60.0 feet.	K112281122812	<u></u> ← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-57a-15 (Well)</u>

SURF. ELEVATION _

10B13a

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/13/15

COMPLETED <u>04/13/15</u>

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		(I)		WATER TABLE AND REMARKS
5—								Advanced bore hole without split spoon sampling to 25.5 feet.	* W	2" SCHEDULE 40 FJT PVC RISER	(3) (1) The transference of the transference o	← 1.5' (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. ← 10.0'
									\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			← 13.0' ← 15.0'
15—											#00N SIZE MORIE SAND PACK	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-57a-15 (Well)</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/13/15

COMPLETED 04/13/15

BLOWS ON DEPTH SAMPLER IN FT

	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 #90N SIZE MORIE SAND PACK	÷ 25.0°
25—								25.5	11.	← 25.5'
								Boring completed at 25.5 feet.		20.0
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2.2						è			,	
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Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-60-15

10B13a HOLE NO. <u>GLP-60-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 483, Northing: 880377,184258

Town of Arkwright, Chautaugua Co., NY

Easting: 964995,181058

CLIENT Fisher Associates

DATE STARTED 04/22/15 COMPLETED 04/22/15

to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL). 12 13 14 15 16 17 18 18 18 19 10 10 10 10 10 10 10 10 10	LL 15 drilled 7.0 feet d location.
Extremely moist black (MUCK), granular soil structure, (OL). 18	15 drilled 7.0 feet d location.
Soil structure, (OL). Soil	15 drilled 7.0 feet d location.
2 6	15 drilled 7.0 feet d location.
2 6	15 drilled 7.0 feet d location.
2 6	15 drilled 7.0 feet d location.
18 7 10 17 18 18 19 19 19 19 19 19	15 drilled 7.0 feet d location.
10 13 15 16 17 18 19 19 19 19 19 19 19	15 drilled 7.0 feet d location.
clear transition to 0.8 Column Col	15 drilled 7.0 feet d location.
Clear transition to U.8 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). Grades downward to 4.0 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below clay, trace sand, clay, trace sand, stiff, very stiff below clayer glacial of clayer glaci	d location.
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). 12 13 13 14 8 12 14 15 16 17 18 18 18 19 10 10 10 11 12 13 14 15 15 16 16 17 18 18 19 10 10 10 11 12 13 14 15 15 16 16 17 18 18 18 19 10 10 10 10 11 12 13 14 15 15 16 16 17 18 18 19 10 10 10 10 10 10 10 10 10	d location.
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). 12 13 Drown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL). Organic rich mu 0.2 feet over c drift with trace to 0.8 feet ove brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below clay, trace sand, stiff, very stiff below	d location.
to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL). Organic rich mu 0.2 feet over c drift with trace to 40% mostly subangular gravel, little clay, trace sand, very stiff with nearly vertical gray desiccation cracks, (ML-CL). Organic rich mu 0.2 feet over c drift with trace to 0.8 feet ove brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below clay, trace sand, stiff, very stiff below	
clay, trace sand, very stiff with nearly vertical gray desiccation cracks, 22	cky surface to
4 8 22 12 12 yertical gray desiccation cracks, (ML-CL). 0.2 feet over c drift with trace 5 2 18 3 6 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below Organic rich mu 0.2 feet over c drift with trace to 0.8 feet over converted to 0.8 feet over con	cky surface to
grades downward to 4.0 0.2 feet over c drift with trace to 0.8 feet over to 4.0 5 2 18 3 6 Cook long grades downward to 10 Cook long grades downward to 4.0 0.2 feet over c drift with trace to 0.8 feet over with little to sol to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below clayeved acial of	cky surface to
grades downward to 4.0 0.2 feet over c drift with trace to 0.8 fee	
Extremely moist distinctly mottled olive to 0.8 feet ove brown gravelly (CLAYEY-SILT) with 15 with little to sor to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below clayey glacial of the control of the clayer glacial of the clayer glaci	oarse silty glacial
5 2 brown gravelly (CLAYEY-SILT) with 15 with little to sol to 40% mostly subangular gravel, some clay, trace sand, stiff, very stiff below	gravel, little sand
to 40% mostly subangular gravel, some clay, trace sand clay, trace sand, stiff, very stiff below	r silty glacial drift
clayey glacial clayey	
clayey glacial company trace sand, stirr, very stirr below clayey glacial company desiccation cracks, (CL).	d to 4.0 feet over
o.0 feet with hearly vertical gray some gravel, trade of the some grav	
desiccation cracks, (CL).	
6 3	
clear transition to 8.0 deposited silt w	ith little to some
Extremely moist faintly mottled olive	
grayish brown gravelly grayish brown gravelly grayish brown gravelly	water sorted and I with some silt to
I I I I I I SANU-SILI-CLATI WITH IS TO 4U% I SANU-SILI-CLATI	water sorted and
gravel, ittle solid city, illin and	water sorted and I with some gravel
16 4 8 0 0 stiff, weakly stratified, (SC). deposited sand to 18.8 feet over	
and deposited	
silt to 23.0 feet	
8 3 sorted and dep	
1	water sorted and
deposited sand	아이 맛있었다. 나무 없이 하루하면서 하고 아이네요.
some gravel litt	tle silt and clay to
29.0 feet over	clayey glacial till
to end of boring	
	and a
grades downward to 18.0	
9.565 dominard to 15.6 = 15.6	
9 1	
17 2 6	
See next sheet.	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-60-15

10B13a

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 483, Northing: 880377,184258

Town of Arkwright, Chautaugua Co., NY

Easting: 964995,181058

CLIENT Fisher Associates

DATE STARTED 04/22/15 COMPLETED 04/22/15

BLOWS ON DEPTH SAMPLER 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).		Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below
	10 21	10	12	13	15	25		Wet gray gravelly (SAND) with 20 to 40% mostly subrounded gravel, fine to very coarse size sand, very loose, stratified, (SW).		with auger with 5 foot interval sampling to 40.0 feet.
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 24	13	20			42		Extremely moist brownish gray (SAND), very fine to coarse size, compact, stratified, (SW).		
30—				22	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,	F F F F F F F F F F F F F F F F F F F	
-	12	10						little silt and clay, hard, stratified, (SC). 29.0 Extremely molist olive gray gravelly	- C	
35—	24	10	16	17	17	33	000	(CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (CL).		
	13 18	12	15	-		37				No water at completion.
40				22	20		0_0	Boring completed at 40.0 feet. 40.0		← 40.9'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-62-15

10B13a

SURF. ELEVATION __

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

- LOCATION Survey ID 482, Northing: 881076,686859

Town of Arkwright, Chautaugua Co., NY

Easting: 965021,564962

CLIENT Fisher Associates

DATE STARTED 04/21/15 COMPLETED 04/21/15

sampling to 40.0 feet.

	DEPTH IN FT			WS ON	1					
8	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	1720	2					********	l =		% (a)el
	20		3				000	Extremely moist black (SANDY-SILT)	3-3-3	← 0.5'
	-20		-,-	1		7	0-0	topsoil with little organic matter and sand, very loose, granular soil	5 3 5 3 B	
				-4	6	1	000	structure, (ML).	15 5 5	6520
		10			- 6	ĺ	0.00	0.3	F.F.F.F.	← 2.0'
V	24	10	9				- O-			
	24		9	_		17	0-0-	Extremely moist distinctly mottled olive		Note: GLP-62-15 drilled 1.0 foot
				- 8	-	ł	000	brown gravelly (CLAYEY-SILT) with 15	L. L. L.	southeast of staked location.
					7	1	0.7-0	to 40% mostly subangular gravel, some clay, trace sand, stiff, weakly blocky		
	3	_4	GOST				0 0	soil structure, (CL).	7.5 7.5 7.4	
5—	22	-	5			15	000	clear transition to 2.0		(1) TOPSOIL FILL
				10				Clear transition to 2.0		(2) CONCRETE
			-		8		000	Extremely moist distinctly mottled olive		
	4	_5_					0 0	brown gravelly (CLAYEY-SILT) with 15	200000	0 "!!- !" - "!! !!!!-
	24	0000	8	_	<u></u>	17	000	to 40% mostly subangular gravel, some		Coarse silty topsoil with little organic matter and sand to 0.3
				9			0-0-	clay, trace sand, very stiff with nearly vertical gray desiccation cracks,		feet over clayey glacial drift
					14		0-0-0	(CL).	35.45	with little to some gravel, trace
	5	8					0.0	(02).		sand to 15.5 feet over loamy
	8	3400	11			25	000		4,4,4,	glacial drift with little to some
				14		20	0-0-0			gravel, little sand and clay to
10—					17		200			23.0 feet over water sorted and
10-	6	10				1	700	clear transition to 10.5	' [deposited coarse silt with trace
	22		15			29		Extremely moist olive gray gravelly	86	gravel and clay, little to some
			, ·	14		29	50	(CLAYEY-SILT) with 15 to 40% mostly	55	sand to 23.5 feet over clayey glacial drift with little to some
					16	ĺ	000	subangular gravel, some clay, trace	T F F F F F F F F F F F F F F F F F F F	gravel, trace sand to 28.0 feet
	7	6			-10	İ	0 0	sand, very stiff, massive soil structure,	5	over silty glacial drift with little
-	24	-0	10			92835	000	(CL).	o.	to some gravel, little sand and
			10	14		24	00_			clay to 28.8 feet over water
				14	10		000			sorted and deposited sand and
		7			16		0 0			gravel with little silt and clay to
	24				-		000			33.0 feet over water sorted and
15—	24		14			31	0.0	clear transition to 15.5		deposited sand with trace gravel
	_		-	17			500	Extremely maint faintly mattled alive	4.4.4.	and silt to 38.0 feet over clayey glacial till to end of boring.
					20		0.00	Extremely moist faintly mottled olive brown gravelly (SAND-SILT-CLAY)		gradial till to cha of borning.
								with 15 to 40% gravel, little sand and		
		_			-		0000	clay, very stiff, weakly stratified,	F. F. F.	Note: advanced bore hole with 4
_			_				0.00	(SC).	STORY 1	1/4 inch ID x 8 inch 0D hollow
	1000						2000	St. Sphrachter.		stem auger casing with
	9	11					000		中文并文并为	continuous split spoon sampling
	12		10			19	C 6.4			to 16.0 feet. Continued below
				0		-2360	. 0		7-5-7-5-7-5	with auger with 5 foot interval



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-62-15

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 482, Northing: 881076,686859

Town of Arkwright, Chautaugua Co., NY

Easting: 965021,564962

CLIENT Fisher Associates

DATE STARTED 04/21/15

COMPLETED 04/21/15

DEPTH BLOWS ON SAMPLER IN FT

1	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
ľ							20-0	Extremely moist faintly mottled olive	-, -, -,	
						1	0 0 9	brown gravelly (SAND-SILT-CLAY)		
Γ						1	00.0	with 15 to 40% gravel, little sand and		
- 1						1	0 0	clay, very stiff, weakly stratified,	户, 产, 产,	
1				-		1	000	(SC).		¥2
\dashv	0.57,4160					1	0 0	grades downward to 23.0	1.50	
1					-	1	0 00 0	grades downward to 25.0		
-	.10	_3_	0			1	0 0	Extremely moist distinctly mottled		
-	17		6			12	000	brownish olive gray (SANDY-SILT)		
				6		3334	0-0-	with 5 to 10% gravel, little to some		
_					9		000	sand, trace clay, loose, weakly		
Т							0.0	stratified, (ML).		
				C-11.		1	200	grades downward to 23.5		
+	7. E. T.						00_	Extremely moist olive gray gravelly		
+						1	000	(CLAYEY-SILT) with 15 to 40% mostly		
ŀ				_		ł	00	subangular gravel, some clay, trace		
+					_	ł	000	sand, stiff, massive soil structure,		
1						1	0 0	(CL).		
L	11	11					0.0	A. E. T. Santa San	<u>-</u> .	
	24		15			38	W	'\ grades downward to 28.0	(A. A. A. H.)	
Γ			1/2:	23		30	0.0	Extremely moist faintly mottled olive	· · · · · · · · · · · · · · · · · · ·	
t					40	1	0.00	brown gravelly (SAND-SILT-CLAY)	BA I	
+				_	40	1	020	with 15 to 40% mostly subangular	S	
H						1	2.0	gravel, little sand and clay, stiff,	<u> </u>	
-	-						0.0	massive soil structure, (ML-CL).	[85] (85] [45]	
-	_						0.00	clear transition to 28.8		
L						ļ	070	Eutromoly moint faintly mattled		
							0 00	Extremely moist faintly mottled		
1							020	brownish gray very gravelly (SAND-SILT-CLAY) with 40 to 60%		
Γ	12	24				1	0. 00 . 0	mostly subrounded gravel, little silt and		
T	24		70				9	clay, hard, weakly stratified, (SC).		
H	- 1		70	- 01		161	.6	SW Company of the com		
+	-			91			0 0 9 . 0	grades downward to 33.0		
+	-				76			Extremely moist highly mottled	H. H. H.	
1							9. 00. 0	brownish gray (SAND) with 5 to 10%		
L							0	gravel, very fine to very coarse size	Takta tal	
							.46.	sand, trace silt, very dense, stratified,		
							0000	(SW).		
1							.9		H. H. H.	
+		_					0. 00 . 0	grades downward to 38.0		
+	-		-	-			9:00:	Futrometry moist alive every everyor	tartarta	
1	13	22					000	Extremely moist olive gray gravelly	医多位多位的	
1	23		34			63	0-0	(CLAYEY-SILT) with 15 to 40% mostly		Manager of Sameton
				29			000	subangular gravel, some clay, trace sand,	户 ,在7年7	No water at completion.
1					46		0.0	hard, massive soil structure, (CL).		← 40.0'

Boring completed at 40.0 feet.

40.0

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



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-64-15

10B13a HOLE NO. <u>GLP-64-15</u>

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 480. Northing: 881054.260773

Town of Arkwright, Chautaugua Co., NY

Easting: 965984.851068

CLIENT Fisher Associates

DATE STARTED 04/23/15 COMPLETED 04/23/15

DEPTH BLOWS ON IN FT SAMPLER

100	IN FT		SAM	PLER				
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	1	2						
	12		2			4		Extremely moist black (MUCK), granular soil structure, (OL).
j				2] #	ø •	0.4 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
					4		000	3 3 9 00
	2	4]	0000	Lexitemery moist brown (SAND) SIETY [E.J.E.]
	16		6			16	0000	with 3 to 5% gravel, little sand, trace clay, very loose, blocky soil structure,
- 3				10		1 10	0 00	(ML). (1) TOPSOIL FILL
					12	1	000	grades downward to 1.5 (2) CONCRETE
8	3	6			- 1,5	1	0 00	
	16		9				0000	Extremely moist faintly mottled brown
,—			,	8		17	0 00	gravelly (SANDY-SILT) with 15 to 40% Note: GLP-64-15 drilled 5.0 feet
				0	10	1	1.00 C	mostly subangular gravel, little sand, trace clay, compact with brittle
- 8	4	4			10	1	0000	consistence, massive soil structure,
	10	_4_	8			2820	0000	(SM). Organic rich mucky surface to
8	10		-	5		13	0000	0.4 feet over coarse silty slack
				_ 5			0 0	grades downward to 8.0 water sediment with trace gravel
	_	_			4_	1	2 0	Extremely moist distinctly mottled and clay, little sand to 1.5 feet
	5 8	_2_	_	_			0.00	over loanly glacial diff with little
	0		3_	_		8	ا من	(SAND-SILT-CLAY) with 15 to 30% to some gravel dominated by silt,
				_ 5	-		2000	
-	_				4_	1	000	gravel, little silt and clay, stiff, massive soil structure, (SC). feet over sandy glacial drift with little to some gravel, little silt and clay to 12.0 feet over water
	6	6	<u> </u>			1	o o	and clay to 12.0 feet over water
	20		5	_		10	-0 A.O	
				5		1	0.00	sorted and deposited sand with 12.0 little to some gravel, little silt, trace clay to 13.0 feet over silty
				-	5		0000	
-	7	3					0000	Extremely moist faintly mottled grayish brown gravelly (SILTY-SAND) with 15 slack water sediment with little clay to 14.0 feet over water
	22		6			11	- 0 0	to 40% mostly subrounded gravel, very sorted and deposited sand with
,	_			5				fine to very coarse size sand, little some gravel, trace silt and clay
		155	-		7			silt, trace clay, compact, stratified, to 23.5 feet over coarse silty
	8	2					0.0.0	(SM). slack water sediment with little
Н	16		5		-	10	0.00.	13.0 sand to 28.0 feet over clayey
				5			0.0.0	Extremely moist faintly mottled grayish and to 33.0 feet over clavey
					6		0.00	beauty (OI AVEN OT T) and Balle elect
							0.0.0	
							V. 000	14.0 Note: advanced bore hole with 4
							0.000 0.000 0.000	1/4 inch ID x 8 inch 0D hollow
					o men		0000	stem auger casing with
	9	4			احما		0.0	
	20		9	· ·		26	:0.n.o	to 16.0 feet. Continued below
				17			0.000 0.000 0.000	with auger with 5 foot interval
, [14		0.0.0.0	See next sheet. sampling to 41.0 feet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-64-15

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 480, Northing: 881054,260773

Town of Arkwright, Chautaugua Co., NY

Easting: 965984.851068

CLIENT Fisher Associates

DATE STARTED 04/23/15 COMPLETED 04/23/15

BLOWS ON DEPTH SAMPLER 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,		
-		-	-	-		1	0.0.0	stratified with occasional thin coarse		
	40	4					0.0.0	silt seam below 18.0 feet, (SW).		
	10 22	4_	13			1		23.5		
			13	15		28		Extremely moist olive gray		
25-					12]		(SANDY-SILT) with little sand,		
25-								compact, thinly bedded, (ML).	\vdash , \vdash , \vdash .	
						-				
				-		1				
			-	-		-				
-		-				1		grades downward to 28.0	-, -, -,	
	11	1	dense-			1	00	Extremely moist olive gray gravelly		
	12		4			11	0 0 0	(CLAYEY-SILT) with 5 to 10% gravel,	- E	
				7] "	<u> </u>	some clay, trace sand, stiff, massive	공	
30—					8			soil structure, (CL).	F F I	Water level at 29.9 feet below
						-	مد مد ه		§	ground surface at completion.
						1	0 -0 -0			
	-					1	0 0 0		궁	
						1				
						1	· · · · · · · · ·	grades downward to 33.0		
	12	5]	000	Extremely moist olive gray gravelly		
	16		7			17	0_0	(CLAYEY-SILT) with 15 to 40% mostly		
				10			000	subangular gravel, some clay, very stiff, hard below 39.5 feet, massive soil		
35—			_		11	ļ	0 0	structure, (CL).	P. A. A.	
			-	-		1	0 0			×
						-	000			
			-			1	0-00-			
			-			1	2000		-, -, -,	
							000			
						1	0_0			
ĺ		(SEATHUR)					000			
	13	5					0_0		<i>-, -, -,</i>	
40	16		21				500			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-64-15

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 480, Northing: 881054,260773

Town of Arkwright, Chautaugua Co., NY

Easting: 965984.851068

CLIENT Fisher Associates

DATE STARTED 04/23/15 COMPLETED 04/23/15

DEPTH BLOWS ON IN FT SAMPLER

INFI		OAH	LEN						
SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
13			25	36	46	0-0	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, hard, massive soil structure, (CL). 41.0		← CUTTINGS BACKFILL ← 41.0'
							Boring completed at 41.0 feet.		
						AS .			
									19118-80-11-05-1



TB 66 HOLE NUMBER: ELEVATION: DATE: 2/27-28/2013 PROJECT: Subsurface Investigation for the Proposed Arkwright Summit Wind Farm, Arkwright, Chautauqua County, NY PREPARED FOR: Fisher Associates **BORING LOCATION:** MONITORING DESCRIPTION AND CLASSIFICATION REMARKS COMMENTS REC WELL Moist, dark brown (SILT) 1.0 Cement / Topsoil to 0.7 foot over Bentonite silty glacial drift to 9.5 feet topsoil with trace very fine over silty glacial till to 20.0 Grout size sand, loose with fine feet over weathered shale size roots rock to 25.9 feet over Moist to extremely moist, 1.21 alternating Siltstone and brown (CLAYEY- SILT) with 2 2 Shale bedrock to end of 3 to 5% gravel, little clay, coring very stiff to hard, blocky soil 13 structure 23 0.3 2" PVC 3 Riser Pipe 17 10 1.4 4 6 9 19 10 15 0.4 5 15 33 73 Moist, gray, gravelly 50/3 2.0 (CLAYEY-SILT) with 15 to 6 19 30% gravel, little clay, hard with brittle consistence. 76 47 massive soil structure 27 1.9 Bentonite 17 Seal 48 43 1.7' #2 Size 8 19 Sand 66 35 42 0.1 2" 10 Slot 50/ PVC Screen >50

LOGGED BY: Dale M. Gramza / Senior Geologist



TB 66 HOLE NUMBER: ELEVATION: DATE: 2/27-28/2013 Subsurface Investigation for the Proposed Arkwright Summit PROJECT: Wind Farm, Arkwright, Chautauqua County, NY Fisher Associates PREPARED FOR: **BORING LOCATION:** 0/ 6/ 12/ 18/ 6 12 18 24 MONITORING REMARKS COMMENTS DESCRIPTION AND CLASSIFICATION WELL 2" 10 Slot Shale rock, gray, very soft to PVC soft, fissile, weathered, wet Screen #2 Size 10 150 Sand Well ^{25.5}Installation k.UN #1 Completed Alternating Siltstone and at 25.0' Shale bedrock, gray to **BGS** medium gray, very thinly bedded 1/2" to 4" thick, moderately hard, can be Auger easily etched with a knife, Cuttings encountered very soft (CLAYEY-SILT) layer between 32.5' to 32.9' and vertical soil filled fracture from 34.9' to 35.7' kunt#2 Coring Completed at 35.9' **BGS** CORE DATA Interval Length Rec Rec RQD Run# % 25.9 to 30.9 4.1 82 30.9 to 35.9 3.9 78

PAGE 2

LOGGED BY: Dale M. Gramza / Senior Geologist



								HOLE NUMBER:	-	ГВ 67		
[DA ²	TΕ	:	3/	1/201	13					ELE/	/ation:
F	PR	ΟĴ	ΕĈ	T:				Subsurface Investigation for	rthe	Proposed A	ırkwright Sı	ummit
								Wind Farm, Arkwright	 		ounty, NY	
					FC	****		Fisher A	\ssoc	iates	 	
E	301	RII	١G	LO	CA	TION	l:					
	SN	0/	6/	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
0 —	1	6	12	18	24		1.000.5	Extremely moist, dark brown	1.3'			Topsoil to 0.9 foot over
	-	<u> </u>	3		 			(SILT) topsoil with trace very os				silty slack water sedimer
			1	5		8		fine size sand, loose with fine size roots		37	2" PVC Riser Pipe	with little clay to 6:0 feet over water sorted and
		Γ			8			Moist, distinctly mottled,			•	deposited sand with little
	2	2						brown (CLAYEY-SILT) with	0.7		Cement / Bentonite	to some silt to 9.5 feet
			3			9		little clay, firm to stiff, blocky soil structure			Grout	over water sorted and deposited sand with little
				6		J		son structure				gravel and silt to 12.0 fee
	ļ				6		N. C		0.7'			over sitty glacial drift to
	3	2	ļ						0.7			15.5 feet over weathered shale rock to 19.7 feet
5	<u> </u>	_	3		ļ	5		e.			5.0	over Siltstone bedrock to
	-	ļ. <u></u>	ļ	2	ļ							21.4 feet over Shale
	-	<u>_</u>	 		1			50 Wet, brown (SILTY-SAND)	1.6'		Bentonite	bedrock to end of boring
	4	2	2	 				with very fine size sand, little			Seal	
	-	-		1		3	(1)	to some silt, thinly bedded				
	<u> </u>	-		<u> </u>	1		Minima Mi				8.ò	A second boring was
	5	WH							1.7'		4.0	advanced to 20.0 feet
		-	WH		-							without sampling offset
				7		>7		9.5				from TB 67 to allow for the installation of a
				***************************************	12		44.74	Wet, brown, gravelly (SILTY-			#2 Size Sand	monitoring well
10	6	14						SAND) with 15 to 25% gravel, very fine size sand	1.2'		Sanu	
			7			13		sand, little silt, thinly bedded				WH = Sampler
				6		, •						Penetration with Weight
					5		21.5	12:0	1.3			of Rods and Hammer
	7	3						Extremely moist, brown to gray (SILT) with 5 to 10%	1.0			
	<u> </u>	-	8			16		gravel, trace very fine size				
		H	-	8	9		3 7	sand and trace clay,				
	8	5	 		3			compact, massive soil structure to weakly thinly	1.7'		2" 10 Slot	
	-		8					bedded			PVC	
5	-			:8		16		15.5			Screen	
			ļ		10			Shale rock, olive gray to				
	9	5						gray, soft to moderately soft,	1.81			
			27			50		fissile, fractured, weathered				
				26		53						
					34				4.01		Well Installation	
	10	29	,,,,						1.0'		Completed	•
			50/ 3"			>50	EEE				at 20.0	
						-					feet	
0	ĻĄ					. 5		Cromzo / Sonior Coolo	aict		0.0 E 1	
	LŲ	نار	GE	IJ	BY	. Ua	ai⊎ IVI.	Gramza / Senior Geolog	yısı	PAG	<u> </u>	



								HOLE NUMBER:	7	ГВ 67		
	DA	ſΕ:		3/	1/201	13					ELE\	/ation:
	PRO	JJ	ΕĈ	T:	afras vernan Avreen			Subsurface Investigation fo	r the I	Proposed Arl	kwright Su	ummit
								Wind Farm, Arkwright				
	PRE	ΞΡ	AR	ΕĎ	FC	R:	,	Fisher A				
						TION				· · · · · · · · · · · · · · · · · · ·		
•		,		·		1	· —			MONITORING		
	SN	0/ 8	6/	12/ 18		N	LETH	DESCRIPTION AND CLASSIFICATION	REC	WELL	REMARKS	COMMENTS
	7							Siltstone bedrock, olive gray,				
			-					very hard, can be etched with a knife with effort, very				
								thinly bedded 1/2" to 3" thick ^{21.4}		-		
]		Shale bedrock, gray,				
								moderately hard, can easily				
	11/							be etched with a knife to				
	X	50/ 5"]		very soft, can be crushed between fingers into	0.3			
								(CLAYEY-SILT) soil				
								material, thinly bedded 1/2"				
					-			to 2" thick				
25 -	1			*************								
										•		
											CO	RE DATA
	12	50/ 5"							0.4'	Run#	Interval	Length Rec Rec RQD
								·			(11)	(ft) (ft) % %
			:							1	19.7 to 23.2	3.5 3.5 100 10
20												
30 ↔												
	13	50/ 3										
								34.0		·.		
								Auger Refusal at 34.0' BGS				
35												
									-			
		\perp										
40.—				لي			<u></u>					
	LO	G	GE	D	BY	: <u>Da</u>	ile M.	Gramza / Senior Geolog	<u>gist</u>	PAGE	2	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-69-15</u>

SURF. ELEVATION _ LOCATION Northing: 885344.17970800000

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

Town of Arkwright, Chautauqua Co., NY

Easting: 965840.20149700000

CLIENT Fisher Associates

DATE STARTED 03/23/15 COMPLETED 03/27/15

BLOWS ON DEPTH IN FT SAMPLER

10B13a

								T. C. C. C. C. C. C. C. C. C. C. C. C. C.
	SN	0/ 6	6/	12/ 18	18/	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	REC	0	16	10	47			(1) 3
	1	1_						Extremely moist dark brown
	17		1			5	<u> </u>	(CLAVEY_SILT) topsoil with 3 to 5%
		V		4		ŭ	000	gravel little organic matter and clay
					8		6 20	very soft, granular soil structure,
	2	6						(ML−CL). □ ← 2.0'
8	16	950	8					0.8 Silty topsoil with little organic
			- **	7		15	000	Extremely moist faintly mottled olive a sity glacial drift with little to
					7		0 0	Extremely moist faintly mottled olive silty glacial drift with little to brown gravelly (CLAYEY-SILT) with 15 some gravel trace sand to 2.0
	_	4					2. 02. 0	brown gravelly (CLAYEY-SILT) with 15 some gravel, trace sand to 2.0 to 40% mostly subrounded gravel, little
	3	_4_	-			8		clay, trace sand, stiff, blocky soil with little to some gravel, trace
5—	21		4_	_	-	9	4 4	structure, (ML-CL).
		-		5_		6	0 0 0	(ML-CL). O.8 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). Extremely moist highly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, trace sand to 4.0 feet over silty 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
					6_		2 2	Clay, trace sand to 6.0 feet over
	4	4	-				0.00	Extremely moist highly mottled olive brown gravelly (CLAYEY-SILT) with 15
	20		4_			10	0.00	brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, some gravel to 8.5 feet over
		_		6		8	00.0	is some clay, trace sand, stiff, blocky
					4		0.00	soil structure, (CL).
	5	9					0000	water sorted and deposited sand with little to some gravel, trace
	16		6			12		The second secon
				6		45	1, 1 1, 1	Extremely moist, becoming wet below Silt to 11.0 feet over loamy glacial (Continued below)
10-					4			i 5.0 feet, distinctly mottled olive brown (Continued Delow) (CLAYEY-SILT) with 10 to 15% mostly ← 10.0'
10-	6	2			75-12-17		0.0.0	subangular gravel, little clay, trace
	20		7			34	0.000	sand, firm with nearly vertical gray
				27	-	34	000	desiccation cracks, (ML-CL).
					36	2	0000	grades downward to 6.0
	7	21					0000	<u></u>
	14		40				000	Wet distinctly mottled olive brown
	-1-1		40	100/5		ī	N. (3. (3. (3	gravely (SAND-SILT-CLAY) with 15 to
		-		100/5			0 00	40% gravel, little sand and clay, stiff,
							1.1.7.2.1.1.1	massive soil structure, (SC).
	8	_17				8	0 0	clear transition to 8.5
15—	16		58			100	N. W. W. W.	Wet olive gray (SAND), very fine and □ ← 15.0°
	-	-		42			0 00	Wet olive gray (SAND), very fine and fine size, trace silt, loose, liquefies when disturbed, thinly bedded. (SP). Wet olive gray (SAND), very fine and Light 15.0 Light 15.
					33		1000	when disturbed, thinly bedded, (SP). clear transition to 10.0 C C C C C C C
							0 00	clear transition to 10.0 Siltstone rock to 28.0 feet over apparent shale bedrock to 28.3
							0000	blad all the desired to the state of the sta
							0 00	to 40% mostly subrounded gravel, very
							2000	fine to very coarse size sand, trace feet over siltstone bedrock to
	9	13					000	fine to very coarse size sand, trace silt, very loose, stratified, (SW). 33.5 feet over shale bedrock to 35.4 feet over siltstone bedrock to 35.9 feet over shale bedrock
	18		26		31//12	51	0 0	11.0 to 35.9 feet over shale bedrock
				25		- 51		to 36.2 feet over siltstone
00					25	D.	0 0	See next sheet. bedrock to end of coring.
20								55.151, 51.551



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915

10B13a

HOLE NO. WTG-69-15

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885344.17970800000

Town of Arkwright, Chautaugua Co., NY

Easting: 965840.20149700000

CLIENT Fisher Associates

DATE STARTED 03/23/15 COMPLETED 03/27/15

DEPTH BLOWS ON IN FT 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).		PVC SCREEN E SAND PACK	Note: WTG-69-15 drilled 5.0 feet southeast of staked location. Water level at 8.4 feet below
(0000	grades downward to	23.0	2" P	ground surface at completion.
	10	100/3						Olive gray apparent siltstone rock, moderately hard.	N . 1 0 − 1	.010 SLOT 2" P	
25—											← 25.0' ← 25.5'
						25		and day day moved to	28.0		Run Depth Length Rec Rec RQD # (ft) (ft) % %
1	1 11 3	100/3						grades downward to Olive gray apparent shale bedrock, soft and very soft, bedded.	28.0		28.3 1 to 1.5 1.4 93 0 29.8
30—	*	Run	#1_			A		Olive gray shale bedrock, very soft, bedded.	28.3		29.8 2 to 6.4 6.0 94 0 36.2
								Olive gray shale bedrock, medium hardness, softer interbeds 1/8 to 1/4'	28.6	NIT COLOR	36.2 3 to 2.1 2.1 100 0 38.3
-		Run	#2					thick.	32.8		EDI Bedrock Hardness Classification
35—								Olive gray siltstone bedrock, medium hardness, core separated into 1/2 to 2" lengths.	33.5		Very soft: can be easily crushed between fingers into soil material. Soft: can be crushed between
3.50	*							Olive gray shale bedrock, moderately soft, thin softer interbeds.	_		fingers into soil material with some effort. Moderately soft: can be etched with fingernail.
9	<u></u>	Run	#3					Olive gray siltstone bedrock, medium hardness, core separated into 1/2 to 3" lengths.	35.9		Medium hardness: can be easily etched with knife. Moderately hard: can be etched with knife with some effort.
40								See next sheet.			← 38.3'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-69-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885344.17970800000

Town of Arkwright, Chautaugua Co., NY

Easting: 965840.20149700000

CLIENT Fisher Associates

DATE STARTED 03/23/15 COMPLETED 03/27/15

BLOWS ON DEPTH SAMPLER IN FT

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL	WATER TABLE AND REMARKS
50-	SN	2000	71500	100000000		N	LITH	Olive gray shale bedrock, moderately soft, thin softer interbeds. Olive gray siltstone bedrock, medium hardness, core separated into 1 to 3' lengths. Coring completed at 38.3 feet.	36.2	WELL	EDI Bedrock Hardness Classification 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 16.0 feet. Continued below with auger with 5 foot interval sampling to 38.3 feet.
60											



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 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, Chautaugua Co., NY

Easting: 968575.582833

CLIENT Fisher Associates

DATE STARTED 04/20/15 COMPLETED 04/20/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

IN FT		SAM	PLER						
SN	0/	6/ 12	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
REC		16	10	44	455			(1) 😼	
1	2						Extremely moist dark brown		← 0.5'
13		3			6	********	(SAND-SILT-CLAY) topsoil with 5 to	3 = 3 = 3 =	0.0
			3				10% gravel, little organic matter, sand	5 5 2	
				4	1	20-7	and clay, firm, granular soil structure,	1,5,5,4	22
2	7				1	- 0	(ML-CL).		+ 2.0
-	-	520			1	200	1.0		
20	-	8			16	0.00		F. F.	/o ======
			-8_		-	1. 12.0.12	Extremely moist distinctly mottled olive		(1) TOPSOIL FILL
				7		000	brown (CLAYEY-SILT) with 15 to 40%		(2) CONCRETE
3	3					X 0 X	mostly subangular gravel, some clay,		
18		4			1	0 0	trace sand, very stiff, stiff below 4.0		0111
			5		9	000	feet with nearly vertical gray	+ 2 + 2 + 2	Silty topsoil with little organic
	-	11577	-0_				desiccation cracks, (CL).	(SEC. 18)	matter, sand and clay, trace
-	-			8		P. D.	y grades downward to 6.0	113 113 113	gravel to 1.0 feet over clayey
4	4					0.00		图9位9位9	glacial drift with little to some
22		5			12	0.00	Extremely moist olive gray gravelly		gravel, trace sand to 6.0 feet
	L		7		6776	0000	(SAND-SILT-CLAY) with 15 to 40%	4.4.4.	over silty glacial drift with little
				6		0. 0	mostly subangular gravel, little sand		to some gravel, little sand and
5	3	150			1	000	and clay, stiff and very stiff, massive	F	clay to 15.0 feet over clayey
16	J	5				O- , O	soil structure, (ML-CL).		glacial drift with little to some
10		5	3362	-	15	D-0 A.O			gravel, trace sand to 34.5 feet
\vdash			10			0. 0		L. L. 글.	over shale rock to refusal.
				8		0.00		T. T. BAOKETIU	
6	5					0 0		<u>6</u> .	Note: advanced bore hole with 4
22		8			19	000		<u> </u>	
			11		10	ا ص			1/4 inch ID x 8 inch OD hollow
			11-11-11	18		0000		Z	stem auger casing with
7	8			10		0 0		100	continuous split spoon sampling to 16.0 feet. Continued below
-	8_			_		000		드, 드, 공,	with auger with 5 foot interval
12	_	10	_	-	21	0 0			sampling to 34.9 feet.
\vdash			_11			LOAG			sampling to 54.8 feet.
				17		0.0			
8	4					10 × 0	8 3 50 80 80 80 80 80 80 80 80 80 80 80 80 80		
24		5			13	0 0	grades downward to 15.0	F. F. F.	
			8		13	200	Extremely moist olive gray gravelly		
			0			7000	(CLAYEY-SILT) with 15 to 40% mostly	1500000	
				9		0.0	subangular gravel, some clay, trace	直接企业企品	
	-	_				000	sand, stiff, massive soil structure,		
						0.0	(CL).	P. A. A.	
						000	15-0		
						-		产3.产3.产3	
9	3					000		18648648	
22	3		-			0-0		13/13/13	
22		6	77,000		13	00		这为这个这个	
$\vdash \vdash$			7			0 0			
1				15		or ord			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-70-15

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project Town of Arkwright, Chautaugua Co., NY

LOCATION Survey ID 477, Northing: 881360,298842 Easting: 968575.582833

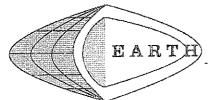
CLIENT Fisher Associates

DATE STARTED 04/20/15 COMPLETED 04/20/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

- A	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							000	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		EDI Rock Hardness Classification
							0_00	subangular gravel, some clay, trace sand, stiff, massive soil structure,		Medium hardness: can be easily etched with knife.
8							0-0-0-	(CL).	h	
	10	4					200		1.00	
	23		6			14	000		F. F. F.	
3				8_		6.0	0 0			
25—					9		000			
1					-		0-0-		h. h. h.	
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	11.	4								
	24		6			15			5	
Í				9		15	000			
30-					10		0-0		P. A. A.	
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,			- Tipe /				0.00			
							0-0-			
							000		4.4.4.	
0							0-0			
-										
-	12 20	3	_				700		h. h. h.	
1	20	- 77	5	7		12	0-0-	34.5		
					100/5		111	Olive gray shale rock, medium		No water at completion.
35—					100/5			hardness.		← 34.9'
1								34.9		
1								Split spoon refusal at 34.9 feet.		
1										
										1
					-					
-										
40 l										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-70-ALT-13

le TB-70-ALT-13 SURF. ELEVATION 1396.71

LOCATION N: 886460.471 E: 966621.757

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

Town of Arkwright, Chautauqua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/26/13 COMPLETED 02/26/13

DEPTH BLOWS ON

10813

IN FT SAMPLER

-	IN F I		OA.,						
	sn REC	0/ 6	8/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS	
	1	2					0000	Extremely moist dark brown	
	14		2	5		7	0000	(SANDY-SILT) topsoil (disturbed) with O to 3% gravel, little sand and organic PROTECTIVE CASING INSTALL	Ed
		40			- 11	i.	0000		
	2 18	12	10			20	0000		
				10_	7		0000	Extremely moist faintly mottled brown [122] 4 [122]	
	3	3					9.08.0	gravelly (SILTY-SAND) with 15 to 25% gravel, very fine to very coarse size sand, some silt, compact, weakly blocky soil structure to stratified,	1
5	21		-5	3		8	2.0	blocky soil structure to stratified,	
					4_		<u>a</u> . <u>a</u> .	(SM). grades downward to 4.0 - 6.0'	
	<u>4</u> 15	7	5			12	4 . 4	Extremely moist faintly mottled brown	
						"		(SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, stiff,	
	5	2			4		0 0	massive soil structure, (ML-CL).	
	18	-	_2_	4		6	0 0 0	Extremely moist gray (SANDY-SILT) Coarse silty topsoil with little sand and organic matter to 0.4	
10—					7_		9 6	with 5 to 10% gravel, little sand, firm, massive soil structure, (ML). feet over water sorted and deposited sand with little to	
	<u>6</u> 22	6	9			27	2-2-	clear transition to 10.8 2 some gravel, some silt to 4.0	
				18		ļ		Gray apparent weathered shale trace to little gravel to 7.5 feet bedrock, very soft and soft.	
	7	45			43			11.5 S S We loany gleater than	
	អ		100/5			-		Clear transition to 10.6 Separate transition to 10.6 Gray apparent weathered shale bedrock, very soft and soft. 11.5 Gray apparent weathered shale bedrock, moderately soft with acceptional this layer of very soft and soft. Some gravel, some sit 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, moderately soft with socrational this layer of very soft and soft.	
					ļ			occasional thin layer of very soft and soft rock.	
	1				ļ	-		soft rock. 14.0 14.0 Over shale bedrock to end of coring,	ļ
15								Gray siltstone bedrock, medium hardness, highly fractured horizontally Note: no water in bore hole until	
	\vdash	Run	#1			-		along bedding planes, thinly bedded,	
				-		-		slightly porous. 14.7 #7 at 12.0 to 14.0 foot depth, water level at 9.0 feet.	
•					 	_		€ 18.0'	
	*			1	-	-			
		Run	#2			1			
20	Ц.		<u> </u>			<u></u>		See next sheet.	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-70-ALT-13

SURF, ELEVATION 1396.71

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

LOCATION N: 886460.471 E: 966621.757

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/26/13 COMPLETED 02/26/13

BLOWS ON DEPTH IN FT SAMPLER

10813

•	INFI		SAM	rlek													
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH		DESCRIPTION AND CLASSIFICATION	WELL		WAT	ER TABI	E AND	REMA	RKS	
	*	Run	#2						Gray shale bedrock moderately soft, highly fractured horizontally along bedding planes with occasional highly broken and fractured zones with		(1)	(1) #	00N SI	ZE MOR	IE SAI	ND PA	CK
	y	Run	#3					7	occasional mudseams and beds of very soft and soft rock, thinly bedded to banded, dense.			+ 23	.5'				
25-									Gray shale bedrock, moderately soft, highly fractured horizontally along bedding plances, thinly bedded to			Run #	Depth (ft)	Length (ft)	Rec (ft)		RGD %
									banded, dense. 23.5 Coring completed at 23.5 feet.			1	14.0 to 18.5	4.5	2,5	56	0
												2	18.5 to 20.5	2.0	2.0	100	0
30												3	20,5 to 23.5	3.0	3.0	100	0
												EDI	Bedroc	k Hardn	ess C	lassif	cation
										· · · · · · · · · · · · · · · · · · ·		Sof	crush into s t: can b fingel with s erately	can be a ed betw coll mate e crush rs into s come eff soft; ca	een f rial, ed be oil ma iort, an be	weer terial	
35—						-						Med		dness: c ed with l		easi	У
												1/4 ster con to 1 with barr	inch ID n auger tinuous 4.0 fee n NO-2 : rel and	nced bo x 8 inct casing split split t. Conti size dou dlamono alled a 2	o OD h with oon sa nued l ble tu i bit to	ollow amplin below be co	g
40						1			MANAGE TO SERVICE THE SERVICE	1			ervation e hole,	well in	comp	eted	

* SPOON 12 * WITH 140 15, WT. FALLING 30 " PER BLOW N=NUMBER OF BLOWS TO DRIVE 2_

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

SHEET 2 OF 2



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-75-15

10B13a

20

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 475, Northing: 881333.616189

Town of Arkwright, Chautaugua Co., NY

Easting: 970318,967759

CLIENT Fisher Associates

DATE STARTED 04/23/15 COMPLETED 04/24/15

	DEPTH IN FT	l		WS ON						
0.00	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) 3	WATER TABLE AND REMARKS
	1	2		erve.			9 0 9 0	Extremely moist black mucky		← 0.5'
	17		2			8	0 0	(SANDY-SILT) topsoil with some	3-3-3	. 0.3
				6		0		organic matter, little sand, very loose,	5 5 8	
					10			granular soil structure, (ML) tending	1559	← 2.0'
	2	8				1	20.0	towards (OL).	4.4.4.	F 2.0
	21		9			1	0.0.9	0.2	New York	
35	XXX			9		18	2000	Moist faintly mattled grangish brown		(1) TOPSOIL FILL
9				9	11	1	0.0	Moist faintly mottled orangish brown (SANDY-SILT) with 5 to 10% gravel,	F. A. A.	(2) CONCRETE
	ু	7			-"-		000	ii little sand, very loose, weakly blocky		
3	3		_		-		0 . O	in soil structure, (ML).		
5-	8	-	7			14	0 0 0 0	clear transition to 1.5		Note: GLP-75-15 drilled 7.5 feet
				7	25 /		4 4	111		south of staked location.
		-			7		\$	Extremely moist faintly mottled olive	1	
	4	2			-		000	brown gravelly (CLAYEY-SILT) with 15		K 1-10 /- K 1-1-
	18		5			10	6 00	to 20% mostly subangular gravel, some		Augers left in bore hole over
				5		1415012	0000	triciay, trace sand, very stirr, blocky soil		night at 40.0 feet, water level the next morning was 10.2 feet
					6		000			below ground surface.
	5	8					7000	grades downward to 2.0	T# 174 T#	below ground our lade.
	8		11			23	0-00	Extremely moist faintly mottled olive	P. A. A.	Organic rich coarse silty topsoil
				12		20	~0 0 Q	brown gravelly (SAND-SILT-CLAY)		with some organic matter, little
10—					16		000	with 15 to 40% mostly subangular	L L BAČKETIIT	sand to 0.2 feet over coarse
10-	6	9					200	gravel, little sand and clay, very stiff	L. L. 👸	silty glacial drift with little sand,
	18		16				2	with nearly vertical gray desiccation it cracks, (ML-CL) tending towards	₩ ₩	trace gravel to 1.5 feet over
			-10	15		31	0.00	IN (SC).	-· -· \$	clayey glacial drift with little
		_		13	12		00.0	Di .		gravel, trace sand to 2.0 feet
	7	5	-		14		0.00	grades downward to 5.0		over loamy glacial drift with little to some gravel to 5.0 feet over
\neg	24	5					000	Extremely moist distinctly mottled olive	공.	silty glacial drift with little gravel
-	24		9			17	O . O	brown (CLAYEY-SILT) with 10 to 15%		to 10.0 feet over loamy glacial
				8	-		-OAO	il gravel, little clay, trace sand, stiff,		drift with little to some gravel to
			× =		7		0.00	ii massive soil structure, (ML-CL).	H2. H2. H2.	10.5 feet over silty glacial drift
	8	3	0.00				1000	grades downward to 6.0		with little to some gravel to 18.0
15_	22		7			17	0 0	! Extremely moist distinctly mottled olive		feet over loamy glacial drift with
				10			0.0	brown gravelly (CLAYEY-SILT) with 15	[4] [4] [4] [4] [4] [4] [4] [4] [4] [4]	little to some gravel to 34.0 feet
ļ					12		م. ۵	to 40% mostly subangular gravel, little		over clayey glacial till to end of
							0.00	clay, trace sand, stiff, very stiff below	17.57.57.5	boring.
							0-00	8.0 feet, massive soil structure,		Note: advanced bore hole with 4
							0000	(ML-CL).		1/4 inch ID x 8 inch OD hollow
							0,00	grades downward to 10.0	H3.7-3.7-3	stem auger casing with
	9	5					Y			continuous split spoon sampling
	23	<u> </u>	9				0.00			to 16.0 feet. Continued below
1			9	0	1.0	18	00.0		F. A. A.	with auger with 5 foot interval
1				9	40		0.00	8		sampling to 40.0 feet.
on l					10			See next sheet.		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-75-15

10B13a HOLE NO. GLP

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 BLOWS ON IN FT SAMPLER

0.70	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							0.0	Extremely moist distinctly mottled olive		
Į.							م م	brown gravelly (SAND-SILT-CLAY)	4.4.4.	
							0000	with 15 to 40% mostly subangular		
							O O	gravel, little sand and clay, hard, very	17.45.45.45.4	
-							000	stiff below 12.0 feet, massive soil		=
3/						1	0.00	structure, (ML-CL) tending towards		
	10	3			V	1	-0 0 0	" (SC).	(+, +, +,	
	18		6			10020	0.00	clear transition to 10.5		
			-0	10		16	10 Q-Q	Extremely moist olive gray gravelly		
	_			10		İ	2 00	(SAND-SILT-CLAY) with 15 to 40%	户3.24.3.24.3	
25—	_				- 11	1.0	0.0	mostly subangular gravel, trace to	\$80.080.08	
3		2 200				1	0.60	little sand and clay, very stiff, massive		
8		-			_	ļ	500.A	soil structure, (ML-CL).		
ŝ			-			ļ	000	grades downward to 18.0		
8						ļ	C 0 0	Extremely moist olive gray gravelly	F. F.	
// <u></u>		_ 3				ļ	000	(SAND-SILT-CLAY) with 15 to 40%		
							0.00	mostly subangular gravel, little sand		
	11	4					0000	and clay, very stiff, massive soil	上、上、当 .	
1	19		9			24	0 0	structure, (SC).		
3				15		24	000		3	
					18	1	ا من ه		F F BACKET	
30—					10		0000		. r Tings,	
						1	0. 0		一、一、看、	
		-		-		-	0000			
		-			90	1	0.00		- · · · · · · · · · · ·	
				_			P-0 0-0			
-					_		0.00			
							10000			
	12	3					0 0	grades downward to 34.0	J	
	20		7			20	0000			
				13			000	Extremely moist olive gray gravelly		
35—					17		0-0	(CLAYEY-SILT) with 15 to 40% mostly		
00_							000	subangular gravel, some clay, trace		
							0 0	sand, very stiff, massive soil structure,	F3.73.73	
						1	2000	(CL).	2000	
		-					0_0		52.52.52	
3		-	-		-		000		F. A. A.	
-			_		-		0-0-		[85.45.45]	
					-		000		1. 1. 1. 1.	
	13	5	- 77 10				0.00			
	18		11			27	000			
				16			0-0-		+1. +1. +1	
40					23		F00-0	Boring completed at 40.0 feet. 40.		← 40.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 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, Chautaugua Co., NY

Easting: 972050,262077

CLIENT Fisher Associates

DATE STARTED 04/24/15 COMPLETED 04/24/15

DEPTH BLOWS ON IN FT SAMPLER

	SN REC	0/ 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	1	1					*********	
	14		2			7		Extremely moist to wet dark gray mucky (SANDY-SILT) topsoil with little
				5		1 '	000	to some organic matter, little sand,
					6	ĺ	0-0-	very loose granular soil structure 1.5.5.9
	2	9			-0	1	000	(ML) tending towards (OL).
	21		9			1	0.00	0.2
			8	10		19	<u> </u>	
				10	10			Extremely moist faintly mottled dark gray (CLAYEY-SILT) topsoil with 5 to (1) TOPSOIL FILL (2) CONCRETE
		_			10	1		10% gravel, little organic matter and
	3	_3_	-				000	clay, soft, granular soil structure,
5—	24		9	100		22	0 0	(ML-CL). Organic rich coarse silty topsoil
		-		13			000	with little to some organic matter,
	-				14		0-0-	ittle sand to 0.2 feet over silty
	4	4	- 138				000	Extremely moist distinctly mottled olive topsoil with little organic matter
	24		7_			20	0_0	brown gravelly (CLAYEY-SILT) with 15 and clay to 0.7 feet over clayey
_				13		FASSA	200	to 40% mostly subangular gravel, some clay, trace sand, very stiff, hard below sorted and deposited sand with
					15		0_0	13.5 feet with nearly vertical gray little to some gravel, little silt to
	5	13					0-0-0	desiccation cracks, (CL).
	24		19			42	0-0-	water sediment with little sand to
			2500	23		72	200	15.5 feet over silty slack water
10					29		0	sediment with little clay to 19.5 feet over clayey glacial till to 23.0 feet over water sorted and
10-	6	7					200	feet over clayey glacial till to
	24		22			45	0.0	23.0 feet over water sorted and
				23		45	0	deposited coarse silt with little
				25	23		000	deposited coarse silt with little to some gravel, some sand to
- 1	7	12			-23	8	00_	29.0 feet over silty glacial till to refusal.
-	24	12	40	-	-	i vermo	000	grades downward to 13.0
1	24		19			38	0000	Extramely maint faintly mattled alive
				19			0000	Extremely moist faintly mottled olive brown gravelly (SILTY-SAND) with 15 Note: advanced bore hole with 4
		_			17		. 0 . 0	to 40% mostly subrounded gravel, very 1/4 inch ID x 8 inch OD hollow
-	8	5						fine to very coarse size sand, little
15_	22		9	1000		19		silt, dense, stratified, (SM).
- 1				10				to 16.0 feet. Continued below
	_				16		5.5	with auger with 5 root interval
-							+	Extremely moist faintly mottled brown sampling to 35.2 feet.
								(SANDY-SILT) with little very fine size sand, compact, thinly bedded, (ML).
							THINGS:	1
								grades downward to 15.5
	9	7						<u> 这多这多</u> 这分
Ì	24		11			24	THE STATE	
				13		24		
20				-10	27		200	See next sheet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. GLP-80-15

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Survey ID 473, Northing: 881307,118584

Town of Arkwright, Chautaugua Co., NY

Easting: 972050.262077

CLIENT Fisher Associates

DATE STARTED 04/24/15 COMPLETED 04/24/15

DEPTH BLOWS ON IN FT SAMPLER

SN	_	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
						000	Extremely moist faintly mottled olive brown (CLAYEY-SILT) with little clay, very stiff, thinly laminated, (ML-CL).		
-						0 0	grades downward to 19.5		
						<u>OO</u>	Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15		
10	4	782005				0000	to 40% mostly subangular gravel, some clay, hard, massive soil structure,		
8	+	22	56		78	0000	(CL).		
			56	63	1	000	grades downward to 23.0	-,-,-,	
						0 0 0 U	Extremely moist faintly mottled grayish	4,4,4,	
-	-			-	1	0000	brown gravelly (SANDY-SILT) with 15 to 40% mostly subrounded gravel,	트. 트. 필.	
	+			0.0410		0 00	some sand, very dense, stratified,		
						0000	(SM).	BAA	
			-			W 1.7 . X . 7 . 1 . 1		TTINGS'BACK	
						000	grades downward to 29.0		
11	6					٧. م	Extremely moist olive gray gravelly	용.	
12		17]	0.00	(SAND-SILT-CLAY) with 15 to 40%	-, -, -,	
-			100/5		-	000	mostly subangular gravel and occasional channer, little sand and		
-						0.00	clay, hard, massive soil structure,		
					1	0 00	(ML-CL).		
						0.00			
_						0-00			
12	27	55				0 0			
10		33	100/4			0.00		F. F. F.	
						0000	35.2		No water at completion.
	+		-				Auger refusal at 35.2 feet.		← 35.2'
-									
-		700		100					
_									
	+	150 20							
	1			-					



		2	E									(716) 937- 652
ENVIR	ONN	ENT/	AL CO	NSULT	ANTS (& CONTR	ACTORS. INC	HOLE NUMBER:	W	/TG 93	vww.natur	eswayenvironmental.com
D	ΑТ	E:		4/	/1/15	5					ELE\	/ATION:
Ρ	RC	JI	EC	T: ˌ				Subsurface Investigation	for Ark	kwright Sumn	nit Wind F	arm
_				_=					wright,			
					FO	_		Fishei	Asso	ciates		
В	OF	SIN	IG	LO	CA	TION	:	Northing: 868468.9)20, E	asting: 9777	66.1480	
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
0 —	1	3	3	3		6		Wet, dark brown, mucky (SILT) with trace very fine size sand, loose with fine	0.5'		2" PVC Riser Pipe	
:	2	6			4			\size roots Wet, faintly mottled, brown, gravelly (SILT) with 15 to	1.4'			sediment with trace sand to 8.0 feet over water sorted and deposited
			6	7	15	13		25% gravel, trace very fine size sand, loose to compact, weakly thinly bedded				sand and gravel with little silt to 17.5 feet over silty glacial till with little gravel
	3	4							1.2'		Soil	to 29.0 feet over silty glacial till with trace
5 —			7			15					Backfill	gravel to refusal
Ů				8		10						
					14			Cytromoly modet alive area	1.5'			
	4	4	4					Extremely moist, olive gray (SILT) with 3 to 5% gravel,	1.0			
			7	6		10		trace very fine size sand, loose, weakly thinly bedded				
							1 200	1005e, weakiy tililiy bedded				

8.0 Wet, brown, very gravelly 5 5 (SILTY-SAND) with 40 to 6 50% gravel, very fine to medium size sand, little silt, 6 compact to dense, stratified 10 -1.0' 9 Bentonite Seal 19 27 16 1.0' 7 12 15 31 16 22 0.8 15 2" Slotted 12 15 PVC 17 Screen 29 # 2 Size Extremely moist, gray, gravelly (SANDY- SILT) with Sand 15 to 25% gravel, little very fine size sand, compact to 0.3' 40 very dense, massive soil 50/ 3" structure

LOGGED BY: Dale M. Gramza / Senior Geologist

PAGE 1 of 3



PAGE 2

ENV	KUNN	IEN I	AL GUI	NSULI	ANTS 6	& CUNTRA	ACTURS, INC	HOLE NUMBER:	W	/TG 93	www.natui	eswayenvironnental.co
	CAC	ΓE:		4/	1/15			HOLL NOMBLIK.	• • • •	10 00	ELE\	/ATION:
	PRO		_					Subsurface Investigation	for Arl	kwright Sum		
				_					wright,			
					FO	_				ciates		
E	3OF	RIN	١G	LO	CA	ΓΙΟΝ	:	Northing: 868468.90)20, E	asting: 977	766.1480	
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
25 –	10		50/3"			>50 >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	
35 -	11	29	50/3"			>50		Extremely moist, gray (SILT) with 5 to 8% gravel, trace very fine size sand, very dense, massive soil structure	0.4'			
		50/							0.4'			

LOGGED BY: Dale M. Gramza / Senior Geologist



HOLE NUMBER: www.natureswayenvironmental.com

	ΑT		_	4/	/1/15						ELE\	/ATION:
Ρ	RC)JE	EC.	T: ˌ				Subsurface Investigation f			nit Wind F	arm
_		- Б	۸ ۵			D.			right,			
					FO	K: TION:	<u>.</u>	Fisher			SE 1/90	
г				12/	18/			Northing: 868468.902		MONITORING		
	SN	0/ 6	6/ 12	18	24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WELL	REMARKS	COMMENTS
}								See previous sheet				
ŀ												
ŀ												
ŀ								Auger Refusal at 42.0' BGS				No Water at Completion
								Augur Nordodi di 42.0 Boo				'
-												
ŀ												
5												
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WWW.natureswayenvironmental.com WTG 95

DATE: 3/23/15	ELEVATION:
PROJECT:	Subsurface Investigation for Arkwright Summit Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

					CA ⁻	ιν. ΓΙΟΝ	<u>.</u>	Northing: 868060.38			16 <i>4</i> 4940	
		0/	6/	12/	18/		I I			MONITORING		
0 —	SN	6	12	18	24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WELL	REMARKS	COMMENTS
	1	2					لإيندي	Extremely moist, dark brown, mucky (SILT) topsoi	1.0'			Topsoil to 0.4 foot over silty slack water sediment
			2	_		5		with trace very fine size				with trace clay to 6.0 feet
				3				sand, loose				over silty slack water
					5			Extremely moist, highly	0.9'			sediment with trace
	2	3	_					mottled, brown (SILT) with trace clay, loose, blocky soil	0.5			gravel to 10.0 feet over water sorted and
			4			8		structure				deposited sand and
				4			8.53					gravel with little silt to
					6				1.4'		_ Soil	14.0 feet over silty glacial
	3	4	_						1.4		Backfill	till to 29.0 feet over shale rock to refusal
5 —			4	_		9	1. V. S.					TOOK to Torusar
				5	_							
					5			Cutro po al como internacional de management	1.8'		_2" PVC	
	4	2	_					Extremely moist, brown (SILT) with 5 to 8% gravel,	1.0		Riser Pipe	
			5			11		trace clay, compact, thinly			·	
				6				bedded				
	_				8				1.7'	8.0	Bentonite	
	5	4	•						•••		Seal	
			6	7		13						
				/	40							
10 —	6				10			Wot brown york grayolly	1.0'			
	6	2	•					Wet, brown, very gravelly (SILTY-SAND) with 40 to	1.0			
			3	7		10		50% gravel, very fine to fine				
								size sand, little silt, loose to				
	7	2			3			compact, stratified	0.5'			
			7						0.0	12.5	# 2 Size	
				9		16					Sand	
				9	10							
	8	4			10			Moist, gray, gravelly	1.0'	14.0	2" Slotted	
		4	7					(SANDY-SILT) with 15 to	-		PVC	
15 —			•	11		18		25% gravel, trace to little			Screen	
				' '	14			very fine size sand, compact				
					14			with brittle consistence, massive soil structure				
								massive son structure				
	9	9							0.9'			
		,	9									
20 —	1)(<u>-</u>		<u> </u>	BY	· D:	ale M	Gramza / Senior Geolo	nist	PAGE	1 of	2
		<i>-</i> •			ı ر	. <u>D</u>	AIO 1VI.	Cramza / Como Colo	9101	1 // 0L		<u>-</u>



www.natureswayenvironmental.com HOLE NUMBER: WTG 95

							TIOLE NOWDER.	V V	10 33	
DA		_		23/15	5					VATION:
PRO	JJI	EC.	Т: ˌ				Subsurface Investigation			arm
DD.		۸ ۵						right,		
PRE					_				ciates	
БОІ	\II\	NG			ΓΙΟΝ		Northing: 868060.3	500, E	asting: 981464.4940	
SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING REMARKS	COMMENTS
10	36	50/5"	30	50/5"	>50		Moist, gray, gravelly (SANDY-SILT) with 15 to 25% gravel, trace to little very fine size sand, compact with brittle consistence, massive soil structure	0.8'	2" Slotted PVC Screen # 2 Size Sand	
11	5"						Shale rock, gray, moderately soft to moderately hard, fissile, dry Auger Refusal at 34.9' BGS	0.2'		No Water at Completion
40 LC	DG	GI	ED.	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE 2 of	2



								HOLE NUMBER:	VV	/IG 96		
	TAC				23/1	5					ELE\	/ation:
F	PRC	JJE	EC.	T: _				Subsurface Investigation f	or Ark	kwright Sumn	nit Wind F	arm
								Arkw	right,	NY		
F	PRE	ĒΡ	٩R	$E\overline{D}$	FO	R:		Fisher	Asso	ciates		
Е	3OF	RIN	1G	LO	CA	TION	:	Northing: 867490.17	'10, E	asting: 9823	97.4520	
		0/	6/	12/	18/					MONITORING	I	
0 -	SN	6	12	18	24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WELL	REMARKS	COMMENTS
Ü	1	3						Extremely moist, black, 0.3	1.0'			Topsoil to 0.3 foot over
			3			6		mucky (SILT) topsoil with trace very fine size sand,				loamy glacial drift to 7.0 feet over water sorted
				3		O		loose				and deposited sand with
					7			Extremely moist, faintly				some gravel to 13.0 feet
	2	3						mottled, brown, gravelly	1.3'			over loamy glacial drift to
			5					(SAND-SILT-CLAY) with 15				24.0 feet over apparent
				6		11		to 25% gravel, little clay and				weathered shale rock to refusal
					6		- April	very fine size sand, loose to compact, weakly thinly				reiusai
	3	5						bedded	1.5'		Soil	
			5								Backfill	
5 –				6		11						
					6							
	4	4					1		1.2'		2" PVC	
			4								Riser Pipe	
				3		7	3.	Wet, brown, gravelly (SILTY-				
				_	2			SAND) with 20 to 40%				
	5	3						gravel, very fine to fine size	0.7'			
			2					sand, little silt, loose, thinly bedded				
			_	3		5		bedded				
					2							
10 –	6	1			_				1.4'	10.0	Bentonite	
	<u> </u>	i.	1								Seal	
			•	4		5	, 3					
				_	6		40.04					
	7	1							1.2'			
	<u> </u>	<u>'</u>	2							12.8		
				7		9		Moist, brown (SAND-SILT-			# 2 Size	
				'	7			CLAY) with 10 to 15%			Sand	
	8	7			'			gravel, little clay and very	0.8'	14.0	2" Slotted	
	l.	'	44					fine size sand, dense,	0.0		PVC	
15 –	-		11	0.5		36		massive soil structure to weakly thinly bedded			Screen	
				25				weakly triirily bedded				
					37							
							100					
	<u> </u>	_							1.0'			
	9	14	_						1.0			
20 –	<u> </u>		11					Crompo / Comion Conto		<u> </u>	1 (
	LC	JĠ	GE	בט	BY	. <u>।</u>	ale IVI.	. Gramza / Senior Geolo	gist	PAGE	<u>1</u> of	2



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								HOLE NUMBER:	VV	1G 96		
	ΓAC		_		23/1	5					ELEV	/ation:
F	PRC	JJI	EC	T: ˌ				Subsurface Investigation	for Ark	kwright Sumn	nit Wind F	arm
								Arkv	right,	NY		
					FO					ciates		
E	3OF	RIN	١G	LO	CA	TION	:	Northing: 867490.1	710, E	asting: 9823	397.4520	
	SN	0/ 6	6/	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
25 –		24		39	19 50/3"	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 Shale rock, gray, soft to moderately soft, fissile, weathered, wet		WELL 24.0	2" Slotted PVC Screen # 2 Size Sand	▼ Water Level at 22.5' BGS at Completion
30 -	11	50/5"						Auger Refusal at 31.3' BGS	0.4'			
35 –												
40 —	LC) G	GE	ED.	BY	: Da	l ale M.	Gramza / Senior Geolo	l gist	l PAGE	2 of	2



Www.natureswayenvironmental.com WTG 97

DATE: 3/25/15 ELEVATION:

PROJECT: Subsurface Investigation for Arkwright Summit Wind Farm

Arkwright, NY

PREPARED FOR: Fisher Associates

PORING LOCATION: Northing: 967003-9369, Facting: 093393-4409

В	BORING LOCATION: Northing: 867093.8360, Easting: 983283.440											
o —	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
U	1	3					X X X X	Extremely moist, dark brown 0.4	0.8'			Topsoil to 0.4 foot over
			1			3		(SANDY-SILT) topsoil with little very fine size sand, very				silty glacial drift with trace gravel to 17.5 feet over
				2				loose, with fine size roots				silty tending toward
					5			Moist to extremely moist,	0.01			clayey glacial till to refusal
	2	2						faintly mottled, brown (SILT)	0.6'			
			5			10		with 5 to 15% gravel, trace very fine size sand, loose to				
				5				compact, weakly thinly				
					4			bedded	0.9'		Soil	
	3	12							0.9		Backfill	
5 —			7	_		16						
				9								
	4	4			12				0.4'		_2" PVC	
	*	4	2						0		Riser Pipe	
			2	3		5						
				3	3							
	5	4			3				1.3'			
	<u> </u>	-	7									
				8		15						
					21							
10 —	6	5							1.3'			
			9									
				10		19						
					14					12.0	n	
	7	6							1.5'	(3.5.1)	Bentonite	
			7								Seal	
				8		15						
					13					14.0)	
	8	10							1.5'		# 2 Size	
15 —			11			29				15.0	Sand	
10				18		29					2" Slotted	
					27						PVC	
											Screen	
								17.5				
								Moist, gray, very gravelly (CLAYEY-SILT) with 40 to				
								50% mostly shale gravel,				
								little to some clay, hard,	1 0'			
	9	25						massive soil structure	1.0'			
20 —			23		DV	. D		Crampo / Carrior Carlo	aict		1 -1	
	LC	JG	GE	בט	BY	. <u>D</u> a	ale IVI.	Gramza / Senior Geolo	gist	PAGE	<u>1</u> of	2



4				// //								(716) 937- 652
ENVIR	ONME	NTA	L COI	VSULT	ANTS &	& CONTRA	ACTORS. INC	HOLE NUMBER:	W	/TG 97	vww.natur	eswayenvironmental.cor
D	ATE	E:		3/2	25/15	5					ELE\	/ATION:
Ы	30	JE	C	Γ: _				Subsurface Investigation	for Arl	kwright Sumn	nit Wind F	arm
								Ark	wright,	NY		
PΙ	REI	PΑ	١R	ED	FO	R: _		Fishe	r Asso	ciates		
В	ЭR	IN	G	LO	CA	TION	:	Northing: 867093.	8360,	Easting: 983	283.4400)
[SN (0/	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
				27		50					2" Slotted	
					50/4"						✓ PVC Screen	
											Coroon	
								Maint areas some areasalls	1 0		# 0 C:- o	
	10 3	39						Moist, gray, very gravelly (CLAYEY-SILT) with 40 to	1.0'		_# 2 Size Sand	
25 —			33			>83		50% mostly shale gravel,		25.0		
				50/5"				little to some clay, hard,				
								massive soil structure				

0.3' 30 -No Water at Completion Auger Refusal at 31.0' BGS

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



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-100-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881021.85621900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975480.36826400000

CLIENT Fisher Associates

DATE STARTED 05/11/15 COMPLETED 05/11/15

DEPTH BLOWS ON IN FT SAMPLER

	TIALI		JAI	II LL	•			
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	1	1					00.00.	Extremely moist black (MUCK), granular Control of the control o
	18		1				6 6	1
				2		3	2 2	soil structure, (OL).
		-	7-11-22		3		0.0	0.3 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	2	15		-		1	0000	Extremely moist highly mottled olive
-	17	_15_	13		-	A3835.5	0000	brown (SANDY-SILT) with 5 to 10%
	1/		13_			22	0000	gravel, little sand, trace clay, very
		V U	-	9	_	ł	0 00 0	loose, weakly blocky soil structure,
					9	1	0000	(ML).
	3	_5_	1.00			1	0000	clear transition to 1.0
5-	18		7			12	0 2]	Extremely moist faintly mottled olive Note: WTG-100-15 drilled 16.0
		-		5	_		0.0.0	gray gravelly (SAND-SILT-CLAY) with feet northwest of staked
					5		0 0	15 to 40% gravel, little sand and clay, location.
	4	2			-	ļ	000	very stiff, blocky soil structure,
	17		4_			9	0,00	(ML-CL).
				5			0.00	grades downward to 2.0 Organic surface to 0.3 feet over coarse silty glacial drift with
					7		0.00	Extremely moist faintly mottled olive
	5	2					700 d	grayish brown gravelly (SILTY-SAND) to 1.0 feet over silty glacial drift
	13		6			12	0.00	with 15 to 25% mostly subrounded with little to some gravel, little
				6		12	-0 0 0	gravel, very fine to very coarse size sand and clay to 2.0 feet over
			6		4	1	0.00	sand, little silt, compact with brittle water sorted and deposited sand
10-	6	4				1	0 0-0	consistence, prismatic soil structure, with little to some gravel, little
	24		8				20-2	(SM). silt to 5.0 feet over water sorted
	24		-0	8		16	0 0 9	grades downward to 5.0 and deposited sand with little to some gravel, trace silt to 6.0 feet over silty glacial drift with
	\vdash			0	7	i	000	Extremely moist faintly mottled olive some gravel, trace silt to 6.0 feet over silty glacial drift with
	7	10	-			1	0000	grayish brown gravelly (SAND) with 15
S EATING		12				1	0000	to 40% mostly subrounded gravel, very
	14	-	20			47	0000	If fine to very coarse size sand, trace sorted and deposited sand with
		_		27	825	ł	0-2	silt, loose, stratified, (SW). some gravel, little silt to 13.5 feet
					15_	1	000	clear transition to 6.0 over silty glacial till to 23.0 feet
	8	13			-		8 8	Extremely moist faintly mottled olive over water sorted and deposited
15—	22		19			37	000	brown gravelly (SAND-SILT-CLAY) sand with little to some gravel,
				18		ļ	0 00	with 15 to 30% gravel, little sand and trace silt to 29.5 feet over water
					17		000	clay, stiff, massive soil structure, sorted and deposited sand and
						1	0.00	(ML-CL). gravel, trace silt to 39.5 feet over water sorted and deposited
							7000	grades downward to 12.0 coarse silt with little to some
							0-00 -00-0	gravel and sand, trace clay to
			V				2000	49.3 feet over coarse silty slack
	9	6					-0-0	water sediment with little sand to
	16		10			25	0 0	53.0 feet over silty glacial till to
				15		25	000	end of boring.
				10	15	1	0 0	See next sheet.
20	-				10			oce next sheet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-100-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881021,85621900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975480.36826400000

CLIENT Fisher Associates

DATE STARTED 05/11/15 COMPL

COMPLETED 05/11/15

DEPTH BLOWS ON IN FT SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL	WATER TABLE AND REMARKS
							0.00	Extremely moist faintly mottled grayish		<u> </u>	Note: advanced bore hole with 4
	41-2					1	0 00	brown gravelly (SILTY-SAND) with 20	1	+, +, +,	1/4 inch ID x 8 inch OD hollow
9						1	0000	to 40% mostly subangular gravel, very fine to very coarse size sand, little			stem auger casing with continuous split spoon sampling
		-				1	တာ္တိုင္ ပတ္ထင္	silt, stratified, (SM).	I		to 16.0 feet. Continued below
		_				1	0 0		13.5		with auger with 5 foot interval
1	10	5	_		-	1	Y . 6 Y .	Extremely moist distinctly mottled olive	7	4,4,4,	sampling to 60.0 feet.
751	10 20	0	10			1	0.0.0.0	brown gravelly (CLAYEY-SILT) with 15			
i			10	13		23	0.0.0	to 40% mostly subangular gravel, little	1		
_				15	17	1	0.00	clay, trace sand, hard, massive soil		+, +, +,	
5—						1	0.0.0.0	structure, (ML-CL). clear transition to	14.5	27:27:23	
]	0.00		-		
3							0.0.0	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly			
	-14 34						0.0.0	subangular gravel, little clay, trace		4,4,4,	
							00.	sand, very stiff and hard, massive soil			
					(A=21.11n=2		0.0.0	structure, (ML-CL).	İ		
	11	5				1	O:00:	grades downward to	23.0	- , - , <u>-</u> , - , - , - , - , - , - , - , - , - ,	
	18		10			27	0.0.0	Extremely moist faintly mottled olive	-		
				13		603	OO.	brownish gray gravelly (SAND) with 15	[BACKF	
0—					18	ļ	0.00	to 40% mostly subrounded gravel, very	ł	0 .	
			o en			-	0:00:	fine to very coarse size sand, trace	1		
						ļ	0.00	silt, compact, stratified, (SW).	00 -		
						}	0.00.	Parameter Programme Annual Control of the Control o	29.5	5.	
						1	5.00	Wet olive gray very gravelly (SAND)	ŀ	-19-19-19	
-						-	0.00	with 40 to 60% mostly subrounded gravel, very fine to very coarse size			
3	200				-	1	0:00:	sand, trace silt, dense, stratified,			
	12	_7_	15		-		0.00	(SW), (GW).	ŀ	t.	
	10		15	23		38	0.00				
20				23	22	1	200		-		
5—					- 66	1	020		Ì		
							6:00:				
	72 - 22 - 11					1	0.00		-		
						1	0.00.				
						1	20.0		ŀ		
						1	0.00				
	13	7				1	6.00				
	20		28			48	0.00				
				20]	0:00:	3	39.5		
0					29		000	See next sheet.			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-100-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881021.85621900000

Town of Arkwright, Chautaugua Co., NY

Easting: 975480.36826400000

CLIENT Fisher Associates

DATE STARTED 05/11/15

COMPLETED 05/11/15

DEPTH BLOWS ON SAMPLER 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).			
45—	14	8	24	36	27	60					
40									<u> </u>		Water level at 45.3 feet below ground surface at completion.
	15 24	10	16	17		33		Extremely moist olive gray	49.3 <u>.</u>	3ACMFILL)	
50—			1,7,5		19			(SANDY-SILT) with little sand, dense, thinly bedded, (ML).		F CULTINGS BACKE	
-								grades downward to	53.0		
	16	20					000	Extremely moist olive gray gravelly	- <u> </u>		
	14		21	58		79	6 20 C	(CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace	<u>.</u>		
55—	112377			50	63		0,00	sand, hard, massive soil structure,			
55-							7000	(ML-CL).			
	-			-			-OAO		Í		
1					=,-==	è	0 00		1		
							500-0 00-0		1		
							000		1	2,43,43	
	17	13	04			g gase	0 -0 1				
	10		21	34		55	0,0				
60					40			Boring completed at 60.0 feet. 6	30.0		← 60.0'



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-101-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 883664,47289100000

Town of Arkwright, Chautaugua Co., NY

Easting: 968130.37913200000

CLIENT Fisher Associates

DATE STARTED 03/17/15 COMPLETED 03/18/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

- 5	INFT		SAN	IPLEF	1			
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
3	1	1					Q	↑ Extremely moist dark reddish brown
	14		1			_	4 4	muck (PEAT), (OL).
				1		2	0 0 0	0.3
					3		0 00 0	一
	2	11					700	Extremely moist faintly mottled olive (1) TOPSOIL FILL
	24		18			36		brown (CLAYEY-SILT) with 5 to 10% gravel, little clay, trace sand, firm, (2) CONCRETE
				18		30	000	blocky soil structure, (ML-CL).
					16		0,0	
	3	10					200	1
-	14		8			12		Extremely most districtly mottled onve
5—				5		13	000	brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subrounded gravel, little
					3		0.70	clay, trace sand, hard, blocky soil Organic rich organic matter to
	4	6					1000	structure, (ML-CL).
	18		5			n.	0.00	with little clay, trace sand and
	10			6		11	-000	SET AND AND STATE OF THE PROPERTY OF THE PROPE
					5		0.00.	Moist olive brown gravelly (CLAYEY-SAND) with 15 to 40% mostly glacial drift with little to some gravel, little clay, trace sand to
	5	4					0.0.0	subrounded gravel, little clay, trace 4.0 feet over water sorted and
	16	-	5					silt and organic matter, firm, weakly deposited sand with little to
	10		-	4		9	2.2	stratified, (SC).
				-	3	ĺ	ond	stratified, (SC). grades downward to 10.0 some gravel, little clay, trace silt and organic matter to 10.0 feet over water sorted and deposited
10-	6	4				ĺ	9.00	" (e.u.e.) " (e.u.e.)
	16		4				0.0.0	Moist olive brown gravelly (SANU) with sand with some gravel, trace silt 30 to 40% mostly fine size subrounded and clay to 18.0 feet over water
	10		-	6		10	0.0.0	30 to 40% mostly fine size subrounded gravel, very fine to very coarse size sand, trace silt and clay, loose, 30 to 40% mostly fine size subrounded and clay to 18.0 feet over water sorted and deposited sand with trace gravel to 18.5 feet over
					7	1	6 6	sand, trace silt and clay, loose, trace gravel to 18.5 feet over
	7	8				1	0.0.0	compact below 12.0 feet, stratified, water sorted and deposited sand
-	24		9	-				(SW). with little silt to 23.0 feet over
	24		-	10		19	0.0.0	water sorted and deposited
				10	10	ĺ	0.00	sand, trace silt to 28.0 feet over silty slack water sediment with
	8	8			10	ĺ	1.0.0.0	little sand and clay, trace gravel
	24	0	9				000	to 33.0 feet over silty glacial
15—	24	_	3	9		18	6.00	drift with little gravel and clay,
	\vdash			-	9	ĺ	0.00	trace sand to 43.0 feet over
					3	1	0.00	silty glacial till to 56.0 feet over
	\vdash					1	0.0.0	apparent siltstone rock to
						1	00.	refusal.
-						1	0.0.0	grades downward to 18.0
				-		1	6	
	9	4_	4	_	_	5276.1		
	20		4	F	-	9		[18] - 18 - 18 - 18 - 18 - 18 - 18 - 18 -
		-		5	6	1	127.73	See next about
20	\Box				6			See next sheet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a HOL

(716) 655-1717 • FAX (716) 655-2915 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 BLOWS ON IN FT SAMPLER

	SN	0/ 6	6/	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). Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D hollow stem auger casing with continuous split spoon sampling
_								Extremely moist faintly mottled olive grayish brown (SILTY-SAND), very to 16.0 feet. Continued below with auger with 5 foot interval sampling to 56.2 feet.
	10 24	2	2	2		4		fine size sand with little silt, loose, thinly bedded, (SM). 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 20	7	11	11		22	4	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
30—					12			(SILTY-SAND) lens, (ML-CL). 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 20	2	4	8		12	6 % 0 0 0	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 20% gravel, little clay, trace sand, stiff, very stiff
35—					13		0 0 0 0 0 0	below 38.0 feet, massive soil structure, (ML-CL).
							1-0 0-0 0 0-0 0 0-0	
	13	6					00°C	
40	22		9	10	10	19	7000 0 000	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-101-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 883664,47289100000

Town of Arkwright, Chautaugua Co., NY

Easting: 968130.37913200000

CLIENT Fisher Associates

DATE STARTED 03/17/15

COMPLETED 03/18/15

DEPTH BLOWS ON IN FT SAMPLER

	SN	0/	6/	12/	18/	N	LITH	DESCRIPTION AND CLASSIFICATION		WELL	WATER TABLE AND REMARKS
	REC	6	12	18	24	4.0					
							200	Extremely moist olive gray gravelly		<i></i>	
							000	(CLAYEY-SILT) with 15 to 20% gravel,			
							0000	little clay, trace sand, very stiff,			
1							a o	massive soil structure, (ML-CL).		+1.41.41	
							Load				
42							o , o	grades downward to	43.0		
	·		-				2 00	Extremely moist olive gray gravelly	-		
	14 22	9	45				0.00	(CLAYEY-SILT) with 15 to 40% mostly			
			_15			32	6- 25	subangular gravel, little clay, trace	1		
	_			17	(2004)		2000	sand, hard, massive soil structure,			
45-			-	-	22	0	000	(ML-CL).			
		-					500 A			tatata	
						5	-0 A O				
							6 51				
						{	00-0			生。生。	
							0 0				
							000			B.	
	15	10					0 00			∴ ⊢ Sp.	
1	20		15			33	000				
				18		33	000			T - T - '5	
50-					23		roga			4.4.2.	
50-							0 0		1		
				A-Vie			~0°6				
İ							200		- 1		
1							0-0-4				7
			_				~ ~~~			tartarta	
-	-						0 0				
-	- 10						000				
	16 22	11			-	5	o z			计3.对3.对3	
	22	-	18			41	LOAG				
	-			23	77.000	i	0 0				
55-	_	-			33	Š.	-00-Q			+++	
					_	:	000	grades downward to	56.0		
							9 9-9		-		← 56.2'
	17	100/2						Olive gray apparent siltstone rock,			. 00.2
								moderately hard, can be etched with knife with some effort.	- 1		
								4			
								5	6.2		
			G 144					Split spoon refusal at 56.2 feet.			
									- 1		
60						Ť					
00 1											



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-101a-15 (Well)</u>

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

S	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		(I) P	L !	WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	~ ~		(P) (P) (P) (P) (P)	(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLEI IN SMALL CONCRETE PAD
5										40 FJT PVC RISER	NGS BACKFILL	(2) CONCRETE (3) BENTONITE SEAL Note: WTG-101a-15 drilled 2 feet southeast of staked location.
										SCHEDULE 40 FJT	I I ICUTITINGS BACKFILL	
10										2" SCF	(3)(-)(1)	← 10.0'
											PACK_	← 13.0'
15								*		VC SCREEN	MORIE SAND PACK	← 15.0'
20										.010 SLOT 2" PV	#00N SIZE	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-101a-15 (Well)</u>

SURF. ELEVATION __

10B13a

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

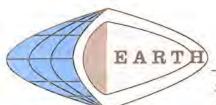
CLIENT Fisher Associates

DATE STARTED 03/17/15

COMPLETED 03/17/15

DEPTH BLOWS ON IN FT SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
9								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK	
25—		3777						25.5	.∵.L	← 25.0'
								Boring completed at 25.5 feet.		← 25.5'
								o en en en en en en en en en en en en en	l)	
1										
-										
										1
30—	-									
										1
						.				
				-						1
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35_	-				-					1
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İ										
40										



Soil and Hydrogeologic Investigations • Welland Delineations

1091 Jamison Road + Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 10B13a HOLE NO. <u>WTG-102-15</u>

SURF. ELEVATION

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 876898.97433900000

Town of Arkwright, Chautaugua Co., NY

Easting: 976559,81915800000

CLIENT Fisher Associates

DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH BLOWS ON IN FT SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
ı	1	4					*******	Tutonaly point blook (CAMPY SUIT)		← 0.5'
	18		15			7		Extremely moist black (SANDY-SILT) topsoil with 0 to 3% gravel, little	3-3-3	- 0.5
				6		1 '	A	organic matter and sand, trace clay,	53538	
	20.0		1.41		7	1	0 60 6	very loose, granular soil structure,	13,2,4	. 0.01
1	2	10				1	0 40 6	(ML).		← 2.0'
	0		6			1		0.2		(1) TOPSOIL FILL
1				6		12	0 00 0	Extremely moist dark brown		(2) CONCRETE
1					6		0 0	(SANDY-SILT) topsoil with 3 to 5%		
1	3	2				1		gravel, trace to little organic matter,		Note: WTG-102-15 drilled 10.5
1	16		4				700	little sand, very loose, granular soil		feet southeast of staked
7	19		1	4		8	000	structure, (ML).		location.
1					5	1	0000	0.8	Street Street	Augers left in bore hole at 12.0
1	4	5			3		0000	Extremely moist distinctly mottled		feet over night, water level at
-	12	J	4			1	0000	brown (SANDY-SILT) with 5 to 15%		4.9 feet below ground surface
t	12		4	2		6	0.0	gravel, little sand, trace clay, compact		the next morning,
+				-	-		000	with brittle consistence with nearly		
1	-	- 4			_1_	1	0 00 0	vertical gray desiccation cracks,	-: -: -:	Note: no recovery for samples
1	5	_1_	_			1	9 9	ii), (ML).	Programme 1	#2, 2.0 to 4.0 and sample #11,
1	20		6	75		21	0 0 0	grades downward to 4.0		28.0 to 30.0 foot depths.
-	-	-		15	- 10		0 00 0	"Extremely moist, wet below 6.0 feet,	l'i' Backeti	Coarse silty topsoil with little
+		(0)			19		20	distinctly mottled olive brown gravelly		organic matter and sand, trace
1	6	19		-			0.00	(CLAYEY-SILT) with 15 to 20% mostly	X	gravel to 2.0 feet over coarse
+	14		35		-	56	0.00	subangular gravel, little to some clay,		silty topsoil with little sand, trace
+	-			21	12		0000	trace sand, firm, massive soil structure,	T. T.	to little organic matter, trace
-					17		<u> </u>	(ML-CL) tending towards (CL). grades downward to 5.5		gravel to 0.8 feet over coarse
+	7	16					0000			silty glacial drift with trace to
-	3		1.7	P. B.		43	0 20	Wet distinctly mottled olive grayish		little gravel, little sand, trace clay to 4.0 feet over silty to
-	-			26			0000	brown gravelly (SANDY-SILT) with 15		clayey glacial drift with little
+		70			34		5 0	ii to 40% mostly subrounded gravel, little		gravel, trace sand to 5.5 feet
-	8	22	- 1				000	" to some sand, loose, stratified, (SM).		over coarse silty slack water
+	22	-	15			36	0-0-	grades downward to 8.0		sediment with little to some sand
-		-		21	73.77		000	Extremely moist distinctly mottled olive	中文产之中 对	and gravel to 8.0 feet over
-					56		0.00	brown (SANDY-SILT) with 5 to 10%		coarse silty slack water sedimen with little sand, trace gravel to
							0 0	gravel, little sand, compact, thinly		10.0 feet over loamy glacial till to
				-			0	bedded, (ML).	医大学 光光	12.0 feet over silty glacial till to
1						4	200	grades downward to 10.0		14.0 feet over clayey glacial till
1							000	Extremely moist distinctly mottled olive		to 38.0 feet over coarse silty
	9	45	JE!	1			0 0	brown gravelly (SAND-SILT-CLAY)		slack water sediment with some
-	22		29			43	000	with 15 to 40% gravel, little sand and		sand to 43.0 feet over silty
				14			0-0-	clay, hard, massive soil structure,		glacial till to 48.0 feet over
					15		000	(SC).	7 - V - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	loamy glacial till to end of boring.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-102-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 876898,97433900000

Town of Arkwright, Chautaugua Co., NY

Easting: 976559,81915800000

CLIENT Fisher Associates

DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

	SN	0/ 6	6/	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 0D hollow stem auger casing with continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval
25-	_10 18	3	8	12	13	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). grades downward to 14.0		sampling to 56.4 feet.
	11	5						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).		
)—	0		9	11	15	20	6 10 10 10 10 10 10 10 10 10 10 10 10 10		CULTINISS BACKFIL	
	12 16	6	8	10	53	18				
								grades downward to 38.0		
0	13	8	19	17	23	36		Wet olive gray (SANDY-SILT) with some very fine size sand, dense, tends to liquefy when disturbed, thinly bedded, (ML).		



Soil and Hydrogeologic Investigations * Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-102-15</u>

SURF. ELEVATION

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 876898,97433900000

Town of Arkwright, Chautaugua Co., NY

Easting: 976559,81915800000

CLIENT Fisher Associates

DATE STARTED 05/20/15 COMPLETED 05/21/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

F	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).		
					-		U- 20-1	grades downward to 43.0		
H	14 22	6	16				000	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		
-			10.	28	22	44		subangular gravel, little clay, trace sand, hard, massive soil structure, (ML-CL).		
							0 0-0 0 0-0 0 0-0			
1							0 0	grades downward to 48.0	X	
-	15 22	4	24				000	Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly	sex	
	22		21	48	49	69		subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (ML) tending towards (SM).	CUTTINGS BACKFIL	
1							0000			
-	16	6	52			110	0000			
-				58	77		0000			
F							0000	56.4		÷ 56.4'
								Boring completed at 56.4 feet.		50.4



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10813

(716) 655-1717 • FAX (716) 655-2915 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, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/27/13 COMPLETED 02/27/13

DEPTH BLOWS ON IN FT SAMPLER

INFT	ı	SAM	IPLE	4			
SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
1	. 1					******	Extremely moist dark brown (2) CONCRETE
18		2			_		Extremely moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% [SANDY-SILT) topsoil fill with 0 to 3%
-10		<i>(</i>	٦		5		
ļ				_		4 4	The state of the s
-				_6_		Y: 04;	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2	-5-					0.0	I N 4 N 1 HOLECTIAL ONDING INDIVERSE
10		5			9		1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
			4) O O O	Extremely moist faintly mottled brown (4) 2 INCH SCH. 40 FJT RISER
				5			! (SAND-SILI-CLAY) WITH 3 TO 7% N.Z. N.Z.
3	3					CO C	gravel, little mostly very fine size sand
s 12		2				1 2000	and clay, stiff, blocky soil structure,
5			2		4	10000	(ML-CL).
	l			2		6o	clear transition to 1.9 Coarse silty topsoil fill with little
	ļ ,) O O O (Extremely moist faintly mottled brown sand and organic matter to 1.3
4		<u> </u>				O. 00.9	gravelly (SAND-SILT-CLAY) with 15 to 25% gravel and flat sided stone fragments, little very fine to very coarse size sand and clay, stiff, massive soil structure, (ML-CL). 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
14_	 	2			6	<u> </u>	25% gravel and flat sided stone
			4_			4 64 6	fragments, little very fine to very
	ļ			10			is coarse size sand and clay, stiff,
5	7					4.0.0.0	fragments, little very fine to very to 1.9 feet over loamy glacial coarse size sand and clay, stiff, massive soil structure, (ML-CL). to 1.9 feet over loamy glacial drift with little to some gravel to
18	<u> </u>	10			23	4.04.0	clear transition to 4.2 Q tu deposited sand with little to
		·	13		دے	4 4 6	clear transition to 4.2 deposited sand with little to some gravel to 6.7 feet over
٠,				18			clear transition to 4.2 Wet brown gravelly (SILTY-SAND) with 15 to 25% gravel, little sand, trace clay, very loose, stratified, (SM). Clear transition to 4.2 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
10 6	8					9 4 6	15 to 25% gravel, little sand, trace and clay, trace to little gravel to
20	 	15				2 2	clay, very loose, stratified, (SM).
20		10	17		32	P. 04.	clear transition to 6.7 5 13.8 feet over apparent
			1/			0.0.0	Clear transition to 6.7 13.8 feet over apparent Wet to extremely moist brown CANDER TOTAL AND WITH 5 to 15.9 Feet over shale and siltstone CANDER TOTAL AND WITH 5 to 15.9 CANDER TOTAL AND WITH 5
··				20		0.00	(CANDEST TECLAY) with 5 to 159
7	8			_		FO CO	gravel and flat sided stone fragments,
11	ļ	9.			21	700.d	little sand and clay, stiff, very stiff siltstone interbeds to end of
			12			0.00	below 7.5 feet, massive soil structure, coring.
				25			(ML-CL).
. 8	36						8.5
15		100/2					Extremely moist gray + 15.0'
'' 个							! (SAND-SILT-CLAY) with 5 to 15%
	T						gravel, little sand and clay, very stiff,
	Run	#1					massive soil structure, (ML-CL). / / / / / / / (ft) (ft) % %
	MOU	πι					clear transition to
							Lear transition to 15.0
	-						(一) 1 to 3.7 l.8 48 0
				ļ			18.7
1	ļ						レーン 「名」
<u> </u>	Run	#2					トン (8.7)
							1 1 1 2 to 6.3 5.9 94 0
20 💷					L		See next sheet. 25.0

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW LOGGED BY Brian R. Bartron. Geologist. (mw) SHEET 1 OF 2



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. Bore Hole TB-103-13

SURF. ELEVATION 1495.74 LOCATION N: 886094,5568 E: 972958,9101

10B13

PROJECT Arkwright Summit Windfarm - Wind Turbine Project

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 02/27/13 COMPLETED 02/27/13

DEPTH

BLOWS ON SAMPLER

	IN FT		SAM	IPLER											
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATE	RTABL	E AND	REMA	ARKS	
						- Andrew Control of the Control of t	The state of the s	Extremely moist gray gravelly (SANDY-SILT) with 15 to 40% gravel, little sand, trace clay, dense with brittle consistence, massive soil structure, (SM).							
25-	+	Run	#2				Service Servic	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).		÷ 25.0					
								Gray apparent weathered shale bedrock, very soft and soft with occasional thin layers of moderately soft rock.		Very	soft: c crushe into se can be	An be of the control	easily veen i erial. ed be	finger	n
30-							The state of the s	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		Mediu	with si rately with fi m hard etche	s into some ef soft; can ngerna ness; con distribution the length	fort. an be il. an be knife.	etch e easi	ed Iy
-								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		# !	(ft) 15.0 to 18.7	(ft) 	(ft) 1.8	49	
35 <u>–</u>						-		inches thick, thinly bedded to banded, dense.		2	18.7 to 25.0	6.3	5.9	94	0
40								Coring completed at 25.0 feet,	- Andrews and the second	1/4 in stem contint to 15. with a core 25.0 to observe	auger nuous s O feet NG-2 barrel feet.	ced box 8 incl casing split sp . Conti size d and dia 4 2 Incl well was	n OD h with oon sa nued ouble amond n PVC as ins	nollow amplir below tube I bit t	ng k



 $Soil\ and\ Hydrogeologic\ Investigations \ \bullet \ Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautaugua Co., NY

Easting: 977401.38813300000

CLIENT Fisher Associates

DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH	BLOWS ON
INFT	SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	(I) B	WATER TABLE AND REMARKS
ľ	1	2					**********	Not don't brave medica (CLAVEY CTLT)		← 0.5'
Г	22		4			2		Wet dark brown mucky (CLAYEY-SILT) topsoil with little to some organic	3-3-3	+ 0.5
				2		3	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	matter, little clay, very soft, granular	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	
ı				-	4		2_ 0 2_ 0	soil structure, (ML-CL) tending	1 5 , 5 , 4	I S WAY
ı	2	6					2 00	towards (OL).		← 2.0'
1	24	.0	7			020	0.0	0.2		
H	24	-		8		15	200			(1) TOPSOIL FILL
ŀ	-			0	-		0.00	Extremely moist faintly mottled dark brownish gray (SANDY-SILT) topsoil		(2) CONCRETE
ŀ		-	-		_11_		000	with 5 to 10% gravel, little organic		MED PROCESSES
ŀ	3	.5		-	-		6 6	matter and sand, very loose, granular		
+	24		_5_			9	LOAO	soil structure, (ML).		Note: WTG-105-15 drilled 39.0
ŀ	\rightarrow	-25		4			0. 0	0.8		feet south of staked location.
-	-				5		مخم	(-1, -1, -1	
-	4	4					芒芒	Extremely moist distinctly mottled olive	STANTANT.	
L	18		8			17		brown (CLAYEY-SILT) with 10 to 15%		Organic rich silty topsoil with
				9		- 85		gravel, little clay, trace to little sand,		little to some organic matter,
Ţ					13			firm, blocky soil structure, (ML-CL).		little clay to 0.2 feet over
Γ	5	7						grades downward to 2.0		coarse silty topsoil with little organic matter and sand to 0.8
T	24		16			2.5	500	Extremely moist distinctly mottled		feet over silty glacial drift with
T	-		10	19		35	000	grayish brown gravelly	٠	little gravel and clay, trace to
t		alt- v		-10	21		0.0	(SAND-SILT-CLAY) with 15 to 40%	분	little sand to 2.0 feet over silty
+	6	8	*		-61		200	gravel, little sand and clay, stiff,	B.A.C.K.	glacial drift with little to some
ŀ	24	0	12			2000000		massive soil structure, (SC).	₩	gravel, little sand and clay to 6.0
ŀ	24	-	12	200		27	0	grades downward to 6.0		feet over clayey slack water
ŀ	-	-		15			200	Extremely moist faintly mottled brown	- L. Y	sediment to 8.0 feet over clayey
+	_		-	-	_17			(CLAYEY-SILT) with some clay, stiff,	50 50 EN	glacial till to 23.0 feet over
+	7	8	P 100				0 :0	thinly laminated, (CL).	5 .	loamy glacial till to 24.0 feet
1	19		12	200000		27	000	8.0		over loamy glacial drift with little to some gravel to 33.0 feet over
-	_			15			Ď Ď	i		loamy glacial till to 38.0 feet
1					28		000	Extremely moist faintly mottled grayish		over clayey glacial till to end of
L	8	8					0 70	brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some		boring.
1	12		16			35	000	! clay, trace sand, very stiff, massive	-, -, -,	authorizana 🕶 to
				19		- 0	00-	soil structure, (CL).		
Γ					18		0-0-0	clear transition to 10.0		
Γ							0_0	·	-3.4-3.4-3	No. 20 registration in 2000, and removed their colors. Another assessment
							0.00	Extremely moist olive gray gravelly	STATE OF THE	Note: advanced bore hole with 4
t		1					<u></u>	(CLAYEY-SILT) with 15 to 40% mostly		1/4 inch ID x 8 inch 0D hollow
+							000	subangular gravel, some clay, trace		stem auger casing with
+	9	2					0	sand, very stiff and hard, massive soil structure, (CL).		continuous split spoon sampling to 16.0 feet. Continued below
H			0				0.0	Structure, (CL).		
22		8			18		13	with a	with auger with 5 foot interval	
			10			مند هنا	<u>[-</u>		sampling to 45.0 feet.	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautaugua Co., NY

Easting: 977401,38813300000

CLIENT Fisher Associates

DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH BLOWS ON IN FT SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
							000	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 24	.5	19			39	0000	Extremely moist highly mottled olive brown gravelly (SILTY-SAND) with 15		
25—				20	19			to 30% gravel, some silt, dense with brittle consistence, massive soil structure, (SM).		
								grades downward to 24.0 Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 30% gravel,		
-	11	1						little sand, compact, massive soil structure, (SM).		
5 - 100 - 100 -	22		5	7	14	12			CULTINGS BACKFILL	
30—					14		0000		T.T.MGS.	
								grades downward to 33.0		
8	12	9	27			145100	0000	Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly		
35—	20		_21	37	46	64		subangular gravel, little sand, very dense with brittle consistence, massive soil structure, (SM).		
							0000	1.00		
_			- 576					grades downward to 38.0		
	13 20	8	18	690		34	0-0-0			
40				16	100/4		0 00	See next sheet.		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-105-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautaugua Co., NY

Easting: 977401,38813300000

CLIENT Fisher Associates

DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH BLOWS ON IN FT 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 (CLAYEY-SILT) with 15 to 40% mostly subangular gravel and occasional cobble, trace sand, hard, massive soil structure, (CL).	, F F Backfill	
8	14 22	16	64				0—,0 0 0 0 0 0 0 0 0 0		F F F F F F F F F F F F F F F F F F F	
45—	to to		04	66	84	130		Boring completed at 45.0 feet.		No water at completion. ← 45.0'
								Borning completed at 40.0 reet.		
50—	-5:1									
_										
55—										
-										
60										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105-15</u>

10B13a

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

	TIN I I		JAI	11 LL1	•			
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	4	2					*********	
	22		1					Wet dark brown mucky (CLAYEY-SILT) ← 0.5'
		_		2		3	4 4	topsoil with little to some organic
		_		2			2 02 0	matter, little clay, very soft, granular soil structure, (ML-CL) tending
					4	1	J 3	soil structure, (ML-CL) tending towards (OL).
	2	6					0.00	[[550] 550] 550
	24		_7_			15	ا می ه	0.2
				8		11.50504	000	Extremely moist faintly mottled dark (1) TOPSOIL FILL
					11		0.00	brownish gray (SANDY-SILT) topsoil (2) CONCRETE
	3	5					0000	with 5 to 10% gravel, little organic
	24		5				O O	matter and sand, very loose, granular
5—	-24			4		9	-0 O O	soil structure, (ML). Note: WTG-105-15 drilled 39.0
				4	-		0 0	0.8 feet south of staked location.
					5			######################################
	4	4		-	-			Extremely moist distinctly mottled olive
	18		8			17		brown (CLAYEY-SILT) with 10 to 15% Organic rich silty topsoil with
_				9		1000	==	gravel, little clay, trace to little sand, firm, blocky soil structure, (ML-CL).
					13			11 1977/2017/2011
	5	7						grades downward to 2.0 coarse silty topsoil with little organic matter and sand to 0.8
	24		16			2-	X 9	Extremely moist distinctly mottled feet over silty glacial drift with
1	-		10	19		35	0 0	i i i i i i i i i i i i i i i i i i i
			_	19	-04		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	grayish brown gravelly (SAND-SILT-CLAY) with 15 to 40% Ittle gravel and clay, trace to little sand to 2.0 feet over silty gravel, little sand and clay, stiff, glacial drift with little to some
10-		120			21		3	gravel, little sand and clay, stiff,
	6	88	_				000	massive soil structure, (SC). gravel, little sand and clay to 6.0
	24	-	12			27	0-0-	grades downward to 6.0 feet over clayey slack water
				15		114411	000	sediment to 8.0 feet over clavey
					17		0_0	Extremely moist faintly mottled brown glacial till to 23.0 feet over
	7	8					000	(CLAYEY-SILT) with some clay, stiff, loamy glacial till to 24.0 feet
- A-	19		12			0.7	0_0	thinly laminated, (CL). over loamy glacial drift with little
				15		27	000	8.0 to some gravel to 33.0 feet over
				-10	20		0-0	Extremely moist faintly mottled grayish loamy glacial till to 38.0 feet
	_	_			28		00	brown gravelly (CLAYEY-SILT) with 15 over clayey glacial till to end of
	8	8	1994		-		0 0	to 40% mostly subangular gravel, some boring.
15—	12		16	Invest A		35	000	clay, trace sand, very stiff, massive
				19	\perp		0-0-	soil structure, (CL).
3					18		000	clear transition to 10.0
			-115				0.00	1
							000	Extremely moist olive gray gravelly Note: advanced bore hole with 4
							0_0	(CLAYEY-SILT) with 15 to 40% mostly 1/4 inch ID x 8 inch OD hollow
							000	subangular gravel, some clay, trace stem auger casing with
1				3	_		<u> </u>	sand, very stiff and hard, massive soil continuous split spoon sampling
-	9	2	_		\rightarrow		000	structure, (CL). to 16.0 feet. Continued below
	22		8	-		18	0-0	with auger with 5 foot interval
			_	10			000	sampling to 45.0 feet.
20 l					10		0-0-	
450 O								



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 872783.07165200000

Town of Arkwright, Chautaugua Co., NY

Easting: 977401,38813300000

CLIENT Fisher Associates

DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH BLOWS ON IN FT SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
8		/er.u-198					000	Extremely moist olive gray gravelly		
						1	0-0-	(CLAYEY-SILT) with 15 to 40% mostly	1-1-1-1	
	-			-		-	0.0	subangular gravel, some clay, trace		
			-	-	-		200	sand, very stiff and hard, massive soil structure, (CL).		
-						1	0_0	grades downward to 23.		
	10	5				İ	0000	`	(A. A. A.	
	24		19				0 00 0	Extremely moist highly mottled olive brown gravelly (SILTY-SAND) with 15		
	-		_13	20		39	0	to 30% gravel, some silt, dense with		
05				20_	19	1	0000	brittle consistence, massive soil	1. 7. 7.	
25—							0000	structure, (SM).		
							0 00	grades downward to 24.	0 7 7 7	
							1. O O O	Extremely moist olive gray gravelly		
							0 00	(SANDY-SILT) with 15 to 30% gravel,	F. 4. 4.	
							D. O. O. O	little sand, compact, massive soil		
							0 00	structure, (SM).		
	11	_1_					0000			
	22		5			12	V. (3. (3. (3)			
- 1				7			0 00		Š	
30					14		1 0 n 0		F F F F F F F F F F F F F F F F F F F	
							000			
			-100				0000			
							0000		ই	
							000		:	
							0000	grades downward to 33.		
	_						8 8			
	12	9_					0000	Extremely moist olive gray gravelly (SANDY-SILT) with 15 to 40% mostly	4.4.4.	9
	20		27			64	000	subangular gravel, little sand, very		
	-	-		37			0000	dense with brittle consistence, massive		
35—	-			-	46		0000	soil structure, (SM).		
1	-+						0 00			
				-			1 0 0 U			
-							0 0			
	-						000			
-	-	-					0 00	grades downward to 38.	이 전 사람 사람	
1	13	8					77.67Y			
1	20	g	18		-		000		4.4.4.	
1	20		10	16		34	000			
40					100/4		0	See next sheet.		



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 872783,07165200000

Town of Arkwright, Chautaugua Co., NY

Easting: 977401.38813300000

CLIENT Fisher Associates

DATE STARTED 04/30/15 COMPLETED 04/30/15

DEPTH

BLOWS ON

SAMPLER IN FT

SN	2.7	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).	F F F F F F F F F F F F F F F F F F F	
14 22		64			130				
			66	84		0 0	45.0		No water at completion. ← 45.0'
							Boring completed at 45.0 feet.		
								22	
-									



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105a-15 (Well)</u>

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 BLOWS ON **IN FT** SAMPLER

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WEL		WATER TABLE AND REMARKS
5-								Advanced bore hole without split spoon sampling to 25.5 feet.	~ v~ 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1	40 FJT PVC RISER	I DUTITINGS BACKFILL F F F P	← 1.5' (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-									の対象があっていていてい	2" SCHEDULE 4	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	← 10.0°
15—										2" PVC SCREEN	SIZE MORIE SAND PACK	← 13.0' ← 15.0'
20										.010 SLOT 2" PV	#00N SIZE	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-105a-15 (Well)</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 05/01/15

COMPLETED 05/01/15

DEPTH BLOWS ON SAMPLER IN FT

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
36 <u>.</u>								Advanced bore hole without split spoon sampling to 25.5 feet.	.010 SLOT 2" PVC SCREEN #00N SIZE MORIE SAND PACK	
25—								25.5	0 NOO#	← 25.0' ← 25.5'
								Boring completed at 25.5 feet.		6 8
3 										
30—										
30—										
_										
35—								»:		
										d
2										
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-110-15</u>

10B13a

SURF, ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 886460,42466300000

Town of Arkwright, Chautaugua Co., NY

Easting: 966621.71670300000

CLIENT Fisher Associates

DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH BLOWS ON IN FT SAMPLER

II	1 FT		SAM	PLER				
F	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
ľ	1	1					72072	[7] [7] (1) 4" LOCKING STEEL
ı	15		2			1	<u> </u>	TEXTREMELY MOIST CARRIED TO A EXTREMELY MOIST CASING
+	10		7	13		6	0.00	
H				_4_			٠. ٥٠	matter and clay, very soft, granular soil structure, (ML-CL).
-			-		_5_	-	0000	[NZ] [NZ]
+	2	17	_				000	0.5 Silty topsoil with little organic matter and clay to 0.5 feet over
-	20	_	20	_		28	0-0-	Extremely moist distinctly mottled silty glacial drift with little gravel,
F				8			000	grayish brown gravelly sand and clay to 21 feet over
L					10		0.0	(SAND-SILT-CLAY) with 15 to 20% clayey glacial till to 15.0 feet
L	3	7_					000	gravel, little sand and clay, stiff, over shale bedrock to end of
	24		9			22		blocky soil structure, (SC).
				13			000	2.1 R. Note: Advanced bore hole with 4
					16		0-0	Extremely moist distinctly mottled
	4	15					000	brown gravelly (CLAYEY-SILT) with 15
F	24	ľ	23					(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 grave desiceation gracks 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 0D hollow stem auger casing with continuous split spoon sampling to 15.0 feet. Cored below with an NG-2 size double tube core
F				25		48		clay, trace sand, very stiff with nearly
1				20	24	ŀ	0	vertical gray desiccation cracks, an NG-2 size double tube core
H	-	3			24		100 O	vertical gray desiccation cracks, (CL). grades downward to 7.5 grades downward to 7.5 Extremely moist cline gray grayelly barrel and diamond bit to 25.0 feet. Installed a 2 inch PVC observation well in completed
H	5 24	3					0	grades downward to 7.5 岩岩 岩 observation well in completed
1	24		6	-		14	0 0	Extremely moist olive gray gravelly bore hole.
+	-1155-	-	-	8			0.00	(CLAYEY-SILT) with 15 to 40% mostly
+	-8		_		10	1	0-0-	subangular gravel, some clay, trace ← 10.0'
H	6	10	-				000	sand, stiff, hard below 10.0 feet,
-	24		17			37	0 0	massive soil structure, (CL).
-				20			000	(3) BENTONITE CHIPS
-		-			29		0 0	∠i ∠i
1	7	12					0-0-0	
L	24		17			40	0-0-	<u> </u>
L				23			00-0	
L					83		0_0	FA FA
	8	58					2000	15 0 X
Γ	10		100/4				<u> </u>	grades downward to 15.0 \$\frac{15.0}{24.} \chi 15.0'
T	1							Olive gray shale bedrock very soft
T	\top							can be easily crushed between fingers into soil material. Augers left in bore hole over night at 15.0 feet, no water in bore hole the peyt morning.
r	+							into soil material.
+	+							15.3 bore hole the next morning.
+	+	Der	Д,					L
+	+	Run	#1	-	-			hardness with softer interheds 1/8 to
1	+	-						1/4 inch thick, can be easily etched (ft) (ft) % %
1	+							1/4 inch thick, can be easily etched with knife. # (ft) (ft) % %
L	+							15.0
L	_							
1	1		L					20.0



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-110-15</u>

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 BLOWS ON IN FT SAMPLER

Run	#2				Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife. 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
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
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
					to 1/4 inch thick that are moderately hard, medium hard rock can be easily
					netched with knife, moderately hard
			_	- 1	rock can be etched with knife with
		- 10			some effort.
1	-				Coring completed at 25.0 feet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-110-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 886460.42466300000

Town of Arkwright, Chautaugua Co., NY

Easting: 966621.71670300000

CLIENT Fisher Associates

DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH BLOWS ON INFT CAMPIED

IN F1	10	JAN	IPLEF	`			
SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
1	1					72072	
15		2				2.00.	Extremely moist dark brown PROTECTIVE CASING
13		-	4		6	D 0 0 4	(CLAYEY-SILT) with little organic (2) CONCRETE (2) CONCRETE
			4	5		2.60	soil structure, (ML-CL).
				5		5000	0.5 Silty topsoil with little organic
2	17				ŀ	000	o.5 [2] Safety topson with little organic
20		20		-	28	0-0-	Extremely moist distinctly mottled silty glacial drift with little grave
-	_	-	_8_	257.01		000	grayish brown gravelly sand and clay to 21 feet over
				10		0_0	
3	_7_			-		000	gravel, little sand and clay, stiff, over shale bedrock to end of
24		9			22	 _	blocky soil structure, (SC).
			13			000	2.1 Note: Advanced bore hole with
				16		7	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).
4	15						brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some stem auger casing with continuous split spoon sampling
24		23			48		to 40% mostly subangular gravel, some continuous split spoon sampling to 15.0 feet. Cored below with
			25		40	200	clay, trace sand, very stiff with nearly to 15.0 feet. Cored below with an Ng-2 size double tube core
				24			vertical gray desiccation cracks,
5	3					200	1
24	J	6				0.5	grades downward to 7.5 4 4 observation well in completed
24		0	8		14	6	Extremely moist olive gray gravelly
-			_0_	10		0000	(CLAYEY-SILT) with 15 to 40% mostly
	10			10	i.	0	subangular gravel, some clay, trace
6	10_	17				00 a	sand, stiff, hard below 10.0 feet,
24		17			37	00	massive soil structure, (CL).
-	-	-	20	7672	8	000	(3) BENTONITE CHIPS
	7.75			29	i.	0.0	ki ki
7	12					000	<u> </u>
24		17			40	0-0-	11 + 13.0'
			23		7094,0	0.0-0	
				83		0.00	[M N
8	58					700	grades downward to 15.0 물
10		00/4					grades downward to 15.0
1							
							into soil material.
							15 2 have beloute and married
	Run	#1			ž.		Olive gray shale bedrock, medium
	11011	11-1					hardness with softer interheds 1/8 to
H							1/4 inch thick, can be easily etched # (ft) (ft) %
H							with knife.
H				_			9 15.0 9 1 to 5.0 2.7 54
H	S			\vdash			응
							1.14 1.14 20.0



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-110-15</u>

HOLE NO. WTG-110-15

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 886460.42466300000

Town of Arkwright, Chautaugua Co., NY

Easting: 966621.71670300000

CLIENT Fisher Associates

DATE STARTED 04/28/15 COMPLETED 04/29/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELI		WAT	ER TAE	LE AND	REMA	RKS	
								Olive gray shale bedrock, medium hardness with softer interbeds 1/8 to 1/4 inch thick, can be easily etched with knife.		2" PVC SCREEN	SAND PACK.	#	(ft) 20.0		(ft)	% 	- -
-		Run	#2					grades downward to	23.0	2" P	ORIE	2	to 25.0	5.0	5.0	100	U
25—	—	- No.1	#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.		.010 SLOT	OON SIZE MORIE	← 25	5.0'				
								Coring completed at 25.0 feet.	25.0								
30—																	
35—																	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-111-15</u>

10B13a

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

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE AND REMARKS
	חבנ							€ 0.3'
	1				-	1	0 0 0	Extremely moist black (MUCK), granular 7 7 7 7 7 7 7 7 7
	17	_	_2_	-		4	0 0 0	soil structure, (OL).
			- 555	2			0 0	$0.3 \begin{array}{ c c c c c c c c c c c c c c c c c c c$
					2		9 0 9 0	Extremely moist brown
	2	5					4 4	(SAND-STIT-CLAY) with 10 to 15%
	23		18			34	9 00 0	gravel, little sand and clay, soft, (2) CONCRETE
			17.500	16		34	0 0	blocky soil structure, (ML-CL).
					18		0 0 0 0	
	2	8				1	0 00	1.5. 1.5. Note: We will be distinct the state of the stat
	34	-8					. 6	Extremely moist faintly mottled olive north of staked location.
5—	24		10	1 1000		23	0 00 0	brown (SANDY-SILT) with 10 to 15%
		-	_	13			0 6	gravel, little sand, trace clay, dense
					16		0.00.0	with brittle consistence, compact below 4.0 feet massive soil structure organic muck to 0.3 feet over silty glacial drift with little gravel,
	4	9					0 00 0	below 4.6 reet, industrie our directors,
	20		18			28	4 4	(ML), sand and clay to 2.0 feet over coarse silty glacial drift with
				10			0 . 0 .	Stroke and 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
					10		0 0	grades downward to 8.0 ittle gravel and sand, trace clay to 8.0 feet over silty glacial drift
	5	4				1	4.04.0	Extremely moist distinctly mottled olive with little gravel, sand and clay
	24	-4	4				0 0	brown (SAND-SILT-CLAY) with 10 to to 14.0 feet over coarse silty
1	24		-4			10	0.0	
		STREET, D		6			¢ 0 ¢ 0	15% gravel, little sand and clay, stiff, massive soil structure, (ML-CL). \ grades downward to 10.0 \ grades downward to 10.0 \ coarse silty slack water sediment with little sand, trace gravel with sand interbeds to 28.0 feet over coarse silty slack water sediment
0-					12		000	y grades downward to 10.0 interbeds to 28.0 feet over
	6	9					0.00	coarse silty slack water sediment
	24		7			16	0.00	Extremely moist distinctly mottled olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, little sand and water sediment with little sand
				9			0000	brown gravelly (SAND-SILT-CLAY) clay to 33.0 feet over silty slack
					10		0.00	atom conversation and atomations of the contract of the contra
	7	6					TO 0 0	(MI CI)
	6		11			23	0.00	Teet over coarse sirty gracial
	-117		- "	12		23	-0 A O	drift with little sand, trace gravel
				-12	40	1	0.00	grades downward to 14.0 and clay to 43.0 feet over
		_			12		9 0 0 0	Extremely moist distinctly mottled olive coarse silty slack water sediment with little sand to 48.0 feet over
	8	6	_	-	_	1		Extremely moist distinctly mottled olive brown (SANDY-SILT) with 5 to 10% with little sand to 48.0 feet over coarse silty slack water sediment
5—	22		7_	-		13	0000	gravel, little sand, loose, compact with little sand, trace gravel to
				6			4 64 6	below 18.0 feet, weakly thinly bedded 53.0 feet over silty glacial till to
					5		0 0	with occasional medium to coarse size 58.5 feet over water sorted and
							9 0 9 0	sand interbed 1/8 to 1/4" thick, (ML) deposited sand with trace gravel
								with (SW) interbeds.
								slack water sediment with little to
						1	4 04 0	some sand to end of boring.
	9	5				1	0 0	
	23	3	_			000	4.04.0	学的学习学习
	23	-	6	320		14	9 9	\$\display\$
3				8	Trykstar I	-	a. a.	
0					10		0	<u> </u>



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-111-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885657,40870900000

Town of Arkwright, Chautaugua Co., NY

Easting: 968694,39090200000

CLIENT Fisher Associates

DATE STARTED 03/30/15 COMPLETED 03/31/15

	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 (SANDY-SILT) with 5 to 10% gravel, little sand, compact, weakly thinly bedded with occasional medium to coarse size sand interbed 1/8 to		Augers left in bore hole over night at 33.0 feet, water level the next morning was 22.1 feet below ground surface.
	10 22	_3_	8	6		14	\$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1/4" thick, (ML) with (SW) interbeds.		Note: advanced bore hole with 4 1/4 inch ID x 8 inch OD hollow stem auger casing with continuous split spoon sampling
25—					7					to 16.0 feet. Continued below with auger with 5 foot interval sampling to 60.0 feet.
_							a_ ° a_ °	grades downward to	28.0	
	11 18	3	7	7		14	0 0 0 0 0 0 0 0	Extremely moist to wet olive gray (SANDY-SILT) with 10 to 15% gravel, little sand, trace clay, compact, weakly thinly bedded, (ML).	ACMF1UL)	
30—					9			weakly thinly bedded, (ML).	J. J. J. J. J. J. J. J. J. J. J. J. J. J	
			20021				0 0 0	grades downward to	33.0	
	12	4	8	7		15	, , , , , , , , , , , , , , , , , , ,	Extremely moist olive gray (SAND-SILT-CLAY) with 5 to 10% gravel, little sand and clay, weakly thinly laminated, (ML-CL).		
35—					7		4 0 4 0 4 0 4 0			
-							4 0 4 0 4 0 4 0	grades downward to	38.0	
	13	3	11	13		24		Extremely moist olive gray (SANDY-SILT) with 5 to 10% gravel, little sand, trace clay, compact, massive soil structure, (ML).		
40					15		. 4 . 4 .	mercule volumental and	40000000000	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-111-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 885657,40870900000

Town of Arkwright, Chautaugua Co., NY

Easting: 968694.39090200000

CLIENT Fisher Associates

DATE STARTED 03/30/15 COMPLETED 03/31/15

	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		
+		-		-			φ	Wet olive gray (SANDY-SILT) with	-	<u> </u>	
ŀ	14 24	2	WH					little very fine size sand, very loose,			WH: Sampler penetration with weight of rods and hammer.
	24		WH.	6		<7		liquefies when disturbed, thinly			weight of rods and nammer.
				-0	24			bedded, (ML).			
45											
Ì											
1											
								20.400 40.00004 10	40.0		
9								grades downward to	48.0 		
	15	8					0 0 0	Wet olive gray (SANDY-SILT) with 5		e. e. a.	
	20		15			27	0 0 0	to 10% gravel, little very fine size sand,	E.	F F	
				12		-	0 0	compact, weakly thinly bedded, (ML).		Š	
50-					11_		6 6				
							0 0 0			. l T.INGS,	
							0 0 0				
1							0 0			ੋ: ਂ - ਹੈ:	
1			-				6 6				
_							0 00 0	grades downward to	53.0		
1						1	4 04 0	Extremely moist olive gray gravelly	-		
}	16 12	8	10					(SAND-SILT-CLAY) with 15 to 40%			
ł	12		12	26	-	38		mostly subangular gravel, little sand			
				20	25	1	4 04 0	and clay, hard, massive soil structure,			
55—					20	i	4 04 0	(ML-CL).			
							0 0			H. H. H.	
			71.5			1	0000				
- 1						1	0 00 0				
									58.5		
	17	5					4 04 0		_		
	20		12			32	4.0				
				20							
60			18		18			See next sheet.			← 60.0'



 $Soil\ and\ Hydrogeologic\ Investigations * Wetland\ Delineations$

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, Chautaugua Co., NY

Easting: 968694,39090200000

CLIENT Fisher Associates

DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH IN FT BLOWS ON SAMPLER

	SN	0/ 6	6/	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).		
								Extremely moist olive gray (SANDY-SILT) with little to some very fine size sand, dense, thinly bedded, (ML). 60.0		÷
65								Boring completed at 60.0 feet.		
_										
70-										
-										
75—										
_										
80										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-111a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 03/30/15 COMPLETED 03/31/15

DEPTH BLOWS ON **IN FT** SAMPLER

		Advanced bore hole without split spoon sampling to 25.5 feet.	~ ~ ()		~(Z)~	← 1.5'
			1			IN A" LUCKING STEEL
				ISER	The transfer of the transfer o	(1) 4" LOCKING STEEL PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL
				E 40 FJT PVC RISER	. SONTITION .	Note: WTG-111a-15 drilled 1.0 feet east of staked location.
				2" SCHEDULE		← 10.0'
			-\-\-			← 13.0'
				SCREEN	DRIE SAND PACK	← 15.0*
				.010 SLOT 2" PVC	#00N SIZE M	
						2" PVC SCREEN



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1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-111a-15 (Well)</u>

LOCATION _

Town of Arkwright, Chautaugua Co., NY

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

CLIENT Fisher Associates

DATE STARTED 03/30/15 COMPLETED 03/31/15

SURF. ELEVATION _

DEPTH BLOWS ON IN FT SAMPLER

10B13a

	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.	VC SCREEN	#00N SIZE MORIE SAND PACK
									.010 SLOT 2" PVC SCREEN	ON SIZE MORIE
25—								25.5 Boring completed at 25.5 feet.		← 25.0' ← 25.5'
	776									
30—										
(27)										
35—										
-										
40										



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-112-15</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 881759.34404100000

Town of Arkwright, Chautaugua Co., NY

Easting: 969421,78989600000

CLIENT Fisher Associates

DATE STARTED 04/15/15 COMPLETED <u>04/16/15</u>

DEPTH BLOWS ON IN FT SAMPLER

	INFI		SAM	IFLER							
	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH		DESCRIPTION AND CLASSIFICATION	WELL (1) 2	WATER TABLE AND REMARKS
	1	1					<u> 2 2 </u>	٦	Extremely moist black (MUCK), granular		← 0.5'
	22		4				5 3	-1	soil structure, (OL).	3-3-3	- 0.5
				5		9	000	1		< 3 < 3 & 3	
				-51	-		0 0	1	0.2	7 7 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
			_				000	1	Extremely moist faintly mottled brown		← 2.0'
_	2	_5_					0 0	1	(SAND-SILT-CLAY) with 3 to 5%		
	17		6			12	000	1	gravel, little sand and clay, stiff,	F. A. A.	Augers left in bore hole over
				6			0 :0 ·	1	blocky soil structure, (ML-CL).		night at 40.0 feet, water level
				10/2/	5		0	1	clear transition to 0.8	F. F. F.	the next morning was 4.5 feet
	3	2				1			clear transition to 0.0		below ground surface.
	24		_				000		Extremely moist distinctly mottled olive	Terrer Terrer	
5-	24		5_		1	14			brown gravelly (CLAYEY-SILT) with 15		(1) TOPSOIL FILL
		-		9					to 20% gravel, some clay, trace to		(2) CONCRETE
					9		20-7		little sand, stiff, very stiff below 6.0	H_1, H_1, H_1	
	4	6					-0		feet with nearly vertical gray	(80 × 80 × 80	Organic rich mucky surface to
	24		10			0.7	D 0 7		desiccation cracks, (CL).	1. 1. 1. 1.	0.2 feet over silty glacial drift
				17		27	200				with trace gravel, little sand and
_				1			2000				clay to 0.8 feet over clayey
				-	26		0-0			L. L. L.	drift with little gravel, trace to
	5	11					000		9.0		little sand to 9.0 feet over water
	24		14			29	8-8			1-111	sorted and deposited sand with
				15			امدم	_	Extremely moist faintly mottled olive		little to some gravel, little silt to
10					24		000	1	brownish gray gravelly (SILTY-SAND)	[]	9.4 feet over clayey glacial till
10—	6	19					5 5	1	with 15 to 30% mostly subrounded	L. L. Š.	to 43.0 feet over shale rock to
	22	19	7400				D-35-	-1	gravel, very fine to very coarse size	ВА	refusal.
	22	_	82		-	97	0-0-0	3	sand, little silt, compact, stratified,		
				15			0-0-	1	(SM).	\ \frac{\pi}{2}	Note: advanced bore hole with 4
					20		000	1	9.4	[5] 大水层。	1/4 inch ID x 8 inch OD hollow
	7	14			_		0.0	11		L L L	stem auger casing with
	6	, , , , , ,	19			35	200	1	Extremely moist distinctly mottled olive	T: T: T:	continuous split spoon sampling
			-10	16		35	<u>Ø</u>	1	brown gravelly (CLAYEY-SILT) with 15		to 16.0 feet. Continued below
				10		Š	000	i	to 40% mostly subangular gravel, some		with auger with 5 foot interval
1					20		0.0	1	clay, trace sand, hard, massive soil	+3,43,43	sampling to 43.7 feet.
	8	9	1000			4	متوقيا	1	structure, (CL).	State and	
15—	16		13			57	0 0	1	clear transition to 10.5		
				44			000	1	Extremely moist alive gray grayally		
					17		0-0-		Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly		
							000		- 이 맛있었는데 하는데 가지면,	[4] (4) (4)	
				-		6.	0.0		subangular gravel, some clay, trace		
							070		sand, hard, massive soil structure,	[1] (大大大)	
						5			(CL).		
							0	- (grades downward to 18.0	Te te te	
	9	9					7000		Extremely moist to wet olive gray gravelly		
	18		12			0.5	000		(CLAYEY-SILT) with 15 to 40% mostly		
			16	12		25	000		subangular gravel, some clay, trace sand,	P. A. A.	
	-	-		13			2004		very stiff, massive soil structure, (CL).		
20					14		~ ~ ~	_	very surry messive son structure, (or).	<u> </u>	



 $Soil\ and\ Hydrogeologic\ Investigations *Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-112-15</u>

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 BLOWS ON IN FT SAMPLER

	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
				04				Extremely moist to wet olive gray gravelly (CLAYEY-SILT) with 15 to		
							0000	40% mostly subangular gravel, trace		
							0.00	sand, very stiff, hard below 38.0 feet, massive soil structure, (CL).		
0							LOGG	massive son structure, (CL).	-,-,-	
	-10	13					-0°00			
	10 6	_13_	14			20	0 0-0			
			14	16		30	0 0-0			
25—					18		0.00			
20							0 00		F. F. F.	
						8	0000			
							0,00 0,00			
							0 0			
-							0.00		+1+1+1	
	11	6					0 00			
	19		12			29	0 0-0			
				17		29	000		BACK	
30—					18		0 00		8 .	
							0000		. 'l' TIMGS,	
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8				_			0-00		-	
							DO 0-0			
_							0 0-0		4.4.4.	
	12	5					0 0			
	23		12			24	000			
				12		-	0.00	F)		
35—					25		0.000		P. P. P.	
							LO Q O			
						Š	0-00			
							0.00			
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							~ 0-0 0 0-0			
	13	15					000			
	22		27		31.55	56	- 00			
				29		. : 	0 0		4.4.4.	
40					57		CAA		1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A 1800 A	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. WTG-112-15

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LOCATION Northing: 881759.34404100000

Town of Arkwright, Chautaugua Co., NY

Easting: 969421,78989600000

CLIENT Fisher Associates

DATE STARTED 04/15/15 COMPLETED 04/16/15

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
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2								Extremely moist to wet olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, trace sand, very stiff, massive soil structure, (CL).	F F F F F F F F F F F F F F F F F F F	EDI Rock Hardness Classification Medium hardness: can be easily etched with knife.
	14	100/1						clear transition to 43.0 Olive gray shale rock, medium hardness.	SILLIA	← 43.7'
45—								Auger refusal at 43.7 feet.		
									F	
50—										
-								· ·		
55—										
33—										
-										
60										



 $Soil\ and\ Hydrogeologic\ Investigations * Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-112a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/16/15

COMPLETED 04/16/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELI	3	WATER TABLE AND REMARKS
5—								Advanced bore hole without split spoon sampling to 25.5 feet.	PVC RISER	L CUTTINGS BACKFILL F TO THE PACKFILL	← 1.5' (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.
15—								,	2	___\\	← 10.0° ← 13.0° ← 15.0°
20									- 6	#00N SIZE MORIE SAND PACK	



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-112a-15 (Well)</u>

10B13a

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/16/15

COMPLETED 04/16/15

BLOWS ON DEPTH SAMPLER IN FT

	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—								25.5		← 25.0'
								Boring completed at 25.5 feet.	25 - 25 - 25	← 25.5'
								-		
-										
30—										
9 <u>-20, 400</u>			(3234							
35—										
						-				
						1				
				-	wet.	1				
40										



3553 Crittenden Road Alden, NY 14004 (716) 937- 6527

Www.natureswayenvironmental.com WTG 114

			• · · · = - · · · · · · · · · · · · · · ·
DATE:	3/19/15	ELEVATION:	ELEVATION:
PROJEC	CT:	Subsurface Investigation for Arkwright Summit Wind Farm	ace Investigation for Arkwright Summit Wind Farm
		A dayright NIV	Autourials AIV

Arkwright, NY

F	PRF	P/	٩R	ED	FO	R:		Fisher	Asso		
						TION	:			Easting: 975178.0770)
		0/	6/	12/	18/				•	MONITORING	T 1
0 —	SN	6	12	18	24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WELL REMARKS	COMMENTS
•	1	2					12.3.4.3	Wet, dark gray, mucky	1.0'	_ 2" PVC	Topsoil to 0.4 foot over
			1			2		(SILT) topsoil with trace very fine size sand, very loose,			silty slack water sediment with trace sand to 1.5 feet
				1		_	3.77	with partially decomposed			over silty glacial drift with
					7			organic material	4 4!		trace gravel to 6.0 feet
	2	5						Extremely moist, faintly	1.4'		over clayey glacial till to end of boring
			8			16		mottled, olive brown (SILT) with trace very fine size			end of boning
				8				sand, very loose. weakly			
					8			thinly bedded	1.0'	Soil	
	3	7						Moist, faintly mottled, olive	1.0	Backfill	
5 —			9			19		brown (CLAYEY-SILT) with 5 to 15% gravel, little clay,			
				10				very stiff, massive soil			
	-				9			structure to weakly thinly	0.9'		
	4	27						\bedded _/ Moist, gray, gravelly	0.5		
			50			88		(CLAYEY-SILT) with 15 to			
				38				30% gravel with occasional			
	5	5			42			cobbles, some clay, hard,	0.4'		
	5	Э	7					massive soil structure	0		
			'	27		34					
				21	31						
10 —	6	4			31		•		0.3'	Bentonite	
	Ť	_	47							Seal	
				50/3"		>97					
	7	4							0.6'		
			8							40.0	
				23		31				∴ # 2 Size	
					26					Sand	
	8	8							1.1'		
			11								
15 —				12		23					
					19		30.5			16.0	
										2" Slotted	
										PVC Screen	
										Screen Screen	
									_		
	9	24							0.2'		
20 —			27								
_0	LC)G	GĒ	ΞD	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE 1 of	2



3553 Crittenden Road Alden, NY 14004 (716) 937-6527

www.natureswayenvironmental.com

_		_						HOLE NUMBER.	V V	16 114		(A.T.O.)
	TAC				19/15	5						/ATION:
F	PRC)JE	=C	Ι:				Subsurface Investigation			nit Wind F	arm
_	חר	. D	۸ ا	-5	ГО	D.			right,	<u>NY</u> ciates		
					FO	r. TION					5470 O77	0
L								Northing: 871787.	<u>0330,</u>		110.011	U
	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	MONITORING WELL	REMARKS	COMMENTS
				24	31	51					Oll Olaysa	
											2" Slotted PVC	
											Screen	
	10	6						Moist, gray, gravelly	1.3'		# 2 Size	
25 —			23			49		(CLAYEY-SILT) with 15 to 30% gravel with occasional			Sand	
25				26		43		cobbles, some clay, hard,				
					50/5"			massive soil structure		26.0		
									4.01			
	11	10							1.3'			
30 —			17	26		43						
					32		37.8					
	12	10					- 3		1.3'			
35 —			20			>70		35.2				
				50/3"				Boring Completed at 35.2'				No Water at Completion
								BGS				
					\vdash							
					\vdash							
40 —	LC	G	GE	D	BY	: Da	ale M.	Gramza / Senior Geolo	gist	PAGE	2 of	2



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-115-15</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION Northing: 880540.95916700000

Town of Arkwright, Chautaugua Co., NY

Easting: 969756.07839200000

CLIENT Fisher Associates

DATE STARTED 04/03/15 COMPLETED 04/06/15

DEPTH BLOWS ON IN FT SAMPLER

Clear transition to 9.5 Clear transition to 9.5		INFI		SAI	MPLEF	1			
Stremely moist faintly mottled olive				320000000000000000000000000000000000000		C93.0 811	N	LITH	
Extremely moist faintly mottled olive brown (CLAYEY-SILT) with little clay, trace organic matter, firm, weakly thinky laminated, (ML-CL). Grades downward to 1.0 Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, some clay, very stiff with nearly vertical gray desiccation cracks, (CL). Grades downward to 2.0 Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, some clay, trace sand, stiff, very stiff and clay, trace sand, stiff, very stiff and clay, trace sand think little to some gravel, trace clay trace organic matter to 1.0 feet over very clayer glacial drift with little to some gravel, trace organic matter to 1.0 feet over very stiff, massive soil structure, (CLAYEY-SILT) with 5 to 40% mostly subangular gravel, some clay, trace and, stiff, very stiff, and with little to some gravel, trace organic matter to 1.0 feet over very clayer glacial drift with little to some gravel, trace and with little to some gravel, trace organic matter to 1.0 feet over very clayer glacial drift with little to some gravel, trace and with little to some gravel, trace and with little to some gravel, trace and the little some gravel, trace and the little to some gravel to some gravel, trace and th		1	4					72.72	Wet black (MICK) (OL) + 0.5'
Extremely moist faintly motited olive brown (CLAYEY-SILT) with little clay, trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter, firm, weakly trace organic matter or 10 ms MALL CONCRETE PAD (2) CONCRETE PAD (2) CONCRETE (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRETE (3) SinstralLED IN SMALL CONCRETE PAD (2) CONCRE		17		4			13		1 3 3 3 3
brown (CLAYEY-SLT) with fittle clay, thinly laminated, (ML-CL). Trace organic matter, firm, weakly thinly laminated, (ML-CL). Trace organic matter, laminated organi					9		13	·	[
10 10 10 10 10 10 10 10						9		0 0 0	Extremely moist faintly mottled olive
thinly laminated, (ML-CL). grades downward to 1.0 a 7 a		2	Œ						I brown (CEATET-SIET) with little clay, [E. J. E
grades downward to 1.0 3 7		22	7.00	6			14		
Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, some clay, very stiff with northeast of staked location. Extremely moist distinctly mottled olive brown (CLAYEY-SILT) with 5 to 10% gravel, some clay, very stiff with northeast of staked location. 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). Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace gravel to 2.0 feet over clayey glacial tiff with little osome gravel, trace gravel to 2.0 feet over sity glacial driff with little to some gravel, trace sand to 13.5 feet over water sorted and deposited sand with little 1s osome gravel, trace sand to 18.0 feet over water sorted and deposited sand with little sit and depo					8		14	000	11 PROTECTIVE CASING INSTALLED
Extremely moist distinctly mottled olive Concrete						10		0 0	The Small Concrete Pau
brown (CLAYEY-SILT) with 5 to 10% grades downward to 2.0 24 13 18 20 20 24 13 20 20 20 20 20 20 20 2		3	7			10		200	1 Table 1 Tabl
grades downward to 2.0 12				Q				-	3. \$1.4000 BENEVER
cracks, (CL). grades downward to 2.0 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, stiff, trey stiff and hard below 4.0 feet with nearly vertical gray desiccation cracks, (CL). Extremely moist distinctly mottled olive brown gravelly of 18 and below 4.0 feet with nearly vertical gray desiccation cracks, (CL). Extremely moist distinctly mottled olive brown gravelly of 18 and below 4.0 feet with nearly vertical gray desiccation cracks, (CL). Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace clay to 15.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 15.0 feet over water sorted and deposited sand with little to some gravel, little silt trace clay to 15.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 15.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 15.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace sand to 18.0 feet over water sorted and deposited sand with little to some gravel, little silt, trace clay to 15.0 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 18.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace and to 18.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace and to 18.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace and to 18.0 feet over water sorted and deposited sand with little to some gravel, little clay, trace and to 18.0 feet over water sorted and clay and silt intra strata to 23.0 feet over clayey glacial till to 18.0 feet over water sorted and clay and silt intra strata to 23.0 feet over clayey glacial diff with little to some gravel, little clay, trace	5-	-10		-	12		20	000	[] [] [] [] [] [] [] [] [] []
grades downward to 2.0 24						00/4		0-0-	Character Commence Co
24 13 24 15 26 Extremely moist distinctly mottled olive brown gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clayer glacial drift with little clay, trace and, stiff, very stiff and hard below 4.0 feet with nearly vertical gray desiccation cracks, (CL) 22 10 20 C Clay trace sand, stiff, very stiff and hard below 4.0 feet with nearly vertical gray desiccation cracks, (CL) Clear transition to 9.5 Clear transition to 40% mostly subangular gravel, little clear, transition to 40% mostly subangular gravel, little clear, transition to 40% mostly subangular gravel, little clear, transition to 40% mostly subang		4				00/4		000	1 5 5 5 Overnie musik to Oddock augu
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). 10			9_	12				0	i diades downward to 2.0 jet in the contract of
Solution of the control of the contr		24		13	10		24	20-0-1	Extremely moist distinctly mottled olive trace organic matter to 1.0 feet
clay, trace sand, stiff, very stiff and hard below 4.0 feet with nearly vertical gray desiccation cracks, (CL). 10	-	_			16			200	[] 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
24 15 18 33 33 20 20 20 20 20 20			_		-	20		0 0	
vertical gray desiccation cracks, (CL). vertical gray desiccation cracks, (CL). clear transition to 9.5 clear transiti		0.5	-8	7.2		-		000	paragraphy and a second control of the control of t
CL) Clear transition to 9.5 Clear transition to 18.0 Clear transition to 18		24	-	15			33	0_0	Take the second
10 10 10 12 10 12 10 12 10 12 10 10					18		8	0000	(CL). Sand with little to sollie gravel,
10 10 10 12 10 12 10 12 10 12 10 10	10-		l haber	-		22		000	clear transition to 9.5 over silty glacial drift with little
10 10 10 12 10 12 10 12 10 12 10 10			_6_					0-0-	to some gravel, trace sand to
sand, very stiff, massive soil structure, (CL). 18		22		10	- 255-7		20	000	
sand, very stiff, massive soil structure, (CL). 18	-			-	10			0.00	deposited sand with little silt and
18 7 10 17				_		12	ć	202	cand very stiff massive soil structure
grades downward to 13.5 10	_	-	6	-				0 0 0	(CL) Teet over clayey glacial till to
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). grades downward to 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). Grades downward to 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 Bay 2 Grades downward to Bay 3 Bay 3 Bay 3 Bay 4 Bay 4 Bay 5 Bay 6 Bay 6 Bay 6 Bay 6 Bay 6 Bay 6 Bay 7 Bay 7 Bay 7 Bay 8 Bay 8 Bay 8 Bay 8 Bay 9 Bay		18		7			17	$\stackrel{\sim}{=}$	i de la compania del compania de la compania del compania de la compania del compania de la compania del compania de la compania del comp
8 7					10			700	Augers left in hore hole over
SILTY-SAND) with 15 to 40% gravel, very fine to very coarse size sand, little silt, trace clay, compact, stratified, (SM). 14	3					12		0000	Extremely moist olive gray gravelly
ittle silt, trace clay, compact, stratified, (SM). grades downward to 15.0 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 15.0 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 18.0 grades downward to 18.0 grades downward to 18.0 grades downward to 18.0 grades downward to 18.0 grades downward to 18.0 grades downward to 18.0 grades downward to 18.0		8	7					0000	(SILTY-SAND) with 15 to 40% gravel, level at 13.3 feet below ground
stratified, (SM). grades downward to 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 15.0 Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D 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.	15—	16		7			16	000	
grades downward to 15.0 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 15.0 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 18.0 Extremely moist olive gray gravelly (1/4 inch ID x 8 inch 0D 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.	20000				9		2782476	000	stratified (SM)
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 18.0 Note: advanced bore hole with 4 1/4 inch ID x 8 inch 0D 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.						14		0 0	down bore note.
(CLAYEY-SILT) with 15 to 40% mostly subangular gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). 16 3 8 grades downward to 18.0 144 inch ID x 8 inch 0D 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.								000	V
subangular gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL). grades downward to 18.0 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.								00	Extremely moist onve gray gravery
sand, very stiff, massive soil structure, (ML-CL). grades downward to 18.0 continuous split spoon sampling to 16.0 feet. Continued below with auger with 5 foot interval sampling to 41.5 feet.								1000	COLATET GIET/ Milliot to 40% mostly
9 2 to 16.0 feet. Continued below with auger with 5 foot interval sampling to 41.5 feet.								0 0	Subaligual gravel, little oldy, trade
grades downward to 18.0 sampling to 41.5 feet.		9	2					200-0	data, very string industrie son street and
sampling to 41.5 feet.		.3		3			Ω	0.0	oracles downward to 18.0 with auger with 5 foot interval
					5		0		sampling to 41.5 feet.
	00					10			See next sheet.



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059 (716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-115-15</u>

10B13a

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 BLOWS ON SAMPLER IN FT

3	SN REC	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	November 1				21154-215		00.0	Wet faintly mottled grayish olive brown		
9							0,00	gravelly (SAND-SILT-CLAY) with 15 to	4. 4. 4.	
							0000	40% gravel, little silt and clay, stiff,		
				-			0- 0	weakly stratified with silt intra strata, (SC) with (ML) intra strata.		
35							- 0 V		1-1	
	-				-		0 00	`		
	10	_3					000	Extremely moist olive gray gravelly		
	12		4			9	0-0-	(CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace	to to ta	
				5	20	ł	200 2 0	sand, stiff, hard below 28.0 feet,		
25—		_			9		0000	massive soil structure, (CL).		
						1	0 0			
				-		1	000		+1+1+1	
						İ	0-0			
							000			
							0		tatata	
	11	12					0-0-			
	22		22			51	000			
				29		31	0_0		<u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> .	
30—					37		000		BAC	
50-							-			
							000		느 는 등	
							0 0			
							000			
							0-0-			
	12	29					0.00			
	24		48			108	000			
				60	44.7		00_			
35—					71		000		- : - : - :	
							0_0			100
		-					- 0-0			
			-				000			
		-					0_0			
-			-		-		000			
	13	19					0_0			
	24	18	40				000		+1,+1,+1	
	- 1		40	44		84	0 0 0			
40				-14	53					



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-115-15</u>

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

SURF. ELEVATION _ LOCATION Northing: 880540,95916700000

Easting: 969756.07839200000

Town of Arkwright, Chautauqua Co., NY

CLIENT <u>Fisher Associates</u>

DATE STARTED 04/03/15 COMPLETED 04/06/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION WELL WATER TABLE A	ND REMARKS
						0-00	Extremely moist olive gray gravelly (CLAYEY-SILT) with 15 to 40% mostly subangular gravel, some clay, trace sand, hard, massive soil structure, (1) CUTTINGS BA	ACKFILL
							(CL). Note: noticed habelow 41.0 feet. Auger refusal at 41.5 feet.	rder drilling
5								
							*	
5——								
io					1			



Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

10B13a

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-115a-15 (Well)</u>

SURF. ELEVATION _

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

LOCATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/06/15 COMPLETED 04/06/15

	SN	0/ 6	6/ 12	12/ 18	18/ 24	N	LITH	DESCRIPTION AND CLASSIFICATION		WELI		WATER TABLE AND REMARKS
								Advanced bore hole without split spoon sampling to 25.5 feet.	~ (~ (-)		~(P)~	← 1.5' (1) 4" LOCKING STEEL
5—										RISER	EACKFILL	PROTECTIVE CASING INSTALLED IN SMALL CONCRETE PAD (2) CONCRETE (3) BENTONITE SEAL
_										ILE 40 FJT PVC RISER	T. T. T. TOUTHINGS BACKFALLT. T. T.	Note: WTG-115a-15 drilled 11.0 feet northeast of staked location.
10-										2" SCHEDULE	(3)(-)(1)	← 10.0'
									/-/-		\\\\-\\\-\\\\-\\\\\\\\\\\\\\\\\\\\\\\\	← 13.0'
15—										OT 2" PVC SCREEN	#00N SIZE MORIE SAND PACK	← 15.0'
20										.010 SLOT	00#	



DIMENSIONS, INC.

 $Soil\ and\ Hydrogeologic\ Investigations \bullet Wetland\ Delineations$

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915 HOLE NO. <u>WTG-115a-15 (Well)</u>

PROJECT Arkwright Summit Wind Farm - Wind Turbine Project

SURF. ELEVATION _

Town of Arkwright, Chautaugua Co., NY

CLIENT Fisher Associates

DATE STARTED 04/06/15 COMPLETED 04/06/15

DEPTH BLOWS ON IN FT SAMPLER

10B13a

	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 SL0T 2" PVC SCREEN	- Nack
									DS DAG	SANG
						6;			SLOT 2" P	WORIE
									.010 SL	NO SIZE
25—								25.5		± 25.0' ← 25.5'
								Boring completed at 25.5 feet.		
80—										
						¥ 12				
85—										
								¥		
10										

APPENDIX B

Laboratory Test Results As prepared by Glynn Group



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

Arkwright
Nature's Way Environmental Consultants Contractors, Inc.
15-1090
Natural Moisture Content ASTM D-2216

Natural Moisture Content ASTM D-2216

G	GE La	ab No	Boring No.	Sample No.	Moisture (%)
SBG	15	1	WTG-115	S-4	12.3
,	15	2	WTG-115	S-7	8.7
	15	3	WTG-115	S-9	8.4
٥	15	4	WTG-115	S-10	9.8
9,11163	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
. L	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
Ĺ	15	15	WTG-101	S-4	11.8
	15	16	WTG-101	S-6	7.6
	15	17	WTG-52	S-4	13.0
1	15	18	WTG-52	S-10	12.9
	15	19	WTG-50	S-3	17.7
	15	20	WTG-50	S-5	10.8
<u> </u>	15	21	WTG-50	S-9	7.8
. L	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



Arkwright
Nature's Way Environmental Consultants Contractors, Inc.
15-1090
Natural Moisture Content ASTM D-2216

	GGE Lab No		Boring No.	Sample No.	Moisture (%)
ng	15	27	174	S-2	13.0
ulti	15	28	174	S-3	14.0
Consulting	15	29	174	S-4	12.7
Ü	15	30	TL 485	S-3	18.4
0	15	31	TL 485	S-4	17.1
18	15	32	TL 485	S-5	15.2
Testing	15	33	TL 487	S-2	11.5
Te	15	34	TL 487	S-3	14.4
als	15	35	TL 487	S-4	10.1
Materials	15	36	TL 490	S-7	12.6
Лat	15	37	TL 490	S-8	20.9
	15	38	TL 490	S-9	15.6
0	15	39	TL 491	S-6	10.1
cal	15	40	TL 491	S-7	5.8
Geotechnica	15	41	TL 491	S-8	10.1
tec	15	42	TL 493	S-2	27.0
60	15	43	TL 493	S-3	13.6
	15	44	TL 493	S-4	10.7
0	15	45	TL 494	S-4	24.5
ral	15	46	TL: 494	S-5	9.5
ructura	15	47	TL 494	S-6	18.6
	15	48	TL-495	S-1	26.1
Sŧ	15	49	TL-495	S-2	19.0
0	15	50	TL-495	S-3	23.3
Civil	15	51	TL 496	S-3	9.8
Ü	15	52	TL 496	S-4	12.3
	15	53	TL 496	S-5	11.1
	15	54	TL 497	S-3	17.1



Arkwright
Nature's Way Environmental Consultants Contractors, Inc. 15-1090
Natural Moisture Content ASTM D-2216

	GGE Lab No		Boring No.	Sample No.	Moisture (%)
ng	15	55	TL 497	S-4	26.9
ulti	15	56	TL 497	S-5	23.4
Consulting	15	57	TL 498	S-4	15.0
\mathcal{C}	15	58	TL 498	S-5	22.2
0	15	59	TL 498	S-6	28.6
18	15	60	TL 499	S-3	24.8
Testing	15	61	TL 499	S-4	25.4
Te	15	62	TL 499	S-5	20.7
als	15	63	TL 500	S-3	14.3
Materials	15	64	TL 500	S-4	19.1
/at	15	65	TL 500	S-5	12.4
	15	66	TL 502	S-6	16.9
0	15	67	TL 502	S-7	14.7
cal	15	68	TL 502	S-8	13.9
Geotechnica	15	69	TL 503	S-2	12.2
tec	15	70	TL 503	S-3	13.0
60	15	71	TL 503	S-4	12.8
O	15	72	TL 505	S-2	42.3
0	15	73	TL 505	S-3	10.4
ral	15	74	TL 505	S-4	14.5
ctu	15	75	TL 509	S-4	17.0
tructural	15	76	TL 509	S-5	18.3
S	15	77	TL 509	S-6	16.8
0	15	78	TL 511	S-2	9.3
Civil	15	79	TL 511	S-3	19.9
$\ddot{\Box}$	15	80	TL 511	S-4	24.1
	15	81	TL 517	S-2	19.7
	15	82	TL 517	S-3	11.9



Arkwright

Nature's Way Environmental Consultants Contractors, Inc.

15-1090

Natural Moisture Content ASTM D-2216

	GGE L	ab No	Boring No.	Sample No.	Moisture (%)
1	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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Project: Arkwright

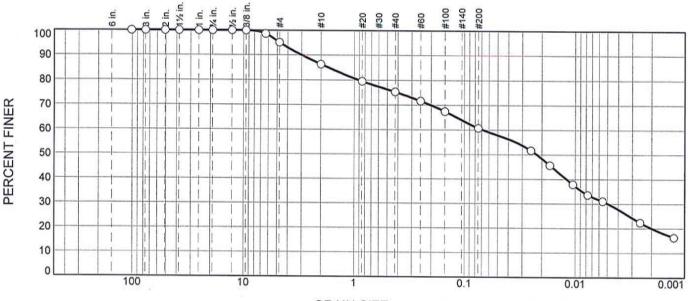
Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S4) Sample Number: 15-01

Depth: 6 - 8 ft

Date: 06.09.15



GRAIN SIZE - mm.							
% +3"	% Gr	avel	% Sand			% Fines	
76 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.8	8.8	11.1	14.6	30.6	30.1

SIEVE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0	LIKOLIKI	(X-140)
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	speci	fication	provided)
1	obee.		provided)

<u>r</u>	Material Descripti	on						
sandy silty clay								
PL= 17	Atterberg Limits	PI= 7						
D ₈₅ = 1.7095 D ₃₀ = 0.0050 C _u =	Coefficients D60= 0.0682 D15= Cc=	D ₅₀ = 0.0222 D ₁₀ =						
USCS= CL-M	USCS= CL-ML Classification AASHTO= A-4(2)							
	Remarks							

Figure

GLYNN GEOTECHNICAL ENGINEERING





Project No.: 05-1090

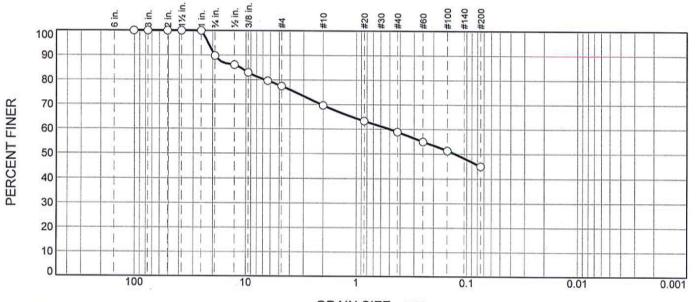
a member of the GLYNN GROUP Project: Arkwright

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S7) Sample Number: 15-02

Depth: 12 - 14 ft

Date: 06.10.15



			G	RAIN SIZE -	mm.		
% +3"	% Gr	avel	% Sand			% Fines	
70 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.1	12.4	7.8	10.8	13.9	45.0	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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	V V	
#100	51.4		
#200	45.0		

(no	specification	provided)
(specification	providedy

<u>r</u>	laterial Description	<u>on</u>
silty sand with g	ravel	
PL= NP	Atterberg Limits	PI= NP
D ₈₅ = 11.2324 D ₃₀ = C _u =	Coefficients D ₆₀ = 0.5000 D ₁₅ = C _c =	D ₅₀ = 0.1274 D ₁₀ =
USCS= SM	Classification AASHT	O= A-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





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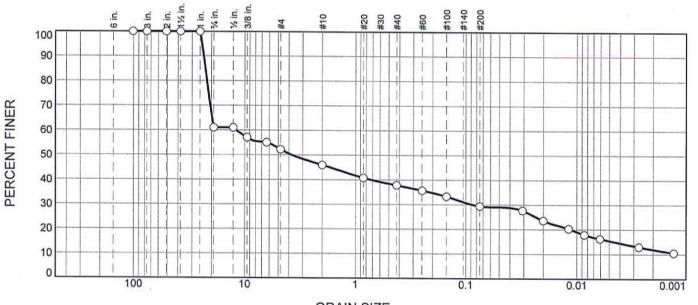
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S9) Sample Number: 15-03

Depth: 18 - 20 ft

Date: 06.10.15



			GI	RAIN SIZE -	mm.		
% +3"	, % Grave	avel	% Sand		% Fines		
70 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	39.0	8.8	6.2	8.2	8.4	14.0	15.4

SIEVE	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		

	V 101 0 2
(no specification	provided)

	terial Descript	ion
silty clayey gravel	with sand	
	Atterberg Limit	
PL= 14	LL= 20	PI= 6
<u> </u>	Coefficients	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
D ₈₅ = 22.6562 D ₃₀ = 0.0873	D ₆₀ = 11.9209	D ₅₀ = 3.7592
C ₁₁ = 0.0873	D ₁₅ = 0.0045 C _C =	D ₁₀ =
	Classification	
USCS= GC-GM		TO= A-2-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





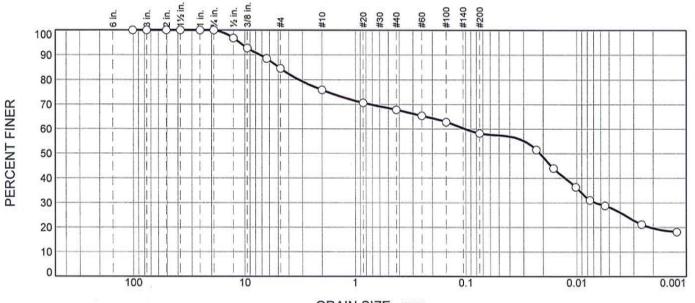
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-115 (S10) Sample Number: 15-04

Depth: 23 - 25 ft

Date: 06.10.15



0/ 011	% Gr	avel		RAIN SIZE - % Sand		% Fin	es
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.4	8.7	8.1	9.6	30.1	28.1

SIEVE	PERCENT	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0	LICELLI	(X-110)
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 Descriptio	<u>on</u>
sandy lean clay	with gravel	
PL= 14	Atterberg Limits LL= 22	PI= 8
D ₈₅ = 4.9009 D ₃₀ = 0.0068 C _u =	Coefficients D ₆₀ = 0.1012 D ₁₅ = C _c =	D ₅₀ = 0.0214 D ₁₀ =
USCS= CL	Classification AASHT	O= A-4(2)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





Project: Arkwright

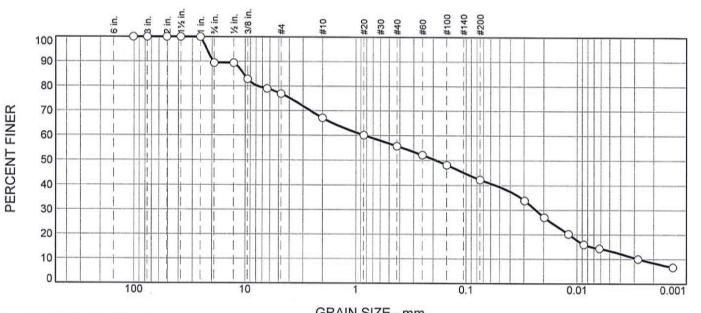
Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S3) Sample Number: 15-05

Depth: 4 - 6 ft

Date: 06.10.15



			G	KAIN SIZE -	mm.		
0/ +3"	% +3" % Grave	avel	% Sand			% Fin	es
70 +3		Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	12.6	9.8	11.3	13.5	28.9	13.4

SIEVE	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 speci	fication	provided)
-----------	----------	----------	---

PL= 16	Atterberg Limits LL= 21	PI= 5
D ₈₅ = 10.3469 D ₃₀ = 0.0236 C _u = 305.41	Coefficients D60= 0.8313 D15= 0.0075 Cc= 0.25	D ₅₀ = 0.1875 D ₁₀ = 0.0027
USCS= SC-SM	Classification AASHTO	D= A-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





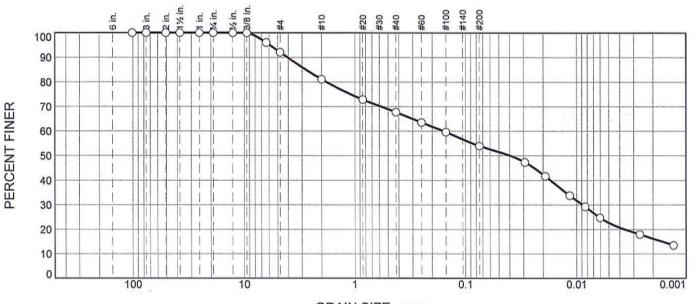
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S5) Sample Number: 15-07

Depth: 8 - 10 ft

Date: 06.10.15



GRAIN SIZE - mm.							
% +3"	% Gravel		% Sand		% Fines		
70 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.0	11.0	13.3	13.8	31.4	22.6

SIEVE	PERCENT	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		(
3"	100.0	8	
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		

				2. (2
- 1	no	eneci	fication	provided)
- 1	110	Speci	neation	Diovided)

Ma	aterial Descript	ion
sandy silty clay		
PL= 16	Atterberg Limit LL= 22	s <u>s</u> PI= 6
D ₈₅ = 2.7631 D ₃₀ = 0.0088 C _u =	Coefficients D60= 0.1574 D15= 0.0017 Cc=	D ₅₀ = 0.0395 D ₁₀ =
USCS= CL-ML	Classification AASH	iTO= A-4(1)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





Project No.: 05-1090

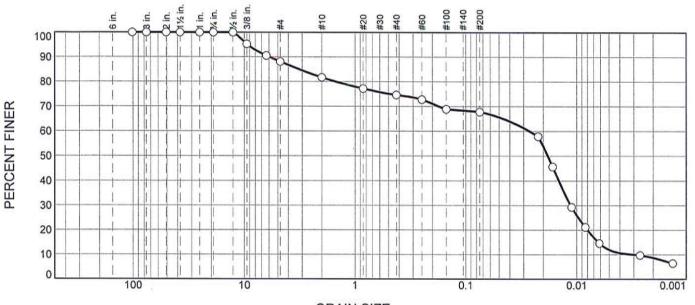
a member of the GLYNN GROUP **Project:** Arkwright

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-111 (S14) Sample Number: 15-08

Depth: 43 - 45 ft

Date: 06.10.15



GRAIN SIZE - mm.							
% +3"	% Gravel		% Gravel % Sand			% Fines	
76 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.9	6.4	7.1	6.8	55.8	12.0

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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 s	pecification	provided)

	Material Descriptio	<u>n</u>
sandy silt	*	
	Atterberg Limits	
PL= 21	LL= 22	PI= 1
D ₈₅ = 3.2029 D ₃₀ = 0.0113 C _u = 8.79	Coefficients D ₆₀ = 0.0266 D ₁₅ = 0.0063 C _c = 1.60	D ₅₀ = 0.0182 D ₁₀ = 0.0030
USCS= ML	Classification AASHT	O= A-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





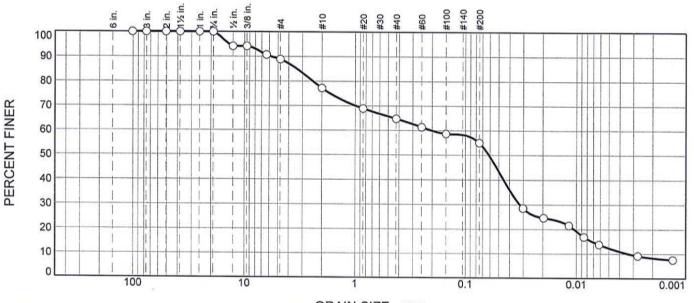
Project: Arkwright Project No.: 05-1090

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		% Gravel % Sand			% Fines	
76 + 5	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.1	11.7	12.4	9.8	42.6	12.4

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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	
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		

1			
(no s	specif	ication	provided)

	Material Description	<u>on</u>
sandy silty o	lay	
PL= 17	Atterberg Limits LL= 22	PI= 5
D ₈₅ = 3.358 D ₃₀ = 0.032 C _u = 61.14	8 D ₆₀ = 0.2021 4 D ₁₅ = 0.0072 C _c = 1.57	D ₅₀ = 0.0612 D ₁₀ = 0.0033
USCS= C	ML Classification AASHT	O= A-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





Project No.: 05-1090

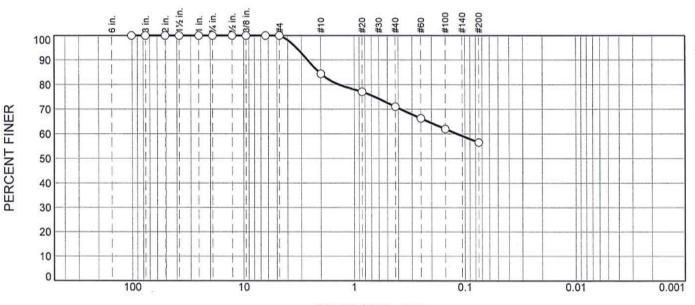
Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-69 (S5) Sample Number: 15-10

Project: Arkwright

Depth: 8 - 10 ft

Date: 06.13.15



GRAIN	SIZE	- mm.
-------	------	-------

% +3"	% Gravel		% Gravel %		% Sand		% Fines	
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	0.0	15.6	13.4	14.5	56.5		

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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	1	
#4	100.0		
#10	84.4		
#20	77.1		
#40	71.0		
#60	66.3		
#100	62.0		
#200	56.5		

(no	speci	fication	provid	ed'
(no	Speci	rication	provid	ea

sandy silt	Material Descripti	<u>on</u>
PL= NP	Atterberg Limits	PI= NP
D ₈₅ = 2.0742 D ₃₀ = C _u =	Coefficients D ₆₀ = 0.1172 D ₁₅ = C _c =	D ₅₀ = D ₁₀ =
USCS= ML	Classification AASH	ΓO= A-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





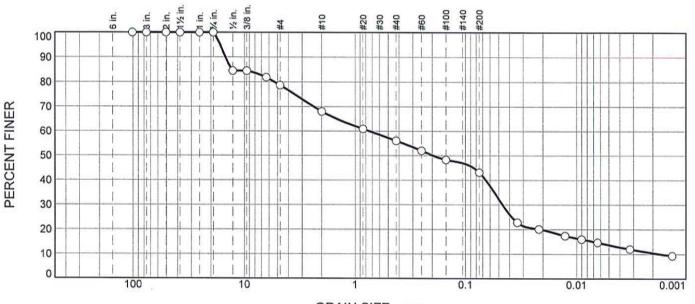
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S3) Sample Number: 15-12

Depth: 4 - 6 ft

Date: 06.13.15



			G	RAIN SIZE -	mm.		
% +3"	% Gravel		% Gravel % Sand		% Fines		
70 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.3	10.7	11.9	13.0	29.4	13.7

SIEVE	PERCENT	SPEC.* PERCENT	PASS?
		PERCENT	(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		

25.57.00	
(no specif	ication provided)

	Material Descripti	<u>on</u>
siity, clayey	sand with gravel	
PL= 17	Atterberg Limits LL= 22	PI= 5
D ₈₅ = 12.97 D ₃₀ = 0.046 C _u = 438.57	Coefficients D ₆₀ = 0.7439 D ₁₅ = 0.0069 C _C = 1.70	D ₅₀ = 0.1961 D ₁₀ = 0.0017
USCS= SC	C-SM Classification AASH	TO= A-4(0)
	Remarks	

Figure

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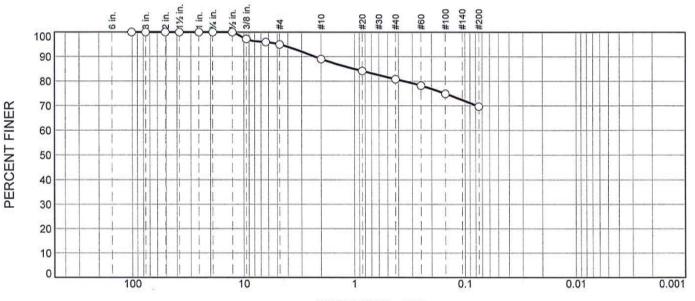
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S4) Sample Number: 15-13

Depth: 6 - 8 ft

Date: 06.13.15



GRAIN	SIZE -	mm.
-------	--------	-----

sandy silt

0/ 12!!	% Gravel		% Gravel % Sand		% Fines		
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	5.9	8.3	11.1	69.7	

SIEVE	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	į.	
#40	80.8		
#60	78.2		
#100	74.9		
#200	69.7		

PL= NP	Atterberg Limi LL= NV	ts PI= NP
D ₈₅ = 1.0006 D ₃₀ = C _u =	Coefficients D ₆₀ = D ₁₅ = C _c =	D ₅₀ = D ₁₀ =
USCS= ML	Classification AASI	<u>1</u> HTO= A-4(0)
	Remarks	

Material Description

Figure

GLYNN GEOTECHNICAL ENGINEERING

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Reported/Reviewed by

⁽no specification provided)



a member of the GLYNN GROUP

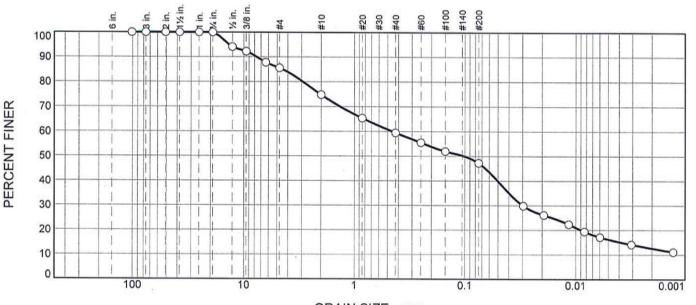
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-51 (S11) Sample Number: 15-14

Depth: 28 - 30 ft

Date: 06.13.15



			GI	RAIN SIZE -	mm.	8	
% +3"	, % G		% Sand			% Fines	
70 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.5	10.7	15.3	12.3	31.0	16.2

SIEVE	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)

M	aterial Description	
silty, clayey sand		
PL= 12	Atterberg Limits LL= 18	PI= 6
D ₈₅ = 4.4614 D ₃₀ = 0.0299 C _u =	Coefficients D60= 0.4525 D15= 0.0038 C _C =	D ₅₀ = 0.1007 D ₁₀ =
USCS= SC-SM	Classification AASHTO=	= A-4(0)
	Remarks	37 lbs

Figure

GLYNN GEOTECHNICAL ENGINEERING





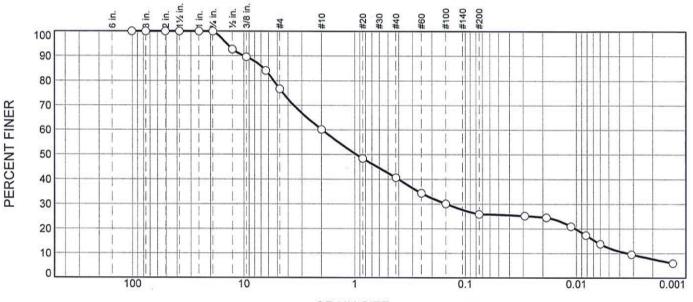
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-101 (S4) Sample Number: 15-15

Depth: 6 - 8 ft

Date: 06.13.15



			GI	RAIN SIZE -	mm.		
0/ +2!!	% Gr	avel	% Sand			% Fines	
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.3	16.5	19.6	14.7	13.7	12.2

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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	1	
#4	76.7		
#10	60.2		
#20	48.4		
#40	40.6		
#60	34.4		
#100	30.1		
#200	25.9		

	AND DESCRIPTION OF	/w		CONTRACTOR OF STREET	1 15
(no	speci	fical	non	provid	ed)
1000	opec.			D. C	

	laterial Description	on
silty, clayey sand	with gravel	
PL= 17	Atterberg Limits LL= 23	PI= 8
D ₈₅ = 6.6319 D ₃₀ = 0.1481 C _u = 576.99	Coefficients D ₆₀ = 1.9786 D ₁₅ = 0.0067 C _c = 3.23	D ₅₀ = 0.9688 D ₁₀ = 0.0034
USCS= SC-SM	Classification AASHT	O= A-2-4(0)
	Remarks	

Figure

GLYNN GEOTECHNICAL ENGINEERING





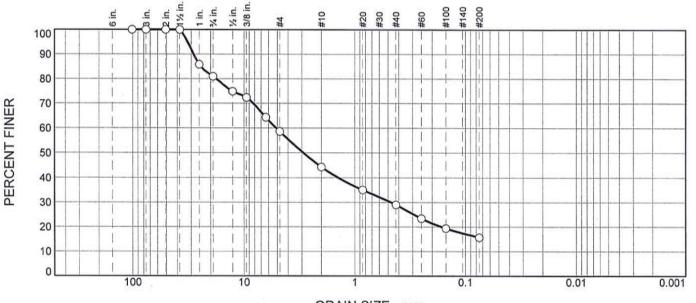
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-101 (S6) Sample Number: 15-16

Depth: 10 - 12 ft

Date: 06.10.15



0/ + 211	% Gr	avel		% Sand		% Fine	s
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.0	22.4	14.3	15.3	13.3	15.7	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	85.8	9.1	
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 p	rovided)
---------------------	----------

<u>n</u>	Material Description	<u>on</u>			
silty sand with gravel					
	Atterberg Limits				
PL= NP	LL= NV	PI= NP			
	Coefficients	State Sectionary			
D ₈₅ = 24.6197 D ₃₀ = 0.4715	$D_{60} = 5.1155$	D ₅₀ = 2.9074			
C _u = 0.4713	C _C =	D ₁₀ -			
	Classification				
USCS= SM	AASHT	O= A-1-b			
	Remarks				

Figure

GLYNN GEOTECHNICAL ENGINEERING





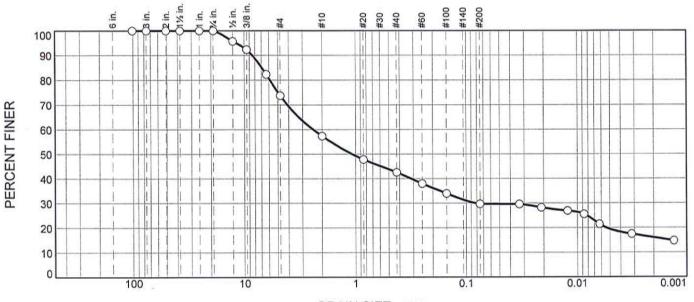
Project: Arkwright Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-52 (S4) Sample Number: 15-17

Depth: 6 - 8 ft

Date: 06.13.15



			GI	RAIN SIZE -	mm.		
0/ .00	% Gr	avel		% Sand		% Fin	es
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	26.2	16.4	14.9	12.8	10.3	19.4

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

11200	
(no specif	ication provided)

clayey sand with	Material Descriptio gravel	
PL= 16	Atterberg Limits	PI= 8
PL- 10	LL- 24	F1- 0
D ₈₅ = 6.9517 D ₃₀ = 0.0826 C _u =	Coefficients D ₆₀ = 2.4019 D ₁₅ = 0.0014 C _C =	D ₅₀ = 1.0742 D ₁₀ =
USCS= SC	Classification AASHT	O= A-2-4(0)
	Remarks	
	्र मान निर्माणको गी संगतिकोत इन्योद्धित ः	

Figure

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a member of the GLYNN GROUP

Project: Arkwright

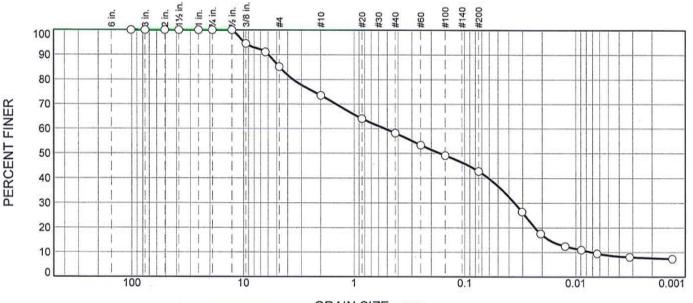
Project No.: 05-1090

Client: Nature's Way Environmental Consultants & Contractors, Inc.

Location: WTG-52 (S10) Sample Number: 15-18

Depth: 23 - 25 ft

Date: 06.13.15



			G	RAIN SIZE -	mm.		
% +3"	% Gr	avel		%.Sand		% Fine	es
76 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.9	11.6	15.3	15.4	34.0	8.8

silty, clayey sand

PL= 16

D₈₅= 4.7178 D₃₀= 0.0356 C_u= 73.29

SIEVE	PERCENT	SPEC.* PERCENT	PASS?
1 10 10 10 10 10 10 10 10 10 10 10 10 10	FINER	PERCENT	(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 specifi	cation provided)	Figure
200	42.8	
100	49.2	
#60	53.4	
#40	58.2	Remarks
#20	64.1	USCS= SC-SM AASHTO= A-4(0)
#10	73.5	USCS= SC-SM Classification USCS= SC-SM AASHTO= A-4(0)
#4	85.1	Classification

rigure

PI= 4

 $D_{50} = 0.1664$ $D_{10} = 0.0072$

GLYNN GEOTECHNICAL ENGINEERING

415 South Transit Street, Lockport, New York 14094 voice 716.625.6933 / fax 716.625.6983 www.glynngroup.com



Material Description

Atterberg Limits
LL= 20

Coefficients

D₆₀= 0.5250 D₁₅= 0.0174 C_c= 0.34