ATLANTIC TESTING LABORATORIES

REPORT OF PRELIMINARY SUBSURFACE INVESTIGATION AND GEOTECHNICAL EVALUATION

PROPOSED WIND TURBINES
ROARING BROOK WIND POWER PROJECT
TOWN OF MARTINSBURG
LEWIS COUNTY, NEW YORK

PREPARED FOR: **Iberdrola Renewables**
1125 NW Couch Street, Suite 700
Portland, Oregon 97209

PREPARED FOR: **ATL Engineering, P.C.**
6431 US Highway 11
Canton, New York 13617

PREPARED BY: **Atlantic Testing Laboratories, Limited**
6431 US Highway 11
Canton, New York 13617

ATL Report No. WTCD2907E-01-08-08

September 29, 2008

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PRELIMINARY SUBSURFACE INVESTIGATION
AND
GEOTECHNICAL EVALUATION

PROPOSED WIND TURBINES AND SUBSTATIONS
ROARING BROOK WIND POWER PROJECT
TOWN OF MARTINSBURG
LEWIS COUNTY, NEW YORK

ATL ENGINEERING, P.C.

1.0 INTRODUCTION

At the request of Mr. Donald F. Hammond, representing Iberdrola Renewables, Atlantic Testing Laboratories, Limited (ATL) performed a preliminary subsurface investigation and geotechnical evaluation for the referenced project to ascertain the general subsurface soil and groundwater conditions at select wind turbine locations and two substation locations. The purpose was to evaluate the engineering significance of these findings, and to provide preliminary recommendations related to foundation design and construction. The subsurface investigation was performed on August 26 and 27, 2008.

The project consists of constructing thirty-nine (39) wind turbines, two (2) substations, and associated underground and overhead interconnect lines in the Town of Martinsburg located in Lewis County, New York. The project coordinates at the approximate center of the site are N 43° 42' 51" latitude and W 75° 36' 34" longitude. A **Site Location Plan** is included in **Appendix A**.

The preliminary subsurface investigation consisted of the excavation of shallow test pits at seven (WTG-2, WTG-10, WTG-12, WTG-18, WTG-21, WTG-29, WTG-33) of the proposed thirty-nine turbine locations, one (TP-33/34) along the proposed buried transmission route, and three test pits at the proposed substations. The test pit locations were selected by ATL and approved by Iberdrola Renewables, formerly PPM Energy, Inc., to provide spatial coverage across the proposed project area.

All elevations and dimensions referenced in this document are reported in units of feet, unless otherwise indicated.

2.0 PROJECT DESCRIPTION

The following information, regarding the proposed wind turbine generators, was provided to ATL by Iberdrola Renewables. The proposed wind turbines will be Gamesa 2.0 MW G90 wind turbines. The turbines will be supported on towers approximately 100 meters (328 feet) high at the rotor hub with a rotor diameter of approximately 90 meters (295 feet).

The anticipated turbine foundations consist of a shallow concrete spread footing founded at a depth of approximately 10 feet below grade, and approximately 50 to 60 feet in diameter.

Information regarding the substation foundation details and loading were not provided at the time of report issuance.

3.0 PREVIOUS INVESTIGATION

A Desktop Study was previously performed by ATL, AE Report No. AE031-01-09-07, dated September 27, 2007, in support of the project. The desktop study indicated that it may be feasible to support the wind turbines on a shallow foundation system bearing on suitable in-situ soil, or compacted engineered fill, or stone columns. Potential geotechnical and geologic risks identified in the study were flooding/high ground water due to wetlands and low permeable site soils, caves/karst due to underlying limestone bedrock, swelling/shrinking clay soil and corrosive soils.

Previous subsurface investigation and geotechnical evaluations were performed by ATL at the 195 turbine Maple Ridge wind project located approximately 1 to 2 miles northeast of the proposed Roaring Brook project site.

4.0 GENERAL SITE CONDITIONS AND GEOLOGY

The proposed project site generally consists of forested rolling hills and agricultural fields. There are interconnected gravel roads within the project area, which were previously constructed by the land owner.

The proposed Roaring Brook wind project is located approximately 7 miles west of Lowville, on the Tug Hill Plateau. The Tug Hill Plateau is located to the west of the Adirondack Mountains, separated by the Black River valley, and to the east of the Ontario Lowlands. Due to the rural, forested nature of the proposed site, the NRCS has not conducted a detailed soil survey of the entire project area.

Based on the Surficial Geologic Map of New York, Adirondack Sheet, the site is generally covered with glacial till that is overlain by lacustrine silty sand. The glacial till varies in texture from boulders to silt, with poorly sorted sand-rich material exhibiting variable permeability. The thickness of the glacial till can range from 3 to 165 feet (1 to 50 meters). Swamp deposits, till moraine, and exposed rock also exist in the project area. The swamp deposits consist of peat-muck, organic silt and sand in poorly drained areas. The thickness of the swamp deposits can range between 3 to 33 feet (1 to 10 meters). Areas to the east and west contain till moraine. Till moraine is variable in size and sorting, with minor amounts of sand and silt that was deposited during the final melting of the glaciers. The thickness of the till moraine ranges from 3 to 33 feet (1 to 10 meters).

Based on the Geologic Map of New York, Adirondack Sheet, the underlying bedrock profile consists of siltstone and shale of the Pulaski and Whetstone Gulf formations underlain by Utica shale. The siltstone and shale are underlain by bedrock formations of the Trenton and Black River Groups, which may consist of limestone, shale, and siltstone. At the southern end of the project site, a cap of Oswego sandstone may exist over the Pulaski and Whetstone formation. The bedrock is primarily marine sediment of

early to mid-Ordovician age (about 400 million years old). The bedrock is relatively flat-lying and undeformed. Within the last 12,000 to 1 million years, the area was covered by glaciers which removed material and rounded the topography, leaving behind glacial till (unsorted clay-rich soil) and outwash (sand and gravel). The geologic conditions mapped at the Roaring Brook site appear similar to the conditions mapped at the Maple Ridge site.

Based on a review of the Maple Ridge Phase 1 subsurface investigation and geotechnical evaluation report (ATL Report No. CD2398E-2-06-05, dated June 10, 2005), the soil conditions at the Maple Ridge Project consisted of loose sand to very compact glacial till, underlain by weathered rock at depths ranging from 2.0 to 30.5 feet below the surface. Competent limestone, shale and siltstone were reportedly encountered at depths ranging from 4.0 to 35.4 feet below the suface. Based on groundwater measurements and soil moisture content, the groundwater table was encountered at depths ranging from 0.5 to 27 feet below the surface. The report indicates that some of the water encountered may be a perched water condition due to the relative impervious nature of the very compact glacial till and underlying bedrock.

5.0 SUBSURFACE INVESTIGATION & SAMPLING METHODOLOGY

Test pits were advanced within the foundation footprint of the proposed wind turbine and substation locations. The tower and substation centers were staked in the field and the surface elevations were obtained by Thew Associates PE/LS, PLLC. Where test pits could not be performed at the staked location due to access limitations, the test pits were offset. The approximate test pit offsets are provided on the test pit logs. A **Turbine Site Plan, Substation Preliminary Grading Plan, and the staked location coordinates** are included in **Appendix B**.

The test pits were excavated using a Kamatsu WB140 rubber tired backhoe at select turbine locations to evaluate the soil and groundwater conditions, and to collect bulk soil samples for laboratory testing. The soil samples were visually classified in the field by a geotechnical engineer using the Burmister Soil Classification System. The **Test Pit Logs** and **Select Photographs** are included in **Appendix C and D**, respectively.

The test pits were backfilled with on-site soil upon completion. It is important that the backfilled test pits be monitored for settlement or subsidence. This will be the responsibility of Iberdrola Renewables. ATL assumes no liability for test pit settlement.

6.0 SITE SUBSURFACE CONDITIONS

The following description of subsurface conditions is based on the soil and groundwater encountered at the locations investigated. Actual subsurface conditions may vary in both the horizontal and vertical dimensions. Detailed subsurface descriptions are provided on the individual Test Pit Logs.

6.1 Test Pits

6.1.1 Wind Turbine Locations

The wind turbine test pits generally encountered a surficial 10 to 12 inch layer of topsoil and forest cover underlain by silt and sand with varying portions of gravel and cobbles

that extended to depths ranging from 1.8 to 3 feet below the surface. Underlying the silt and sand was sand and gravel with varying portions of silt and cobbles that extended to test pit termination at depths ranging from 7.5 to 9 feet below the surface. Due to the very compact nature of the subsurface soils and the presence of cobbles, the test pits were generally terminated due to bucket refusal of the excavation equipment.

6.1.2 Buried Transmission Location

Test pit TP-33/34, performed in the area of the proposed buried transmission line, encountered a surficial 10 to 12 inch layer of topsoil and forest cover underlain by sand with varying portions of gravel, silt, and cobbles that extended to test pit termination due to bucket refusal at a depth of 6 feet below the surface.

6.1.3 Substation Locations

At the west substation location, test pit TP-SS1A encountered a surficial 6-inch layer of topsoil and organic material underlain by clayey silt that extended to a depth of 7 feet below the surface. Underlying the clayey silt was sand with varying portions of gravel, silt, and cobbles that extended to test pit termination at the depth of 9.5 feet. Test pit TP-SS1B encountered a surficial 6-inch layer of topsoil and organic material underlain by clayey silt that extended to a depth of 5 feet below the surface. Underlying the clayey silt was gravel with varying portions of sand and silt that extended to 7 feet. Underlying the gravel was sand with varying portions of gravel, silt, and cobbles that extended to test pit termination at the depth of 9.5 feet.

At the east substation location, test pit TP-SS2 encountered a surficial 6-inch layer of topsoil and organic material underlain by silty sand that extended to a depth of 2.5 feet below the surface. Underlying the silty sand was sand with varying portions of gravel, silt, and cobbles that extended to test pit termination at the depth of 9.5 feet.

A **Test Pit Summary Table** is included in **Appendix E**.

6.2 Groundwater

6.2.1 Wind Turbine Locations

Groundwater was observed in test pits WTG-10, WTG-12, and WTG-18 during the test pit excavations. Slight groundwater seepage was encountered in test pit WTG-10 at depths between 4 and 4.5 feet below the ground surface. Groundwater seepage was encountered in test pit WTG-12 at depths between 6 and 8 feet below the ground surface and in test pit WTG-18 at depths between 7 and 10.5 feet below the ground surface. Sidewall sloughing was observed in test pits WTG-12 and WTG-18 due to the water seepage.

6.2.2 Substation Locations

Slight groundwater seepage was encountered in test pit TP-SS1B at a depth of 7 feet below the ground surface. Groundwater was not observed at the other substation locations.

7.0 ELECTRICAL RESISTIVITY

7.1 Field Ground Resistivity Tests

Electrical resistivity tests were performed utilizing a Nilsson Model 400, Soil Resistivity Meter, Serial No. 4-7542, in accordance with IEEE Std. 81-1983.

Two perpendicular tests were performed at turbine locations WTG-2, WTG-10, WTG-21, and WTG-29 and at the two proposed interconnect substations. The tests were performed using spacings of 5, 10, 15, and 20 feet. The values for each of these tests are shown in the **Soil Resistivity Test Field Reports** included in **Appendix F**.

8.0 LABORATORY ANALYSES

Select soil samples were submitted to ATL's geotechnical laboratory for analyses. The laboratory tests included Particle Size Analysis, Moisture Content Determination, Laboratory Compaction, Atterberg Limits, Thermal Resistivity, and Chemical Analysis. The samples were selected based on our field observations and the subsurface soil conditions encountered in the test pits.

8.1 Particle Size Analysis

Six (6) soil samples were selected for particle size analysis at turbine locations WTG-2, WTG-10, WTG-18, TP-33/34, and at substation locations TP-SS1A and TP-SS2. The tests were performed in accordance with ASTM D422 "Particle Size Analysis of Soils." The test results are summarized in the **Particle Size Analysis Summary Table** provided in **Appendix G**.

Soil samples collected from test pit excavations are generally classified using the Unified Soil Classification System (USCS), with group symbols GM for WTG-2, SM for WTG-10, WTG-18, TP-33/34, and TP-SS2 and CL for TP-SS1A.

8.2 Moisture Content

Twelve (12) soil samples were selected for natural moisture content determination. The tests were performed in accordance with ASTM D2216 "Laboratory Determination of Water (Moisture) Content of Soil and Rock." The test results are located on the test pit logs.

The natural moisture content of the samples collected at the turbine locations ranged between 8.7 and 14.6 %. The natural moisture content of the samples collected at the substation locations ranged between 9.9 and 33.4 %.

8.3 Atterberg Limits

Five (5) soil samples were selected for Atterberg Limits determination at locations WTG-2, WTG-10, WTG-18, and TP-33/34 and at substation location TP-SS1A. The tests were performed in accordance with ASTM D4318 "Liquid Limit, Plastic Limit, and Plasticity Index of Soils." The test results are summarized in the **Atterberg Limits Results Table** provided in **Appendix H**.

The plasticity index of the samples analyzed were classified as non-plastic for WTG-2, WTG-10, WTG-18, and TP-33/34. The clayey silt sample analyzed for TP-SS1A had a plasticity index of 8.

8.4 Laboratory Compaction

Five (6) soil samples were selected for Laboratory Compaction testing at locations WTG-10, WTG-18, TP-33/34, WTG-2 and at substation locations TP-SS1A, and TP-SS2. The tests were performed in accordance with ASTM D1557 "Laboratory Compaction Characteristics of Soil Using Modified Effort." The test results are summarized in the **Laboratory Compaction Results Table** provided in **Appendix I**.

The corrected optimum moisture content and corrected maximum dry density of the sand and gravel samples collected ranged between 5.3 and 6.4 %, and 132.0 and 139.2 pcf, respectively, with the exception of the silty sand sample collected at substation location TP-SS1A. The optimum moisture content and corrected maximum dry density of the silty sand was 12.8 % and 117.4 pcf, respectively.

8.5 Chemical Analysis

Three (3) soil samples were selected for pH, chlorides, and soluble sulfate determination at locations WTG-10, WTG-18, and TP-33/34. The test results are summarized in the **Table of Chemical Analysis** provided in **Appendix J**.

The pH of the samples analyzed ranged between 6.0 and 6.3 standard units (S.U.). The chloride results in all the samples analyzed were less than 0.10 %, and the soluble sulfate results ranged were less than 0.10 %.

8.6 Thermal Resistivity

Three (3) soil samples were selected for thermal resistivity analysis at natural and dry moisture conditions at turbine locations WTG-10, WTG-18, and buried transmission line location TP-33/34. The test results are summarized in the **Table of Thermal Resistivity Analysis** provided in **Appendix K**.

The thermal resistivity of the samples analyzed ranged between 4.231 and 6.953 Mk/w in dry conditions, and between 0.491 and 0.634 Mk/w at natural moisture conditions.

9.0 GEOTECHNICAL ENGINEERING DISCUSSION

9.1 Subsurface Soil Conditions

9.1.1 Wind Turbine Locations

The turbine test pits generally encountered a surficial 10 to 12 inch layer of topsoil and forest cover underlain by silt and sand with varying portions of gravel and cobbles that extended to depths ranging from 1.8 to 3 feet below the surface. The silt and sand was underlain by sand and gravel that extended to test pit termination depths ranging from 7.5 to 9 feet. Based on our observations, the consistency of the sand and gravel appears to range from medium compact to very compact. Cobbles and boulders were

observed throughout the depths of the test pit excavations and at the surface across the project area.

Weathered rock or bedrock was not encountered within the test pit excavations and visible areas of exposed bedrock were not noted around the test pit areas. Since bedrock was not encountered during the test pit excavations, an evaluation of the potential for karst formations could not be made during this investigation. A site walkover at the time of the test pit excavations did not reveal the presence of any visual sinkholes or other surface depressions that may be indicative of underlying karst formations. Based on our experience at the Maple Ridge project, karst formations were not encountered during the site investigations or during construction. Further evaluation of the potential for karst formations to exist within the project area should consist of supplemental soil borings to evaluate the type, depth, and condition of the underlying bedrock. If warranted, further analysis using geophysical techniques could be performed.

Soils subject to swelling or shrinking were not encountered in the test pits.

The natural moisture content of the soils encountered is generally greater than the optimum moisture content determined from the laboratory compaction tests. Based on the test results and our experience with these soil types, significant moisture conditioning of the on-site soil is not anticipated for use as foundation backfill.

The percentage of fines passing the No. 200 sieve contained in the samples ranged between 21 and 26%. Based on the fines content, the site soils are considered moisture sensitive and frost susceptible, and may become unstable when exposed to repetitive construction traffic and excessive moisture.

9.1.2 Substation Locations

The substation test pits generally encountered a surficial 6-inch layer of topsoil underlain by clayey silt with varying portions of sand, and gravel that extended to depths ranging from 0.5 to 7 feet below the surface. The clayey silt was underlain by sand with varying portions of silt, and gravel that extended to test pit termination depths ranging from 8 to 9.5 feet.

Soils subject to swelling or shrinking were not encountered in the test pits.

The natural moisture content of the clayey silt soils encountered at the substation location is generally greater than the optimum moisture content determined from the laboratory compaction tests. Based on the test results and our experience with these soil types, the clayey silt is generally considered unsuitable for use as fill within the substation footprint.

The percentage of fines passing the No. 200 sieve contained in the clayey silt was 83%. Based on the fines content, the site soils are considered moisture sensitive and frost susceptible, and will become unstable when exposed to repetitive construction traffic.

9.2 Groundwater Conditions

9.2.1 Wind Turbine Locations

Based on test pit observations, groundwater seepage was observed at turbine test pit locations WTG-10, WTG-12, and WTG-18. Slight groundwater seepage was observed at WTG-10 at a depth of 4 feet. Groundwater seepage observed at locations WTG-12 and WTG-18, at depths ranging from 6 to 7 feet, resulted in sidewall sloughing. Based on our knowledge of the project area, a perched groundwater condition may exist during the wetter periods of the year. Supplemental investigation activities consisting of soil borings and rock coring at each of the turbine locations along with the installation of monitoring wells is required to determine the actual groundwater conditions for final foundation design. It is recommended that groundwater monitoring be performed through the end of the spring season, which typically exhibits high precipitation levels, and runoff from snowmelt.

Fluctuations in groundwater levels may occur due to seasonal and climatic variations, changes in the surface runoff patterns, construction activity, and subsequent site development, along with other interrelated factors.

Based on the observed groundwater conditions and our experience at the Maple Ridge project, it is anticipated that the majority of groundwater encountered during foundation excavations should be controlled by pumping from trenches or sumps installed around the perimeter of the foundation excavations.

9.2.2 Substation Locations

Based on test pit observations, slight groundwater seepage was observed at the west substation location TP-SS1B at the depth of 7 feet below the surface. Groundwater was not observed at the other substation test pit locations.

9.3 Shallow Foundations

Based on the information collected during the preliminary subsurface investigation, the subsurface conditions appear suitable for support of the turbine and substation foundations on shallow foundation systems. To provide adequate frost protection, shallow foundations should be founded a minimum of 5 feet below final exterior grade. Excavations for foundations may encounter cobbles, boulders, weathered bedrock, sound bedrock, and ground or surface water during the wetter periods of the year.

Supplemental subsurface investigation activities consisting of soil borings and rock coring at each of the proposed turbine and substation locations, seismic testing, and additional laboratory testing of recovered soil and rock samples is required to evaluate soil and rock parameters, and groundwater conditions for final foundation design.

9.3.1 Wind Turbines

Typical octagonal spread foundation designs have foundation diameters ranging from 50 to 60 feet and are usually founded at depths up to 10 feet below finished grade. Based on our observations and experience with the sand and gravel soils encountered in the

test pits, a safe allowable soil bearing pressure of 4000 pounds per square foot (psf) may be utilized for preliminary foundation design. Supplemental soil borings with Standard Penetration Tests (SPT) are required at each proposed turbine location to evaluate the safe allowable soil bearing capacity for final foundation design.

At turbine locations where the excavation is advanced below groundwater and/or the bearing subgrade is wet or saturated, the subgrade should be overexcavated 6-inches and a 6-inch layer of NYSDOT Number 2, crushed stone placed in the bottom of the excavation to provide a dewatering media and to stabilize the bottom of the excavation. The number 2, crushed stone should be compacted with four passes of a walk behind, dual drum, vibratory roller or diesel plate tamper (Wacker DPU6055 or equivalent) under the direction of a geotechnical engineer. The foundation can then be supported on the number 2, crushed stone. The number 2, crushed stone should be placed and compacted as soon as possible after the excavation is complete.

Based on our experience at the Maple Ridge project, loose or unstable soil conditions may exist within a few feet below the planned bottom of footing depths at some proposed turbine locations. The results of supplemental soil borings should identify the location and estimated depths of the loose soil conditions. Where shallow, loose or unstable soil conditions are encountered, overexcavation and replacement with compacted structural fill may be required to support the foundations. All structural fill should be compacted to densities in excess of 95% of the maximum dry density as determined by ASTM D1557, or as directed by a geotechnical engineer.

9.3.2 Substations

Based on the existing and proposed site contours depicted on the preliminary grading plan prepared for the substation locations, an approximate 2-foot cut and fill is estimated to achieve the finished grade at substation location 1. At substation location 2, an approximate 5-foot cut and 3-foot fill are estimated. Footings founded at a depth of 5 feet will likely bear on a combination of clayey silt and silty sand at the substation locations.

Based on our test pit observations, a safe allowable soil bearing pressure ranging between 1000 and 2000 psf may be utilized for preliminary substation foundation design. Due to the high fines content and moisture condition of the clayey silt, imported fill should be utilized to raise the site grades within the substation footprints. Supplemental soil borings with Standard Penetration Tests (SPT) are required to evaluate the safe allowable soil bearing capacity for final foundation design. At a minimum, soil borings should be performed at the four corners and center of each of the proposed substation locations.

9.4 Foundation Stiffness

Seismic testing consisting of MASW and seismic refraction should be performed at select turbine locations to evaluate poisson's ratio, shear modulus, and quality of the underlying soil and bedrock at the project site.

9.5 Sliding Stability

A coefficient of friction value of 0.45 may be used for preliminary foundation design to evaluate sliding stability of the turbine foundations for concrete footings founded on the in-situ sand and gravel soils. Substation footings founded on the silt soils may be designed using a coefficient of friction value of 0.30.

9.6 Turbine Foundation Backfill

The on-site soils at the turbine locations appear suitable for use as foundation backfill, provided the compacted backfill provides sufficient weight for overturning stability. All turbine foundation backfill should have a maximum particle size limited to 6 inches, or less, and should be compacted to the minimum required unit weight specified by the structural engineer and a minimum of 90% of the maximum dry density, as determined by ASTM D 1557. The sites must be graded to convey water away from the tower foundations.

9.7 Chemical Analysis

Based on a chemical analysis of select soil samples, the soils encountered at the test pit locations ranged from slightly acidic to neutral and sulfate exposure from the foundation soil is considered negligible. A Type I or II cement may be utilized for foundation concrete.

10.0 SUMMARY

The test pit logs and this report in its entirety are presented as a preliminary subsurface investigation and geotechnical evaluation, and may not be representative of the site subsurface conditions across the entire project area, but only what was found at the individual test locations at the time the preliminary investigation was performed. The subsurface soil and groundwater conditions may be different from those described in this report and on the test pit logs.

This report was prepared to present the findings of our preliminary subsurface investigation and engineering evaluation. Further investigation activities will be required for final foundation design.

Prepared by:

Ryan M. Morrison, I.E.
Geotechnical Engineer

Reviewed by:

Brian T. Barnes, P.E.
Senior Engineer

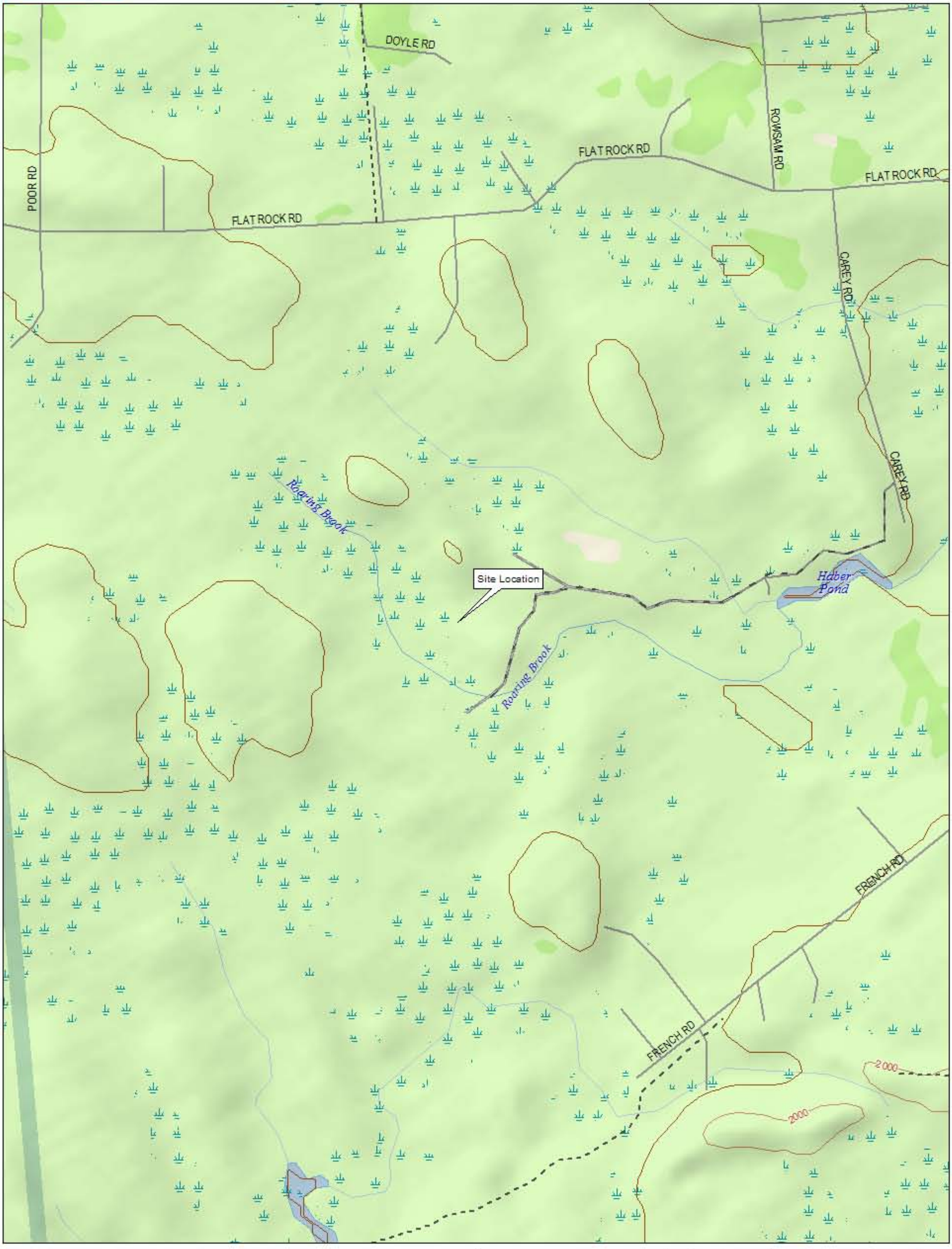
RMM/BTB/rmm

APPENDIX A

SITE LOCATION PLAN

DELORME

Topo USA® 5.0



Data use subject to license.

www.delorme.com

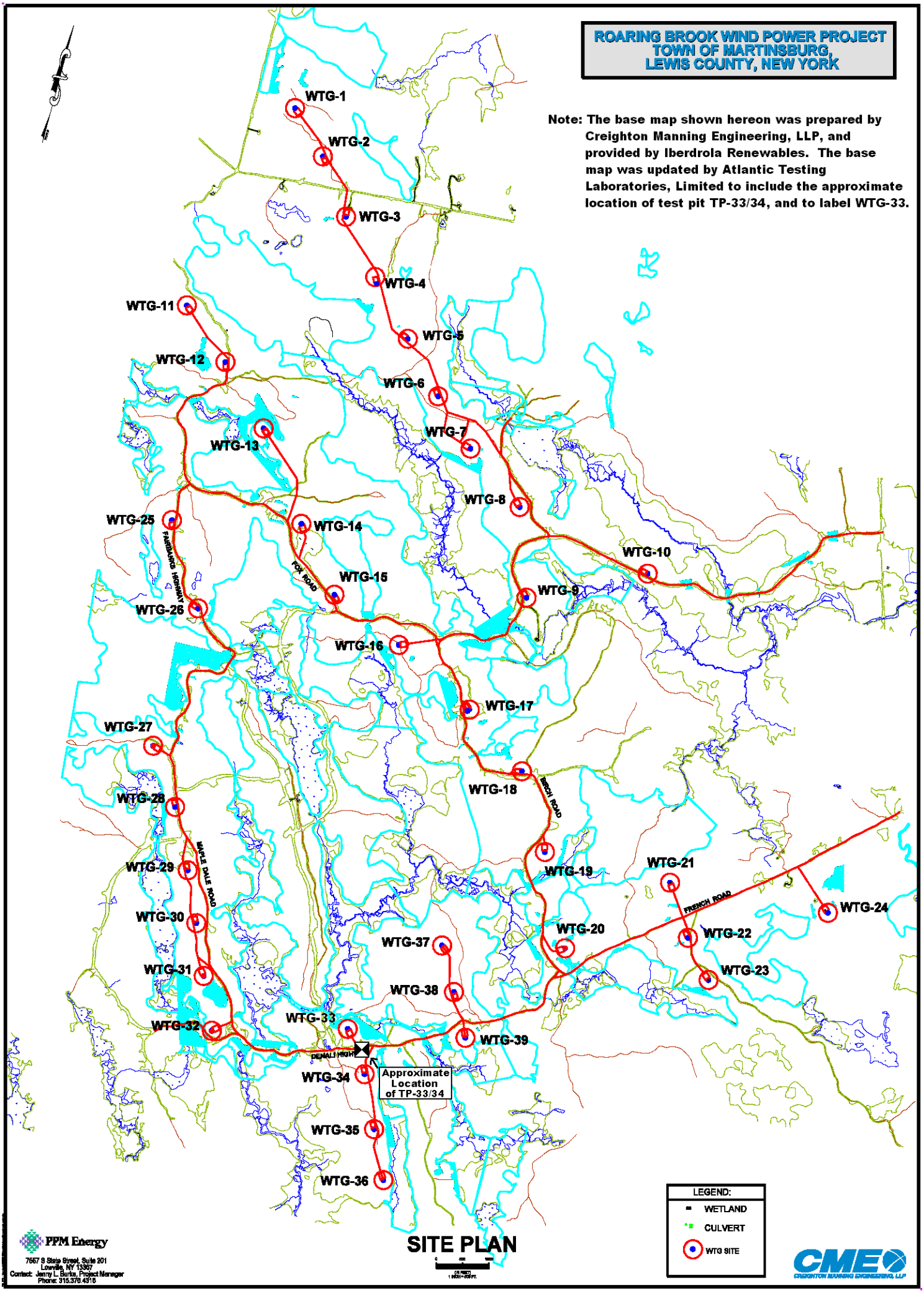
MN (13.1° W)

0 800 1600 2400 3200 4000 ft

Data Zoom 13-0

APPENDIX B

TURBINE SITE AND SUBSTATION PRELIMINARY GRADING PLAN


ROARING BROOK WIND POWER PROJECT
TOWN OF MARTINSBURG,
LEWIS COUNTY, NEW YORK
Note: The base map shown hereon was prepared by Creighton Manning Engineering, LLP, and provided by Iberdrola Renewables. The base map was updated by Atlantic Testing Laboratories, Limited to include the approximate location of test pit TP-33/34, and to label WTG-33.
WTG-1
WTG-2
WTG-3
WTG-4
WTG-5
WTG-6
WTG-7
WTG-8
WTG-9
WTG-10
WTG-11
WTG-12
WTG-13
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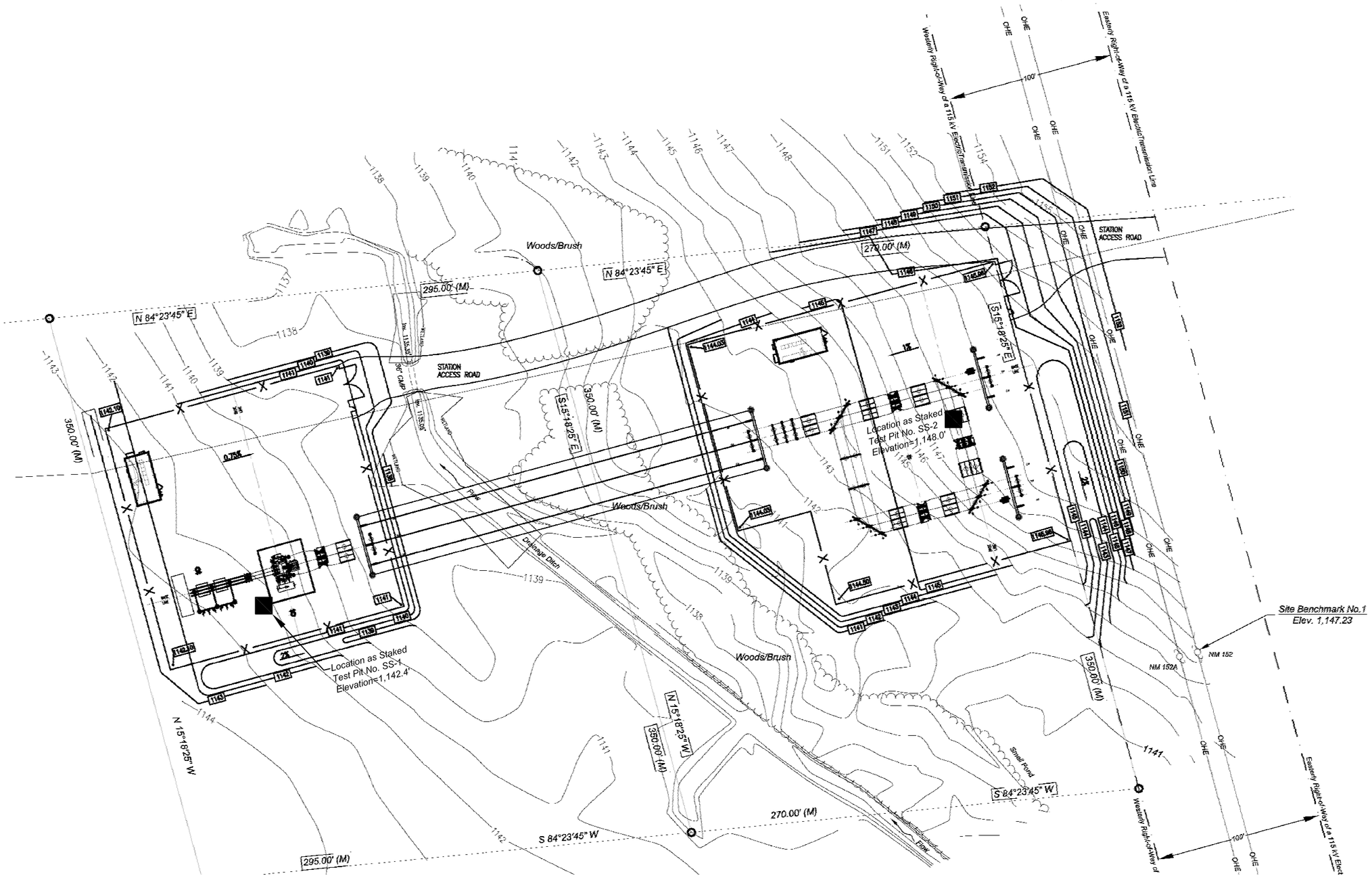
WTG-31
WTG-32
WTG-33
WTG-34
WTG-35
WTG-36
WTG-37
WTG-38
WTG-39
FARRBANKS HIGHWAY
FOX ROAD
BIRCH ROAD
FRENCH ROAD
MAPLE DALE ROAD
DENALI HIGH
Approximate Location of TP-33/34
LEGEND:
WETLAND
CULVERT
WTG SITE
SITE PLAN
PPM Energy
7667 S Stony Street, Suite 201
Lowville, NY 13367
Contact: Jenny L. Burke, Project Manager
Phone: 315.376.4316
CME
CREIGHTON MANNING ENGINEERING, LLP



Substation site plan was taken from from a drawing titled "Roaring Brook Wind Power Facility, 34.5/115kv Collector and Interconnect Subs, Grading and Site Plan" prepared by Henkels and McCoy, Inc., last revised August 29, 2008, and is distinguished as Drawing No. C-1.

Test Pit Location Plan	SCALE	PROJECT No.	DATE
	None	CD2907	9/29/08
Roaring Brook Wind Power Facility 34.5/115kv Collector and Interconnect Substation	ATLANTIC TESTING LABORATORIES, LTD. CANTON, NY PLATTSBURGH, NY UTICA, NY WATERTOWN, NY ALBANY, NY CICERO, NY POUGHKEEPSIE, NY ENDICOTT, NY		

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Staked Test Pit Locations and Elevations
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Staked Test Pit ID	Northing	Easting	Elevation
WTG-2	1,361,500.10	1,072,421.12	1,981.42
WTG-10	1,355,421.03	1,080,457.06	1,925.05
WTG-12	1,357,231.23	1,071,643.81	1,945.19
WTG-18	1,351,161.42	1,079,113.69	1,942.55
WTG-21	1,349,841.89	1,082,394.93	1,950.98
WTG-29	1,347,693.36	1,073,453.74	1,941.88
WTG-33	1,345,563.36	1,077,180.84	1,932.40
SS-1	1,358,006.04	1,118,258.98	1,142.35
SS-2	1,358,118.14	1,118,673.76	1,148.01

Coordinates shown hereon reference the North American Datum of 1983, 2007 adjustment (NAD83/07) and are projected on the New York State Plane Coordinate System (Central Zone).

Elevations shown hereon reference the North American Vertical Datum of 1988 (NAVD88).

APPENDIX C

TEST PIT LOGS

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-2
Test Pit Location:	30 Feet South of Proposed Tower Center	Date:	8/27/08
		Elevation:	1981±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/27/08	10:10 AM	9.0'	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			1.0	12" TOPSOIL and ORGANIC MATERIAL
			2.5	Brown SILT; trace f SAND; some GRAVEL (moist, plastic)
1	8.0'	9.0'		Brown cmf GRAVEL; some cmf SAND; some SILT (moist, non-plastic) w=9.8% - soil matrix contained approximately 30-40% FLAT COBBLES and BOULDERS up to 30 inches
				Test pit terminated at 9.0 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Very hard digging at 8.0 feet
3. Rolling Terrain

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-10
Test Pit Location:	Proposed Tower Center	Date:	8/26/08
		Elevation:	1925±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	11:45 AM	9.0'	See Note 2	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			0.8	10" TOPSOIL and ORGANIC MATERIAL
			2.5	Brown SILT; and mf SAND; some cmf GRAVEL (moist, non-plastic) - soil matrix contained approximately 10% COBBLES
1	4.0'	6.0'		Brown cmf SAND; and cmf GRAVEL; little SILT (moist, non-plastic) w=11.2% - soil matrix contained approximately 30-40% COBBLES and BOULDERS up to 18 inches - Large boulder encountered at 7.0 feet
				Test pit terminated at 9.0 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Very slight seepage between 4.0 and 4.5 feet.
3. Hard digging at 2.5 feet. Very hard digging at 6.0 feet.

ATL Representative: R. Morrison/B. Barnes

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-12
Test Pit Location:	Proposed Tower Center	Date:	8/26/08
		Elevation:	1945±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	6:00	9.0'	See Note 2	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			1.0	12" TOPSOIL and ORGANIC MATERIAL
			2.0	Brown SILT; and mf SAND; little cmf GRAVEL (moist, plastic)
1	7.0'	8.0'		Grey cmf SAND; and cmf GRAVEL; trace SILT (wet, non-plastic) w=13.5% - soil matrix contained approximately 30-40% COBBLES and BOULDERS up to 24 inches - Soil becomes wet at 5.0 feet
				Test pit terminated at 8.0 feet due to sidewall sloughing.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Water seepage between 6.0 and 8.0 feet.
3.

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-18
Test Pit Location:	25' Northeast of Proposed Tower Center	Date:	8/26/08
		Elevation:	1943±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	1:10 PM	10.5'	See Note 2	--
8/26/08	1:15 PM	10.5'	9.0'	1934±

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			0.8	10" TOPSOIL and ORGANIC MATERIAL
			1.8	Brown mf SAND; some SILT; and mf GRAVEL (moist, plastic) - soil matrix contained approximately 10% COBBLES
1	4.0'	6.0'		Brown cmf SAND; some cmf GRAVEL; some SILT (moist, non-plastic) w=11.3% - soil matrix contained approximately 20-30% COBBLES and BOULDERS up to 27 inches - Soil becomes wet at 6.0 feet
				Test pit terminated at 12.5 feet.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Hard digging at 2.5'.
3. Water seepage between 7.0 and 10.5 feet.

ATL Representative: R. Morrison / B. Barnes

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-21
Test Pit Location:	30' South of Proposed Tower Center	Date:	8/26/08
		Elevation:	1951±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	2:30 PM	7.5'	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			1.0	12" TOPSOIL and ORGANIC MATERIAL
			2.0	Brown mf SAND; some cmf GRAVEL; some SILT (moist, plastic)
1	7.0'	8.0'		Grey mf SAND; some cmf GRAVEL; trace SILT (moist, non-plastic) w=8.8% - soil matrix contained approximately 20-30% COBBLES and BOULDERS up to 30 inches
				Test pit terminated at 7.5 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Hard digging at 2.0 feet.
3.

ATL Representative: R. Morrison/B. Barnes

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	WTG-29
Test Pit Location:	Proposed Tower Center	Date:	8/26/08
		Elevation:	1942±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	4:30 PM	9.0'	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			1.0	12" TOPSOIL and ORGANIC MATERIAL
			3.0	Brown mf SAND; some GRAVEL; some SILT (moist, non-plastic)
1	8.0'	9.0'		Grey mf SAND; some GRAVEL; little SILT (moist, non-plastic) w=14.6% - soil matrix contained approximately 20-30% COBBLES and BOULDERS up to 30 inches
				Test pit terminated at 9.0 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Very hard digging at 2.0 feet.
3.

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Project	Test Pit No.:	WTG-33
Test Pit Location:	Proposed Tower Center	Date:	8/26/08
		Elevation:	1932±

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	3:15 PM	7.5'	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			0.8	10" TOPSOIL and ORGANIC MATERIAL
			2.0	Brown SILT; trace f SAND; trace GRAVEL (moist, plastic)
1	4.0'	6.0'		Grey mf SAND; some cmf GRAVEL; trace SILT (moist, non-plastic) w=8.7% - soil matrix contained approximately 20-30% COBBLES and BOULDERS up to 18 inches
				Test pit terminated at 7.5 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Very hard digging at 6.0 feet.
3. Rolling Terrain

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Project	Test Pit No.:	TP-33/34
Test Pit Location:	South side of Denali Highway between	Date:	8/26/08
	turbines WTG-33 and WTG-34	Elevation:	Not Determined

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/26/08	3:30 PM	6.0’	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS (‘C’ COARSE, ‘M’ MEDIUM, ‘F’ FINE) (‘AND’ 35-50%, ‘SOME’ 20-35%, ‘LITTLE’ 10-20%, ‘TRACE’ 0-10%)
			1.0	12” TOPSOIL and ORGANIC MATERIAL
			2.5	Brown mf SAND; little GRAVEL; some SILT (moist, non-plastic)
1	4.0’	6.0’		Brown cmf SAND; and cmf GRAVEL; some SILT (moist, non-plastic) w=11.5% - soil matrix contained approximately 10-20% COBBLES up to 8 inches
				Test pit terminated at 6.0 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Very hard digging at 6.0 feet.
3.

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	TP-SS1A
Test Pit Location:	40' South of Proposed Center of Substation 1	Date:	8/27/08
		Elevation:	Not Determined

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/27/08	12:00 PM	9.5'	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			0.5	6" TOPSOIL and ORGANIC MATERIAL
1	2.0'	3.0'	3.5	Blue SILT; and CLAY (moist, plastic)
2	4.0'	6.0'	7.0	Brown SILT; some CLAY; little mf SAND; trace mf GRAVEL (wet, plastic) w=33.4%
3	8.0'	9.0'		Brown mf SAND; and SILT; some GRAVEL (moist, non-plastic) w=10.5% - soil matrix contained approximately 10-20% COBBLES and BOULDERS up to 8 inches
				Test pit terminated at 9.5 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Hard digging at 9.0 feet.
3.

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	TP-SS1B
Test Pit Location:	30' North of Proposed Center of Substation 1	Date:	8/27/08
		Elevation:	Not Determined

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/27/08	12:30 PM	9.5'	See Note 2	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS ('C' COARSE, 'M' MEDIUM, 'F' FINE) ('AND' 35-50%, 'SOME' 20-35%, 'LITTLE' 10-20%, 'TRACE' 0-10%)
			0.5	6" TOPSOIL and ORGANIC MATERIAL
			5.0	Blue SILT; and CLAY (moist, plastic)
1	6.0'	7.0'	7.0	Brown cmf GRAVEL; some cmf SAND; trace SILT (wet, non-plastic) w=16.4%
				Brown mf SAND; and SILT; little GRAVEL (moist, non-plastic) - soil matrix contained approximately 10-20% COBBLES up to 8 inches
				Test pit terminated at 9.5 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Slight water seepage at 7.0 feet.
3. Hard digging at 9.0 feet.

ATL Representative: R. Morrison

ATLANTIC TESTING LABORATORIES

TEST PIT LOG

Client:	ATL Engineering, PC	Project No.:	CD2907
Project:	Roaring Brook Wind Power Project	Test Pit No.:	TP-SS2
Test Pit Location:	Proposed Center of Substation 2	Date:	8/27/08
		Elevation:	Not Determined

GROUNDWATER OBSERVATIONS

Date	Time	Hole Depth	Water Depth	Water Elevation
8/27/08	1:00 PM	8.0’	None Observed	--

SOIL STRATIGRAPHY

Sample Number	Depth of Sample From	Depth of Sample To	Depth of Change	CLASSIFICATION OF MATERIALS (‘C’ COARSE, ‘M’ MEDIUM, ‘F’ FINE) (‘AND’ 35-50%, ‘SOME’ 20-35%, ‘LITTLE’ 10-20%, ‘TRACE’ 0-10%)
			0.5	6” TOPSOIL and ORGANIC MATERIAL
			2.5	Brown SILT; and mf SAND (moist, plastic)
1	3.0’	6.0’		Brown cmf SAND; some SILT; some cmf GRAVEL (moist, non-plastic) w=9.9% - soil matrix contained approximately 10-20% COBBLES and BOULDERS up to 8 inches
				Test pit terminated at 8.0 feet due to bucket refusal.

NOTES

1. Type of Excavator: Komatsu WB140 Rubber Tired Backhoe
2. Hard digging at 9.0 feet.
3. Test pit located on a slope.

ATL Representative: R. Morrison

APPENDIX D

SELECT PHOTOGRAPHS

Photograph 1: **View of test pit WTG-10.**

Photograph 2: **View of test pit WTG-12.**

Photograph 3: **View of test pit WTG-18.**

Photograph 4: **View of test pit WTG-29.**

Photograph 5: **View of test pit TP-SS1B**

Photograph 6: **View of test pit TP-SS2**

APPENDIX E

TEST PIT SUMMARY TABLES

ATLANTIC TESTING LABORATORIES

Table 1

Preliminary Subsurface Investigation Summary
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

	Field Investigation		Laboratory Analysis					
Test Pit No.	**Test Pit**	**Electrical Resistivity**	**Particle Size Analysis**	**Natural Moisture**	**Atterberg Limits**	**Laboratory Compaction**	**Chemical Analysis**	**Thermal Resistivity**
WTG-2	1	1	1	1	1	1		
WTG-10	1	1	1	1	1	1	1	1
WTG-12	1			1				
WTG-18	1		1	1	1	1	1	1
WTG-21	1	1		1				
WTG-29	1	1		1				
WTG-33	1			1				
TP-33/34	1		1	1	1	1	1	1
TP-SS1A	1	1	1	1	1	1		
TP-SS1B	1			1				
TP-SS2	1	1	1	1				

Table 2

Test Pit Summary
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

		Test Pit Data	
Test Pit No.	**Date**	**Water Depth (ft)**	**Termination Depth (ft)**
WTG-2	08/27/08	None Observed	9.0
WTG-10	08/26/08	4.0	9.0
WTG-12	08/26/08	6.0	8.0
WTG-18	08/26/08	7.0	10.5
WTG-21	08/26/08	None Observed	7.5
WTG-29	08/26/08	None Observed	9.0
WTG-33	08/26/08	None Observed	7.5
TP-33/34	08/26/08	None Observed	6.0
TP-SS1A	08/27/08	None Observed	9.5
TP-SS1B	08/27/08	7.0	9.5
TP-SS2	08/27/08	None Observed	8.0

Remarks:

Water depths are estimated based on field observations.

APPENDIX F

SOIL RESISTIVITY TEST FIELD REPORTS

ATLANTIC TESTING LABORATORIES, Limited

Soil Resistivity Test Field Report

JOB NO: CD2907
DATE: 19-Sep-08

Field Technician: R. Morrison
Test Instrument: Nilsson Model 400
Procedure: 4 point soil resistivity test

LOCATION (attach map)	DEPTH TESTED (spacing in feet)	METER READING (ohms)	CALCULATED SOIL RESISTIVITY =191.5 x SPACING (ft) x R (ohms)
WTG-21#1	5	140	134,050
	10	110	210,650
	15	107	307,378
	20	92	352,360
WTG-21#2	5	330	315,975
	10	170	325,550
	15	95	272,888
	20	57	218,310
WTG-29#1	5	240	229,800
	10	120	229,800
	15	63	180,968
	20	41	157,030
WTG-29#2	5	250	239,375
	10	150	287,250
	15	73	209,693
	20	48	183,840
WTG-2#1	5	550	526,625
	10	120	229,800
	15	94	270,015
	20	57	218,310
WTG-2#2	5	230	220,225
	10	150	287,250
	15	79	226,928
	20	61	233,630
WTG-10#1	5	250	239,375
	10	120	229,800
	15	62	178,095
	20	51	195,330
WTG-10#2	5	200	191,500
	10	104	199,160
	15	41	117,773
	20	23	88,090

ATLANTIC TESTING LABORATORIES, Limited

Soil Resistivity Test Field Report (con't)

Test Instrument: Nilsson Model 400
Procedure: 4 point soil resistivity test

LOCATION (attach map)	DEPTH TESTED (spacing in feet)	METER READING (ohms)	CALCULATED SOIL RESISTIVITY =191.5 x SPACING (ft) x R (ohms)
TP-SS1#1	5	8.5	8,139
	10	5.8	11,107
	15	4.8	13,788
	20	4.5	17,235
TP-SS1#2	5	5.1	4,883
	10	4.4	8,426
	15	4.1	11,777
	20	3.7	14,171
TP-SS2#1	5	9.8	9,384
	10	6.3	12,065
	15	6.3	18,097
	20	5.7	21,831
TP-SS2#2	5	7.5	7,181
	10	6.1	11,682
	15	5.3	15,224
	20	4.9	18,767

APPENDIX G

PARTICLE SIZE ANALYSIS SUMMARY TABLE

ATLANTIC TESTING LABORATORIES

Table 3

Particle Size Analysis Results
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Test Pit No.	Sample No.	Depth (ft)	Percent Passing										
			4"	3"	2"	1"	¾"	½"	#4	#10	#40	#200	0.005 (mm)
WTG-2	S-1	8.0-9.0	100	98	84	75	71	66	54	46	36	21	--
WTG-10	S-1	4.0-6.0	100	100	90	84	80	75	64	57	45	26	--
WTG-18	S-1	7.0-8.0	100	100	99	91	87	82	70	59	47	24	--
TP-33/34	S-1	4.0-6.0	100	100	98	84	81	75	64	59	49	23	--
TP-SS1A	S-1	4.0-6.0	100	100	100	100	99	99	97	97	93	83	28
TP-SS2	S-1	3.0-6.0	100	100	94	90	88	85	78	72	59	32	--

APPENDIX H

ATTERBERG LIMITS RESULTS TABLE

Table 4

Atterberg Limits Results
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Test Pit No.	Sample No.	Depth (ft)	USCS Soil Classification	Plastic Limit	Liquid Limit	Plasticity Index
WTG-2	S-1	8.0-9.0	GM	NP	NP	NP
WTG-10	S-1	4.0-6.0	SM	NP	NP	NP
WTG-18	S-1	4.0-6.0	SM	NP	NP	NP
TP-33/34	S-1	4.0-6.0	SM	NP	NP	NP
TP-SS1A	S-1	4.0-6.0	CL	19	27	8

Remarks:

NP indicates non-plastic.

APPENDIX I

LABORATORY COMPACTION RESULTS TABLE

Table 5

Laboratory Compaction Results
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Test Pit No.	Sample No.	Depth (ft)	Natural Moisture Content (%)	Optimum Moisture Content (%)	Maximum Dry Density (pcf)
WTG-2	S-1	8.0-9.0	9.8	5.7	139.2
WTG-10	S-1	4.0-6.0	11.2	5.6	138.6
WTG-18	S-1	7.0-8.0	11.3	6.4	132.0
TP-33/34	S-1	4.0-6.0	11.5	5.3	138.9
TP-SS1A	S-1	4.0-6.0	33.4	12.8	117.4
TP-SS2	S-1	3.0-6.0	9.9	5.5	138.3

APPENDIX J

TABLE OF CHEMICAL ANALYSIS

Table 6

Chemical Analysis Results
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Test Pit No.	Sample No.	Depth (ft)	Chemical Analysis		
			pH (S.U.)	Chlorides (%)	Soluble Sulfate (%)
WTG-10	S-1	4.0-6.0	6.0	<0.1	<0.1
WTG-18	S-1	4.0-6.0	6.3	<0.1	<0.1
TP-33/34	S-1	4.0-6.0	6.1	<0.1	<0.1

APPENDIX K

TABLE OF THERMAL RESISTIVITY RESULTS

Table 7

Thermal Resistivity Results
Roaring Brook Wind Power Project
ATL Report No. CD2907E-01-08-08

Test Pit No.	Moisture (%)	Temp (C)	R^2	Mk/w
WTG-10	Dry	25.9	1.0000	4.231
WTG-10	11.2	24.2	0.9999	0.491
WTG-18	Dry	26.0	0.9999	6.953
WTG-18	11.3	25.3	0.9996	0.634
TP-33/34	Dry	25.5	1.0000	5.128
TP-33/34	11.5	24.2	0.9994	0.503

APPENDIX L

LABORATORY TEST REPORTS

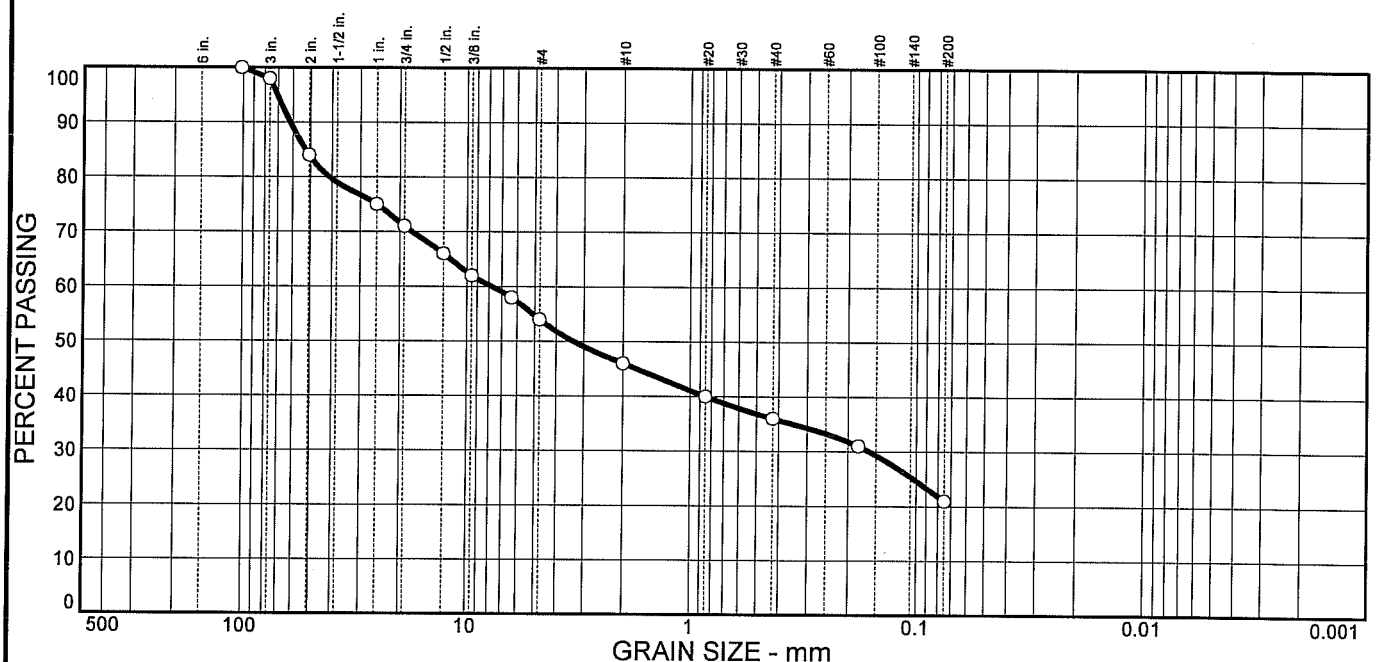
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2907SL-01-09-08

Client: ATL Engineering, P.C. **Date:** 9/23/08

Sample No: S-1 **Source of Sample:** WTG-2

Location: In-Situ **Elev./Depth:** 8.0 - 9.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
2	27	17	8	10	15	21	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
4 in.	100		
3 in.	98		
2 in.	84		
1 in.	75		
3/4 in.	71		
1/2 in.	66		
3/8 in.	62		
1/4 in.	58		
#4	54		
#10	46		
#20	40		
#40	36		
#80	31		
#200	21		

* (no specification provided)

Soil Description

Brown cmf GRAVEL; some cmf SAND; some SILT; trace COBBLES

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 52.7 D_{60}= 7.79 D_{50}= 3.33
D_{30}= 0.161 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= GM AASHTO=

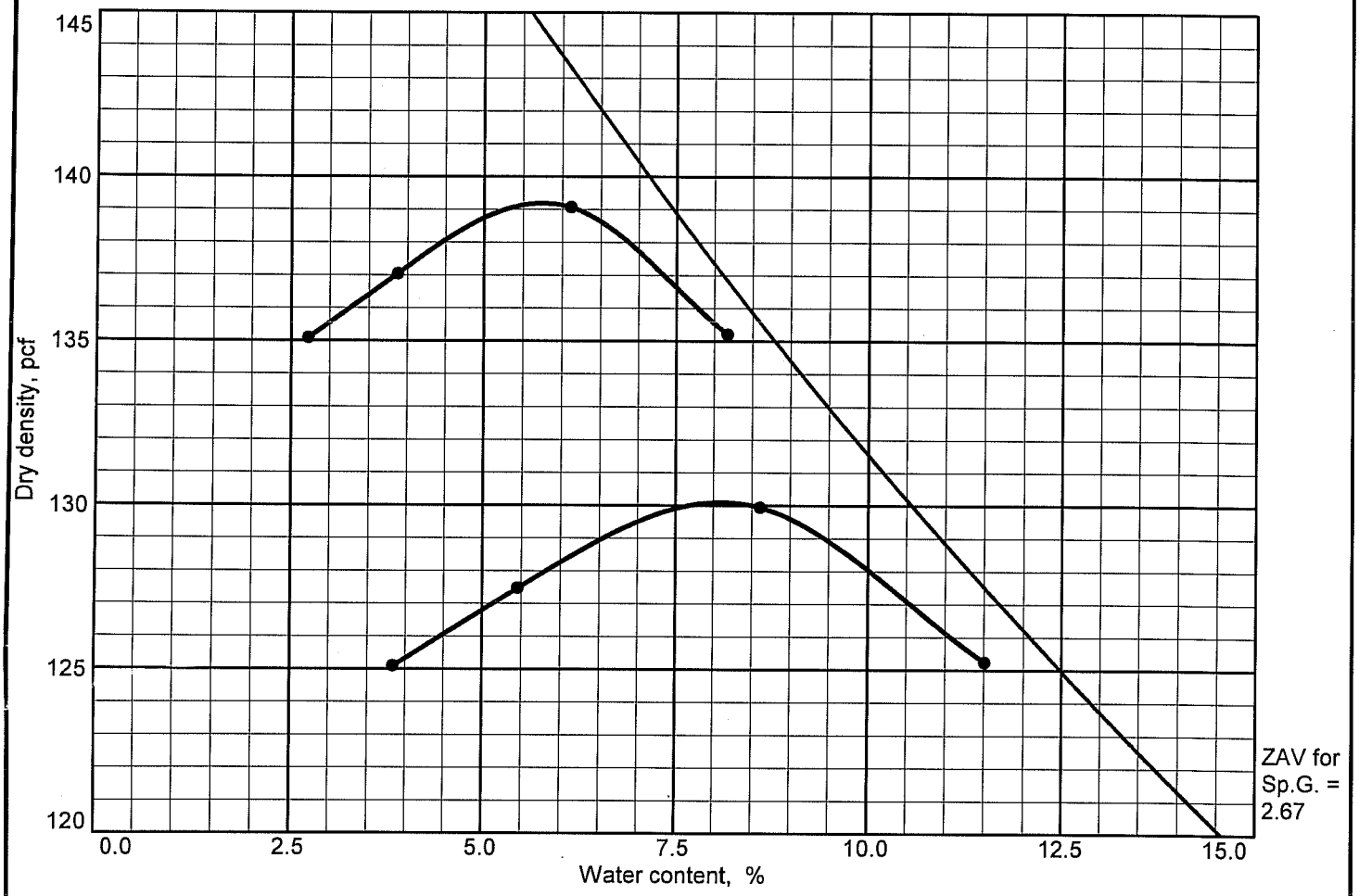
Remarks

Sample collected by R. Morrison on 8/27/08.
Moisture content 9.8%

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Anstey Date: 9/29/08

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Procedure C Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > 3/4 in.
	USCS	AASHTO						
8.0 - 9.0'	GM		9.8	2.67	NP	NP	NP	29.0

TEST RESULTS

Maximum dry density = 139.2 pcf

Optimum moisture = 5.7 %

MATERIAL DESCRIPTION

Brown cmf GRAVEL; some cmf SAND; some SILT; trace COBBLES

Report No.: CD2907SL-01-09-08 **Client:** ATL Engineering, P.C.
Project: Proposed Roaring Brook Wind Project
Sample No.: S-1 **Source of Sample:** WTG-2
Location: In-Situ **Date:** 9/23/08

Remarks:
Sample collected by R. Morrison on 8/27/08.
Dry preparation

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Rammer: Mechanical
Specific Gravity: Assumed

Reviewed by: Ryan Autry

Date: 9/29/08

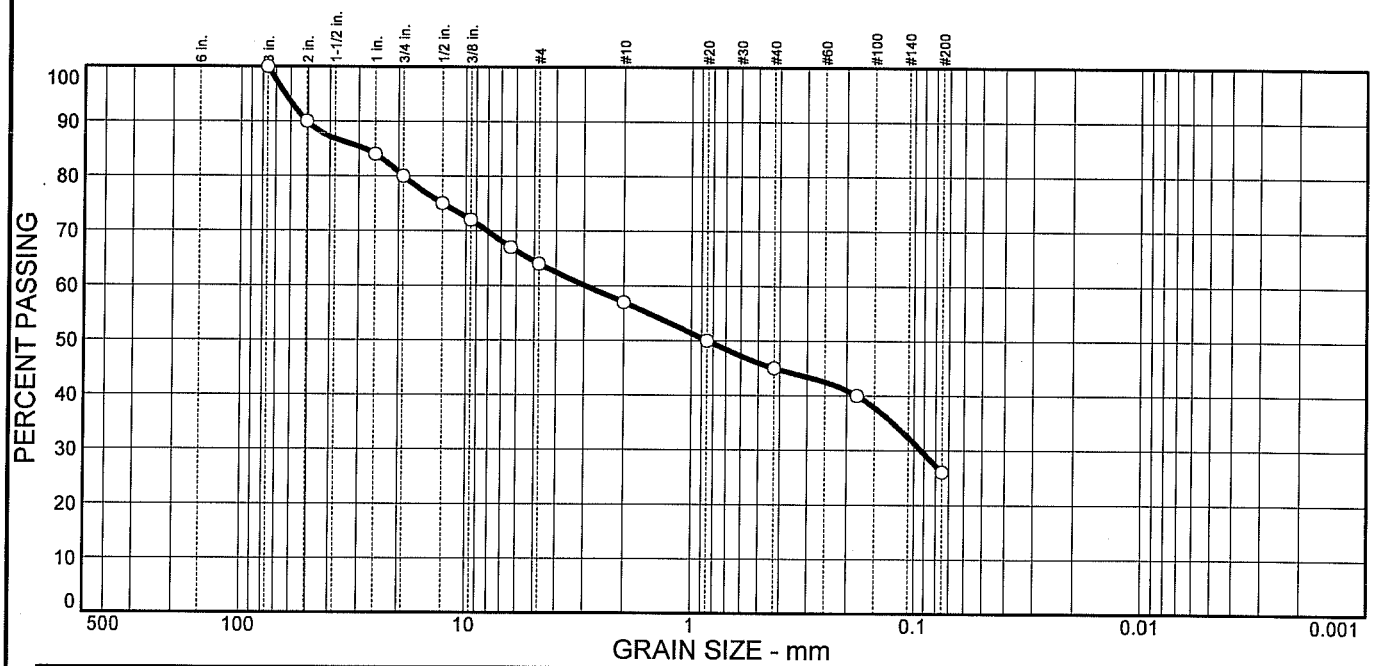
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2907SL-02-09-08

Client: ATL Engineering, P.C. **Date:** 9/23/08

Sample No: S-1 **Source of Sample:** WTG-10

Location: In-Situ **Elev./Depth:** 4.0 - 6.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	20	16	7	12	19	26	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
3 in.	100		
2 in.	90		
1 in.	84		
3/4 in.	80		
1/2 in.	75		
3/8 in.	72		
1/4 in.	67		
#4	64		
#10	57		
#20	50		
#40	45		
#80	40		
#200	26		

* (no specification provided)

Soil Description

Brown cmf SAND; and cmf GRAVEL; little SILT

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 28.3 D_{60}= 2.95 D_{50}= 0.850
D_{30}= 0.0929 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

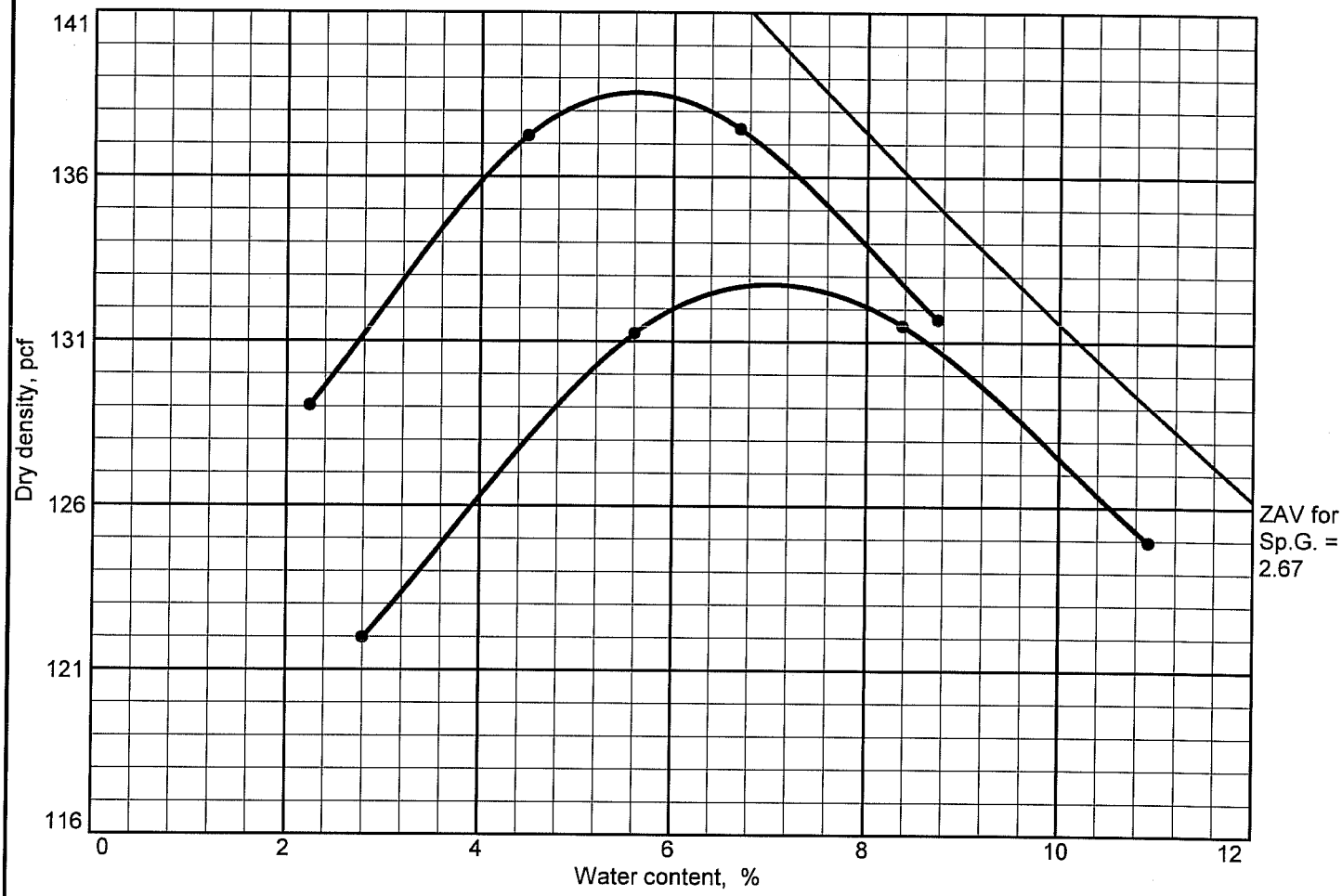
Remarks

Sample collected by R. Morrison on 8/26/08.
Moisture content 11.2%

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Anthony Date: 9/29/08

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Procedure C Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > 3/4 in.
	USCS	AASHTO						
4.0 - 6.0'	SM		11.2	2.67	NP	NP	NP	20.0

TEST RESULTS

Maximum dry density = 138.6 pcf

Optimum moisture = 5.6 %

MATERIAL DESCRIPTION

Brown cmf SAND; and cmf GRAVEL; little SILT

Report No.: CD2907SL-02-09-08 **Client:** ATL Engineering, P.C.
Project: Proposed Roaring Brook Wind Project
Sample No.: S-1 **Source of Sample:** WTG-10
Location: In-Situ **Date:**

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Remarks:
Sample collected by R. Morrison on 8/26/08.
Dry preparation

Rammer: Mechanical
Specific Gravity: Assumed

Reviewed by: Ryan Anthony

Date: 9/29/08

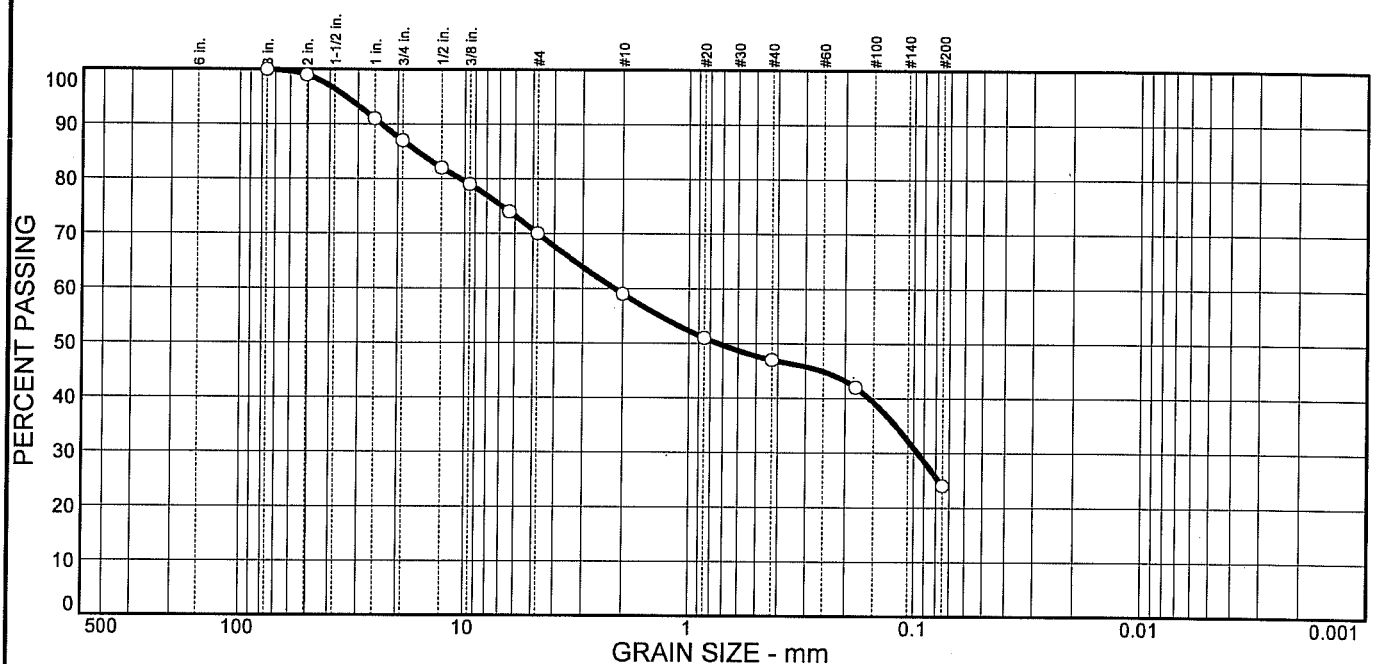
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2722SL-03-09-08

Client: ATL Engineering, P.C. **Date:** 9/23/08

Sample No: S-1 **Source of Sample:** WTG-18

Location: In-Situ **Elev./Depth:** 4.0 - 6.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	13	17	11	12	23	24	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
3 in.	100		
2 in.	99		
1 in.	91		
3/4 in.	87		
1/2 in.	82		
3/8 in.	79		
1/4 in.	74		
#4	70		
#10	59		
#20	51		
#40	47		
#80	42		
#200	24		

* (no specification provided)

Soil Description

Brown cmf+ SAND; some cmf GRAVEL; some SILT

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 16.4 D_{60}= 2.18 D_{50}= 0.740
D_{30}= 0.0961 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

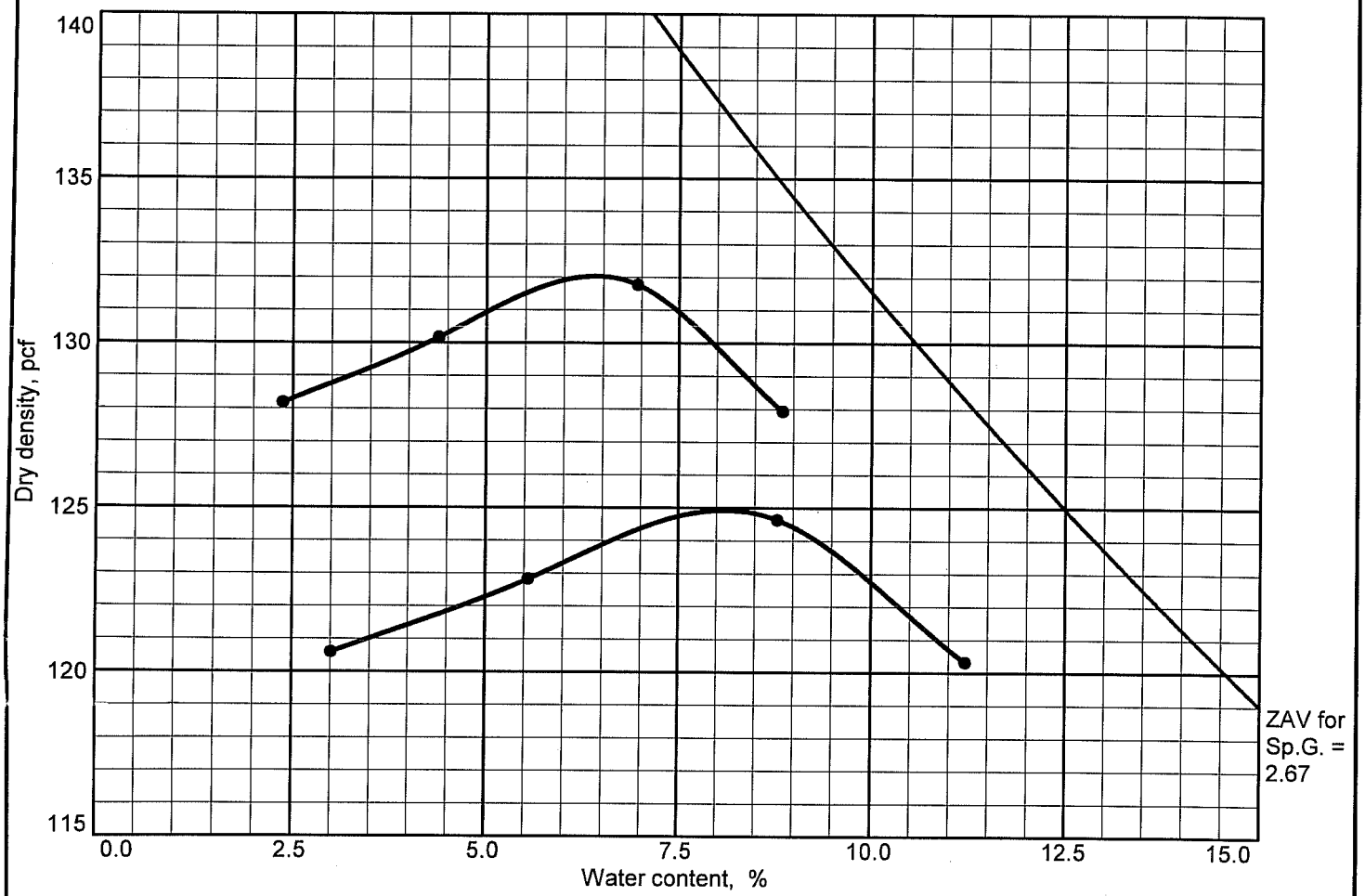
Remarks

Sample collected by R. Morrison on 8/26/08.
Moisture content 11.3%

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Chaney Date: 9/29/08

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Procedure B Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > 3/8 in.
	USCS	AASHTO						
4.0 - 6.0'	SM		11.3	2.67	NP	NP	NP	21.0

TEST RESULTS

Maximum dry density = 132.0 pcf

Optimum moisture = 6.4 %

MATERIAL DESCRIPTION

Brown cmf+ SAND; some cmf GRAVEL; some SILT

Report No.: CD2722SL-03-09-08 **Client:** ATL Engineering, P.C.
Project: Proposed Roaring Brook Wind Project
Sample No.: S-1 **Source of Sample:** WTG-18
Location: In-Situ **Date:**

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Remarks:
Sample collected by R. Morrison on 8/26/08.
Dry preparation

Rammer: Mechanical
Specific Gravity: Assumed

Reviewed by: Ryan Anthony

Date: 9/29/08

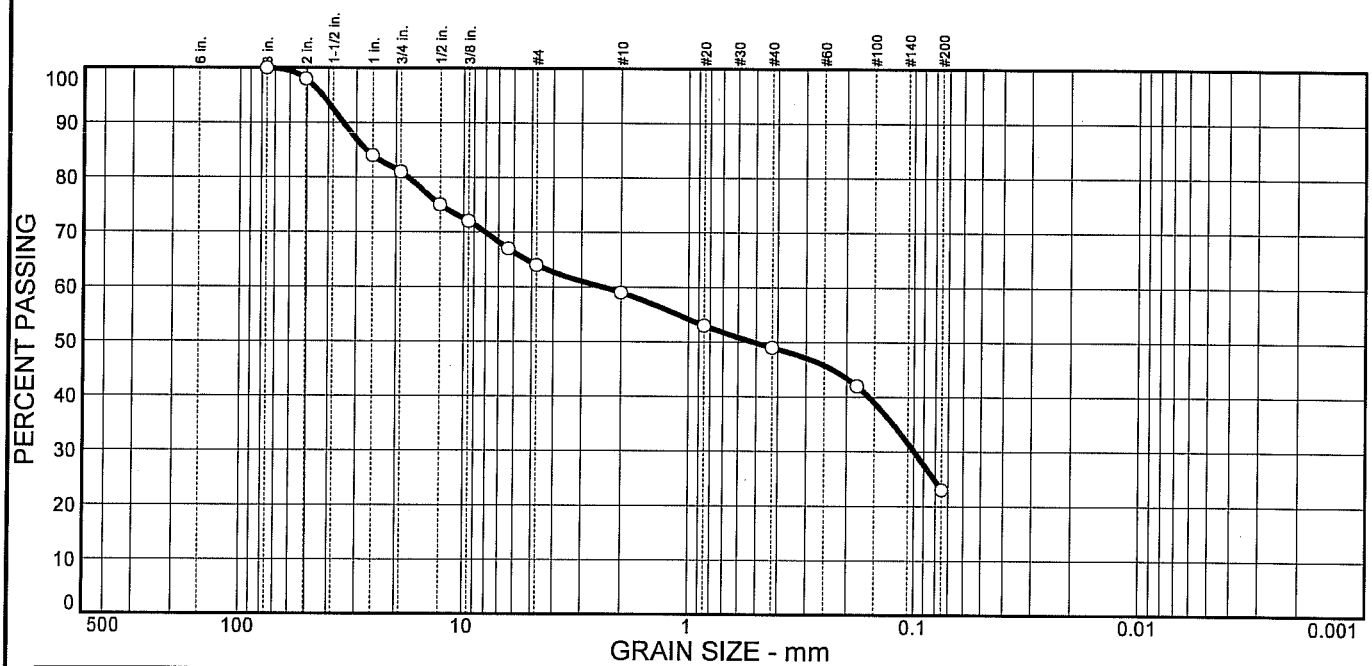
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2907SL-04-09-08

Client: ATL Engineering, P.C. **Date:** 9/23/08

Sample No: S-1 **Source of Sample:** TP-33/34

Location: In-Situ **Elev./Depth:** 4.0 - 6.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	19	17	5	10	26	23	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
3 in.	100		
2 in.	98		
1 in.	84		
3/4 in.	81		
1/2 in.	75		
3/8 in.	72		
1/4 in.	67		
#4	64		
#10	59		
#20	53		
#40	49		
#80	42		
#200	23		

* (no specification provided)

Soil Description

Brown cmf+ SAND; and cmf GRAVEL; some SILT

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 27.1 D_{60}= 2.42 D_{50}= 0.515
D_{30}= 0.0995 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

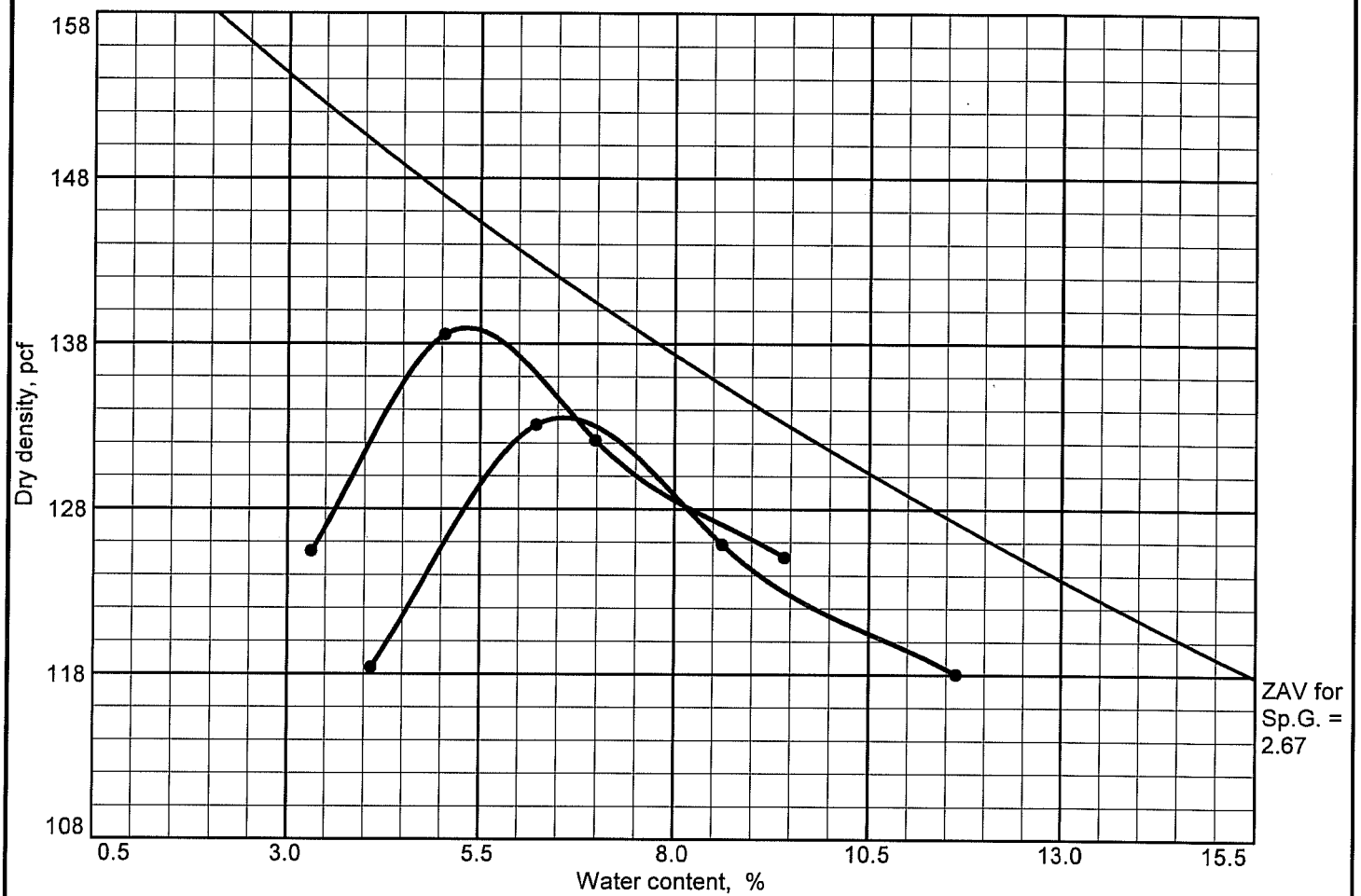
Remarks

Sample collected by R. Morrison on 8/26/08.
Moisture content 11.5%

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Ahting Date: 9/29/08

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Procedure C Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > 3/4 in.
	USCS	AASHTO						
4.0 - 6.0'	SM		11.5	2.67	NP	NP	NP	19.0

TEST RESULTS

Maximum dry density = 138.9 pcf

Optimum moisture = 5.3 %

MATERIAL DESCRIPTION

Brown cmf+ SAND; and cmf GRAVEL; some SILT

Report No.: CD2907SL-04-09-08 **Client:** ATL Engineering, P.C.
Project: Proposed Roaring Brook Wind Project
Sample No.: S-1 **Source of Sample:** TP-33/34
Location: In-Situ **Date:** 9/23/08

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Remarks:
Sample collected by R. Morrison on 8/26/08.
Dry preparation

Rammer: Mechanical
Specific Gravity: Assumed

Reviewed by: Ryan A. Tang

Date: 9/29/08

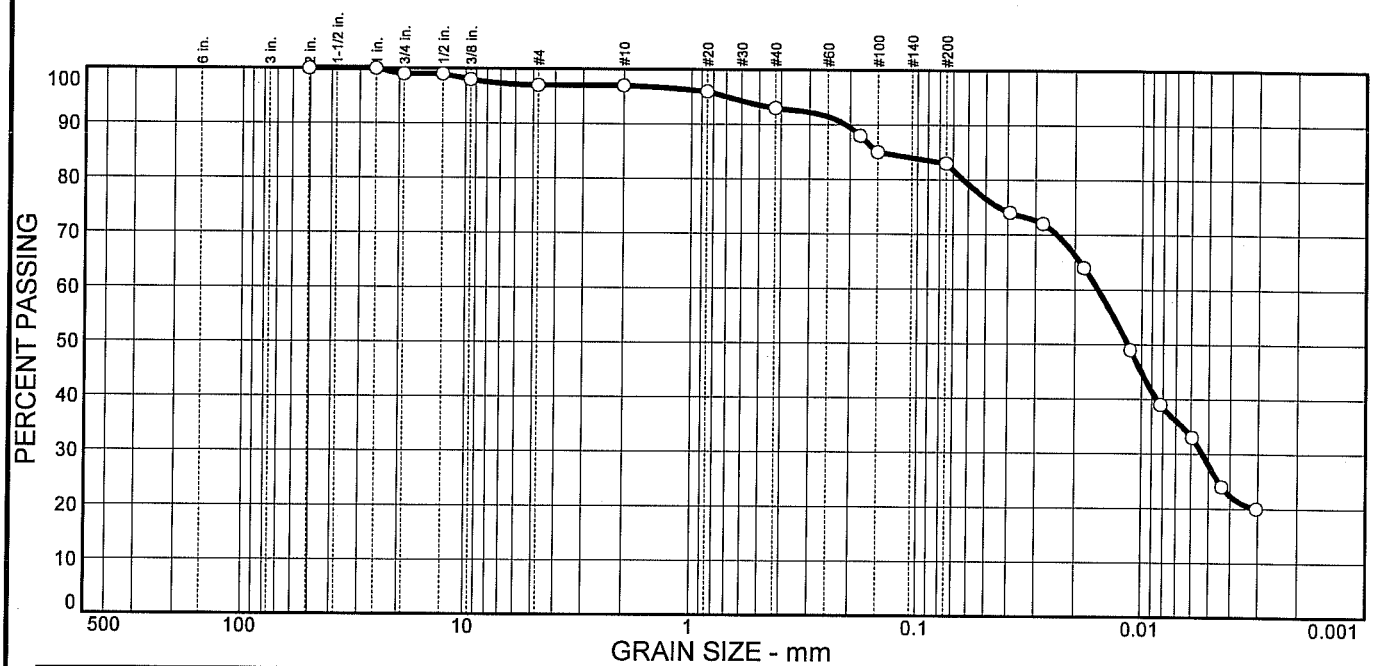
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2907SL-05-09-08

Client: ATL Engineering, P.C. **Date:** 09/23/08

Sample No: S-1 **Source of Sample:** TP-SS1A

Location: In-Situ **Elev./Depth:** 2.0 - 3.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	1	2	0	4	10	55	28

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
2 in.	100		
1 in.	100		
3/4 in.	99		
1/2 in.	99		
3/8 in.	98		
#4	97		
#10	97		
#20	96		
#40	93		
#80	88		
#100	85		
#200	83		

* (no specification provided)

Soil Description

Brown SILT; some CLAY; little mf SAND; trace mf GRAVEL

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{85}= 0.150 D_{60}= 0.0158 D_{50}= 0.0115
D_{30}= 0.0053 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

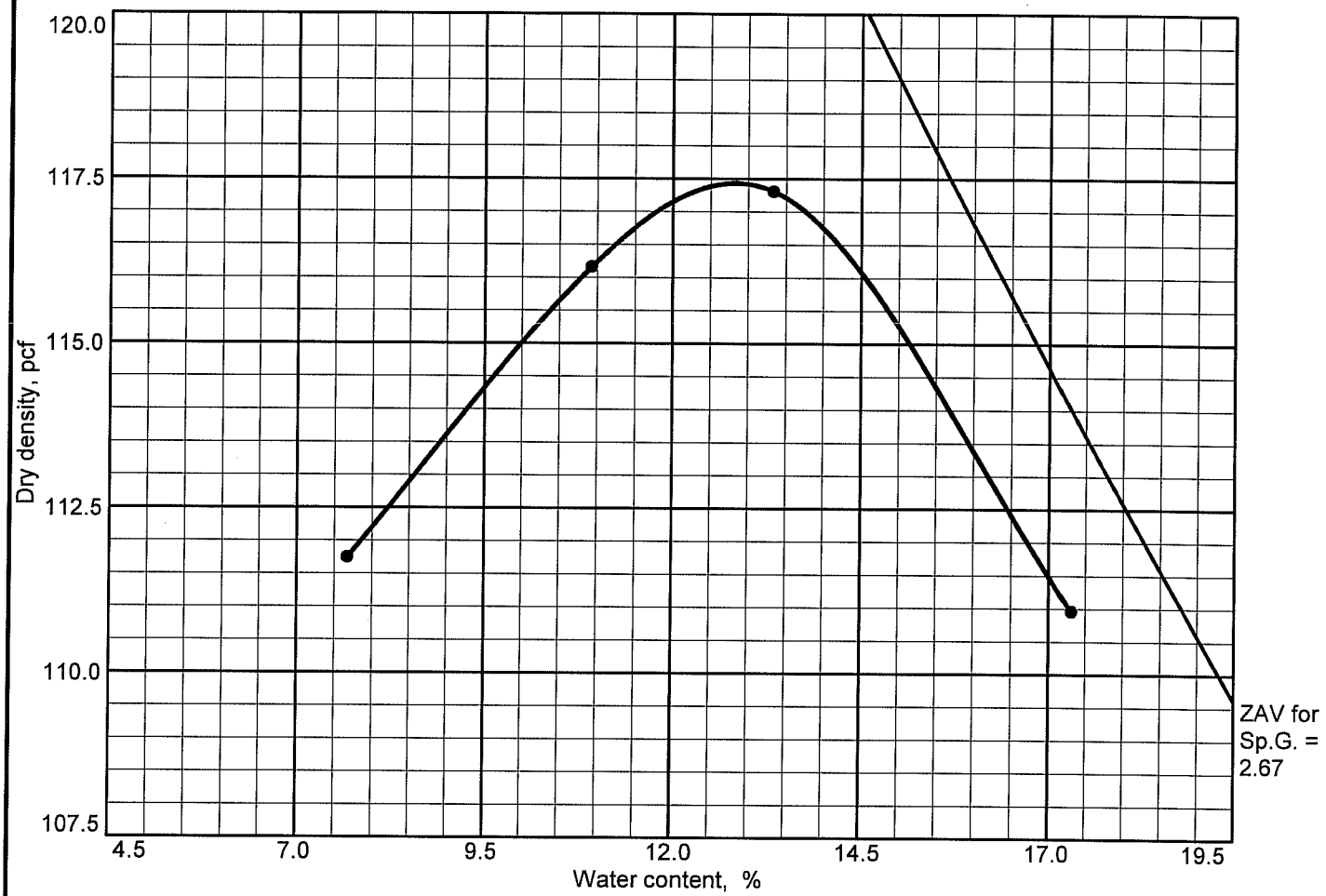
Remarks

Sample collected by R. Morrison on 08/27/08.
Moisture content 26.5%

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Autry Date: 9/26/08

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Procedure A Modified

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > No.4
	USCS	AASHTO						
2.0 - 3.0'	CL		26.5	2.67	27	19	8	3.0

TEST RESULTS

Maximum dry density = 117.4 pcf

Optimum moisture = 12.8 %

MATERIAL DESCRIPTION

Brown SILT; some CLAY; little mf SAND; trace mf GRAVEL

Report No.: CD2907SL-05-09-08 **Client:** ATL Engineering, P.C.

Project: Proposed Roaring Brook Wind Project

Sample No.: S-1 **Source of Sample:** TP-SS1A

Location: In-Situ **Date:** 9/23/08

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Remarks:

Sample collected by R. Morrison on 8/27/08.
Dry preparation

Rammer: Mechanical

Specific Gravity: Assumed

Reviewed by: Ryan Autry

Date: 9/29/08

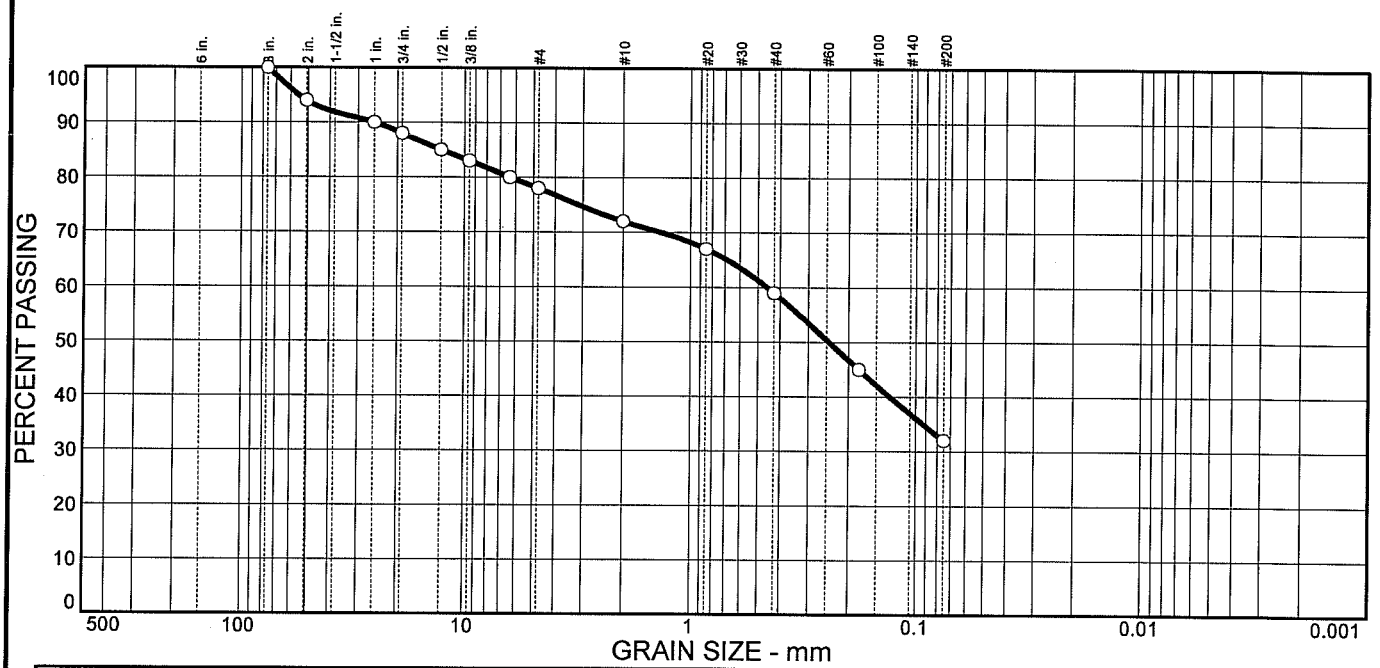
Particle Size Distribution Report

Project: Proposed Roaring Brook Wind Project **Report No.:** CD2907SL-06-09-08

Client: ATL Engineering, P.C. **Date:** 9/23/08

Sample No: S-1 **Source of Sample:** TP-SS2

Location: In-Situ **Elev./Depth:** 3.0 - 6.0'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	12	10	6	13	27	32	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
3 in.	100		
2 in.	94		
1 in.	90		
3/4 in.	88		
1/2 in.	85		
3/8 in.	83		
1/4 in.	80		
#4	78		
#10	72		
#20	67		
#40	59		
#80	45		
#200	32		

Soil Description

Brown cmf+ SAND; some SILT; some cmf GRAVEL

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 12.7 D_{60}= 0.456 D_{50}= 0.243
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample collected by R. Morrison on 8/27/08.
Moisture content 9.9%

* (no specification provided)

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Ryan Anthony Date: 9/29/08

COMPACTION TEST REPORT

Test specification: ASTM D 1557-00 Procedure A Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Received Moist.	Sp.G.	LL	PL	PI	% > No.4
	USCS	AASHTO						
3.0 - 6.0'	SM		9.9	2.67	NP	NP	NP	12.0

TEST RESULTS

Maximum dry density = 138.3 pcf

Optimum moisture = 5.5 %

MATERIAL DESCRIPTION

Brown cmf+ SAND; some SILT; some cmf GRAVEL

Report No.: CD2907SL-06-09-08 **Client:** ATL Engineering, P.C.
Project: Proposed Roaring Brook Wind Project
Sample No.: S-1 **Source of Sample:** TP-SS2
Location: In-Situ **Date:**

COMPACTION TEST REPORT

ATLANTIC TESTING LABORATORIES, LIMITED

Remarks:
Sample collected by R. Morrison on 8/27/08.
Dry preparation

Rammer: Mechanical
Specific Gravity: Assumed

Reviewed by: Ryan Anthony

Date: 9/29/08

Environmental
LABORATORY SERVICES

7280 Caswell Street, Hancock Air Park, North Syracuse, NY 13212
(315) 458-8033, FAX (315) 458-0526, (800) 842-4667

Laboratory Analysis Report

ATLANTIC TESTING LABORATORIES
P.O. Box 29
6431 U.S. Highway 11
Canton, NY 13617
ATTN: Mr. Ryan Armstrong

PO#: 70994

PROJECT #: 230320
RECEIVED: 09/16/2008 @ 09:30

Site Address:
ROARING BROOK WIND FARM

CLIENT JOB NUMBER: CD2907

TEST PERFORMED	RESULTS	UNITS	DATE/TIME PERFORMED	METHOD NUMBER	PERFORMED BY
SAMPLE #: 487072 **CLIENT SAMPLE ID:** T-110, S-1				**DATE/TIME SAMPLED:** 08/26/08 @ 13:10	
CHLORIDE	210	MG/KG DRY WT.	09/22/08	EPA 325.2	KCH
SOLIDS, TOTAL	89	PERCENT	09/18/08	SM18 2540B	KCH
SULFATE, SOLUBLE	720	MG/KG DRY WT.	09/22/08	EPA 375.2	KCH
SAMPLE #: 487073 **CLIENT SAMPLE ID:** T-118, S-1				**DATE/TIME SAMPLED:** 08/26/08 @ 13:10	
CHLORIDE	130	MG/KG DRY WT.	09/22/08	EPA 325.2	KCH
SOLIDS, TOTAL	88	PERCENT	09/18/08	SM18 2540B	KCH
SULFATE, SOLUBLE	800	MG/KG DRY WT.	09/22/08	EPA 375.2	KCH
SAMPLE #: 487074 **CLIENT SAMPLE ID:** T-133/T-134, S-1				**DATE/TIME SAMPLED:** 08/26/08 @ 15:30	
CHLORIDE	150	MG/KG DRY WT.	09/22/08	EPA 325.2	KCH
SOLIDS, TOTAL	87	PERCENT	09/18/08	SM18 2540B	KCH
SULFATE, SOLUBLE	960	MG/KG DRY WT.	09/22/08	EPA 375.2	KCH

ATLANTIC TESTING LABORATORIES
P.O. Box 29
6431 U.S. Highway 11
Canton, NY 13617
ATTN: Mr. Ryan Armstrong

PO#: 70994

PROJECT #: 230320
RECEIVED: 09/16/2008 @ 09:30

Site Address:
ROARING BROOK WIND FARM

CLIENT JOB NUMBER: CD2907

TEST PERFORMED	RESULTS	UNITS	DATE/TIME PERFORMED	METHOD NUMBER	PERFORMED BY

Sample Receipt Temperature: 19.6Degrees C
Samples received above acceptable temperature requirements of 0-6 degrees C.

David R. Hill
Laboratory Director

09/23/2008
Print Date

All tests performed under NYS ELAP Laboratory Certification # 11375 unless otherwise stated.
Report relates only to the samples as received by the laboratory and shall not be reproduced except in full, without written approval from Environmental Laboratory Services.

Environmental
LABORATORY SERVICES

ATLANTIC TESTING LABORATORIES

ENVIRONMENTAL - CHAIN OF CUSTODY

230320

№ 2556

Albany
22 Corporate Drive
Clifton Park, NY 12065
518/383-9144 (T)
518/383-9166 (F)

Binghamton
406 North Street
Endicott, NY 13670
607/757-9326 (T)
607/757-9252 (F)

Canton
6431 U.S. Highway 11
Canton, NY 13617
315/386-4578 (T)
315/386-1012 (F)

Plattsburgh
1080 Military Turnpike
Plattsburgh, NY 12901
518/563-5878 (T)
518/562-1321 (F)

Poughkeepsie
251 Upper North Road
Highland, NY 12590
845/691-6098 (T)
845/691-6099 (F)

Syracuse
6085 Court Street Road
Syracuse, NY 13206
315/699-5281 (T)
315/699-3374 (F)

Utica
301 St. Anthony Street
Utica, NY 13501
315/735-3309 (T)
315/735-0742 (F)

Watertown
P.O. Box 91
Felts Mills, NY 13638
315/773-5390 (T)
315/773-0334 (F)

Project No.	Client Name	QA/QC Code	Parameters	Report Distribution
CD2907	ATL Engineering, P.C.	☐NYSDEC ☐SW-846 ☐NYSDOH ☐CLP ☐Other	Chloride; Soluble Sulfate	Dates Required: std 10/1/08
Page 1 of 1				Send Reports To: rarmstrong
Project Contact:		Project Location		Fax Results: ☐Yes ☐No
Project Name:	Roaring Brook Wind Farm			

Date	Time	Sample Location	Sample Type	No. of Containers	Chloride	Soluble Sulfate	Laboratory Identification No.	Field Notes
		T-110; S-1	GS	1	x	x	487072	
		T-118; S-1	GS	1	x	x	487073	
		T-133/T-134; S-1	GS	1	x	x	487074	

Custody Seal: X = intact

Sampler's Name:		Date:		Received for Name:	Dmyslee	Date:	9/16/08	Shipment Rec'd Intact?
Sampler's Signature:		Time:		Laboratory Signature:		Time:	930Am	☐Yes ☐No

Samples Relinquished By:				Samples Received By:				Sample Type Code Key:			Laboratory Remarks
Name:	Ryan Armstrong	Date:	9/15/8	Name:		Date:		Description: C Composite; G Grab; Q QA/QC; O Other	Matrix: DW Drinking Water; GW Groundwater; O Oil; S Soil; SL Sludge; WW Wastewater		19.6°C
Signature:		Time:	16:00	Signature:		Time:					
Name:		Date:		Name:		Date:					
Signature:		Time:		Signature:		Time:					

Think Quality

Distribution: White with Samples
Yellow to Laboratory
Pink to ATL Files

PO# 70994

OF-7E
Revised: 11/02