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STETSON II WIND PROJECT

T8 R 4 NBPP

Supplemental Soils Report

Prepared for:

STANTEC
(Formerly known as Woodlot Alternatives)
(UPC Wind Management, LLC)
30 Park Drive
Topsham, ME 04086

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1.0 Introduction

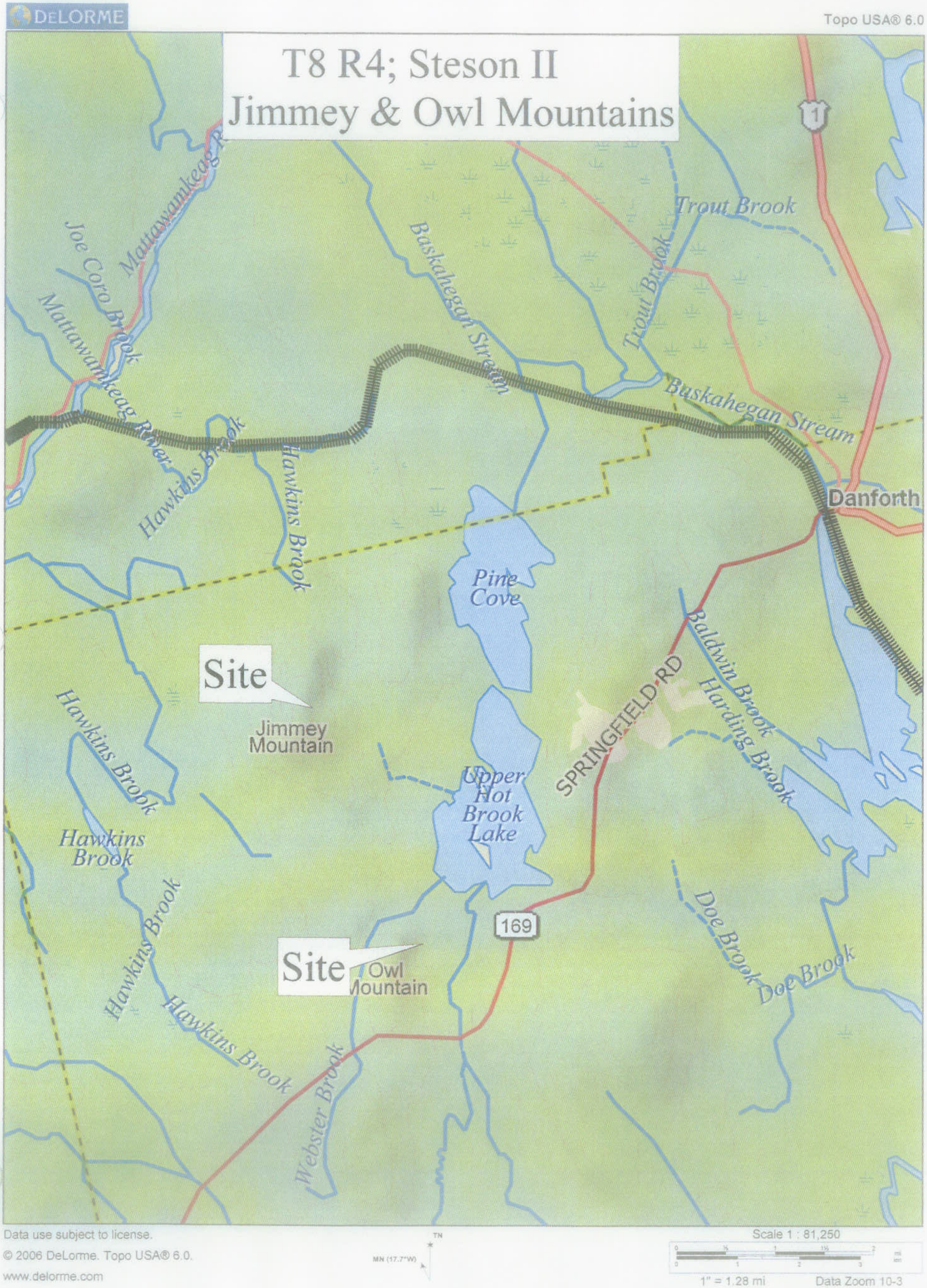
Albert Frick Associates is pleased to provide the enclosed Class C Medium-High Intensity soil survey for the proposed Stetson II Wind Power project in Township 8, Range 4 NBPP in northern Washington County, Maine.

1.1 Purpose

The purpose of our investigation was to provide taxonomic classification for the various soils identified on the 580 +/- acre project site, to better quantify limitations for development, with respect to soil drainage, physical properties and/or depths to bedrock class. Specifically, our investigation was intended to yield a Class C Medium-High Intensity level of soils mapping for the proposed project, to verify and upgrade the Class D medium intensity soil survey information published by the USDA Natural Resources Conservation Service for Washington County.

1.2 Appendices

This report is subject to the limitations specified in Appendix A. Appendix B contains a reduced 11" x 17" copy of the Class C Medium-High Intensity Soil Survey, along with full size folded plans at 1" = 400' scale. Appendix C provides details of map unit composition and soil types encountered, along with specific information regarding soil drainage class, permeabilities, runoff and hydrologic groupings for the various individual soil encountered. Appendix D contains individual soil test pit classifications and descriptions for each test pit excavated on the project site, either by backhoe or hand shovel. Appendix E includes a glossary of soil terms that better explain the soil information presented in the soil narrative report. Appendix F describes the methodology for creation of a soil survey, and provides details for the minimum mapping standards established by the Maine Association of Professional Soil Scientists (MAPSS) in accordance with the Maine Department of Environmental Protection (MDEP) requirements for mapping guidelines.


DeLorme
Topo USA® 6.0
T8 R4; Steson II
Jimmey & Owl Mountains
Trout Brook
Mattawamkeag R
Joe Coro Brook
Mattawamkeag River
Baskahegan Stream
Trout Brook
Buskahegan Stream
Hawkins Brook
Hawkins Brook
Danforth
Pine Cove
Site
Jimmey Mountain
Baldwin Brook
Harding Brook
SPRINGFIELD RD
Hawkins Brook
Upper Hot Brook Lake
Hawkins Brook
Hawkins Brook
169
Site
Owl Mountain
Doe Brook
Doe Brook
Hawkins Brook
Webster Brook
Data use subject to license.
© 2006 DeLorme. Topo USA® 6.0.
www.delorme.com
TN
MN (17.7°W)
Scale 1 : 81,250
1" = 1.28 mi
Data Zoom 10-3

2.0 Site Location/Setting

The approximately 580 +/- - acre site, as identified by project managers, is located off Route 169 (Springfield Road) to the north, in Township 8, Range 4 NBPP in northern Washington County, near the Penobscot county line. It consists of moderately to steeply sloping topography, and is comprised mainly of mixed-growth woodlands.

3.0 Site Investigation and Testing

Albert Frick Associates (AFA) conducted our field investigations on November 28 and November 29, 2008. Test pits were excavated, either by backhoe or hand shovel, and were identified on-site with numbered flagging tape. Each was located by submeter GPS by AFA personnel. Additional confirmatory soil borings/observations by soil auger assisted in placement of soil map unit boundaries onto the soil survey base map. Further *ad hoc* symbols have been added in places to the map, to provide more detailed information about bedrock outcropping locations, groundwater seeps or surface water runoff, the location of intermittent or perennial streams or watercourses, and other natural features of the property.

4.0 General Site and Subsurface Conditions

The site includes exposed bedrock ridges, and sidesloping areas nearest the upper portions of watershed areas. Soil landforms include shallow to bedrock glacial till ridges, eskers of glacial outwash, and shallow depressional areas that may include wetlands. The predominant mapped soils are Chesuncook and Telos soils, which are formed in fine textured glacial till. Shallow-to-bedrock Knob Lock, Monson, and moderately deep Elliottsville soils also occur in the uppermost portions of upland map units. The deep hydric soils Monarda and Burnham may also be identified as wetland areas, where prevalence of hydrophytic vegetation and wet hydrology are also present.

5.0 Soil Map Unit Descriptions

The map unit descriptions included in Appendix C provide taxonomic details regarding the soil series encountered, and an idea of the composition of soils within a given map unit (both for the range of soil characteristics and the dominant soils within complex units). In map units with multiple names, the names are generally listed in order of their prevalence within the map unit. Slope gradient ranges are also provided, and refer to slope phases indicated in the soil survey map and in the soil legend.

6.0 Conclusions and Recommendations

Based on our observations of the project site, and our knowledge of the proposed use of the property, the soils within the development area are suitable for the proposed use.

Moderately sloping to strongly sloping soils that are at least moderately well drained are generally suitable for the proposed use, although some modifications to drainage or slope may be needed to improve conditions. On the somewhat poorly drained soils, where seasonal high groundwater tables may be within 12" of the mineral soil surface for a significant portion of the year, additional measures such as the addition of coarse granular fill, or the installation of upslope curtain drains to intercept sheet flow drainage, may be needed to overcome limitations.

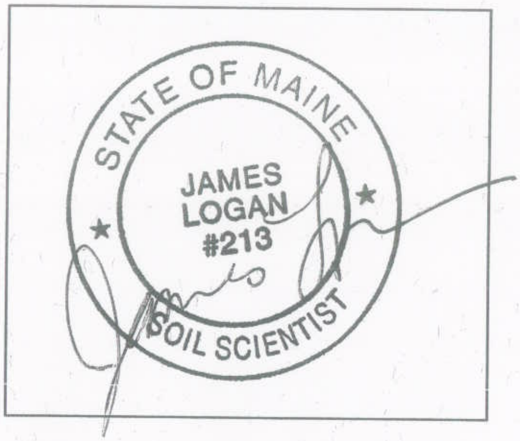
The poorly or very poorly drained hydric soils have further limitations due to prolonged wetness and frost susceptibility, and may have additional permitting implications if identified as wetland areas.

Portions of the well to excessively well drained outwash soils such as Adams and Masardis may also be a source of granular fill material for use as road sub-grades, etc.

7.0 Closure

It has been a pleasure of Albert Frick Associates to be of assistance in the resource inventory and evaluation phase of your project. Please do not hesitate to contact us, should further assistance or information be necessary.

James Logan, C.S.S #213
L.S.E. #237



1	APPENDIX A Limitations
2	APPENDIX B Class C Medium-High Intensity Soil Survey Maps
3	APPENDIX C Map Unit Descriptions
4	APPENDIX D Soil Profile Descriptions and Taxonomic Names
5	APPENDIX E Glossary of Soil Terminology
6	APPENDIX F Methodology
7	APPENDIX G Photographs
8	

APPENDIX A

Limitations

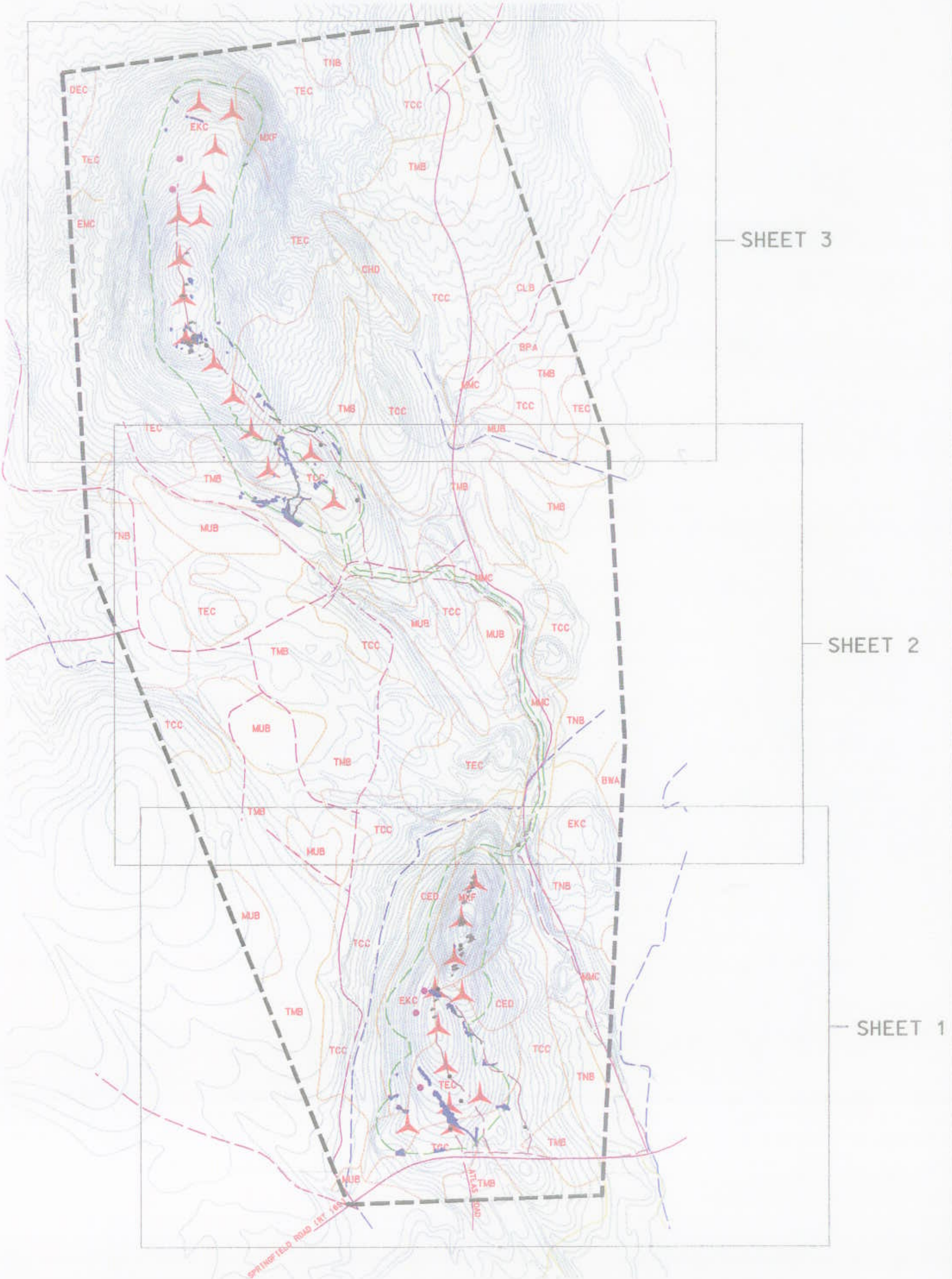
This soil narrative report and accompanying soil survey map have been prepared for the exclusive use of Stantec/UPC Wind Management, LLC, for its specific application to the proposed Stetson II Wind Power Project in Township 8, Range 4, NBPP near Danforth, Maine. Albert Frick Associates, Inc. conducted the work in accordance with generally accepted soil science practices outline in the Maine Association of Professional Soil Scientists guidelines, and the Maine Board of Certification of Geologists and Soil Scientists guidelines. Further, presentation of mapping information meets the requirements of Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping (2004), and in accordance with standards adopted by the Maine Department of Environmental Protection (MDEP) for project review. No other warranty, expressed or implied, is made.

It should be recognized that map unit design is influenced by the intended use of the soil survey information, and may not be adequate or sufficient to evaluate for uses other than that for which the specific soil survey was developed. Soils which are non-limiting for one use may be considered a limitation for different use than that identified.

The analysis contained herein is based on data obtained during subsurface exploration of the site, and the interpretation of published information by the USDA Natural Resources Conservation Services. Due to the glaciation of Maine, and the complexity of the landscaping, variations in subsurface conditions may exist between exploration sites which may not become evident until significant project excavation begins. Should significant variations in subsurface conditions become evident after the submission of this report, it may be necessary to re-evaluate the nature of the variation, in light of the recommendations enclosed herein.

APPENDIX B

Class C Medium-High Intensity Soil Survey Map, scaled 1" = 400'



U.S.G.S. BLUE LINE STREAM
PATH / TRAVELED WAY (PER U.S.G.S. MAP)
ROAD (PER U.S.G.S. MAP)
LIMIT OF WORK AREA
SOIL BOUNDARY LINE

DATE	REVISIONS

MASTER SOIL SURVEY INDEX PLAN

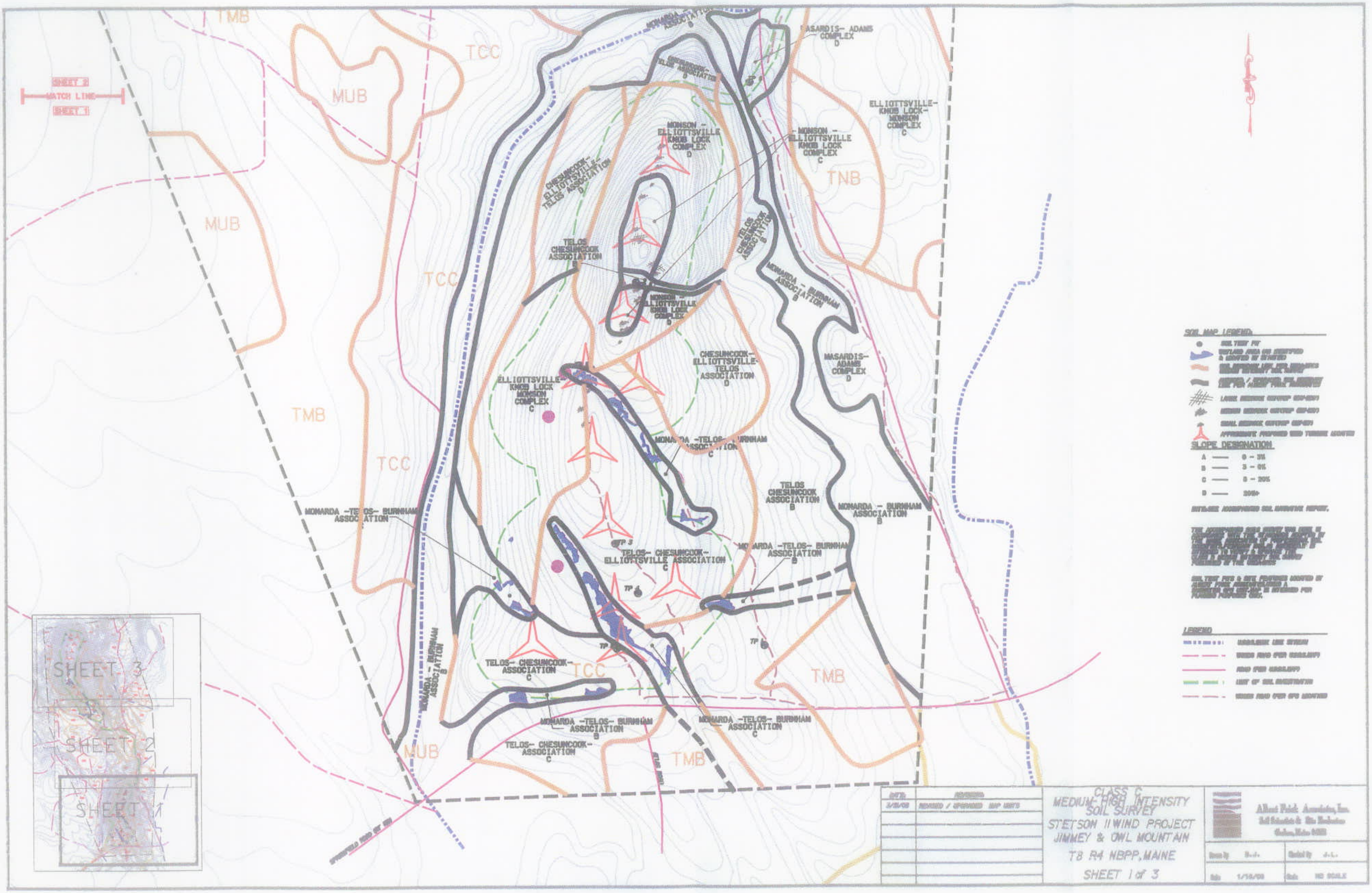
STETSON II WIND PROJECT

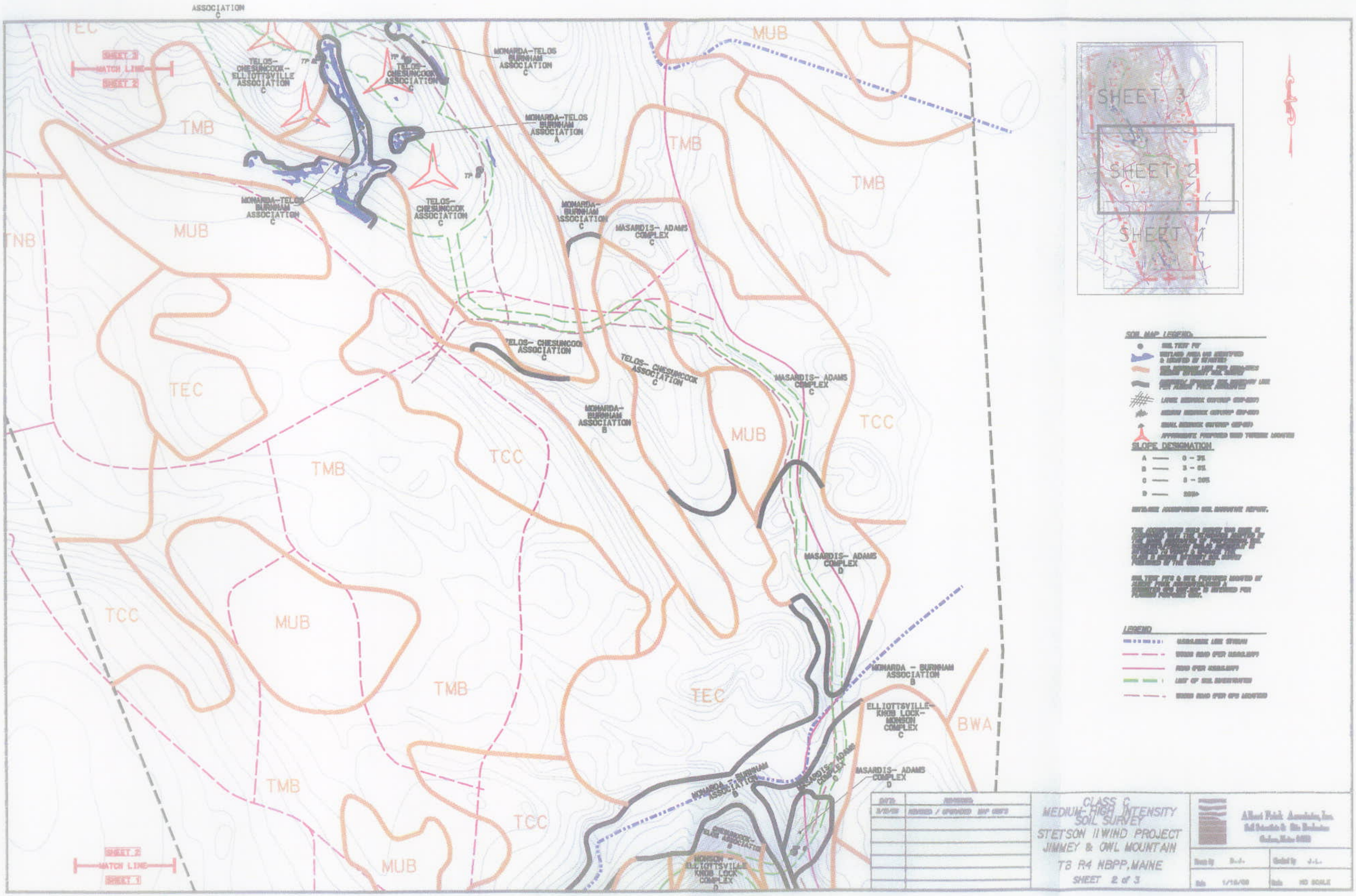
JIMMEY & OWL MOUNTAIN

T8 R4 NBPP, MAINE

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators

Drawn By B.J.	Checked By J.L.
Date 11/26/07	Scale NO SCALE


CLASS C
MEDIUM-HIGH INTENSITY
SOIL SURVEY
STETSON II WIND PROJECT
JIMMEY & OWL MOUNTAIN
T8 R4 NBPP, MAINE
SHEET 1 of 3
SOIL MAP LEGEND
SLOPE DESIGNATION
A 0 - 3%
B 3 - 8%
C 8 - 20%
D 20%+
LEGEND
SHEET 2
MATCH LINE
SHEET 1
SHEET 3
SHEET 2
SHEET 1
TMB
TCC
MUB
TNB
MASARDIS- ADAMS
COMPLEX
D
ELLIOTTSVILLE-
KNOB LOCK-
MONSON
COMPLEX
C
MONSON -
ELLIOTTSVILLE
KNOB LOCK
COMPLEX
D
MONSON -
ELLIOTTSVILLE
KNOB LOCK
COMPLEX
C
CHESUNCOOK-
ELLIOTTSVILLE-
TELOS ASSOCIATION
D
TELOS
CHESUNCOOK
ASSOCIATION
B
MONARDA - BURNHAM
ASSOCIATION
B
CHESUNCOOK-
ELLIOTTSVILLE-
TELOS
ASSOCIATION
D
MASARDIS-
ADAMS
COMPLEX
D
ELLIOTTSVILLE-
KNOB LOCK
MONSON
COMPLEX
C
MONARDA -TELOS- BURNHAM
ASSOCIATION
C
TELOS
CHESUNCOOK
ASSOCIATION
B
MONARDA - BURNHAM
ASSOCIATION
B
TELOS- CHESUNCOOK-
ELLIOTTSVILLE ASSOCIATION
C
MONARDA -TELOS- BURNHAM
ASSOCIATION
B
TELOS- CHESUNCOOK-
ASSOCIATION
C
MONARDA -TELOS- BURNHAM
ASSOCIATION
B
MONARDA -TELOS- BURNHAM
ASSOCIATION
C
TELOS- CHESUNCOOK-
ASSOCIATION
C
MONARDA - BURNHAM
ASSOCIATION
B
TP 3
TP


ASSOCIATION C
SHEET 3
MATCH LINE
SHEET 2
TELOS-CHESUNCOOK-ELLIOTTSVILLE ASSOCIATION C
TELOS-CHESUNCOOK ASSOCIATION C
MONARDA-TELOS BURNHAM ASSOCIATION C
MONARDA-TELOS BURNHAM ASSOCIATION A
MONARDA-BURNHAM ASSOCIATION C
MASARDIS- ADAMS COMPLEX C
TELOS- CHESUNCOOK ASSOCIATION C
MONARDA-BURNHAM ASSOCIATION B
MASARDIS- ADAMS COMPLEX D
MONARDA - BURNHAM ASSOCIATION B
ELLIOTTSVILLE-KNOB LOCK-MONSON COMPLEX C
MONSON ELLIOTTSVILLE KNOB LOCK COMPLEX D
TEC
TMB
MUB
TNB
TCC
BWA
SHEET 2
MATCH LINE
SHEET 1
SHEET 3
SHEET 2
SHEET 1
SOIL MAP LEGEND:
SLOPE DESIGNATION
LEGEND
CLASS C
MEDIUM-HIGH INTENSITY
SOIL SURVEY
STETSON II WIND PROJECT
JIMMEY & OWL MOUNTAIN
T8 R4 NBPP, MAINE
SHEET 2 of 3


SHEET 3
SHEET 2
SHEET 1
DEC
TEC
EMC
TCC
BPA
TMB
MUB
MONARDA-TELOS BURNHAM ASSOCIATION C
MONSON-ELLIOTTSVILLE KNOB LOCK-COMPLEX D
ELLIOTTSVILLE KNOB LOCK-MONSON-COMPLEX D
ELLIOTTSVILLE KNOB LOCK-MONSON-COMPLEX C
MONARDA-TELOS BURNHAM ASSOCIATION B
TELOS-CHESUNCOOK-ASSOCIATION C
TELOS-CHESUNCOOK-ELLIOTTSVILLE ASSOCIATION C
SHEET 3
MATCH LINE
SHEET 2
SOIL MAP LEGEND:
SLOPE DESIGNATION
A — 0 - 3%
B — 3 - 8%
C — 8 - 20%
D — 20%+
LEGEND
CLASS C
MEDIUM-HIGH INTENSITY
SOIL SURVEY
STETSON II WIND PROJECT
JIMMEY & OWL MOUNTAIN
T8 R4 NBPP, MAINE
SHEET 3 of 3
Albert Frick Associates, Inc.
NO SCALE

APPENDIX C

Map Unit Descriptions

CHESUNCOOK-ELLIOTSVILLE-TELOS ASSOCIATION (CED)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands.
Position in Landscape:	Side slopes and upper portions of landscape features.
Slope Gradient Ranges:	(C) 8-20% (D) 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly drained Telos to moderately well-drained (Chesuncook) to well-drained (Elliottsville), with a perched water table in Telos and Chesuncook soils 1.0 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation. Chesuncook and Telos soils are greater than 6' to bedrock, while Elliottsville is 20-40" to bedrock. Water table is present in Elliottsville soils on bedrock surface for short durations in spring and during periods of excessive precipitation.

Typical Profile Description: (for Chesuncook)	Surface layer:	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"
(for Elliottsville)	Surface layer:	Dark reddish brown organic, 0-1"
	Subsurface layer:	Pinkish gray silt loam, 1-2"
	Subsoil layer:	Dark reddish brown to olive brown channery loam, 2-17"
	Substratum:	Olive channery loam, 17-26"
	Slate Bedrock @ 26"	
(for Telos)	Surface layer:	Pinkish gray silt loam, 0-4"
	Subsurface layer:	Dark reddish to yellowish brown silt loam, 4-15"
	Subsoil layer:	Light olive brown silt loam, 15-20"
	Substratum:	Olive gravelly silt loam, 20-65"
	Surface layer:	Dark reddish brown organic, 0-3"
	Note:	These soils occur on the landscape in a regular repeating pattern that was not separated out at the scale provided.

Hydrologic Group:	Group C
Surface Run-off:	Rapid

Permeability:	Chesuncook:	0-21"	0.6 - 2.0 in/hr
		> 21"	< 0.2 in/hr
	Elliottsville		0.6 – 2.0 in/hr
	Telos	0–18"	0.6 – 2.0 in/hr
		>18"	0.0 – 0.2 in/hr

Depth to Bedrock:	Chesuncook:	Very deep, greater than 60 inches.
	Elliottsville:	Moderately deep, 20-40"
	Telos:	Very deep, greater than 60 inches
Hazard to Flooding:	None	
Erosion Factors (Kf):	0 – 8": .28 0 – 65": .37	(Elliottsville is 20-40" to bedrock)

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Tunbridge, B slopes in C and D slope map units

Contrasting: Monson, Lyman (less than 20" to bedrock), Colonel, Brayton, Monarda

USE AND MANAGEMENT

Development on wind power projects: The limiting factor for building site development is wetness due to the presence of a perched water table 1.5 to 3.0 feet beneath the soil surface for some portion of the year in Chesuncook.

Proper foundation drainage or other site modification is recommended for construction. Chesuncook soil is suitable for subsurface wastewater disposal, in accordance with the State of Maine Rules for Subsurface Wastewater Disposal. This soil requires a 12-inch separation distance between the seasonal high groundwater table and the bottom of any disposal area, and also requires 4.0 gpd for disposal beds.

Elliottsville soils are moderately deep to bedrock (20-40", generally) and blasting or ripping of the bedrock surface may be needed for deep excavations. Elliottsville soils can provide for anchoring into bedrock within practical depths to bedrock. Telos soils have further limitations for wetness, due to a seasonal high groundwater table 1.0 to 1.5 feet beneath the soil surface for a significant portion of the year, usually perched on a relatively shallow compact glacial till hardpan. Proper foundation drainage or other site modification is recommended for construction.

CHESUNCOOK-TELOS ASSOCIATION (CHD)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands.
Position in Landscape:	Side slopes.
Slope Gradient Ranges:	(B) 3-8% (C) 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Moderately well drained (Telos) to somewhat poorly drained (Chesuncook), with a perched water table 0.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation.		
Typical Profile Description: (for Chesuncook)	**Surface layer:**	Dark reddish brown organic, 0-3"	
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"	
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"	
	Substratum:	Olive gravelly loam, 24-36"	
Typical Profile Description: (for Telos)	**Surface layer:**	Black organic material, 0-2"	
	Subsurface layer:	Pinkish gray, gravelly silt loam, 2-5"	
	Subsoil layer:	Dark brown, dark yellowish brown, olive, gravelly silt loam, 5-52"	
	Substratum:	Olive gravelly silt loam, 52-60"	
	Note:	These soils occur on the landscape in a regular repeating pattern that was not separated out at the scale provided.	
Hydrologic Group:	Group C		
Surface Run-off:	Rapid		
Permeability:	Chesuncook:	0-21"	0.6 - 2.0 in/hr
		> 21"	< 0.2 in/hr
	Telos:	0-18"	0.6-2.0 in/hr
		>18"	0.0-0.2 in/hr
Depth to Bedrock:	Very deep, greater than 60 inches.		
Hazard to Flooding:	None		
Erosion Factors (Kf):	0-8": .28		
	8-65": .37		

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Colonel

Contrasting: Telos, Monson, Elliottsville (less than 40" to bedrock), D slopes in C slope map units, stony and very stony phase inclusions, Monarda

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness due to the presence of a perched water table 1.0 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. Chesuncook soil is suitable for subsurface wastewater disposal, in accordance with the State of Maine Rules for Subsurface Wastewater Disposal. This soil requires a 12-inch separation distance between the seasonal high groundwater table and the bottom of any disposal area, and also requires 4.0 and 2.0 sq.ft/gpd for disposal beds and chamber area, respectively.

ELLIOTSVILLE-KNOB LOCK-MONSON COMPLEX (EkC)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands, ridge tops.
Position in Landscape:	Uppermost positions of landforms, ridgetops
Slope Gradient Ranges:	**(C)** 8-20% **(D)** 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat excessively well drained (Monson) to well drained (Elliottsville) in complex with well to excessively well drained Knob Lock, with no water table observed throughout the growing season.	
Typical Profile Description: (for Elliottsville)	**Surface layer:**	Dark reddish brown organic, 0-1"
	Subsurface layer:	Pinkish gray silt loam, 1-2"
	Subsoil layer:	Dark reddish brown to olive brown channery loam, 2-17"
	Substratum:	Olive channery loam, 17-26"
	Slate Bedrock @ 26"	
(for Knob Lock)	**Surface layer:**	Dark reddish brown to black organic material, 0-7"
	Subsoil layer:	Dark reddish gray very fine sandy loam, 7-9"
	Bedrock @ 9"	
(for Monson)	**Surface layer:**	Dark reddish brown organic material, 0-4"
	Subsurface layer:	Light gray channery silt loam, 4-5"
	Subsoil layer:	Dark reddish to yellowish brown silt loam, 6-11"
	Substratum:	Light olive brown channery silt loam, 11-19"
	Slate bedrock @ 19"	
	Note:	These soils occur in a non-regular, non-repeating pattern that could not be separated out in mapping at the scale provided.
Hydrologic Group:	**for Elliottsville:**	Group B
	for Knob Lock:	Group A
	for Monson:	Group C/D
Surface Run-off:	Rapid	
Permeability:	0.6 - 2.0 in/hr (for Monson & Elliottsville) Not determined for Knob Lock	
Depth to Bedrock:	shallow 10-20" (Monson and Knob Lock) moderately deep 20-40" (Elliottsville)	

Hazard to Flooding:	None	
Erosion Factors (Kf):	0-8":	.28
	8" bedrock surface	.37

INCLUSIONS
(within mapping unit)

Similar: Chesuncook, Dixfield

Contrasting: Monarda, Burnham (small areas of very limited extent), Telos, Naskeag (Variant), Brayton

Development on wind power projects: The limiting factor for building site development is bedrock, due to varying depths generally less than 40" from the mineral soil surface. Seasonal water tables are either not present, due to position near uppermost elevations within landscapes/watersheds, or present for short durations only after prolonged storm events or spring snowmelt.

Blasting or ripping of the bedrock surface may be necessary for deep excavations. This map unit can generally provide for stable anchoring points for tower/turbine construction. Proper foundation drainage or other site modification is recommended for construction.

MASARDIS-ADAMS COMPLEX (MMC)

SETTING

Parent Material:	Derived from outwash, stratified drift material.
Landform:	Occupy outwash terraces and sand plains, deltas, lake plains, moraines, terraces and eskers.
Position in Landscape:	Usually occupies the upper positions of landform.
Slope Gradient Ranges:	**(C)** 8-20% **(D)** 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat excessively to excessively well drained, with no evidence of high groundwater table within 3.5 feet of the soil surface.	
Typical Profile Description (for Masardis):	**Surface layer:**	Light brownish gray gravelly very fine sandy loam, 0-6"
	Subsurface layer:	Dark reddish brown gravelly sandy loam, 6-11"
	Subsoil layer:	Strong brown gravelly sand, 11-22"
	Substratum:	Yellowish brown very gravelly sand, 16-70"
Typical Profile Description (for Adams)	**Surface layer:**	Pinkish gray sand, 0-4"
	Subsurface layer:	Dark brown loamy sand, 4-10"
	Subsoil layer:	Brown & yellowish brown sand, 10-26"
	Substratum:	Grayish brown sand, 26-70"
	Note: These soils in a non-regular, non-repeating pattern that could not be separated out at the scale of mapping.	
Hydrologic Group:	Group A	
Surface Run Off:	Very slow to medium	
Permeability:	Rapid or very rapid	
Depth to Bedrock:	Very deep, greater than sixty inches	
Hazard to Flooding:	None	
Erosion Factors (Kf):	0-1":	.17
	1-11":	.15
	11-17":	.20
	17-65":	.17

INCLUSIONS
(Within Mapping Unit)

Similar:	Soils that are fine sandy loam to very fine sandy loam to a depth of 20 inches, Colton.
Contrasting:	Croghan soils that are moderately well drained and occur in shallow depressions.

USE AND MANAGEMENT

Development of Wind Power Projects: Masardis and Adams soils are suitable for subsurface wastewater disposal in accordance with State of Maine Rules for Subsurface Wastewater Disposal, and the development of wind power projects. This map unit may provide suitable materials for use as road subgrades, etc.

MONARDA-BURNHAM ASSOCIATION (MUB)

SETTING

Parent Material:	Loamy glacial till.
Landform:	Nearly level to sloping soils.
Position in Landscape:	Occupies lower positions in the landscape, base of long slopes, swales, and depressional areas.
Slope Gradient Ranges:	**(A)** 0-3% **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Poorly drained (Monarda) to very poorly drained (Burnham), with a perched groundwater table 0 to 1.5 feet beneath the soil surface from October through May and during periods of heavy precipitation.

Typical Profile Description: (for Monarda)	Surface layer:	Black organic layer, 0-4"
	Subsurface layer:	Light brownish gray, gravelly silt loam, 4-9"
	Subsoil layer:	Gray, olive gray and olive, gravelly silt loam, 9-33"
	Substratum:	Gray, gravelly silt loam, 33"+
(for Burnham)	Surface layer:	Black muck (organic), 0-4"
	Subsurface layer:	Gray channery silt loam, 13-18"
	Subsoil layer:	Olive gray channery silt loam, 18-34"
	Substratum:	Dark grayish brown channery silt loam, 34-65"

Note: These soils occur in a regular repeating pattern that was not separated out in mapping at the scale provided.

Hydrologic Group:	Group D	
Surface Run-off:	Slow	
Permeability:	Moderate to moderately slow in the solum, moderately slow to slow in the substratum.	
Depth to Bedrock:	Deep, greater than 60".	
Hazard to Flooding:	None	
Erosion Factors (Kf):	0-6":	.28
	6-65":	.32

INCLUSIONS
(Within Mapping Unit)

Similar: Brayton, Telos, Colonel

Contrasting: Peacham, Naskeag (less than 40" to bedrock)

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness due to the presence of a high perched water table 0 to 1.5 feet below the existing the soil surface for a significant portion of the year This map unit is unsuitable for on-site subsurface wastewater disposal. Monarda soil may be classified as wetlands, based on the combined consideration of hydric conditions, hydrology, and vegetation, and Burnham is usually classified as wetlands.

Proper foundation drainage and the addition of granular fill is recommended for any construction in Monarda and Burnham soils. This map unit may have further permitting implications, in project areas identified as wetlands.

MONARDA-TELOS-BURNHAM ASSOCIATION

SETTING

Parent Material:	Loamy glacial till.
Landform:	Nearly level to sloping soils.
Position in Landscape:	Occupies lower positions in the landscape, base of long slopes, swales, and depressional areas.
Slope Gradient Ranges:	(B) 3-8% (C) 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Poorly drained (Monarda) to somewhat poorly drained (Telos) to very poorly drained (Burnham), with a perched groundwater table 0 to 1.5 feet beneath the soil surface from October through May and during periods of heavy precipitation.	
Typical Profile Description: (for Monarda)	**Surface layer:**	Black organic layer, 0-4"
	Subsurface layer:	Light brownish gray, gravelly silt loam, 4-9"
	Subsoil layer:	Gray, olive gray and olive, gravelly silt loam, 9-33"
	Substratum:	Gray, gravelly silt loam, 33"+
(for Telos)	**Surface layer:**	Pinkish gray silt loam, 0-4"
	Subsurface layer:	Dark reddish to yellowish brown silt loam, 4-15"
	Subsoil layer:	Light olive brown silt loam, 15-20"
	Substratum:	Olive gravelly silt loam, 20-65"
	Surface layer:	Dark reddish brown organic, 0-3"
(for Burnham)	**Surface layer:**	Black muck (organic), 0-4"
	Subsurface layer:	Gray channery silt loam, 13-18"
	Subsoil layer:	Olive gray channery silt loam, 18-34"
	Substratum:	Dark grayish brown channery silt loam, 34-65"

Note: These soils occur in a regular repeating pattern that was not separated out in mapping at the scale provided.

Hydrologic Group:	Group D	
Surface Run-off:	Slow for Monarda & Burnham, Rapid for Telos	
Permeability:	Moderate to moderately slow in the solum, moderately slow to slow in the substratum.	
Depth to Bedrock:	Deep, greater than 60".	
Hazard to Flooding:	None	
Erosion Factors (Kf):	0-6":	.28
	6-65":	.32 - .37

INCLUSIONS
(Within Mapping Unit)

Similar: Brayton, Colonel

Contrasting: Peacham, Naskeag (less than 40" to bedrock)

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness due to the presence of a high perched water table 0 to 1.5 feet below the existing the soil surface for a significant portion of the year. This map unit is generally unsuitable for on-site subsurface wastewater disposal. Monarda soil may be classified as wetlands, based on the combined consideration of hydric conditions, hydrology, and vegetation, and Burnham is usually classified as wetlands.

Proper foundation drainage and the addition of granular fill is recommended for any construction in Monarda and Burnham soils. This map unit may have further permitting implications, in project areas identified as wetlands.

MONSON-ELLIOTSVILLE-KNOB LOCK COMPLEX (MXF)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands, ridge tops.
Position in Landscape:	Uppermost positions of landforms, ridgetops
Slope Gradient Ranges:	**(C)** 8-20% **(D)** 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat excessively well drained (Monson) to well drained (Elliottsville) in complex with well to excessively well drained Knob Lock, with no water table observed throughout the growing season.

Typical Profile Description: (for Monson)

Surface layer:	Dark reddish brown organic material, 0-4"
Subsurface layer:	Light gray channery silt loam, 4-5"
Subsoil layer:	Dark reddish to yellowish brown silt loam, 6-11"
Substratum:	Light olive brown channery silt loam, 11-19"
Slate bedrock @ 19"	

(for Elliottsville)

Surface layer:	Dark reddish brown organic, 0-1"
Subsurface layer:	Pinkish gray silt loam, 1-2"
Subsoil layer:	Dark reddish brown to olive brown channery loam, 2-17"
Substratum:	Olive channery loam, 17-26"
Slate Bedrock @ 26"	

(for Knob Lock)

Surface layer:	Dark reddish brown to black organic material, 0-7"
Subsoil layer:	Dark reddish gray very fine sandy loam, 7-9"
Bedrock @ 9"	
Note:	These soils occur in a non-regular, non-repeating pattern that could not be separated out in mapping at the scale provided.

Hydrologic Group:

for Monson:	Group C/D
for Elliottsville:	Group B
for Knob Lock:	Group A

Surface Run-off: Rapid

Permeability: 0.6 - 2.0 in/hr (for Monson & Elliottsville)
None determined for Knob Lock

Depth to Bedrock: shallow 10-20" (Monson and Knob Lock)
moderately deep 20-40" (Elliottsville)

Hazard to Flooding:	None	
Erosion Factors (Kf):	0-8":	.28
	8"-bedrock surface	.37

INCLUSIONS
(Within mapping unit)

Similar: Telos, Chesuncook, B slope inclusions within C/D map units

Contrasting: Monarda, Burnham (very limited extent), Naskeag (Variant)

Development on wind power projects: The limiting factor for building site development is bedrock, due to depths varying from zero to within 40" of the mineral soil surface. This map unit provides for stable anchoring for tower/turbine construction.

Proper foundation drainage or other site modification is recommended for construction, in moderately deep Elliottsville portions of mapping units where seasonal water tables may be present above the bedrock surfaces, or in deep inclusions of Chesuncook or Telos soils.

TELOS-CHESUNCOOK ASSOCIATION (TCC)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands.
Position in Landscape:	Side slopes.
Slope Gradient Ranges:	(B) 3-8% (C) 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained (Chesuncook) to somewhat poorly drained (Telos), with a perched water table 0.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation.

Typical Profile Description: (for Telos)	**Surface layer:**	Black organic material, 0-2"
	Subsurface layer:	Pinkish gray, gravelly silt loam, 2-5"
	Subsoil layer:	Dark brown, dark yellowish brown, olive, gravelly silt loam, 5-52"
	Substratum:	Olive gravelly silt loam, 52-60"
(for Chesuncook)	**Surface layer:**	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"
	Note:	These soils occur on the landscape in a regular repeating pattern that was not separated out at the scale provided.

Hydrologic Group:	Group C		
Surface Run-off:	Rapid		
Permeability:	Chesuncook:	0-21"	0.6 - 2.0 in/hr
		> 21"	< 0.2 in/hr
	Telos:	0-18"	0.6-2.0 in/hr
		>18"	0.0-0.2 in/hr
Depth to Bedrock:	Very deep, greater than 60 inches.		
Hazard to Flooding:	None		
Erosion Factors (Kf):	0-8":	.28	
	8-65":	.37	

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Colonel

Contrasting: Monson, Elliottsville (less than 40" to bedrock), D slopes in C slope map units, stony and very stony phase inclusions, Monarda

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness due to the presence of a perched water table 1.0 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. Chesuncook soil is suitable for subsurface wastewater disposal, in accordance with the State of Maine Rules for Subsurface Wastewater Disposal. This soil requires a 12-inch separation distance between the seasonal high groundwater table and the bottom of any disposal area, and also requires 4.0 and 2.0 sq.ft/gpd for disposal beds and chamber area, respectively.

TELOS-CHESUNCOOK-ELLIOTSVILLE ASSOCIATION (TEC)

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands.
Position in Landscape:	Side slopes and upper portions of landscape features.
Slope Gradient Ranges:	**(B)** 3-8% **(C)** 8-20% **(D)** 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained to well-drained, with a perched water table in Chesuncook soils 1.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation. Water table is present in Elliottsville soils on bedrock surface for short durations in spring and during periods of excessive precipitation.

Typical Profile Description: (for Telos)	**Surface layer:**	Black organic material, 0-2"
	Subsurface layer:	Pinkish gray, gravelly silt loam, 2-5"
	Subsoil layer:	Dark brown, dark yellowish brown, olive, gravelly silt loam, 5-52"
	Substratum:	Olive gravelly silt loam, 52-60"
(for Chesuncook)	**Surface layer:**	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"
(for Elliottsville)	**Surface layer:**	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"
	Note:	These soils occur on the landscape in a regular repeating pattern that was not separated out at the scale provided.

Hydrologic Group:	Group C	
Surface Run-off:	Rapid	
Permeability:	Chesuncook:	0-21" 0.6 - 2.0 in/hr > 21" < 0.2 in/hr
	Telos:	0-18" 0.6-2.0 in/hr >18" 0.0-0.2 in/hr
	Elliottsville:	0.6 - 2.0 in/hr

Depth to Bedrock:	Chesuncook: Elliottsville: Telos:	Very deep, greater than 60 inches. Moderately deep, 20-40" Very deep, greater than 60"
Hazard to Flooding:	None (Telos may be saturated from time to time)	
Erosion Factors (Kf):	0-8": 8-65":	.28 .37 (Elliottsville is 20-40" to bedrock)

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Tunbridge, B slopes in C slope map units, Monson, Colonel

Contrasting: Brayton, Monarda, Burnham (very limited extent)

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness in Telos and Chesuncook soils, due to the presence of a perched water table 1.0 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction in these soils. Elliottsville (20" – 40" to bedrock) is well drained and is generally suited to uses necessary for development of wind power projects. This soil may provide for anchoring at practical depths to bedrock, and blasting or ripping of the bedrock surface may be necessary for deep excavation or road cuts.

APPENDIX D

Soil Profile Descriptions and Taxonomic Names

Town, City, Plantation	Street, Road Subdivision	Owner's Name
T8 R4 NBPP	STETSON II (OFF ROUTE 169)	WOODLOT / STANTEC

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 1 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches): 0–50

Texture	Consistency	Color	Mottling
GRAVELLY FINE SANDY LOAM	FRIABLE	BROWN	
		DARK YELLOW BROWN	
GRAVELLY SILT LOAM			
	SOMEWHAT FRIABLE TO FIRM	OLIVE BROWN	FEW, FAINT
			COMMON, DISTINCT
LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	
CHESUNCOOK (Profile / Condition)	___ %	24 "	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP 2 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches): 0–50

Texture	Consistency	Color	Mottling
GRAVELLY SILT LOAM	FRIABLE	DARK YELLOW BROWN	
		YELLOW BROWN	
	SOMEWHAT FIRM	OLIVE BROWN	FEW, FAINT
	FIRM	OLIVE	COMMON, DISTINCT

Soil Classification	Slope	Limiting Factor	
CHESUNCOOK (Profile / Condition)	___ %	22 "	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 3 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches): 0–50

Texture	Consistency	Color	Mottling
GRAVELLY SILT LOAM	FRIABLE	DARK YELLOW BROWN	
	SOMEWHAT FIRM	OLIVE BROWN	COMMON, FAINT
	FIRM	OLIVE	COMMON, DISTINCT

Soil Classification	Slope	Limiting Factor	
CHESUNCOOK (Profile / Condition)	___ %	17 "	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP 4 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches): 0–50

Texture	Consistency	Color	Mottling
GRAVELLY SILT LOAM	FRIABLE	DARK YELLOW BROWN	
		YELLOW BROWN	
	SOMEWHAT FIRM TO FIRM	OLIVE BROWN	FEW, FAINT
		OLIVE	COMMON, FAINT

Soil Classification	Slope	Limiting Factor	
CHESUNCOOK (Profile / Condition)	___ %	24 "	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

James Logan — Site Evaluator / Soil Scientist Signature

237/ 213 — SE/CSS #

11/28/07 — Date

Town, City, Plantation	Street, Road Subdivision	Owner's Name
T8 R4 NBPP	STETSON II (OFF ROUTE 169)	WOODLOT / STANTEC

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 5 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–10	GRAVELLY SILT LOAM	FRIABLE	BROWN	
10–17			OLIVE BROWN	COMMON, FAINT
17–30		SOMEWHAT FIRM TO FIRM	OLIVE	COMMON, DISTINCT & △△△ FREE WATER

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
TELOS	___ %	11 "	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP 6 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–16	GRAVELLY LOAMY SAND	FRIABLE	YELLOW BROWN	
16+			OLIVE BROWN	NONE EVIDENT

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
ADAMS/ MASARDIS	___ %	___ "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 7 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–4	GRAVELLY SILT LOAM	FRIABLE	DARK BROWN	
4–26			DARK YELLOW BROWN	NONE EVIDENT
26	BEDROCK			

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
ELLIOTSVILLE	___ %	26 "	☐ Ground Water ☐ Restrictive Layer ■ Bedrock ☐ Pit Depth

Observation Hole TP 8 ■ Test Pit ☐ Boring

_____ " Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–12	GRAVELLY SILT LOAM	FRIABLE	DARK YELLOW BROWN	NONE EVIDENT
12–13	BEDROCK			

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
MONSON	___ %	12-13 "	☐ Ground Water ☐ Restrictive Layer ■ Bedrock ☐ Pit Depth

[signature] James Logan

Site Evaluator / Soil Scientist Signature — 237/ 213 SE/CSS # — 11/28/07 Date

Town, City, Plantation	Street, Road Subdivision	Owner's Name
T8 R4 NBPP	STETSON II (OFF ROUTE 169)	WOODLOT / STANTEC

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 9 ■ Test Pit ☐ Boring
____ " Depth of Organic Horizon Above Mineral Soil

Depth (inches)	Texture	Consistency	Color	Mottling
0–~17	GRAVELLY SILT LOAM	FRIABLE	DARK YELLOW BROWN	
~17–~21		SOMEWHAT FIRM	OLIVE BROWN	FEW, FAINT
~21–49		FIRM	OLIVE	COMMON, DISTINCT
~49	LIMIT OF EXCAVATION			

Soil Classification: CHESUNCOOK (Profile / Condition) | Slope: ___ % | Limiting Factor: 17 " | ■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP 10 ■ Test Pit ☐ Boring
____ " Depth of Organic Horizon Above Mineral Soil

Depth (inches)	Texture	Consistency	Color	Mottling
0–~7	GRAVELLY SILT LOAM	FRIABLE	DARK BROWN	
~7–~14			DARK YELLOW BROWN	
~14–~19			OLIVE BROWN	FEW, FAINT
~19–~42		FIRM	OLIVE	COMMON, DISTINCT
~42	LIMIT OF EXCAVATION			

Soil Classification: CHESUNCOOK (Profile / Condition) | Slope: ___ % | Limiting Factor: 16 " | ■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP 11 ■ Test Pit ☐ Boring
____ " Depth of Organic Horizon Above Mineral Soil

Depth (inches)	Texture	Consistency	Color	Mottling
0–~6	GRAVELLY SILT LOAM	FRIABLE	DARK BROWN	
~6–~13			OLIVE BROWN	
~13–~42		FIRM	OLIVE	ΔΔΔ FREE WATER & COMMON, FAINT
~42	LIMIT OF EXCAVATION			

Soil Classification: TELOS (Profile / Condition) | Slope: ___ % | Limiting Factor: 13 " | ■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP 12 ■ Test Pit ☐ Boring
____ " Depth of Organic Horizon Above Mineral Soil

Depth (inches)	Texture	Consistency	Color	Mottling
0–~8	MUCKY PEAT		BLACK	ΔΔΔ FREE WATER
~8–~16	GRAVELLY SILT LOAM	FRIABLE	VERY DARK GRAYISH BROWN	
~16–		FIRM		

Soil Classification: BURNHAM (Profile / Condition) | Slope: ___ % | Limiting Factor: 0 " | ■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

James Logan
Site Evaluator / Soil Scientist Signature

237/ 213
SE/CSS #

11/28/07 & 11/29/07
Date

ALBERT FRICK ASSOCIATES – 95A COUNTY ROAD GORHAM, MAINE 04038 – (207) 839-5563

APPENDIX E

Glossary Of Soil Terminology

Depth Classes

These refer to the depth of the particle control section used to describe the central concept of each taxonomic unit. These are as follows:

Very shallow	less than 10" to bedrock
Shallow	10" to 20" to bedrock
Moderately deep	20" to 40" to bedrock
Deep	40" to 60" deep
Very deep	greater than 60"

Drainage Class

Drainage class is a reference to the frequency and duration of periods of soil saturation and/or action by seasonal groundwater tables, as evidenced by soil morphologic features identified within each respective soil profile.

Seven classes of soil drainage are recognized:

Excessively drained — water is removed from the soil very rapidly. These are commonly very coarse-textured, rocky or shallow. All are free of soil mottling related to wetness.

Somewhat excessively drained — water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy-textured and very pervious/porous. Some are shallow. Some occur on steep slopes where much of the water they receive is lost as runoff. These too are free of observed mottling due to wetness.

Well drained — Water is removed from the soil readily, but not rapidly. It may be available for plant growth at the deepest rooting depths, and not so wet as to inhibit the growth of plant roots for significant periods during most growing seasons. Well drained soils are often medium textured, or contain restrictive subhorizons generally below 24". They are mainly free of mottling related to wetness.

Moderately well drained	water is removed from the spoils somewhat slowly during wet periods and spring seasons. Moderately well drained soils are saturated in the upper soil profile for short duration during the growing season. Often, they contain a slowly pervious (or restrictive) layer beneath the solum, and may receive additional runoff from upslope areas.
Somewhat poorly drained	water is removed so slowly that the soil is wet for significant periods during the growing season. Somewhat poorly drained soils commonly have an impervious substratum that contributes to a perched water table, additional water through sideslope seeps, long continuous sheet flows below large watershed areas with few or no outlets, or a combination of these together.
Poorly drained	water is removed from these soils so slowly that the soil is saturated during the growing season or remains wet for long durations. Water is present during the growing season which may be prohibitive to plant root growth, due to anaerobic/saturated conditions. These soils are classified as hydric, and may also have implications as wetlands.
Very poorly drained	water is removed from these soils so slowly that free water can be observed at or very near the mineral soil surface for long durations during the growing season. These commonly occur on nearly level slopes or in depressional areas, and can be frequently ponded. Often they include thick organic surface horizons.

Hydrologic Soil Groups

A hydrologic soil group is a class of numerous soil series that all have the same runoff potential under similar climate and vegetative conditions. Soil properties that can influence runoff are those that affect minimum infiltration rates for a bare soil after prolonged wetting and with no frozen ground surface. Most important are depth to seasonal high groundwater table, permeability rates after prolonged wetting, and depth to slowly permeable (restrictive) layer.

Permeability

Permeability is the soil property which enables water to move downward through the soil profile. It is measured as the number of inches per hour of water that can be added to a particular soil as it moves downward through the unsaturated soil. Terminology and ranges are as flows:

Very slow	less than 0.06 in./hr
Slow	0.06 to 0.20 in./hr
Moderately slow	0.20 to 0.60 in./hr
Moderate	0.6 to 2.0 in./hr
Moderately rapid	2.0 to 6.0 in./hr
Rapid	6.0 to 20 in./hr

Soil Erodibility (K Factor)

The measure of soil erodibility, or K factor, is the susceptibility of a soil particle to detachment and transport by rainfall. K factors for soil in Maine vary from 0.02 to 0.69. The higher the value, the more susceptible the named soil is to sheet or rill erosion by water.

Soil properties which influence erosion are those that can affect infiltration rates, movement of water through the soil profile and the water storage capacity of a soil. Other soil properties can affect the dispersion and mobility of soil particles by rainfall ad/or runoff. Some of the most important of these properties include soil layer, and the size and stability of the soil structural aggregates in the exposed faces of subsoils. Background levels of soil moisture and the presence of frozen soil horizons also can influence erosion.

Soil Texture

Soil texture refers to the USDA classification for the relative proportions by weight of the several soil particle size classes that are finer than 2 millimeters in diameter, which form the fine earth fraction. (Materials larger than 2 mm. in diameter are considered rock fragments).

Soil texture can influence on plant growth, or the soil mechanics of a particular site when used as construction and/or backfill material for foundations, etc. It influences such physical properties as load bearing strength, permeability, shrink/swell potential (frost action or due to wetness), compressibility and compaction. Rock fragment size and content can also affect applications for use as construction materials.

Soil Texture Modifiers

Named soil texture classes can be further modified by the addition of appropriate adjectives when rock fragment content approaches 15% by volume (i.e. gravelly sandy loam). "Mucky" or "peaty" are modifying terms used when organic matter content reaches 40% (i.e. mucky silt/loam).

Surface Runoff

Surface runoff is water that flows away from the soil over the surface of the site without infiltrating into the ground surface. It may originate from precipitation, or as drainage water from adjacent, upslope areas. The rate and amount of runoff are affected by internal physical characteristics of the soil as well as slope gradient ranges and landform shape (i.e. concave vs. convex slopes). Runoff can be significantly different on a given soil under natural vegetation, cultivation by man, or other kinds of management. Runoff from a particular site can also be affected by other factors such as rainfall amounts, snow pack accumulation or other climatic fluctuations. Surface runoff is usually significantly greater on frozen ground surfaces.

Six categories for runoff rates are provided:

Ponded	little or none of the precipitation and run-on (from surrounding, higher elevations) escapes the site as runoff. Free water stands on or above the existing soil surface for significant periods of time. Ponding normally appears on level to nearly level (i.e. <3%) slopes, in depressions or within concavities in a pit/mound micro-relief topography. Water depth may vary considerably throughout the year, or from year to year. Often this is consistent with very poorly drained soils.
Very slow	surface water flows away slowly, and free water may be present at the soil surface for portions of the year, or may infiltrate slowly into the soil surface when not ponded. These soils may be consistent with very poorly drained, or poorly drained soils that are coarser textured and somewhat porous.
Slow	surface water flows away from the soil quickly enough, either due to slope or the porosity of the soils, so that free water can be observed at the soil surface for moderate periods immediately following spring snowmelt or prolonged storm rainfall events. Most of the water passes through the soil, is used by plants, or evaporates.
Medium	surface water flows away quickly enough due to slope or soil porosity that water is observed at or near the soil surface for short durations, usually during spring snowmelt or immediately following significant storm rainfall events.

Rapid — surface water flows away quickly enough that any period of saturation is brief, and free water does not stand on the soil surface. Only a small portion of the water enters the soil as infiltration, either due to steep slopes and/or fine textures with slow rates of absorption.

Very rapid — surface water flows away so quickly that duration of any event is brief, and water never stands on the soil surface. Only a very small portion of the available moisture enters the soil as infiltration.

ADDITIONAL SOIL TERMS

Flooding (Hazard to flooding)

Flooding is the temporary covering of the soil surface by flowing water from any source, including but not limited to: streams or rivers overflowing their banks, runoff from adjacent or upslope areas, inflow from high tide action, or a combination of sources. Water due to snowmelt is excluded from this definition, as is standing or ponded water that forms a permanent or semi-permanent cover above the soil surface.

Flooding hazard is further expressed by frequency classes, duration, and the time of year that the flooding occurs. The velocity and depth of the floodwater are also important factors.

Ponding — Ponding is standing water in a closed depression. The water is removed only by evaporation, transpiration by plants, or percolation through the ground.

Soil complex — A map unit that consist of two or more kinds of soils (i.e. soil series/taxonomic unit) that occur on a non-regular, non-repeating pattern that cannot be separated out at the scale provided. The order of the soils named are generally in order of predominance within the map unit.

Soil map unit — A collection of soils or soil areas that are delineated during soils mapping. It generally is an aggregate of several soil entities with a predominant named soil type. Kinds of soil map units may include complexes, consociations, or associations.

Soil slope gradient range

The slope identified for any given map unit, based on the immediate topography within a specific portion of the mapping site. Designations generally are as follows:

A	0-3%	nearly level to level
B	3-8%	gently sloping
C	8-20%	moderately sloping
D	20%+	steeply sloping

Stoniness

This is a phase of surface characteristic that may be identified in soils mapping, ranging from stony or bouldery (0.01 to 0.1% of soil surface covered with stones) to rubbly or rubble land, in which up to 75% of the soil surface is covered with stones. Extremely stony sites or sites with rubble land may have additional limitations for use of mechanized equipment.

APPENDIX F

Methodology

Soils identification and mapping were done in accordance with the standards adopted by the Maine Association of Professional Soil Scientists (revised February 2004) for Class A-D soil surveys. Soils are described using standard soil terminology developed by the USDA Natural Resources Conservation Service, which is also where soil interpretation records originate for each soil series described in Maine. Scale requirements vary depending on the level of soil survey required, and limits for dissimilar soil inclusions likewise vary depending on class of mapping accuracy requested. Where important distinctions between hydric and non-hydric soils are made in the mapping, the Maine Association of Professional Soil Scientists Key to Soil Drainage Classes was also utilized, as well as a separate list of regional indicators for identification of hydric soils (Field Indicators for Identifying Hydric Soils in New England, version 3 2004).

APPENDIX G

Photographs

Stetson II Wind Project
Monarda-Burnham soils setting

Stetson II Wind Project
Chesuncook soil (the Official Maine State Soil)

Stetson II Wind Project
Monarda-Burnham soils setting

Stetson II Wind Project
Somewhat excessively well drained Colton soils

Stetson II Wind Project
Colton Soils

Stetson II Wind Project
Colton soil profile

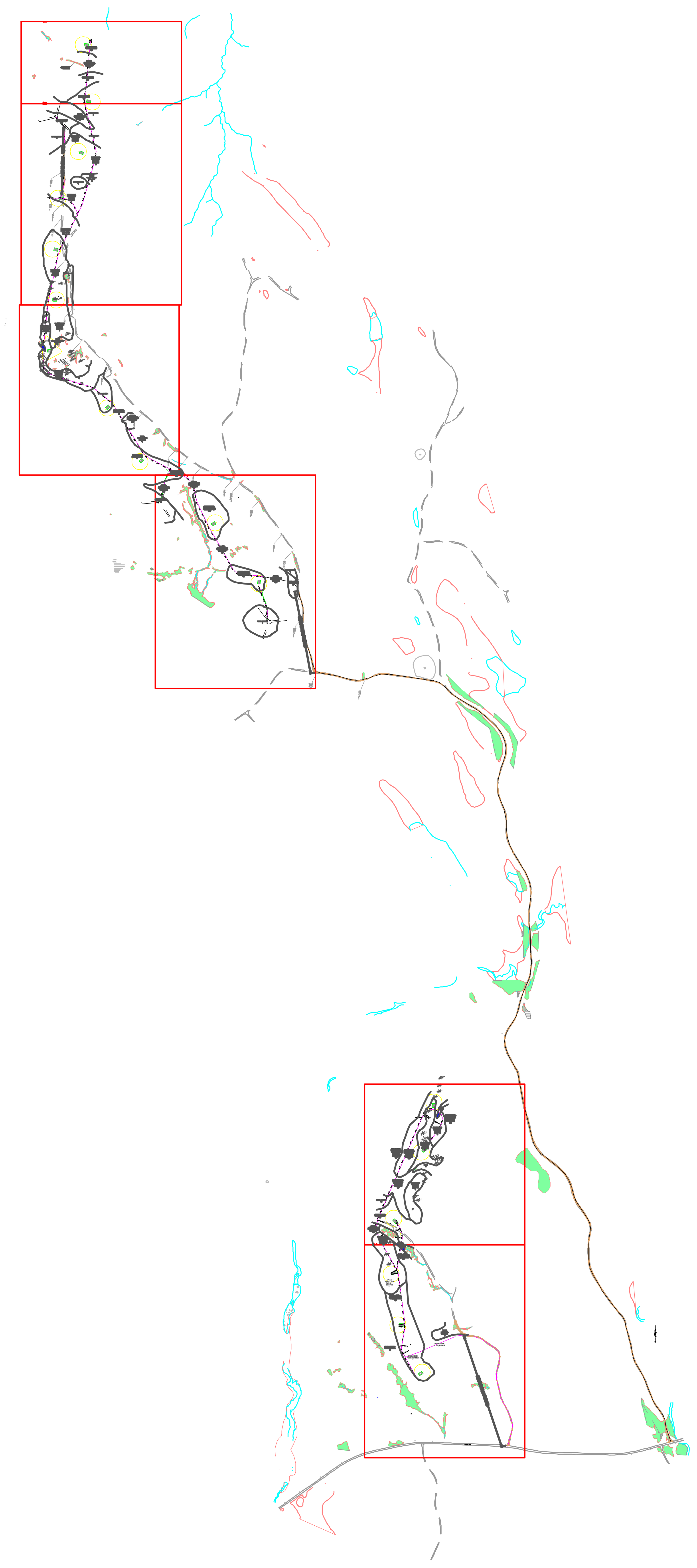
Stetson II Wind Project
Rock outcrop adjacent to haul road

Stetson II Wind Project
Adams and Colton outwash soils (Borrow area)

Stetson II Wind Project
Monson soils – 12" to bedrock

Stetson II Wind Project
Monson – Elliotsville rock outcrop complex

Stetson II Wind Project
Map unit boundary location; C slopes break to D slopes



DATE:	REVISIONS:

OVERALL SITE PLAN

STETSON II

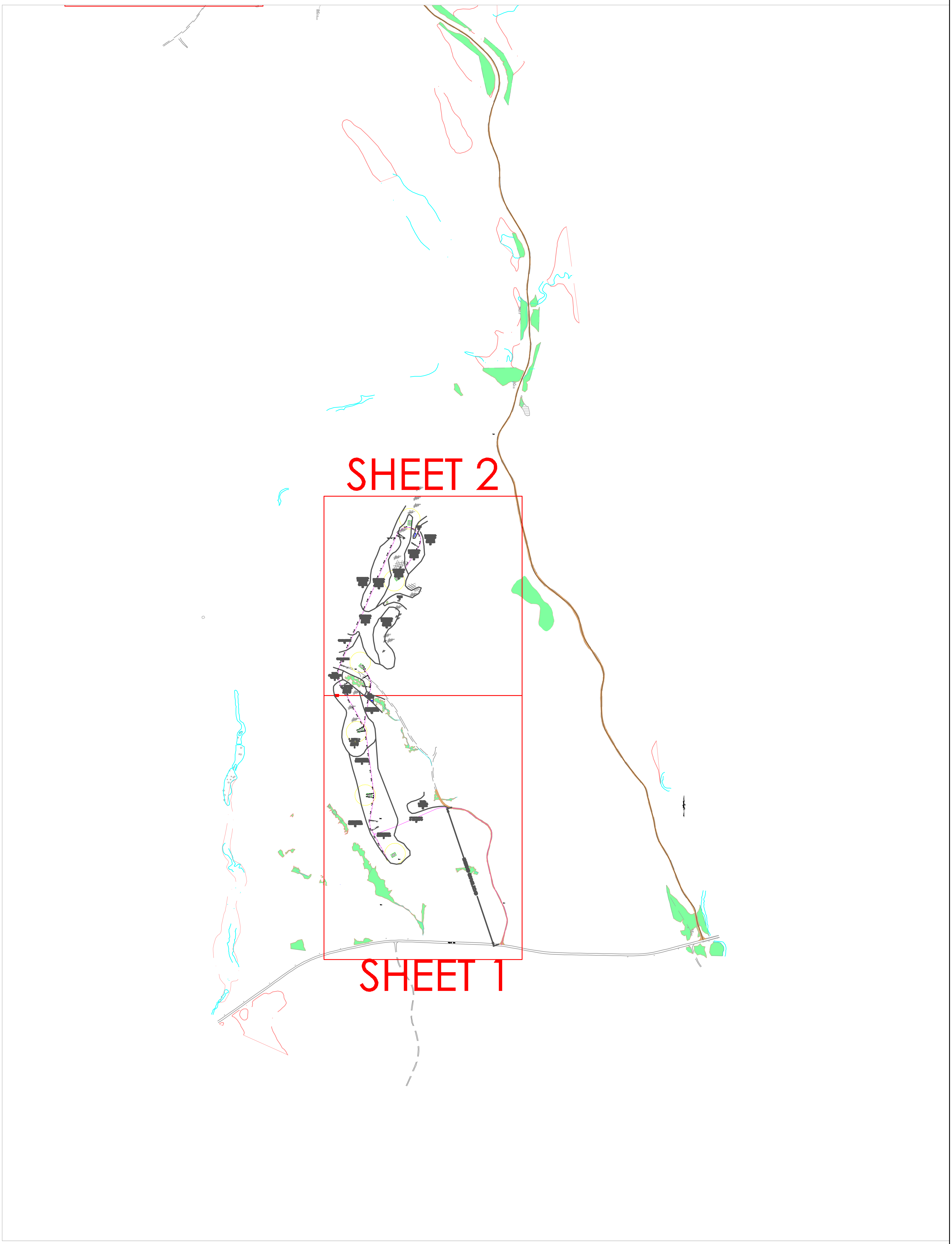
OWL & JIMMEY MOUNTAINS

T8, R4 NBPP, MAINE

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O. | Checked By: J.L.

Date: 8/25/08 | Scale: 1" = 1000'



GRAPHIC SCALE

500 0 250 500 1000

(IN FEET)
1 inch = 500 ft.

DATE:	REVISIONS:

SHEET INDEX PLAN

STETSON II
PREPARED FOR STANTEC

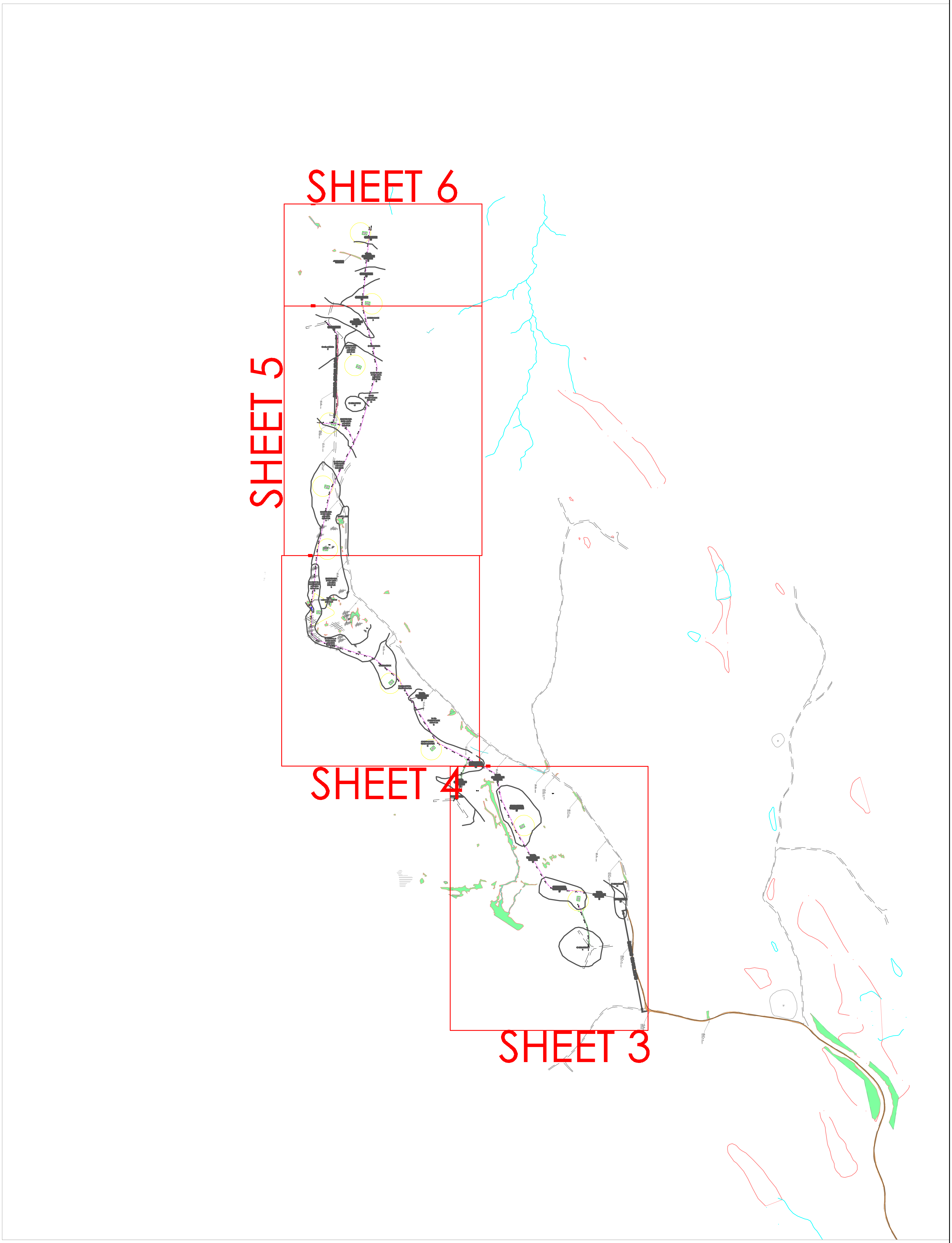
OWL MOUNTAIN

T8, R4 NBPP, MAINE

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O. | Checked By: J.L.

Date: 8/28/08 | Scale: 1" = 500'

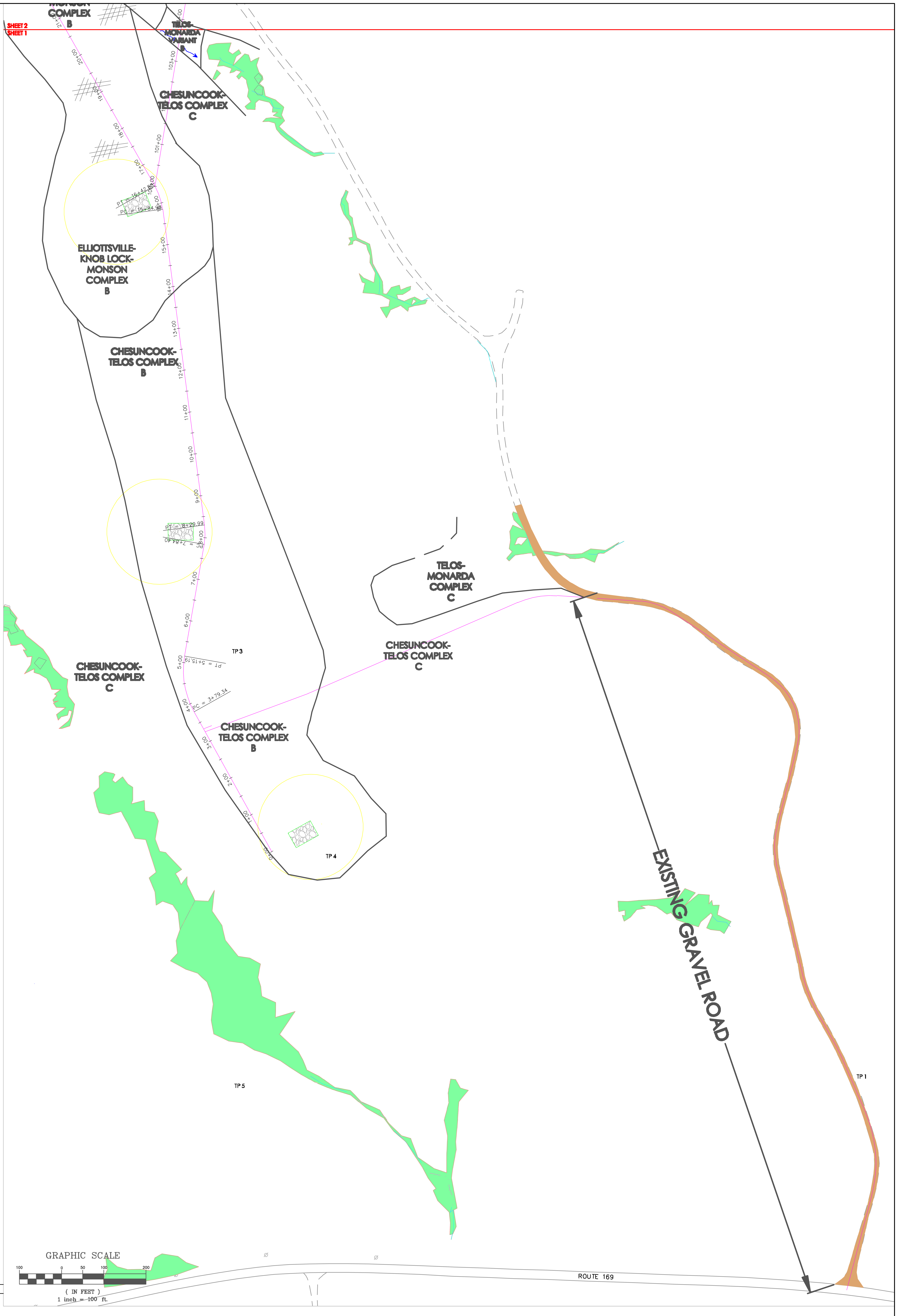


DATE:	REVISIONS:

SHEET INDEX PLAN
STETSON II
PREPARED FOR STANTEC
JIMMEY MOUNTAIN
T8, R4 NBPP, MAINE

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 500'



SOILS MAP LEGEND:

- TP — SOIL TEST PIT
- WETLAND AREA
- SOIL BOUNDARY LINE
- SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

- LARGE BEDROCK OUTCROP (100-200')
- MEDIUM BEDROCK OUTCROP (50-100')
- SMALL BEDROCK OUTCROP (25-50')

NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 AND OCTOBER, 2008

THE ACCOMPANYING SOILS SURVEY WAS DONE IN ACCORDANCE WITH THE STANDARDS ADOPTED BY THE MAINE ASSOCIATION OF PROFESSIONAL SOIL SCIENTISTS, FEBRUARY 1995, AS AMENDED. IT IS INTENDED TO VERIFY & UPGRADE THE CLASS D MEDIUM INTENSITY SOIL SURVEY PUBLISHED BY THE USDA-NRCS

SOIL TEST PITS & SITE FEATURES LOCATED BY ALBERT FRICK ASSOCIATES, INC. USING A SUBMETER GPS UNIT.

PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

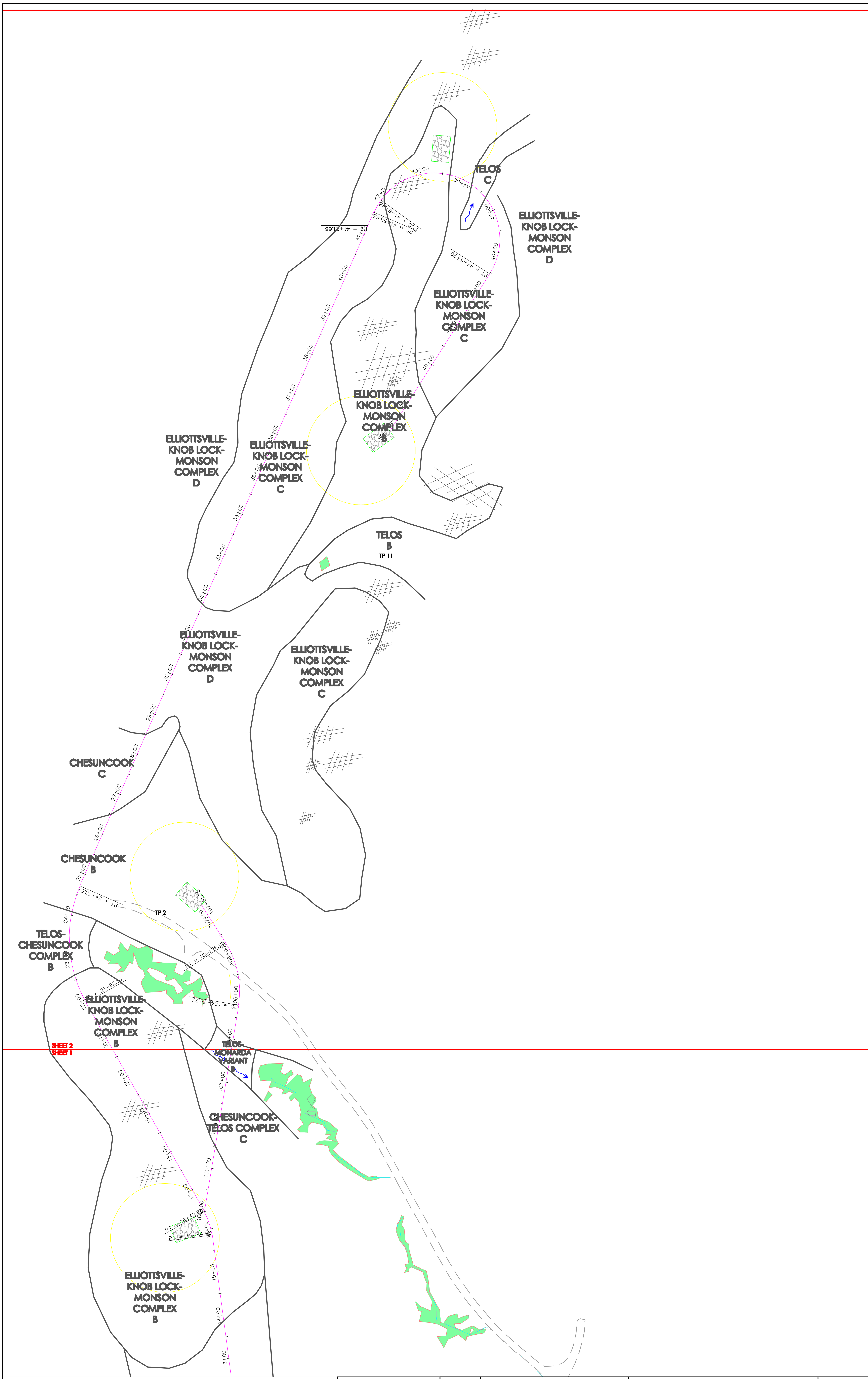
STATE OF MAINE
JAMES LOGAN
#213
CERTIFIED SOIL SCIENTIST

DATE:	REVISIONS:

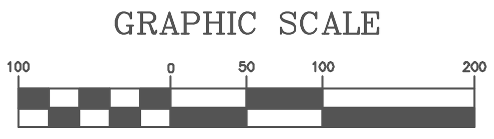
ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 1 OF 6

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

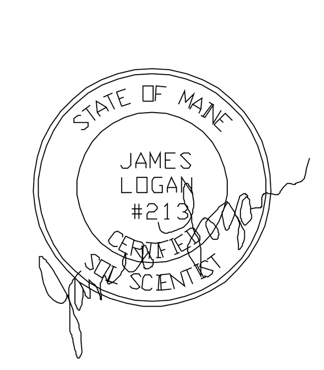
Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 100'



GRAPHIC SCALE



(IN FEET)
1 inch = 100 ft.



DATE:	REVISIONS:

ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 2 OF 6

SOILS MAP LEGEND:

TP	SOIL TEST PIT
	WETLAND AREA
	SOIL BOUNDARY LINE
	SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

- LARGE BEDROCK OUTCROP (100-200')
- MEDIUM BEDROCK OUTCROP (50-100')
- SMALL BEDROCK OUTCROP (25-50')

NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 & OCTOBER, 2008

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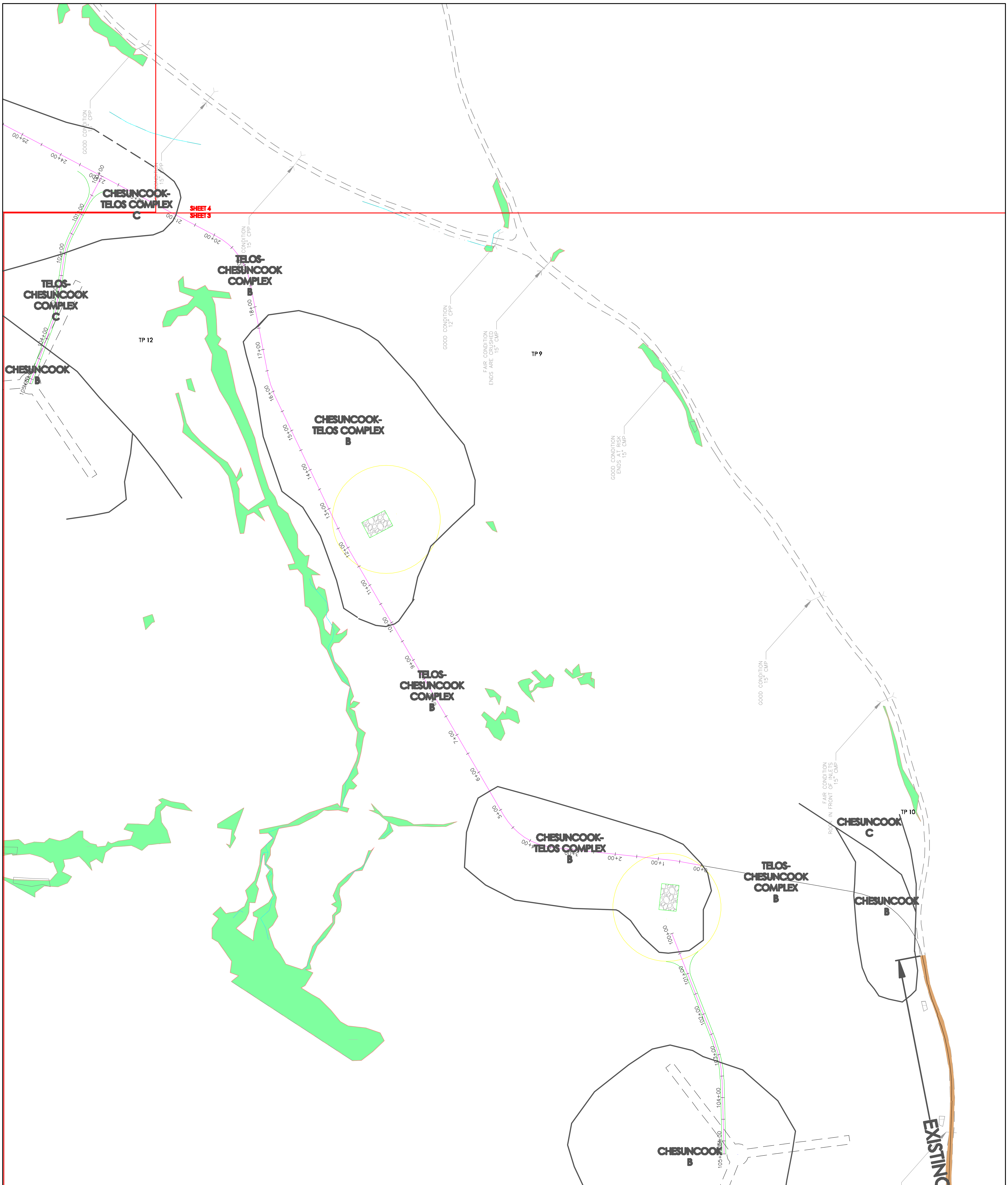
SOIL TEST PITS & SITE FEATURES LOCATED BY ALBERT FRICK ASSOCIATES, INC. USING A SUBMETER GPS UNIT.

PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 100'



SOILS MAP LEGEND:

TP	SOIL TEST PIT
	WETLAND AREA
	SOIL BOUNDARY LINE
	SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

- LARGE BEDROCK OUTCROP (100-200')
- MEDIUM BEDROCK OUTCROP (50-100')
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NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 & OCTOBER, 2008

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SOIL TEST PITS & SITE FEATURES LOCATED BY ALBERT FRICK ASSOCIATES, INC. USING A SUBMETER GPS UNIT.

PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

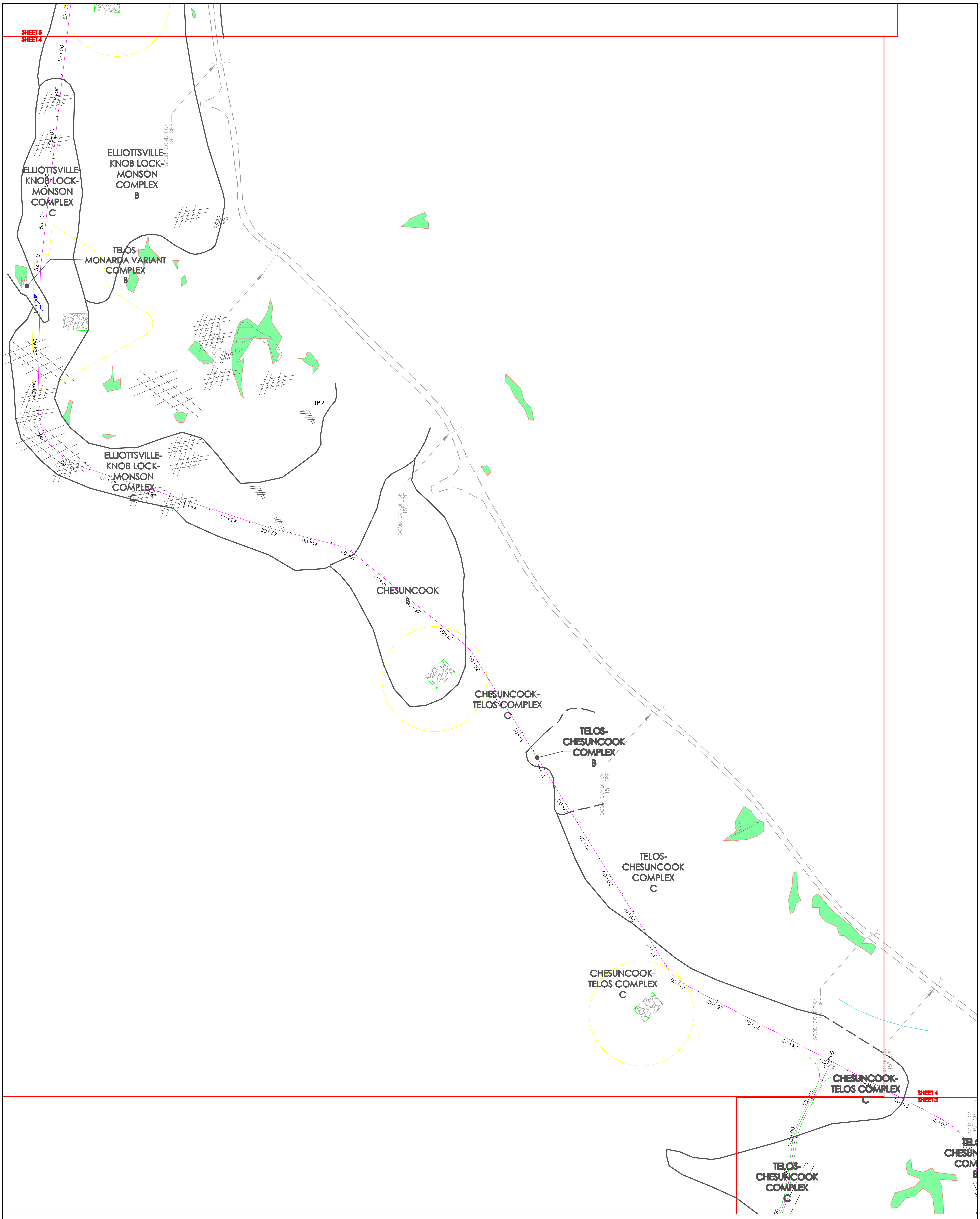
STATE OF MAINE JAMES LOGAN #213 CERTIFIED SOIL SCIENTIST

DATE:	REVISIONS:

ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 3 OF 6

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 100'



GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

SOILS MAP LEGEND:

- TP — SOIL TEST PIT
- WETLAND AREA
- SOIL BOUNDARY LINE
- SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

- LARGE BEDROCK OUTCROP (100-200')
- MEDIUM BEDROCK OUTCROP (50-100')
- SMALL BEDROCK OUTCROP (25-50')

NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 & OCTOBER, 2008

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PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

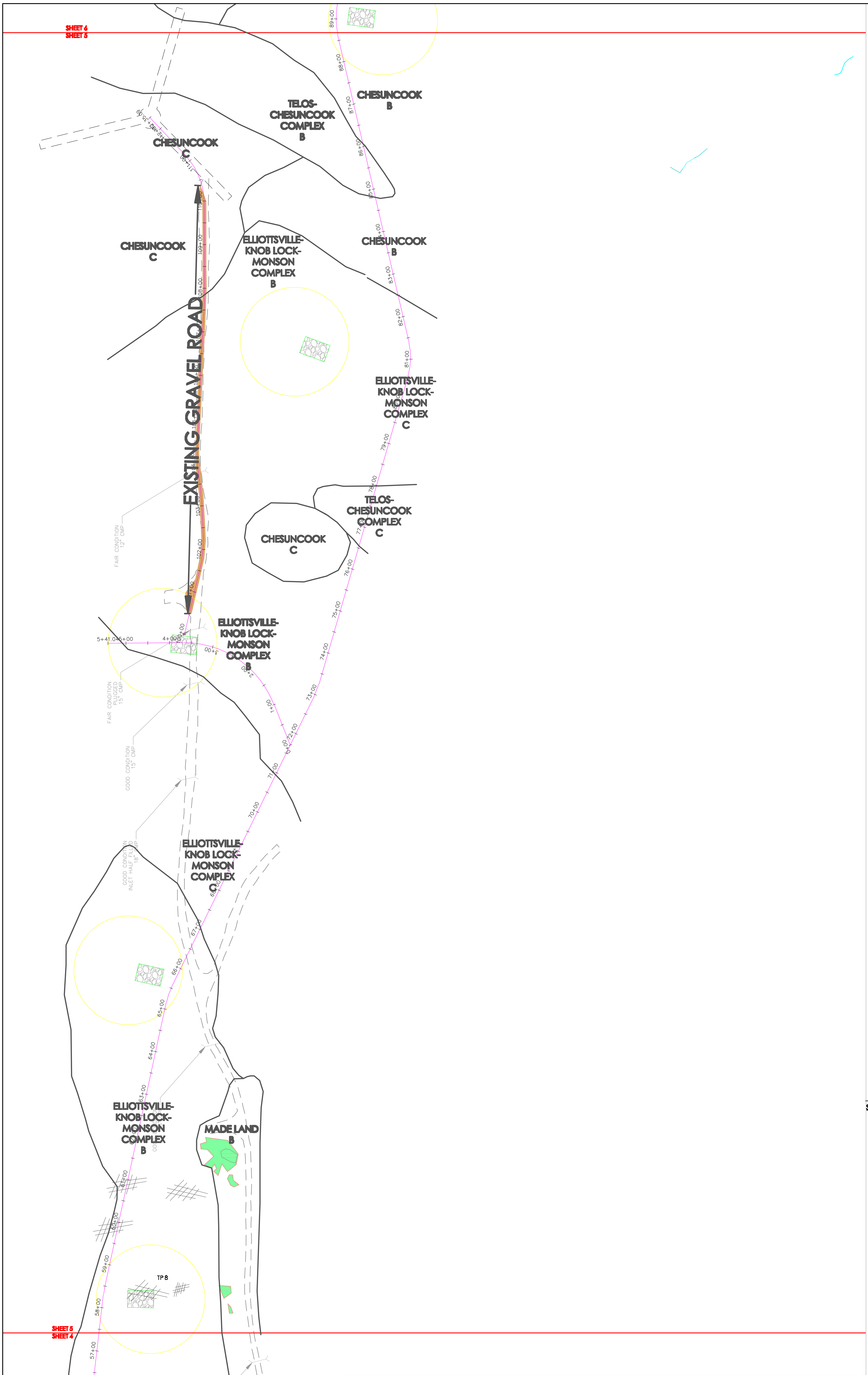
STATE OF MAINE
JAMES LOGAN
#213
CERTIFIED SOIL SCIENTIST

DATE:	REVISIONS:

ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 4 OF 6

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.
Checked By: J.L.
Date: 8/28/08
Scale: 1" = 100'



SOILS MAP LEGEND:

TP	SOIL TEST PIT
	WETLAND AREA
	SOIL BOUNDARY LINE
	SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

- LARGE BEDROCK OUTCROP (100-200')
- MEDIUM BEDROCK OUTCROP (50-100')
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NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 & OCTOBER, 2008

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PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

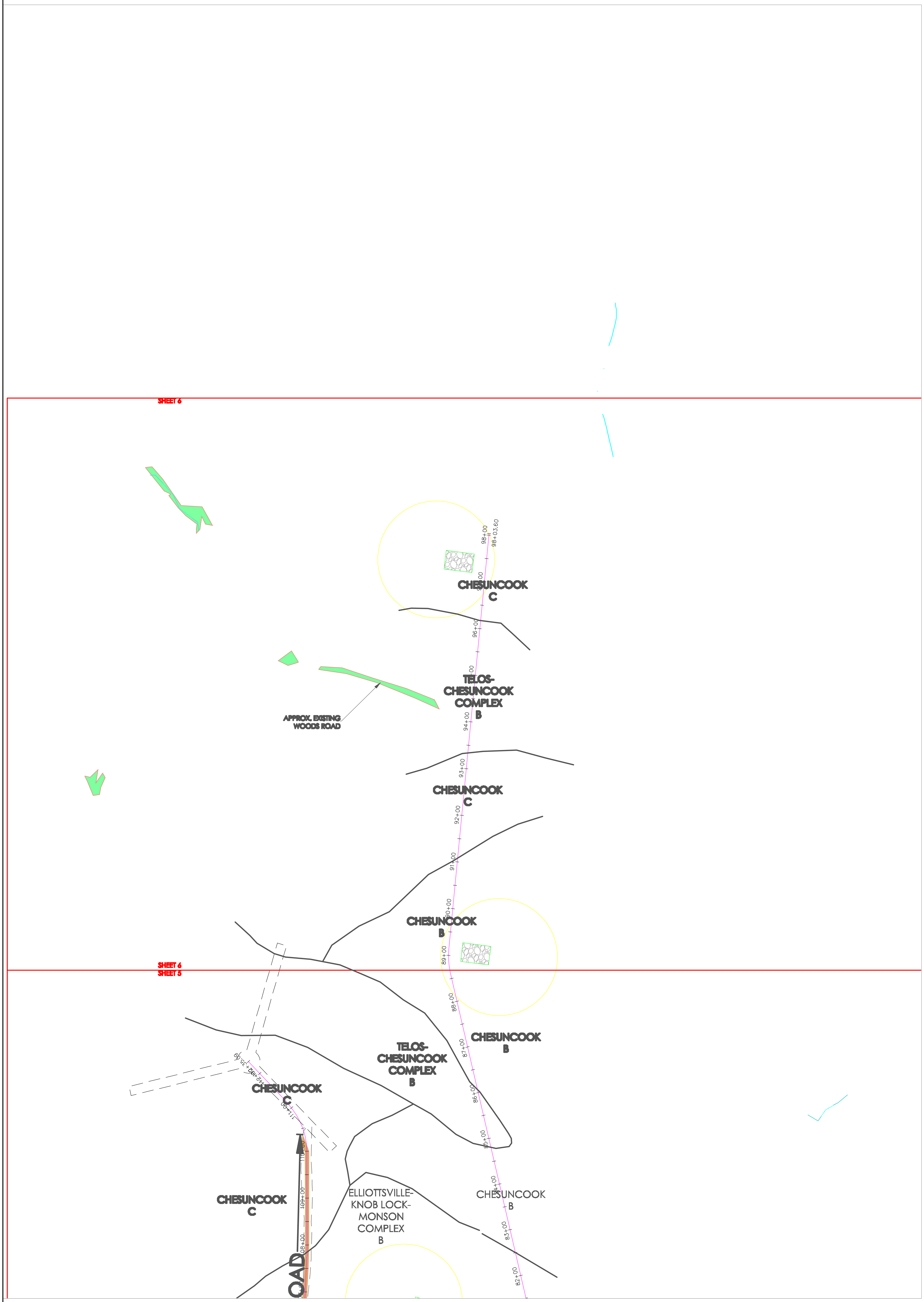
STATE OF MAINE
JAMES LOGAN
#213
CERTIFIED SOIL SCIENTIST

DATE:	REVISIONS:

ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 5 OF 6

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 100'



SOILS MAP LEGEND:

TP — SOIL TEST PIT

WETLAND AREA

SOIL BOUNDARY LINE

SURFACE DRAINAGE

SLOPE DESIGNATION

A	0 – 3%
B	3 – 8%
C	8 – 20%
D	20%+

BEDROCK OUTCROP LEGEND

LARGE BEDROCK OUTCROP (100-200')

MEDIUM BEDROCK OUTCROP (50-100')

SMALL BEDROCK OUTCROP (25-50')

NOTE: SEE ACCOMPANYING SOIL NARRATIVE REPORT, DATED SEPTEMBER, 2008 & OCTOBER, 2008

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PROPERTY INFORMATION PER PLAN BY SEWALL ASSOCIATES

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

STATE OF MAINE
JAMES
LOGAN
#213
CERTIFIED
SOIL SCIENTIST

DATE:	REVISIONS:

ROAD ALIGNMENT SOILS SURVEY
STETSON II
PREPARED FOR STANTEC
OWL & JIMMEY MOUNTAINS
T8, R4 NBPP, MAINE
SHEET 6 OF 6

Albert Frick Associates, Inc.
Soil Scientists & Site Evaluators
Gorham, Maine 04038

Drawn By: B.O.	Checked By: J.L.
Date: 8/28/08	Scale: 1" = 100'

1.0 Purpose

This soils mapping effort is intended to identify areas of potential concern for road construction related to soil drainage within areas not previously identified as wetlands.

Albert Frick Associates, Inc. (AFA) communicated closely with the State Soil Scientist in the development of meaningful soil classification and mapping information standards and techniques, in a timely and cost-effective fashion, to facilitate meaningful reviews of long, linear projects such as wind energy facilities.

2.0 Methodology

AFA reviewed the specific location of proposed access road, using download-able Autocad file in a submeter Global Positioning System unit, showing road centerline stationing for guidance in the field.

Soil observation and classification for drainage and parent material occurred at each 100-foot road centerline station for additional compilation onto the base plan at the series level.

CHESUNCOOK
(Typic Haplorthods)

SETTING

Parent Material: Loamy glacial till.

Landform: Glaciated uplands.

Position in Landscape: Side slope.

Slope Gradient Ranges: **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained, with a perched water table 1.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation.

Typical Profile Description:

	Surface layer:	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"

Hydrologic Group: Group C

Permeability: Moderate in the solum, moderately slow or slow in the compact substratum.

Depth to Bedrock: Very deep, greater than 60 inches.

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Berkshire

Contrasting: Telos, Monson, Elliotsville (less than 40" to bedrock)

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for site development is wetness due to the presence of a perched water table 1.5 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. Chesuncook soil is suitable for construction of wind power projects, for both turbine pad placement and road construction.

CHESUNCOOK-TELOS COMPLEX

SETTING

Parent Material: Coarse-loamy glacial till.

Landform: Glaciated uplands.

Position in Landscape: Side slopes.

Slope Gradient Ranges: **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained (Chesuncook) to somewhat poorly drained (Telos), with a perched water table 0.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation.

In this map unit, Chesuncook soils generally occupy small mounds within the micro-topography, while Telos, with water tables generally 9-15", tends to occupy small depressional areas. Chesuncook forms the larger, or more dominant soil component of this map unit.

Typical Profile Description: (for Telos- see also Chesuncook description)

Surface layer:	Black organic material, 0-2"
Subsurface layer:	Pinkish gray, gravelly silt loam, 2-5"
Subsoil layer:	Dark brown, dark yellowish brown, olive, gravelly silt loam, 5-52"
Substratum:	Olive gravelly silt loam, 52-60"

Note: These soils occur on the landscape in a complex pattern that could not be separated out at the level of detail provided.

Hydrologic Group: Group C

Permeability: Chesuncook: 0-21" 0.6 - 2.0 in/hr
> 21" < 0.2 in/hr

Depth to Bedrock: Very deep, greater than 60 inches.

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Colonel, stony phase inclusions

Contrasting: Telos, Monson, Elliotsville (less than 40" to bedrock), D slopes in C slope map units, stony and very stony phase inclusions, Monarda

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for site development is wetness due to the presence of a perched water table 1.5 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. Chesuncook and this Telos soil are suitable for construction of wind power projects, by overcoming limitations due to soil drainage through sound engineering practice. Slopes are generally more convex than concave, though small depressions exist within micro-topography.

MONSON-ELLIOTSVILLE-KNOB LOCK COMPLEX

SETTING

Parent Material:	Coarse-loamy glacial till.
Landform:	Glaciated uplands, ridge tops.
Position in Landscape:	Uppermost positions of landforms, ridgetops
Slope Gradient Ranges:	**(B)** 0-8% **(C)** 8-20% **(D)** 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat excessively well drained (Monson) to well drained (Elliotsville) in complex with well to excessively well drained Knob Lock, with no water table observed throughout the growing season.	
Typical Profile Description: (for Monson)	**Surface layer:**	Dark reddish brown organic material, 0-4"
	Subsurface layer:	Light gray channery silt loam, 4-5"
	Subsoil layer:	Dark reddish to yellowish brown silt loam, 6-11"
	Substratum:	Light olive brown channery silt loam, 11-19"
	Slate bedrock @ 19"	
(for Elliotsville)	**Surface layer:**	Dark reddish brown organic, 0-1"
	Subsurface layer:	Pinkish gray silt loam, 1-2"
	Subsoil layer:	Dark reddish brown to olive brown channery loam, 2-17"
	Substratum:	Olive channery loam, 17-26"
	Slate Bedrock @ 26"	
(for Knob Lock)	**Surface layer:**	Dark reddish brown to black organic material, 0-7"
	Subsoil layer:	Dark reddish gray very fine sandy loam, 7-9"
	Bedrock @ 9"	
	Note:	These soils occur in a non-regular, non-repeating pattern that could not be separated out in mapping at the scale provided.
Hydrologic Group:	**for Monson:**	Group C/D
	for Elliotsville:	Group B
	for Knob Lock:	Group A
Surface Run-off:	Rapid	
Permeability:	0.6 - 2.0 in/hr (for Monson & Elliotsville) None determined for Knob Lock	
Depth to Bedrock:	shallow 10-20" (Monson and Knob Lock) moderately deep 20-40" (Elliotsville)	

Hazard to Flooding: None

Erosion Factors (Kf):

	0-8"	-.28
	8"-bedrock surface	-.37

INCLUSIONS
(Within mapping unit)

Similar: Chesuncook, B slope inclusions within C/D map units

Contrasting: Telos, Monarda, Burnham (very limited extent), Naskeag (Variant)

Development of wind power projects: The limiting factor for building site development is bedrock, due to depths varying from zero to within 40" of the mineral soil surface. This map unit provides for stable anchoring for tower/turbine construction. Slopes are generally convex in shape, and very near the uppermost portions of watersheds, thus surface water runoff is minimal.

Proper foundation drainage or other site modification is recommended for construction, in moderately deep Elliotsville portions of mapping units where seasonal water tables may be present above the bedrock surfaces, or in deep inclusions of Chesuncook or Telos soils.

TELOS-CHESUNCOOK COMPLEX

SETTING

Parent Material: Coarse-loamy glacial till.

Landform: Glaciated uplands.

Position in Landscape: Side slopes.

Slope Gradient Ranges: (B) 3-8%   (C) 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly drained (Telos) to Moderately well drained (Chesuncook), with a perched water table 0.5 to 3.0 feet beneath the existing soil surface March through May and during periods of excessive precipitation.

In these map units, Telos soils that are generally 9”-15” to seasonal high groundwater table, occupy the lowest portions of the slope phase within micro-depressions. Chesuncook soils generally are found in mounds with the micro-relief. Telos soils dominate this map unit, and overall slopes may be more concave than convex.

Typical Profile Description: (for Telos)	**Surface layer:**	Black organic material, 0-2"
	Subsurface layer:	Pinkish gray, gravelly silt loam, 2-5"
	Subsoil layer:	Dark brown, dark yellowish brown, olive, gravelly silt loam, 5-52"
	Substratum:	Olive gravelly silt loam, 52-60"
(for Chesuncook)	**Surface layer:**	Dark reddish brown organic, 0-3"
	Subsurface layer:	Light gray, dark reddish brown to reddish brown and yellowish brown silt loam and loam, 3-14"
	Subsoil layer:	Olive brown to grayish brown, gravelly loam, 14-24"
	Substratum:	Olive gravelly loam, 24-36"
	Note:	These soils occur on the landscape in a regular repeating pattern that could not be separated out at the scale provided.

Hydrologic Group: Group C

Surface Run-off: Rapid

Permeability:

Chesuncook:	0-21"	0.6 - 2.0 in/hr
	> 21"	< 0.2 in/hr
Telos:	0-18”	0.6-2.0 in/hr
	>18”	0.0-0.2 in/hr

Depth to Bedrock: Very deep, greater than 60 inches.

Hazard to Flooding: None

Erosion Factors (Kf): 0-8" -.28
8-65" -.37

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Colonel

Contrasting: Telos, Monson, Elliotsville (less than 40" to bedrock), D slopes in C slope map units, stony and very stony phase inclusions, Monarda

USE AND MANAGEMENT

Development of wind power projects: The limiting factor for building site development is wetness due to the presence of a perched water table 1.0 to 3.0 feet beneath the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. Telos soils have limitations for construction of roads, however, within these map units, seasonal high groundwater tables within the Telos component generally are 9"-15" beneath the soil surface. Soil limitations due to drainage generally can be overcome through sound engineering practices.

TELOS-MONARDA COMPLEX
(Typic Haplorthods)

SETTING

Parent Material: Loamy dense basal till.

Landform: Lower side slopes in glaciated uplands.

Position in Landscape: Nearly level to steeply sloping soils on upland till ridges.

Slope Gradient Ranges: **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly drained (Telos) to poorly drained Monarda or Monarda Variant with perched seasonal high groundwater table 0-1.5' beneath the soil surface from October through May and during periods of heavy precipitation.

Typical Profile Description: (for Telos)	**Surface layer:**	Pinkish gray silt loam, 0-4"
	Subsurface layer:	Dark reddish to yellowish brown silt loam, 4-15"
	Subsoil layer:	Light olive brown silt loam, 15-20"
	Substratum:	Olive gravelly silt loam, 20-65"

Typical Profile Description: (for Monarda)	**Surface layer:**	Black organic layer, 0-4"
	Subsurface layer:	Light brownish gray, gravelly silt loam, 4-9"
	Subsoil layer:	Gray, olive gray and olive, gravelly silt loam, 9-33"
	Substratum:	Gray, gravelly silt loam, 33"+

Note: These soils occur in a non-regular, non-repeating pattern which could not be separated out at the mapping scale provided.

Hydrologic Group: Group C

Surface Run Off: Slow

Permeability: Moderate in the solum, and slow or very slow in the substratum.

Depth to Bedrock: Very deep, greater than 65".

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Chesuncook, Colonel

Contrasting: Brayton, Monarda, Naskeag, Burnham (very limited extent)

<u>USE AND MANAGEMENT</u>

Telos soils that are generally 7-10" to high water tables generally occupy the mounds found within the pit/mound micro-relief, while the Monarda soil component is found within depressions.

Development of wind power projects: The limiting factor for building site development is wetness, due to the presence of a groundwater table 1.0 to 1.5 feet below the soil surface for some portion of the year. Proper foundation drainage or other site modification is recommended for construction. These map units have limitations for construction of roads and/or use as turbine pad construction sites, since significant drainage is present for long durations during the year, but oxiaquic conditions prevent identification of these areas as wetlands. Soil drainage limitations can be overcome through sound engineering practice and best management techniques.

S.W.COLE
ENGINEERING, INC.
• Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

08-0248 G

June 13, 2008

First Wind
Attention: Ryan Chaytors and Jed Dailey
85 Wells Avenue, Suite 305
Newton, MA 02459

Subject: Geological Reconnaissance – Preliminary Acid Rock Drainage Evaluation
Proposed Stetson Mountain Extension Wind Power Project
Owl Mountain and Jimmey Mountain
T8R4 NBPP Township (Danforth Area)
Washington County, Maine

Dear Sirs:

Enclosed, please find five copies of our Geological Reconnaissance – Preliminary Acid Rock Drainage Evaluation for the project referenced above. It has been a pleasure to be of assistance to you with this phase of your project.

Please call if you have any questions.

Very truly yours,

S. W. COLE ENGINEERING, INC.

Clifford R. Lippitt, C.G.
Senior Geologist

CRL:slh

Corporate Office/Bangor, ME
37 Liberty Drive, Bangor, ME 04401-5784 ▪ Tel (207) 848-5714 ▪ Fax (207) 848-2403 ▪ E-Mail info@swcole.com ▪ www.swcole.com
Other offices in Augusta, Caribou, and Gray, Maine & Somersworth, New Hampshire

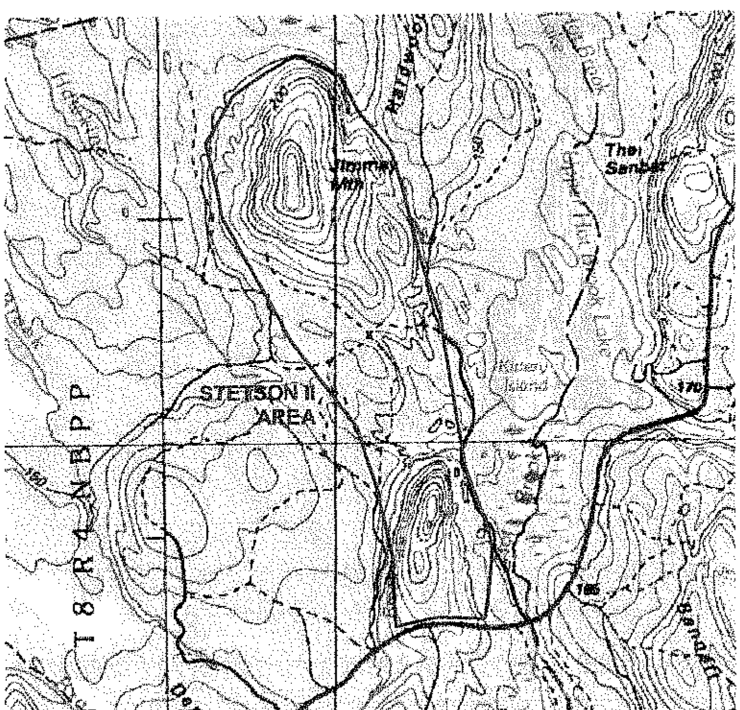
GEOLOGICAL RECONNAISSANCE
PRELIMINARY ACID ROCK DRAINAGE EVALUATION
PROPOSED STETSON MOUNTAIN EXTENSION
WIND POWER PROJECT
OWL MOUNTAIN AND JIMMEY MOUNTAIN
T8R4 NBPP TOWNSHIP (DANFORTH AREA)
WASHINGTON COUNTY, MAINE

08-0248 G JUNE 13, 2008

PREPARED BY

S.W.COLE ENGINEERING, INC.

FOR
FIRST WIND



From Terraserver – Not to Scale

S.W.COLE ENGINEERING, INC.
• Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

08-0190 G

June 13, 2008

First Wind
Attention: Ryan Chaytors and Jed Dailey
85 Wells Avenue, Suite 305
Newton, MA 02459

Subject: Geological Reconnaissance – Preliminary Acid Rock Drainage Evaluation
Proposed Stetson Mountain Extension Wind Power Project
T8R4 NBPP Township (Danforth Area), Maine

Dear Sirs:

In accordance with our Budget Estimate dated April 16, 2008 and your Purchase Order dated May 08, 2008, we have provided geological reconnaissance services for the preliminary acid rock drainage evaluation of the Stetson Mountain II area (see cover page) in T8R4 NBPP Township, Maine. The area was defined on a map provided by First Wind (formerly UPC Wind Power LLC) on April 01, 2008. We understand that this geological reconnaissance has been requested to fulfill some of the baseline geological evaluation of the areas as part of the pre-application data package. The purpose of this reconnaissance was to characterize the bedrock to evaluate the potential for acid rock drainage (ARD) production associated with site construction and potential erosion/ weathering. The contents of this report are subject to the limitations set forth in Attachment A.

INTRODUCTION

We understand the proposed Stetson II Wind Power project consists of an area north of the existing Stetson Mountain Wind Power Project and Maine Route 169. The area includes Owl Mountain, immediately north of Route 169, and Jimmey Mountain. Both mountains are located in T8R4 NBPP township approximately 10 miles west of Danforth, Maine. Published geological mapping (Ludman & Hopeck, 2007, Sheet 1) indicates the southern portion of the area (Owl Mountain) is underlain by felsic[1] volcanic

[1] Applied to a igneous rock with abundant light colored minerals

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Other offices in Augusta, Caribou, and Gray, Maine & Somersworth, New Hampshire

rocks (Osm1) similar to those on Stetson Mountain; and the northern portion of the area (Jimmey Mountain) is underlain by Daggett Ridge Formation (Sdr) meta[2]-conglomerates. Pelite[3], silt, and sand layers are interbedded within the conglomerate. Metasediments consisting of pelite without carbonaceous material (Ssr – Sam Rowe Ridge Formation) and pelite with carbonaceous material (SOmp – Mill Privilege Brook Formation) are mapped in the area between Jimmey Mountain and Owl Mountain, and to the west and east of the proposed area of development.

SCOPE OF WORK

S. W. COLE ENGINEERING, INC. provided the following services:

- Reviewed the published geologic information.
- Contacted geologists with the Maine Geological Survey, Maine DEP, and universities, who have performed bedrock mapping in this area to assess bedrock structural geology and mineral composition of the bedrock.
- Performed geological reconnaissance of bedrock outcrops in the area.
- Collected representative bedrock samples that were used as reference hand specimens and submitted for laboratory characterization of acid base accounting (ABA) parameters. ABA analyses were performed by Sturm Environmental of Bridgeport, West Virginia. The samples were analyzed for Fizz, Color, Paste pH, Neutralization Potential (NP) and total sulfur. Neutralization Potential (NP) and total sulfur are used to calculate Maximum Potential Acidity (MPA) and Net Neutralization Potential (NNP).
- Submitted nine samples that were analyzed for ABA parameters, and two samples that were analyzed for chloride and sulfate.
- Prepared this report summarizing bedrock field observations, bedrock and geochemical research, and testing results.

PUBLISHED GEOLOGICAL DATA

The area of investigation has been the subject of several geological publications. The *Draft Bedrock Geology of the Danforth 1:100,000 Quadrangle, Maine* (Ludman & Hopeck 2007), maps the bedrock underlying Owl Mountain as felsic meta-volcanics,

[2] Prefix applied rock that have been exposed to some form of metamorphism
[3] Pelite is a metamorphic equivalent of a mudstone, being composed of clay size material.

with conglomerates underlying the northern two-thirds of Jimmey Mountain. The meta-sediments between and surrounding the two areas consist of metamorphosed sandstone-siltstone and pelite with (SOmp) and without (Ssr) carbonaceous material.

FIELD WORK

Bedrock outcrops along the apex of Owl Mountain and Jimmey Mountain are consistent with the published geological mapping. The logging road over the apex of Jimmey Mountain exposed the conglomerate in several locations. The metasediments were observed on the western and northwestern flank of Jimmey Mountain, with varying amounts of sulfide mineralization observed in the black pelite. Visual descriptions of the rock samples submitted for acid-base accounting are summarized on Sheet 2.

Nine bedrock samples were selected for acid base assessment analyses, two from Owl Mountain and seven from Jimmey Mountain. Sample locations were surveyed using a Garmin Rino 520 GPS unit with ±10-meter accuracy. Sampling locations ARD-1 to ARD-9 are shown on Sheet 1. Rock samples ARD-2 and ARD-3 were submitted for soluble chloride and sulfate analyses. Sample locations were selected to be generally representative of the bedrock that may be encountered during construction of the proposed project, and based on the limited occurrence of outcrop. Photographs of rock sample location are included as Attachment B.

Sturm Environmental Services (SES) of Bridgeport, West Virginia performed the acid-base accounting analysis. Analyses for Fizz, Color, Paste pH, Neutralization Potential (NP) and total sulfur are used to calculate Maximum Potential Acidity (MPA) and Net Neutralization Potential (NPP). NP, MPA and NPP are expressed in Calcium Carbonate Equivalent Tons/100 Tons (ppt) of rock material. REIC Labs of Beaver, West Virginia was subcontracted by Sturm for soluble chloride and sulfate analyses. Laboratory reports are included as Attachment C

RESULTS AND DISCUSSION

The two meta-volcanic rock samples (ARD-1 and ARD-9) and the three conglomerate samples (ARD-2, -3, and -4), as noted on Sheet 2, all contain less than 0.1 % sulfur. Sulfur concentrations range from 0.341% to 0.989% (maximum potential acid/ MPA based on sulfide anion forming sulfuric acid) for the four meta-sediment samples on the west flank of Jimmey Mountain (ARD-5 to ARD-8). With the exception of ARD-1 and ARD-9 the neutralization potential (NP) is less than 10 ppt as $CaCO_3$. Paste pH values range from 4.6 to 8.5, with the lowest pH not corresponding to the highest sulfur concentration.

Neutralization Potential (NP) is a presumed to be a measure of carbonate minerals, exchangeable bases and weatherable silicate minerals and provides an index of available acid neutralizers in the rock. Formulas to calculate Maximum Potential Acidity (MPA) and Net Neutralization Potential (NNP) from percent total sulfur and Neutralization Potential (NP) are:

$$MPA = \%S \times 31.25$$
$$NNP = NP - MPA$$

The formula for MPA assumes that sulfide sulfur is the only acid generating source, with sulfate and organic sulfur assumed to be non-acid generating. In addition, the MPA formula assumes that carbon dioxide gas is exsolved and no carbonic acid is generated.

Guidelines from the Pennsylvania DEP on the interpretation of analytical results used for acid base accounting (ABA) include:

- Rocks with NNP (Excess $CaCO_3$) less than -5 ppt are potentially toxic - *The NNP for ARD-5, ARD-6, and ARD-8 are less than -5 ppt;*
- Rocks with pH <4.0 are considered acid toxic - *All samples have a pH of 5.1 or greater;*
- Rocks with greater than 0.5% sulfur may generate significant acidity - *Only sample ARD-8 exceeds this concentration with 0.989% total Sulfur;*
- Rocks with NP >30 ppt $CaCO_3$ and Fizz are a significant source of alkalinity (have potential for neutralizing acid rock, and the potential to be alkali toxic) - *Samples ARD-1 and ARD-9 (Owl Mountain) have an NP greater than 30 ppt;*
- Rocks with NNP >20 ppt $CaCO_3$ produce alkaline drainage - *ARD-1 and ARD-9 (Owl Mountain) are reported to have an NNP greater than 20 ppt;*

- Rocks with NNP less than -20 ppt $CaCO_3$ produce acid drainage - *Only sample ARD-8 has an NNP of less than -20 ppt, with a calculated NNP of -23.0 ppt; three of the nine samples have calculated NNP values between -4.2 and -8.4 ppt;*
- Rocks with NNP greater than 0 ppt $CaCO_3$ do not produce acid - *Samples ARD-1 through ARD-4 and ARD-9 have NNP values greater than 0;*
- NP/MPA ratios less than 1 likely result in acid drainage - *Samples ARD-1 through ARD-4 and ARD-9 have ratios greater than 1. Ratios greater than 1 range from 4.6 to 1468.7;* and
- Theoretical NP/MPA ratio of 2 or greater is needed for complete acid neutralization - *Samples ARD-1 through ARD-4 and ARD-9 have ratios greater than 1.*

In summary, these acid base accounting criteria indicate that the bedrock in the ridge areas of Owl Mountain and Jimmey Mountain are not acid toxic. However, rock samples of the pelitic metasediments similar to those that are mapped as underlying the area between the two mountains meet several of the criteria to produce ARD. The carbonaceous pelite sampled at ARD-8 appears to have the highest potential to generate ARD; however, the pyritic carbonaceous pelite showed little evidence of iron-oxide staining or coatings, with the paste pH greater than 5. The entire area mapped as Sam Rowe Ridge Formation (Ssr) or Mill Privilege Brook Formation (SOmp) appears to have low neutralization potential (less than 10 ppt) with higher than average sulfur (greater than 0.34 %). We did not observe heavy iron staining or coatings in the drainage ditches that would be interpreted as ARD related. Iron oxide coatings were generally limited to fracture/ foliation faces of outcrops. Fresh sulfides minerals (pyrite) were observed in fresh breaks of rocks (see photos).

Based on the topography and existing geological mapping associated with the Stetson II area, geotechnical investigations, soils mapping (delineation finding additional outcrop locations), road building and site preparation may expose additional bedrock zones with potential for ARD generation (Potential ARD area on Sheet 1) .

Soluble chloride and sulfate analyses were performed as a preliminary screening for potential corrosion of rock bolts. The chloride and sulfate analyses were below the method detection limits of 10 mg/kg and 50 mg/kg respectively. We understand that sulfate concentrations greater than 2,000 mg/kg may require additional corrosion protection. Therefore, these preliminary data indicate that additional corrosion protection should not be necessary; however, the locations with the greatest potential to generate acid (samples ARD-6, ARD-7, ARD-8 and potential ARD area delineated on Sheet 1) were not tested for chloride or sulfate.

RECOMMENDATIONS

Based on this preliminary investigation, we recommend that additional monitoring and mitigation planning be performed as part of the next phase of site evaluation. These efforts should be concentrated in potential construction area that may be underlain by the Sam Rowe Ridge Formation (Ssr) or Mill Privilege Brook Formation (SOmp) meta-sediments. If warranted based on further investigation, utilization of mitigation methods that may include isolation, blending, and/or neutralization with ongoing monitoring should allow construction without toxic ARD production.

Based on the results of this preliminary evaluation we recommend the following investigation, concentrating on the Potential ARD zone (Sheet 1).

- Surface water sampling and analyses to evaluate current drainage conditions; using laboratory methods and field testing with the Hach™ Acid Mine Drainage Test Kit;
- Additional bedrock reconnaissance, with ABA sampling and testing, once a construction plan (road and tower locations) is available to evaluate site specific conditions;
- Further ARD evaluation as part of the geotechnical evaluation (resistivity testing and core drilling);
    - Geological review of the core in regard to sulfide mineralization, alteration, and carbonate mineralization;
    - Acid base accounting analysis of the first 10 feet (composite samples) of geotechnical bedrock core. The upper 10 feet is the zone most likely to be exposed to weathering by construction activities;
    - Soluble sulfate and chloride analyses of the bottom 15 feet of core holes (composite samples) to evaluate corrosion potential;

- Resistivity surveys, generally performed to evaluate grounding requirements, should also be performed to evaluate the potential for sulfide mineralization.

Additional recommendations for monitoring and mitigation should be made based on the findings from the above recommended ABA testing of rock core associated with the geotechnical program. A mitigation and monitoring plan should be prepared as part of the final development design, based on locations for cuts and fills and the associated bedrock conditions.

CLOSURE

It has been a pleasure to assist you in this matter. If you have any questions, please contact us.

Very truly yours,

S. W. COLE ENGINEERING, INC.

STATE OF MAINE
CLIFFORD R. LIPPITT GE292
GEOLOGIST

Clifford R. Lippitt, C.G.
Senior Geologist

CRL:crl/slh

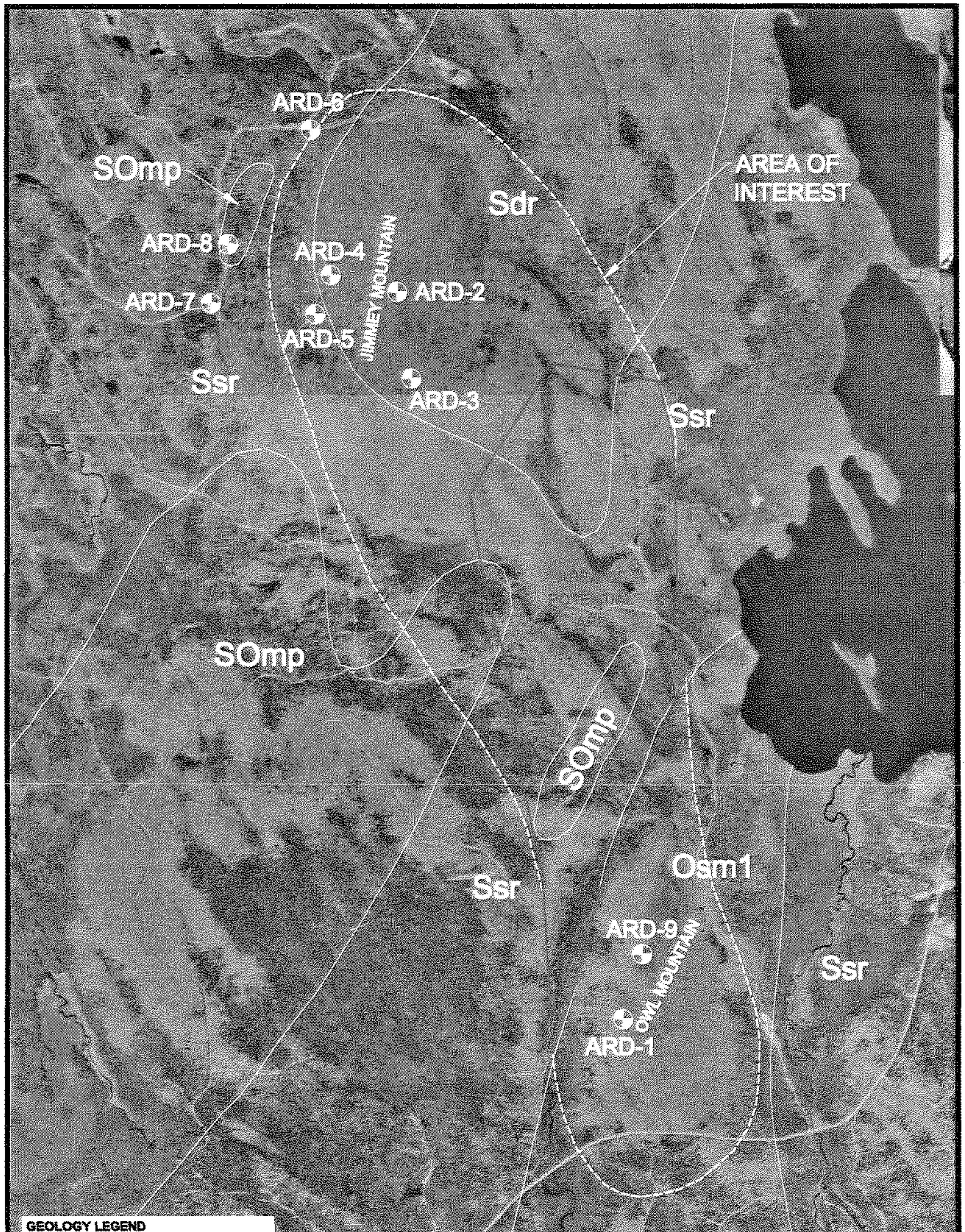
P:\2006\06-0039.1 G -AMEC - Kibby Maine - Wind Tower Geological Assess - CRL\Reports and Letters\06-0039.1 Bedrock Recon Report.doc

BIBLIOGRAPHY

Ludman, A, and J. Hopeck, 2007. *Draft Bedrock Geology of The Danforth 1:100,000 Quadrangle, Maine. For Display at the Northeast G.S.A Meeting March 2007.* Maine Geological Survey. Department of Conservation. Augusta, Maine.

Osberg, P. H., A. M. Hussey II, and G. M. Boone. 1985. *Bedrock Geologic Map of Maine.* Maine Geological Survey. Department of Conservation. Augusta, Maine.

Perry, E. F. 1998. *Interpretation of Acid-Base Accounting.* Office of Surface Mining. Pittsburgh, PA 15220.



GEOLOGY LEGEND

SOmp - Mill Priveledge Brook Formation

Ssr - Sam Rowe Ridge Formation

Sdr - Dagget Ridge Formation

Osm1 - Felsic Volcanics

NOTE :

Modified from Ludman & Hopeck, 2007.

BEDROCK GEOLOGY BASED ON MAPPING BY OTHERS , AND LIMITED FIELD OBSERVATIONS, ACTUAL CONDITIONS MAY VARY

S.W.COLE ENGINEERING, INC.

UPC

SITE PLAN

Preliminary Acid Rock Evaluation
Stetson II
T8 R4 NBPP, Maine

Job No. 08-0248 G
Date : 06/11/08

Scale 1" = 2,000'
Sheet 1

SHEET 2
ACID-BASE ACCOUNTING RESULTS
PROPOSED STETSON MOUNTAIN II WIND POWER PROJECT
FIRST WIND
T8 R4 NBPP, MAINE

Sample #	Interval	Sampler/ Date Sampled	Visual Description	NP/ MPA	NNP	FIZZ	COLOR (Munsell)	% S	CALCIUM CARBONATE EQUIVALENT: TONS/1000 TONS MATERIAL				PASTE pH
									MPA from % S	N.P. FROM $CaCO_3$	MAXIMUM NEEDED (pH-7)	EXCESS $CaCO_3$	
ARD-1	0.0	CRL/ 4/29/2008	Meta-volc	1468.7	44.0	3	**2.5Y 7/2**	0.001	0.03	44.06		44.03	8.5
ARD-2	0-1	CRL/ 5/1/2008	Conglomerate	10.5	4.2	0	**2.5Y 6/2**	0.014	0.44	4.6		4.16	6.8
ARD-3	0-1	CRL/ 5/1/2008	Conglomerate	14.2	5.8	0	**5Y 6/2**	0.014	0.44	6.26		5.82	6.8
ARD-4	0-1	CRL/ 6/03/08	Congomerate/SS	4.6	3.4	0	**2.5Y 6/2**	0.03	0.94	4.31		3.37	5.8
ARD-5	0-1	CRL/ 6/03/08	SS/ Pelite	**0.4**	**-6.8**	0	**5Y 6/1**	0.355	11.09	4.29	**6.8**		4.6
ARD-6	0-1	CRL/ 6/03/08	SS/ Pelite	**0.2**	**-8.4**	0	**5Y 4/1**	0.352	11	2.59	**8.41**		5.3
ARD-7	0-1	CRL/ 6/03/08	SS/ Pelite	**0.6**	**-4.2**	0	**5Y 5/2**	0.341	10.66	6.48	**4.18**		5.2
ARD-8	0-1	CRL/ 6/03/08	Pelite (carbonaceous)	**0.2**	**-23.8**	0	**5Y 5/1**	**0.989**	30.91	7.15	**23.78**		5.2
ARD-9	0-1	CRL/ 6/03/08	Meta-volc	52.5	74.7	4	**2.5Y 7/1**	0.045	1.45	76.18		74.73	8.1

Definintions: NP - neutralization potential; NNP - net neutralization potential; MPA - Maximum potential acid

Criteria for interpretation of ABA data for ARD potential, modified from Pennsylvania DEP guidelines.

1. Rocks with NNP (Excess $CaCO_3$) < -5 ppt $CaCO_3$ are potentially toxic.
2. Rocks with pH <4.0 are considered acid toxic
3. Rocks with greater than 0.5% sulfur may generate significant acidity
4. Rocks with NP >30 ppt $CaCO_3$ and Fizz are a significant source of alkalinity
5. Rocks with NNP >20 ppt $CaCO_3$ produce alkaline drainage
6. Rocks with NNP less than -20 ppt $CaCO_3$ produce acid drainage
7. Rocks with NNP greater than 0 ppt $CaCO_3$ do not produce acid
8. NP/MPA ratios less than 1 may result in acid drainage
9. Theoretical NP/MPA ratio of 2 or greater is needed for complete acid neutralization

ATTACHMENT A

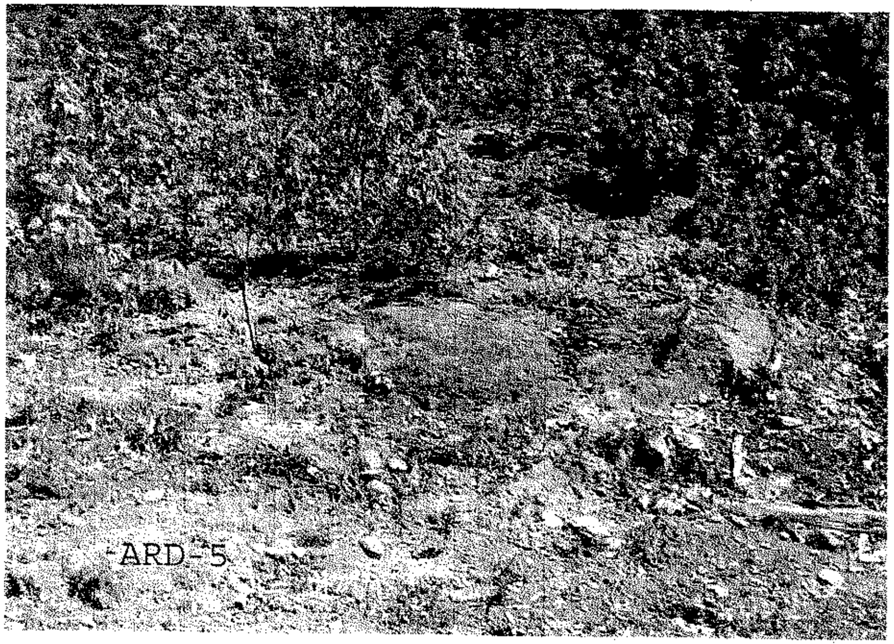
Attachment A
Limitations

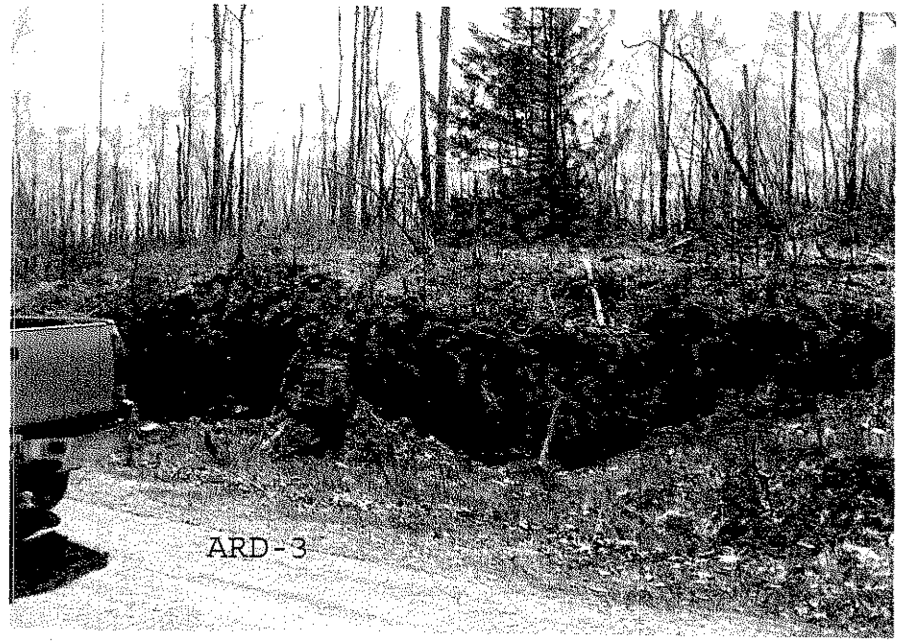
This report has been prepared for the exclusive use of First Wind for specific application to evaluation of the acid generation potential in the Owl Mountain and Jimmey Mountain areas of Township T8R4 NBPP, Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally geological practices. No warranty, expressed or implied, is made.

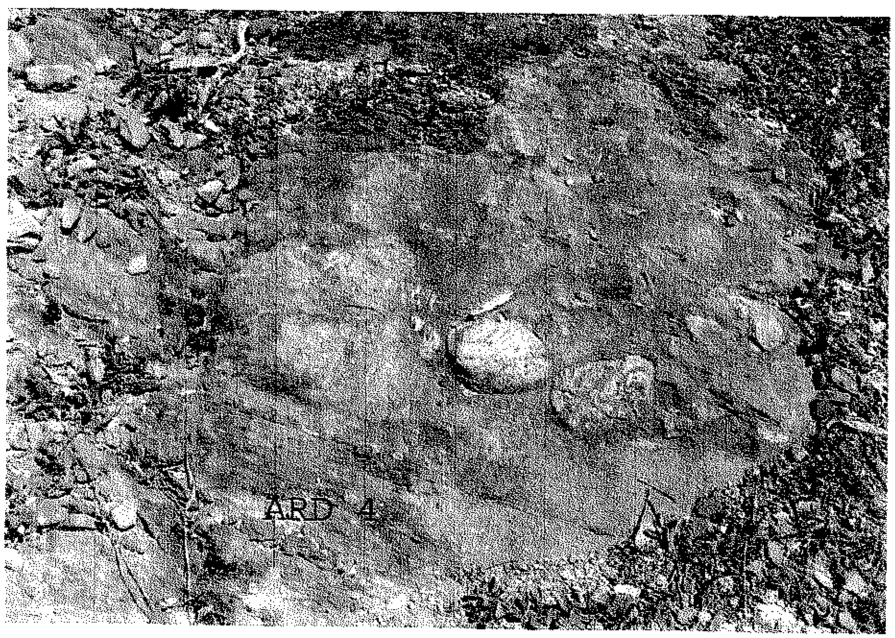
The bedrock descriptions are based on visual observations of outcrop samples. Variations in bedrock composition and texture may occur as referenced in the report. Geological mapping is based on work performed by others.

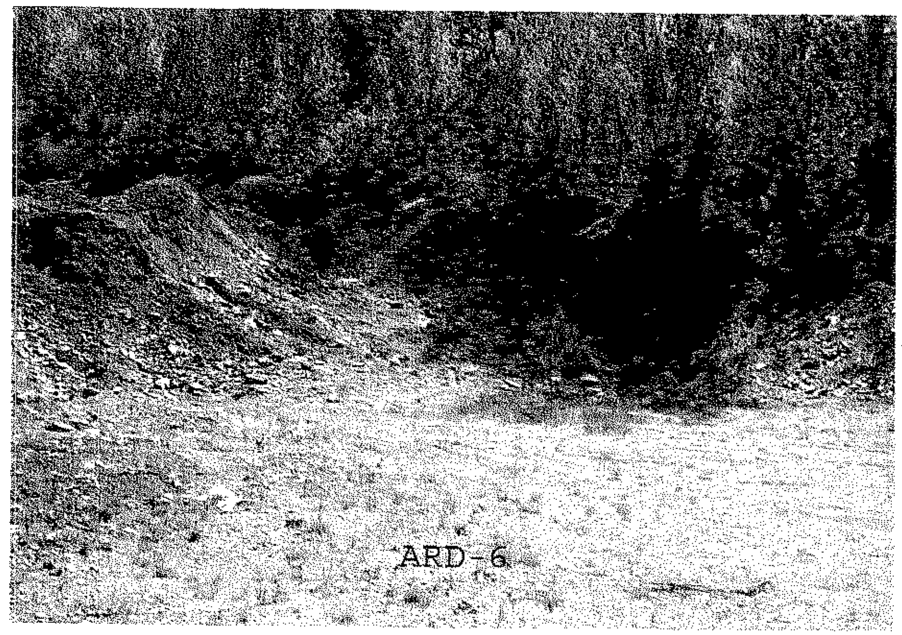
Observations have been made during exploration work to assess bedrock acid producing potential in the area investigated. Results may vary by location within the area of investigation and for other areas not included in this investigation.

ATTACHMENT B









ATTACHMENT B

ATTACHMENT C

Sturm Environmental Services

COMPANY: S. W. COLE ENGINEERING INC

PROJECT: PROJECT #08-0248

DATE RECEIVED: MAY 1, 2008

ACID - BASE ACCOUNT

Sample ID	Depth (feet)	Strata Thick (feet)	Rock Type	Fiz	Color	% S	Calcium Carbonate Equivalent Tons/1000 Tons of Material: Max. From % S	N.P. $CaCO_3$ Equiv.	Max. Needed (pH-7)	Excess $CaCO_3$	Paste pH
SM2 ARD-1			SURFACE	3	2.5Y 7/2	.001	.03	44.06		44.03	8.5

Approved [signature]

MAIN OFFICE—POST OFFICE BOX 650 • BRIDGEPORT, WEST VIRGINIA 26330 • (304) 623-6549
CHARLESTON BRANCH—POST OFFICE BOX 8337 • SOUTH CHARLESTON, WEST VIRGINIA 25303-0337 • (304) 744-9864

Sturm Environmental Services

COMPANY: S. W. COLE ENGINEERING INC

PROJECT: PROJECT #08-0248, SAMPLED 5-1-08

DATE RECEIVED: MAY 9, 2008

ACID - BASE ACCOUNT

Sample ID	Depth (feet)	Strata Thick (feet)	Rock Type	Fiz	Color	% S	Calcium Carbonate Equivalent Tons/1000 Tons of Material: Max. From % S	N.P. $CaCO_3$ Equiv.	Max. Needed (pH-7)	Excess $CaCO_3$	Paste pH
SM-2-ARD-2	0-1	1		0	2.5Y 6/2	.014	.44	4.60		4.16	6.8
SM-2-ARD-3	0-1	1		0	5Y 6/2	.014	.44	6.26		5.82	6.8

Approved [signature]

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CHARLESTON BRANCH—POST OFFICE BOX 8337 • SOUTH CHARLESTON, WEST VIRGINIA 25303-0337 • (304) 744-9864

Sturm Environmental Services

COMPANY: S. W. COLE ENGINEERING INC

PROJECT: PROJECT #07-0248, SAMPLED 6-1-08 (ST2-ARD)

DATE RECEIVED: JUNE 3, 2008

ACID - BASE ACCOUNT

Sample ID	Depth (feet)	Strata Thick (feet)	Rock Type	Fiz	Color	% S	Calcium Carbonate Equivalent Tons/1000 Tons of Material: Max. From % S	N.P. $CaCO_3$ Equiv.	Max. Needed (pH-7)	Excess $CaCO_3$	Paste pH
ARD 4 OC	0 – 1		Cong/SS	0	2.5Y 6/2	.030	.94	4.31		3.37	5.8
ARD 5 OC	0 – 1		Volc/SS	0	5Y 6/1	.355	11.09	4.29	6.80		4.6
ARD 6 OC	0 – 1		SS/Pelite	0	5Y 4/1	.352	11.00	2.59	8.41		5.3
ARD 7 OC	0 – 1		Pelite/SS	0	5Y 5/2	.341	10.66	6.48	4.18		5.2
ARD 8 OC	0 - 1		Pelite	0	5Y 5/1	.989	30.91	7.15	23.76		5.2

Approved [signature]

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Sturm Environmental Services

RECEIVED
JUN 12 2008
S.W. COLE BANGOR

COMPANY: S. W. COLE ENGINEERING INC

PROJECT: PROJECT #08-0248, SAMPLED 6-3-08

DATE RECEIVED: JUNE 5, 2008

ACID - BASE ACCOUNT

Sample ID	Depth (feet)	Strata Thick (feet)	Rock Type	Fiz	Color	% S	Calcium Carbonate Equivalent Tons/1000 Tons of Material: Max. From % S	N.P. $CaCO_3$ Equiv.	Max. Needed (pH-7)	Excess $CaCO_3$	Paste pH
ST 2 ARD 9	0-1	1		4	2.5Y 7/1	.045	1.45	76.18		74.77	8.1

Approved ____

MAIN OFFICE—POST OFFICE BOX 650 • BRIDGEPORT, WEST VIRGINIA 26330 • (304) 623-6549
CHARLESTON BRANCH—POST OFFICE BOX 8337 • SOUTH CHARLESTON, WEST VIRGINIA 25303-0337 • (304) 744-9864

REIC

Improving the environment, one client at a time...

225 Industrial Park Drive
Beaver, WV 25813
TEL: 304.255.2500
FAX: 304.255.2572
Website: www.reiclabs.com

RECEIVED
JUN 05 2008
S.W. COLE BANGOR

CLP

May 28, 2008

Ms. Mary Superak
STURM ENVIRONMENTAL SERVICES
P O BOX 650
BRIDGEPORT WV 26330

TEL: (304) 623-6549
FAX (304) 623-6552

RE: S.W. COLE ENGINEERING, INC.

Order No.: 0805A80

Dear Ms. Mary Superak:

REI Consultants, Inc. received 5 sample(s) on 5/15/2008 for the analyses presented in the following report.

Please note two changes you may see on your report.

- Results for "Dissolved" parameters will be shown under a separate sample ID, rather than as a separate analysis under the same sample ID. The sample ID for "Dissolved" parameters will include "Field Filtered" or "Lab Filtered", as appropriate.
- Metals results will no longer be identified as "Total" or "Total Recoverable". The methods have not been changed, only their appearance on the report.

If you have any questions regarding these results, please do not hesitate to call.

Sincerely,

Jimmy Suttle

Jimmy Suttle
Project Manager

REIC

Improving the environment, one client at a time...

225 Industrial Park Drive
Beaver, WV 25813
TEL: 304.255.2500
FAX: 304.255.2572
Website: www.reiclabs.com

Report Narrative

Project Manager:: **Jimmy Suttle**

WO#: **0805A80**
Date: **5/28/2008**

CLIENT: STURM ENVIRONMENTAL SERVICES
Project:

All analyses were performed using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. REI Consultants, Inc. (REIC) technical managers have verified compliance of reported results with the REIC's Quality Program and SOPs, except as noted in this case narrative. Any deviation from compliance is explained below and/or identified within the body of this report by a qualifier footnote which is defined at the bottom of each page.

All samples were analyzed using the methods stated in the analytical report without modification, unless otherwise noted.

All sample results are reported on an "as-received" basis unless otherwise noted.

Results reported for sums of individual parameters, such as Total Trihalomethanes (TTHM) and Total Haloacetic Acids (HAA5), may vary slightly from the sum of the individual parameter results. This apparent anomaly is caused by rounding individual results and summations at reporting, as required by EPA.

The test results in this report meet all NELAP requirements for parameters for which accreditations are required or available. Any exceptions are noted in this report. This report may not be reproduced, except in full, without the written approval of REIC.

In compliance with federal guidelines and standard operating procedures, all reports, including raw data and supporting quality control, will be disposed of after five years unless otherwise arranged by the client via written notification or contract requirement.

REI Consultants, Inc. **Analytical Results** **Date:** *28-May-08*

CLIENT:	STURM ENVIRONMENTAL SERVICES	**WorkOrder:**	0805A80
Client Sample ID:	08339	**Lab ID:**	0805A80-04A
Project:		**Collection Date:**	5/1/2008
Site ID:	SM2-ARD-2	**Matrix:**	SOIL

Analyses	Result	Units	Qual	MDL	PQL	Date Analyzed
ANIONS BY IC, WATER SOLUBLE			**SW9056**			Analyst: **SB**
Chloride	ND	mg/Kg		NA	10.0	5/23/2008 8:09:00 PM
Sulfate	ND	mg/Kg		NA	50.0	5/23/2008 8:09:00 PM

Key:

MCL	Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
MDL	Minimum Detection Limit	E	Estimated Value above quantitation range
NA	Not Applicable	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the PQL or MDL	S	Spike/Surrogate Recovery outside accepted recovery limi
PQL	Practical Quantitation Limit	*	Value exceeds Maximum Contaminant Level
TIC	Tentatively Identified Compound, Estimated Concentrati		

REI Consultants, Inc. **Analytical Results** **Date:** *28-May-08*

CLIENT: STURM ENVIRONMENTAL SERVICES
Client Sample ID: 08340
Project:
Site ID: SM2-ARD-3

WorkOrder: 0805A80
Lab ID: 0805A80-05A
Collection Date: 5/1/2008
Matrix: SOIL

Analyses	Result	Units	Qual	MDL	PQL	Date Analyzed
ANIONS BY IC, WATER SOLUBLE			SW9056			Analyst: **SB**
Chloride	ND	mg/Kg		NA	10.0	5/23/2008 8:09:00 PM
Sulfate	ND	mg/Kg		NA	50.0	5/23/2008 8:09:00 PM

Key:

MCL	Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
MDL	Minimum Detection Limit	E	Estimated Value above quantitation range
NA	Not Applicable	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the PQL or MDL	S	Spike/Surrogate Recovery outside accepted recovery limi
PQL	Practical Quantitation Limit	*	Value exceeds Maximum Contaminant Level
TIC	Tentatively Identified Compound, Estimated Concentrati		

1.0 INTRODUCTION

Resource Systems Engineering (RSE) completed an analysis of sound levels for Stetson Wind II, LLC, with regards to its proposed 25.5-megawatt (MW) wind energy facility, Stetson II Wind Project, to be located on Owl and Jimmey Mountains in T8 R4 NBPP, an unorganized township in Washington County, Maine. The objective of the sound assessment was to determine the expected sound levels from routine operation of the wind project and compare them with relevant noise standards.

The Township (T8 R4 NBPP) falls under the jurisdiction of the Maine Land Use Regulation Commission (LURC), which has set forth land use standards for certain developments. The Stetson II Wind Project is located within an "expedited permitting area" as identified by LURC and defined by 35-A M.R.S.A. Chapter 34-A, *Expedited Permitting of Grid-Scale Wind Energy Development.* Further, in accordance with special provisions established under 12 M.R.S.A. Section 685-B, a wind energy development within the expedited permitting area is required to meet the requirements of the Board of Environmental Protection's noise control rules. These rules were adopted pursuant to the Site Location of Development Law and identified as Maine Department of Environmental Protection (MDEP) Chapter 375.10, Control of Noise. The MDEP noise control regulation applies to in lieu of Section F.1 *Noise* of LURC Chapter 10 *Land Use Districts and Standards*.

The following presents a description of the Stetson II Wind Project, a summary of MDEP noise standards, measurements of existing ambient sound levels, and sound level estimates for future wind turbine operations. The sound level estimates are compared to relevant MDEP sound level limits applicable under the expedited permit process for wind energy projects. The Sound Assessment provides an evaluation of sound levels from construction and operation of the wind project. There will be no substation or operations and maintenance facility associated with the Stetson II Wind Project. Sound from construction or operation of the electrical collection line for the Stetson II Wind Project to the existing Stetson Wind Project is not addressed.

2.0 SITE DESCRIPTION

The proposed Stetson II Wind Project is located in an undeveloped area of Maine's Washington County. The designated project area is located within an expedited permitting area for wind energy developments. As proposed, the project will consist of 17 General Electric (GE) turbines with an output of 1.5 MW per turbine.

Six turbines would run north–south along Owl Mountain ridge at elevations varying from 600 to 755 feet (above mean sea level). Eleven turbines would run north-south along Jimmey Mountain ridge at elevations varying from 700 to 900 feet. Webster Brook flows between the peaks into Upper Hot Brook Lake. There is an existing road network accessing that will be incorporated into the project where appropriate. The project site and surrounding area have been harvested in commercial forest operations. The transmission line will connect the turbines on Jimmey Mountain to the turbines on Owl Mountain then cross Route 169 and connect to the existing substation located on the south end of Stetson Mountain.

The Township is under one ownership and consists primarily of forested land used for professionally managed, commercial wood harvesting operations. Other surrounding land uses include private logging roads, utility rights-of-way, undeveloped land where commercial harvesting does not occur, residential dwellings, and seasonal camps. Upper and Lower Hot Brook Lakes are located easterly of the wind project site. The westerly shorelines of these lakes are located within T8 R4 NBPP and are undeveloped. Upper Hot Brook Lake is closer to the project with the nearest proposed wind turbine approximately 4,200 feet from the west shoreline. There are residential dwellings located in the Town of Danforth along the opposite (eastern) shorelines of both lakes. The nearest dwelling is on Upper Hot Brook Lake approximately 6,100 feet from a wind turbine site. The nearest public road is Route 169 approximately 1,000 feet south of a proposed turbine site at the south end of Owl Mountain.

Stetson Wind II, LLC currently has a lease with the landowner of T8 R4 NBPP that permits construction and operation of the proposed wind project. Hot Brook forms the boundary of T8 R4 NBPP east of Owl

Mountain. Moving north, this township boundary traverses the center of Upper and Lower Hot Brook Lakes. The nearest parcels without landowner participation in the project are located in the Town of Danforth. The closet point to the project in Danforth is approximately 3,270 feet from a proposed wind turbine site.

For the proposed GE wind turbines, spacing between turbines will range from approximately 780 feet to over 1,400 feet. There is a distance of approximately 1.5 miles between the south turbine on Jimmey Mountain and the north turbine on Owl Mountain. There are no external ladders or similar structures proposed on the towers and no guy wires or external cables. Access for maintenance will be provided by ladders located inside the towers.

Figure 1, Vicinity Site Plan, shows the 17 wind turbine sites as currently proposed in relation to the geographical features, municipal and township boundaries, dwellings and other surrounding land uses. Selection of the turbine sites is based on studies related to meteorology, natural resources, and sound emissions as well as other environmental factors.

3.0 WIND TURBINES

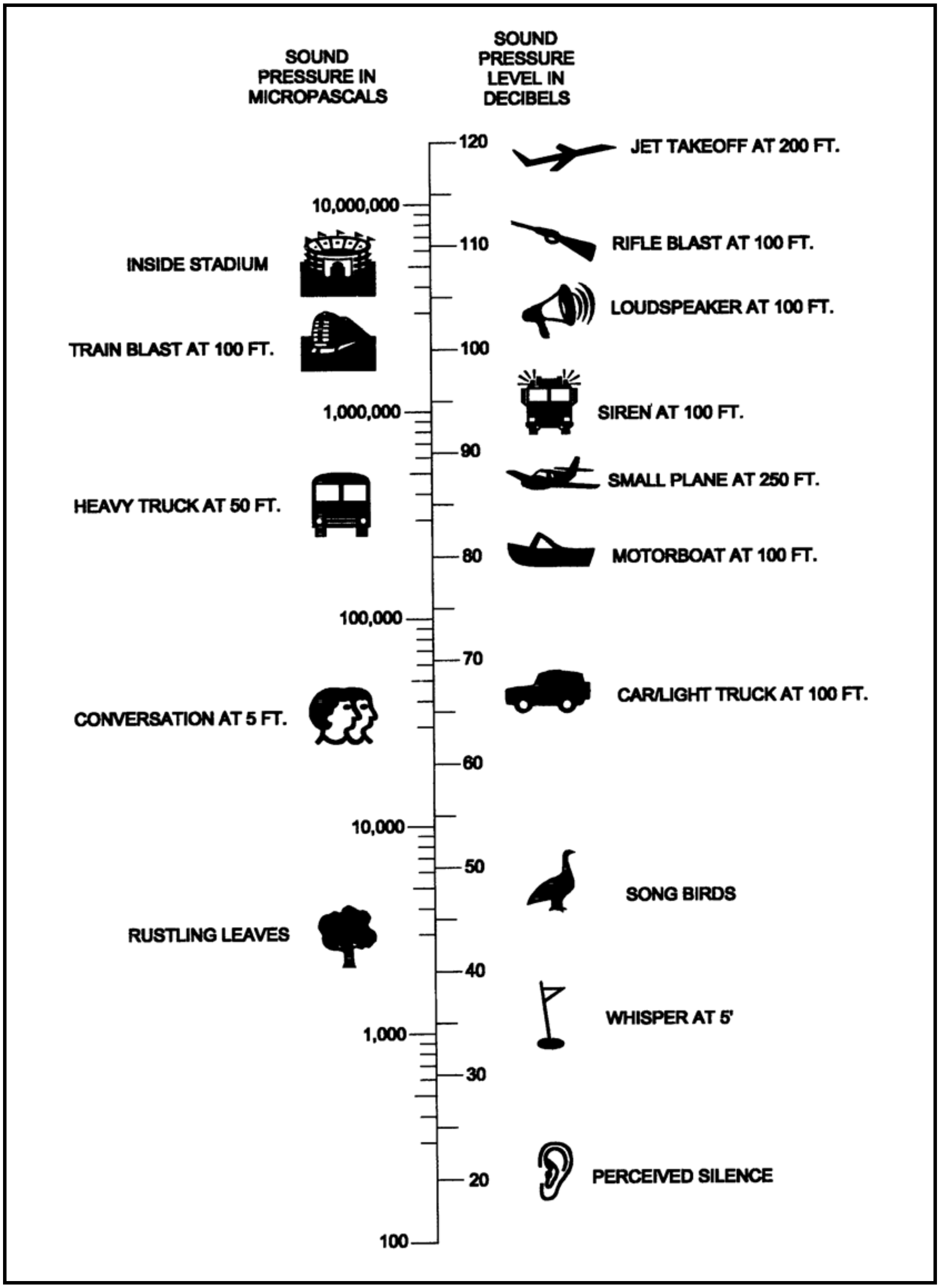
Stetson Wind II, LLC is currently proposing the widely-used GE 1.5 sle model wind turbines with a rated electric generating capacity of 1.5 MW. The proposed turbines feature variable speed control to continually adjust the rotor rpm level for optimum output at various wind speeds. Each turbine consists of a free-standing monopole tower, an enclosed nacelle mounted at the top of the tower, and an upwind-mounted, three-blade rotor. Other components of the wind turbine include the main shaft, gear box, and generator installed inside the nacelle (enclosure) at hub height, and a transformer at ground level. In addition to the nacelle enclosure, the gear box and generator are supported by elastomeric elements to minimize noise emissions Rotor blades with active blade pitch control are also designed to minimize noise emissions. (GE Wind Energy, GEA-13550, 11/03 5M).

For the Stetson II Wind Project, the GE turbines will have hub heights of 80 meters (262 feet) above the base elevation; and rotor diameters of 77 meters (253 feet), respectively. Maximum heights, with one rotor blade straight up, will be approximately 119 meters (389 feet). The turbines will begin rotating (cut-in) at wind speeds of 3 to 4 meters/second (6.7 to 8.9 mph) at the turbine hub, and shutdown (cut-out) when winds reach 25 meters/second (56 mph). Turbines can continue to rotate when wind speed temporarily drops below the cut-in speed. Rotation speed varies from about 10 to 22 rpm, or one rotation on the order of every three to six seconds. Tower oscillation is kept to a minimum through active damping of the entire turbine system.

4.0 SOUND AND DECIBELS

Sound is a rapid fluctuation in pressure that the human ear has the potential to detect. The decibel (dB) is the standard unit of sound measurement. The decibel scale is logarithmic to avoid very large numbers associated with units of pressure change. Figure 2 shows a comparison of sound pressure and decibel levels for some typical sound environments.

FIGURE 2
RELATION BETWEEN SOUND PRESSURE IN MICROPASCALS AND SOUND PRESSURE LEVEL IN DECIBELS



Undesirable sound is generally referred to as *noise*. The effects of noise depend on its frequency (or pitch), decibel level, and duration, particularly in relationship to changes in existing sound levels. The frequency of a sound refers to the number of vibrations per second, measured in hertz (Hz). Sounds audible to humans range from about 20 Hz to 20,000 Hz, with greater sensitivity between 1,000 and 4,000 Hz. Sound is generally a disorderly mixture of many frequencies, but may consist of a single frequency known as a pure tone. A-weighted sound levels, expressed as dBA, simulate the hearing response of the human ear to varying sound level frequencies.

Sound propagation outdoors can be compared to ripples created by throwing a stone into a pond with a calm surface. The ripples spread out uniformly in all directions of the pond surface decreasing in amplitude as they move away from the source. For a stationary noise source outdoors, the sound level drops by 6 dB every time the distance from the source is doubled. Thus, if the sound level is 50 dBA at 500 feet, the sound level at 1000 feet will be 44 dBA and will be 38 dBA at 2000 feet. Obstacles in the sound path, such as intervening terrain or buildings, and weather conditions can greatly affect outdoor sound propagation.

For constant sounds, a brief measurement close to the source can generally quantify the level of sound over both long and short periods. However, when sound sources vary, longer sampling periods are needed to accurately quantify the sound levels. Integrating sound level meters are commonly used to measure fluctuating sound sources. These meters record the sound level every 1/8 of a second when set to fast response and every one-second on slow response. When set to fast, the instrument measures 480 sound levels every minute and 28,800 records in an hour. Due to the large number of records, statistical parameters are used for analysis and comparison of measurement data.

The most commonly used parameter for measuring outdoor sound is the A-weighted equivalent sound level or L_{Aeq}. The L_{Aeq} represents the sound energy during a given sampling period as a constant decibel level, taking all fluctuations into account similar to an averaging technique. Other common statistical parameters include L_{A1}, L_{A10}, L_{A50} and L_{A90}, which represent the sound level exceeded 1 percent, 10 percent, 50 percent, and 90 percent of the time during the measurement, respectively. The L_{A90} excludes most transient or intermittent noise sources and therefore, is commonly used to determine the value of constant or residual sound level during a measurement.

In order to calculate sound levels resulting from multiple noise sources, such as wind turbines, it is necessary to combine decibel levels from each source. Decibels add exponentially to reflect their logarithmic nature. When two sounds of equal decibel levels are combined, the resulting sound level is just 3 dB higher than the individual sound levels (e.g. 50 dBA + 50 dBA = 53 dBA). RSE's analysis of the wind farm addresses both individual and combined sound sources associated with the wind project.

5.0 MAINE NOISE REGULATIONS

The MDEP and LURC have adopted separate noise control regulations that may be applied to utility-scale wind energy projects depending on their location and permitting requirements. The Stetson II Wind Project is located within an "expedited permitting area" as identified by LURC and defined by 35-A M.R.S.A. Chapter 34-A, Expedited Permitting of Grid-Scale Wind Energy Development. Under 12 M.R.S.A. Section 685-B, a wind energy development within the expedited permitting area is required to meet the requirements of MDEP Chapter 375.10. Consequently, the MDEP noise control regulation applies to Stetson II in lieu of Section F.1 *Noise* of LURC Chapter 10 *Land Use Districts and Standards*.

MDEP Chapter 375.10 applies hourly sound level limits at facility property boundaries and at nearby *protected locations*. Protected locations are defined as "any location accessible by foot, on a parcel of land containing a residence or approved subdivision.…" In addition to residential parcels, protected locations also include but are not limited to schools, state parks, and designated wilderness areas (ref. MDEP 375.10.G.16).

The hourly equivalent sound level (L_{Aeq-Hr}) resulting from routine operation of the wind project is limited to 75 dBA at any facility property boundary. The limits at protected locations vary depending on local zoning or surrounding land uses and existing (pre-development) ambient sound levels.

At protected locations within commercially or industrially zoned areas, or where the predominant surrounding land use is non-residential, the hourly sound level limits for routine operation are 70 dBA daytime (7:00 a.m. to 7:00 p.m.) and 60 dBA nighttime (7:00 p.m. to 7:00 a.m.). At protected locations within residentially zoned areas or where the predominant surrounding land use is residential, the hourly sound level limits for routine operation are 60 dBA daytime and 50 dBA nighttime. In addition, where the daytime pre-development ambient hourly sound level at a protected location is equal to or less than 45 dBA and/or the nighttime hourly sound level is equal to or less than 35 dBA, the hourly sound level limits for routine operation are 55 dBA daytime and 45 dBA nighttime. For areas where pre-development ambient sound levels exceed the specified limits at a protected location, limits may be chosen as 5 dBA less than the pre-development sound levels (ref. MDEP 375.10.C.1).

In all cases, nighttime limits at a protected location apply up to 500 feet from sleeping quarters. At distances over 500 feet or where no sleeping quarters exist, daytime limits apply during all facility operating hours (ref. MDEP 375.10.G.16). Where various limits apply depending on the distance from sleeping quarters, all limits must be met at the protected location.

The MDEP regulation establishes sound level limits for construction, maintenance, and tonal and short duration repetitive sounds as follows:

> *Construction* - Sound from nighttime construction is subject to the same nighttime limits as routine operation. Even though daytime construction limits are contained in MDEP Chapter 375.10, normal daytime construction sound levels are exempt from this regulation by Maine Statute (38 M.R.S.A. Section 484). Equipment used in construction must also comply with applicable federal noise regulations and must include environmental noise control devices in proper working condition as originally provided by its manufacturer (ref. MDEP 375.10.C.2).
>
> *Maintenance* -- Sound from routine, ongoing maintenance activities are considered part of routine operations and subject to the daytime and nighttime limits for routine operation. Sound from occasional, major overhaul activities is regulated as construction activity (ref. MDEP 375.10.C.3).
>
> *Short Duration Repetitive and Tonal Sounds* - When routine operations produce a short duration repetitive or tonal sound, 5 dBA is added to the observed sound levels of these sounds for determining compliance. There is also a maximum sound level (L_{Amax}) limit for certain types of short duration repetitive sounds (ref. MDEP 375.10.C.1.d and e).

Sounds associated with certain activities are exempt from regulation under MDEP Chapter 375.10. Exempt activities associated with the proposed wind project may include (ref. MDEP 375.10.C.5):

- Construction activity during daylight or daytime hours, whichever is longer;
- Emergency maintenance and repairs.

An exemption also applies to protected locations subject to a noise easement.

When a development is located in a municipality that has duly enacted a quantifiable noise standard that (1) contains limits that are not higher than the MDEP limits by more than five dBA, and (2) limits or addresses the types of sounds regulated by the MDEP, then the MDEP is to apply the local standard rather than the MDEP standard. Further, when noise produced by a facility is received in another municipality, the quantifiable noise standards of the other municipality must be taken into consideration (ref. MDEP 375.10.B.1).

Inquiries to the town codes officer concerning the land use ordinance indicate that no quantitative noise standards have been enacted in Danforth.

6.0 EXISTING SOUND LEVELS

On April 25 to 26, 2008, pre-development ambient sound levels were measured for approximately 24 hours at three monitoring positions in the vicinity of the proposed Stetson II project site. These monitoring positions, also shown on the Vicinity Site Plan (Figure 1), were selected based on aerial photos, land use mapping, and field observations to represent ambient conditions at nearby residential parcels and lot lines of the proposed site. The monitoring positions are as follows:

Position	**Description**
MP-1	Approximately 9,000 feet north from the centerline of Route 169 and 780 feet east of Eight Mile Road. MP-1 is at approximate elevation of 450 feet and represents ambient sound levels northeast of Owl Mountain and near the western shore of Hot Brook Lake.
MP-2	Approximately 2,775 feet north from the centerline of Route 169 and 30 feet east of Eight Mile Road. MP-2 is at approximate elevation of 460 feet and represents ambient sound levels east of Owl Mountain along the boundary between T8R4 NBPP and Danforth.
MP-3	Located on the access road of Owl Mountain approximately 480 feet north of the centerline of Route 169. MP-3 is at approximate elevation of 620 feet and represents ambient sound levels at nearby land uses along Route 169.

Instrumentation consisted of Larson-Davis Model 812 Integrating Sound Level Meters, which were programmed to continuously measure sound levels and calculate statistics at both hourly and five-second intervals. One CEL593 Sound Level Analyzer was co-located at Position MP-3 and was programmed to continuously measure sound levels, including one-third octave band measurements, and calculate statistics at hourly intervals.

The sound level meters meet Type 1 (precision) performance requirements of American National Standard Institute Specification for Sound Level Meters, ANSI S1.4. Although the specified accuracy varies by octave band frequency, the overall accuracy for measurement of A-weighted broadband sound is generally considered to be plus or minus 1.5 dBA for Type 1 meters. The microphones were fitted with standard windscreens and mounted on tripods at a height of five feet above the ground. The sound level meters were calibrated before and after the twenty-four hour monitoring period using a Bruel & Kjaer 4231 Sound Level Calibrator. Additionally, a certified laboratory performs a calibration within 12 months of the measurements. Calibration certificates are available upon request.

RSE personnel recorded weather conditions during observations at the monitoring positions, including wind speed measurements using a hand-held Kestrel 2500 anemometer. These observations were supplemented by weather data recorded at an airport meteorological station (ground elevation 489 feet) in Houlton, Maine (ref. wunderground.com), which is approximately 35 miles north of the proposed wind project. In addition, Stetson Wind II, LLC provided wind data from an on-site meteorological station located near the south end of Owl Mountain. The ground elevation at the meteorological station is 710 feet above mean sea level. Wind speed and direction measurements were recorded at a height of 194 feet above the ground. This data can be used to determine the turbine power output that could be expected for weather conditions that occurred during the ambient sound level measurements.

On April 25 to 26, 2008, temperatures ranged from 25 to 59 degrees Fahrenheit and relative humidity ranged from 21 percent to 81 percent. Observations at the monitoring positions indicated surface winds to be calm to five miles per hour (mph) from the east and northeast. Skies were mostly clear both day and night. From Houlton weather data, surface wind speeds ranged from 0 to 10 mph except in the late afternoon on April 25 when surface wind speeds were 12 to 15 mph. There were several hours during the overnight period when surface winds were calm. Ridge-top wind speeds from the Owl Mountain met station ranged from 8 to 22 mph with the majority ranging from 10 to 14 mph. These are average wind speeds over 10-minute interval periods. Wind direction was from the east and northeast.

Pre-development ambient sound level measurements recorded at the Owl Mountain site are presented in Figures 3 through 5. The measurements and reported results include hourly L_{Aeq}, L_{A10}, L_{A50} and L_{A90} values for each position. The L_{Aeq} represents the average energy level of all sounds present during the measurement period. These figures include a photo of the monitoring position and graphs that plot the measured sound levels in relation to surface and ridge top wind speeds. The hourly L_{Aeq} is the parameter specified for use by the MDEP for establishing pre-development ambient sound levels. L_{A1} and L_{A10} are the sound levels exceeded 10 percent of the time, respectively, during the measurement period. Likewise, L_{A50} and L_{A90} are the sound levels exceeded 50 percent and 90 percent of the time during the measurement period.

At Position MP-1 during MDEP daytime hours (7 a.m. to 7 p.m.), L_{Aeq}s ranged from 27 to 42 dBA with an average of 35 dBA. During MDEP nighttime hours (7 p.m. to 7 a.m.), L_{Aeq}s ranged from 24 to 46 dBA with an average of 30 dBA, excluding the hour beginning at 22:00 (10:00 p.m.) due to contribution from RSE during observations and instrumentation check. Sound sources noted at MP-1 during both daytime and nighttime hours were flowing water, rustling leaves and birds.

At Position MP-2 daytime L_{Aeq}s ranged from 25 to 39 dBA with an average L_{Aeq} of 32 dBA and nighttime L_{Aeqs} ranged from 22 to 38 dBA with an average L_{Aeq} of 28 dBA, excluding the hour beginning at 22:00 (10:00 p.m.) due to contribution from RSE during observations and instrumentation check. Sound sources at MP-2 included birds and rustling leaves.

At Position MP-3, daytime L_{Aeqs} ranged from 28 to 38 dBA with an average L_{Aeq} of 32 dBA and nighttime L_{Aeq}s ranged from 27 to 40 dBA with an average L_{Aeq} of 33 dBA. Sound sources at MP-3 included traffic from Route 169, activity and traffic at Atlas Road entrance, and occasionally rustling leaves.

A summary of ambient daytime and nighttime sound levels is presented in Table 1. This includes the range of daytime and nighttime hourly L_{Aeq} sound levels and the average daytime and nighttime hourly L_{Aeq} at each position. The existing, pre-development ambient sound levels at the monitoring positions are below the MDEP thresholds for quiet areas of 45 dBA daytime and 35 dBA nighttime.

Table 1

Pre-Development Ambient Sound Levels

Monitoring Position	**Range of Hourly L_{Aeq}s**		**Average Hourly L_{Aeq}**	
	Daytime 7 am to 7pm	**Nighttime 7 pm to 7 am**	**Daytime 7 am to 7pm**	**Nighttime 7 pm to 7 am**
MP-1	27 to 42	24 to 46	35	30
MP-2	25 to 39	22 to 38	32	28
MP-3	28 to 38	27 to 40	32	33

FIGURE 3. AMBIENT SOUND LEVEL MEASUREMENTS AT MP-1

Date	Start Time	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
4/25/08	13:00	42	49	44	38	32
	14:00	38	46	41	36	32
	15:00	35	44	38	33	27
	16:00	39	48	36	30	27
	17:00	30	39	33	28	24
	18:00	27	36	28	24	22
	19:00	25	32	27	23	21
	20:00	29	40	28	23	22
	21:00	26	31	26	23	22
	22:00	38	49	33	23	22
	23:00	24	30	26	24	22
4/26/08	0:00	30	39	32	25	23
	1:00	30	43	25	23	22
	2:00	27	33	25	22	21
	3:00	26	35	26	22	21
	4:00	26	35	28	23	22
	5:00	47	60	47	25	22
	6:00	46	59	48	24	21
	7:00	42	57	34	22	20
	8:00	35	50	27	23	21
	9:00	40	57	26	23	21
	10:00	39	52	36	29	23
	11:00	36	49	33	27	23
	12:00	30	40	28	24	22
	13:00	31	42	30	25	22
MDEP daytime avg		35	47	32	27	24
MDEP nighttime avg		30	40	31	23	22

= Nighttime Hours

Measurement starting at 22:00 not included in nighttime averages.

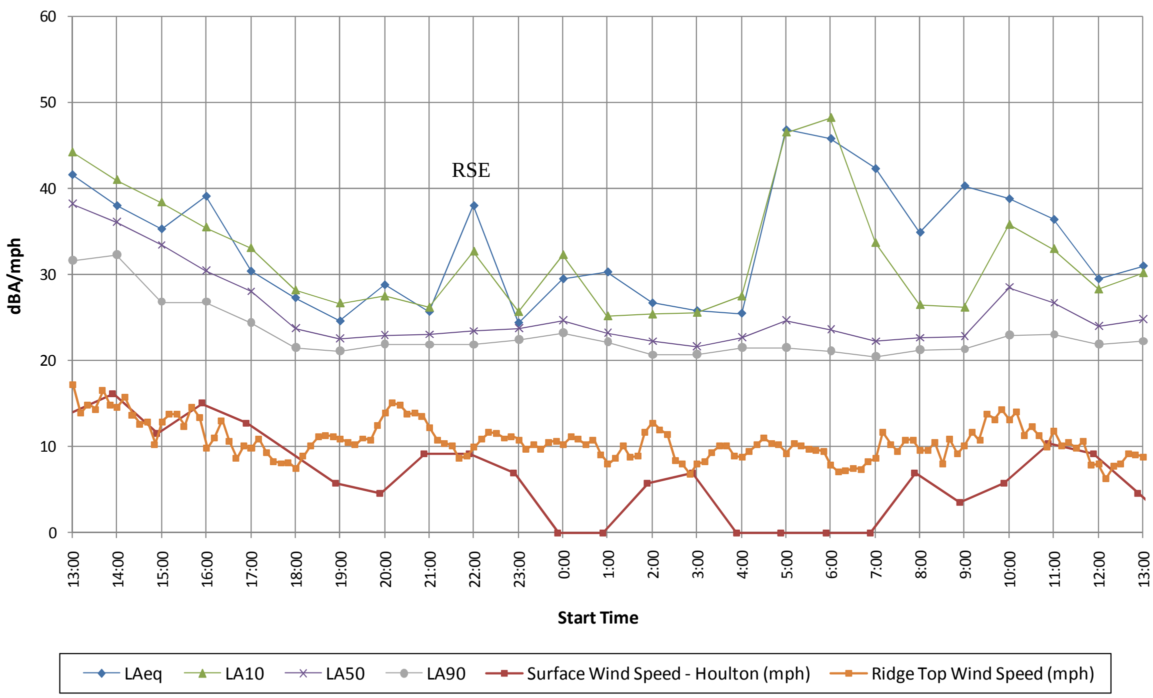


FIGURE 4. AMBIENT SOUND LEVEL MEASUREMENTS AT MP-2

Date	Start Time	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
4/25/08	13:00	39	47	41	37	32
	14:00	37	46	40	35	31
	15:00	35	43	38	33	27
	16:00	38	49	35	30	25
	17:00	28	35	31	27	23
	18:00	25	34	28	23	20
	19:00	28	37	31	25	21
	20:00	32	44	31	26	24
	21:00	26	33	28	25	23
	22:00	38	48	29	24	22
	23:00	34	47	29	23	22
4/26/08	0:00	27	36	30	24	22
	1:00	24	35	24	22	21
	2:00	25	35	26	22	21
	3:00	22	26	23	22	20
	4:00	29	42	32	22	20
	5:00	31	41	34	26	22
	6:00	34	45	38	28	22
	7:00	30	41	31	22	19
	8:00	30	43	31	23	20
	9:00	29	41	30	23	20
	10:00	33	44	35	28	23
	11:00	32	41	35	28	23
	12:00	35	44	34	26	21
	13:00	37	46	32	25	21
MDEP daytime avg		32	42	33	27	23
MDEP nighttime avg		28	39	30	24	22

= Nighttime Hours (19:00–6:00 shaded)

Measurement starting at 22:00 not included in nighttime averages.

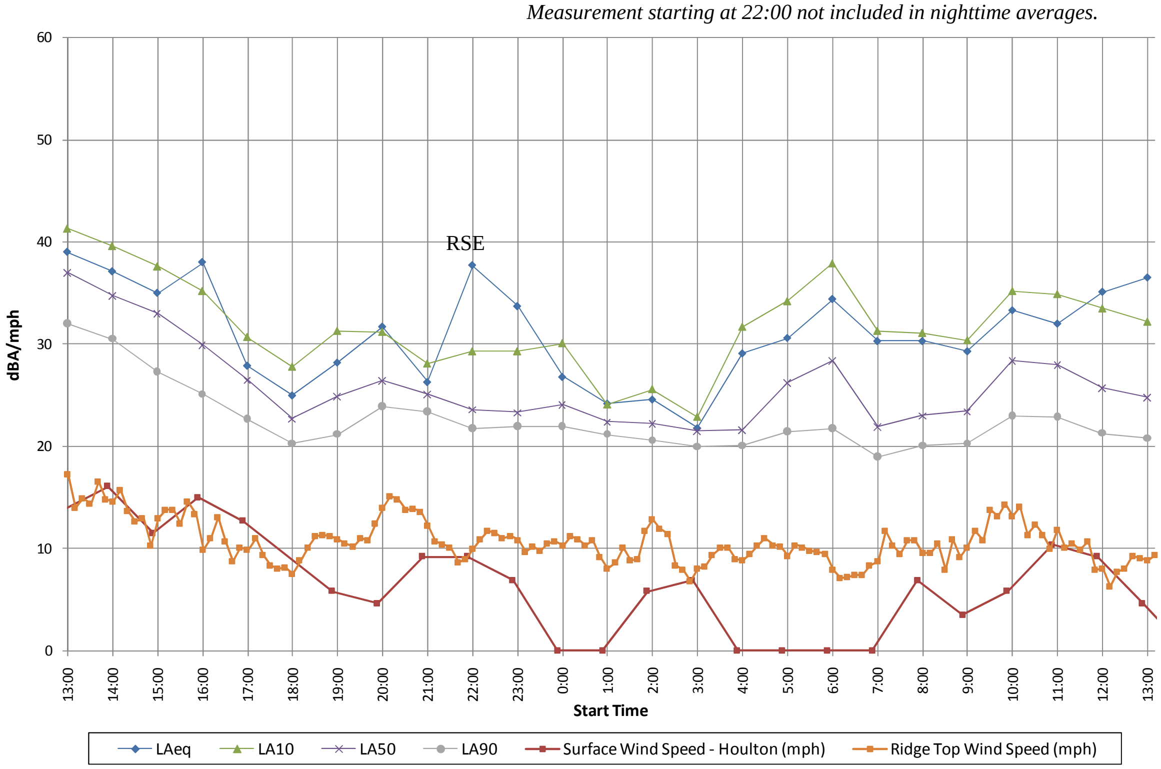
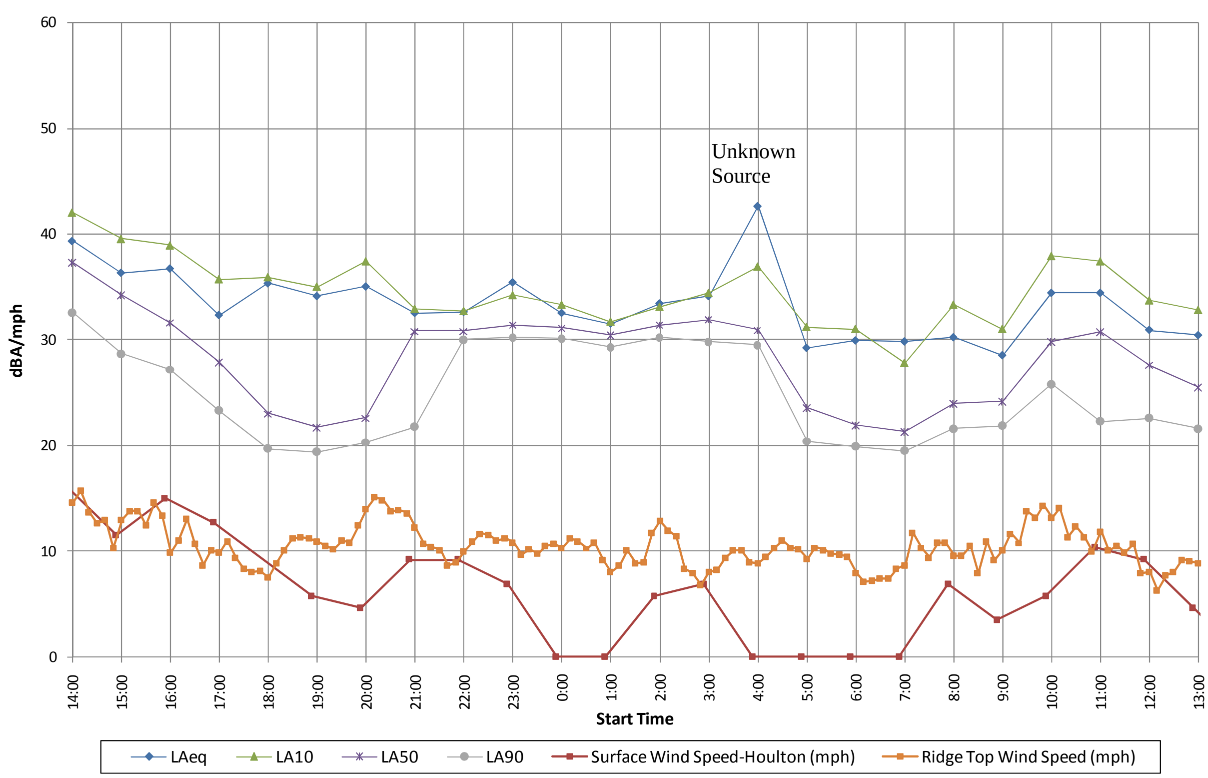


FIGURE 5. AMBIENT SOUND LEVEL MEASUREMENTS AT MP-3

Date	Start Time	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
4/25/08	14:00	39	47	42	37	33
	15:00	36	44	40	34	29
	16:00	37	47	39	32	27
	17:00	32	44	36	28	23
	18:00	35	44	36	23	20
	19:00	34	46	35	22	19
	20:00	35	47	37	23	20
	21:00	33	44	33	31	22
	22:00	33	42	33	31	30
	23:00	35	46	34	31	30
4/26/08	0:00	33	41	33	31	30
	1:00	32	37	32	30	29
	2:00	33	44	33	31	30
	3:00	34	45	34	32	30
	4:00	43	53	37	31	30
	5:00	29	40	31	24	20
	6:00	30	42	31	22	20
	7:00	30	42	28	21	20
	8:00	30	41	33	24	22
	9:00	29	39	31	24	22
	10:00	34	44	38	30	26
	11:00	34	45	37	31	22
	12:00	31	42	34	28	23
	13:00	30	42	33	26	22
MDEP daytime avg		33	43	35	28	24
MDEP nighttime avg		34	44	34	28	26

= Nighttime Hours



7.0 SOUND LEVEL LIMITS

MDEP sound level limits at protected locations have been assigned for the Stetson II Wind Project based on pre-development ambient sound levels, lease agreements, and existing land uses. Pursuant to Maine Law, the sound level limits set forth by MDEP Chapter 375.10 apply to routine operation of the proposed Stetson II wind turbines. MDEP sound level limits do not apply at protected locations where landowners have signed leases with Stetson Wind II, LLC providing development rights or authorizing sound from the project that would exceed otherwise applicable MDEP sound level limits.

The pre-development ambient sound levels at all measurement positions are below the threshold values for quiet areas. Consequently, the most restrictive MDEP sound level limit of 45 dBA applies during nighttime hours (7 pm to 7 am) at locations on residential parcels that are within 500 feet of a residence. The quiet daytime limit of 55 dBA applies during daytime hours (7 am to 7 pm) and during all hours at locations on residential parcels that are over 500 from a residence.

The MDEP regulation specifies sound level limits in terms of hourly A-weighted equivalent sound levels ($L_{Aeq\text{-}Hr}$). At protected locations where tonal or short duration repetitive sound levels are present from operation of the wind project, 5 dBA would be added to these sounds for purposes of determining compliance with applicable sound level limits.

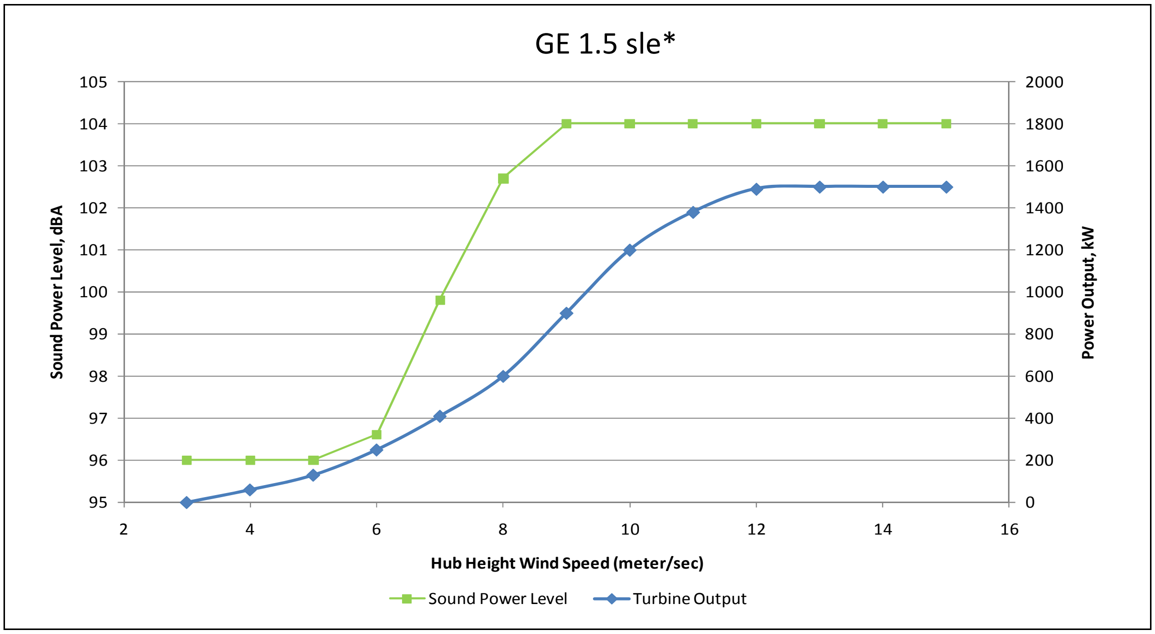
8.0 SOUND LEVELS FROM WIND FARM OPERATION

Operation of the proposed project will consist of 17 wind turbines operating up to 24 hours per day and seven days per week depending on weather conditions. RSE developed a sound level prediction model to estimate sound levels from operation of the proposed Stetson II wind project. The acoustic model was developed using the CADNA/A software program to map area terrain in three dimensions, locate proposed wind turbines and calculate outdoor sound propagation from the wind turbines. Area topography and wind turbine locations, for entry into CADNA, were provided to RSE by Stantec Consulting based on USGS topographic information and project design.

The wind project will be capable of operating any time of the day or night, including holidays and weekends. However, the wind turbines will only operate when the continuous wind incident on the turbine hub is at or above the cut-in wind speed of 3 meters per second (6.7 mph). During periods of light or calm winds, sound level emissions from the wind project will be virtually non-existent. As wind speed increases, the turbines begin to rotate and will reach full sound power output at approximately 9 meters per second (20.1 mph) or 60 percent of rated power output.

Sound generated by the GE 1.5 sle wind turbine generator system is predominantly the result of the aerodynamic broadband sound of the rotor blades. Other minor sound sources include mechanical and electrical equipment housed in the nacelle and ground level transformer. Sound levels from the turbine blades increase with wind speed until the rated rotor speed is reached at approximately 20 rpm. Full power generation from the wind turbines occurs when the hub-height wind speed is at or above 11.5 meters per second (25.7 mph). The turbines shutdown or “cut-out” when winds reach 25 meters per second (56 mph).

Figure 6 presents a plot of the sound power level and power generation versus wind speed at the turbine hub for wind speeds ranging from 3 to 15 meters per second. Figure 6 indicates that maximum sound power occurs at or above 9 meters per second where turbine output reaches 60 percent of rated power generation (900 kW). At a wind speed of 7 meters per second, the sound power level is approximately 4 dBA less while the power output drops to 27 percent of rated capacity or 400 kilowatts. As shown by Figure 6, the sound power level remains constant from 60 percent to 100 percent of rated electrical power output.



Excludes Uncertaintly Factor of ± 2 dBA per GE Technical Documentation – Noise Emission Characteristics (2005) and Confidence Level of +2dBA per GE Technical Specification – Noise Emission Compliance, GE Wind Energy, May 2005.

Figure 6. Sound Power Level and Power Output of GE 1.5 sle Wind Turbine in Relation to Hub Wind Speed

RSE calculated sound levels for simultaneous operation of 17 GE 1.5 sle wind turbines at full sound power as defined by GE Energy. These moderate to near-full load conditions exist with a wind speed of 9 meters per second (20.1 miles per hour) at the hub height. The wind turbines were treated as point sources with a hub height of 80 meters (262 feet) above base/grade elevation using sound power levels from GE Energy (Technical Documentation Wind Turbine Generator System GE 1.5sl/sle 50 & 60 Hz, Noise Emission Characteristics, 2005). GE Energy determined turbine sound power levels in accordance with IEC 61400-11, Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques, 2002. Table 2 provides sound power levels by third octave and whole octave frequency as provided by GE Energy. Sound level estimates used here include an uncertainty factor of plus 2 dBA per GE specifications.

TABLE 2

WIND TURBINE SOUND POWER LEVELS (Hub Wind Speed ≥ 9 m/s)

3rd Octave Center Frequency Hz	Sound Power Level dBA	Octave Band Frequency Hz	Sound Power Level dBA
50	76.2		
63	79.9	63	85.1
80	82.6		
100	84.8		
125	86.7	125	94.0
160	92.4		
200	90.7		
250	92	250	97.2
315	94		
400	94.3		
500	93.8	500	98.6
630	93.2		
800	94		
1000	92.8	1000	97.9
1250	92.3		
1600	91.5		
2000	89.6	2000	94.5
2500	87.1		
3150	84.8		
4000	82.2	4000	87.3
5000	78.6		
6300	75.9		
8000	71.3	8000	78.1
10000	70.8		
SUM	**104**	**SUM**	**104**

Source: Technical Documentation Wind Turbine Generator System GE 1.5sl/sle 50 & 60 Hz, Noise Emission Characteristics, 2005

Sound level attenuation from the wind turbines to the receiver points was calculated by the acoustic model in accordance with ISO 9613-2 “Attenuation of sound during propagation outdoors”. ISO 9613-2 is an international standard commonly used for predicting sound levels from a noise source for moderate downwind condition in all directions.

For Stetson II the prediction model calculates attenuation due to distance, atmospheric absorption and intervening terrain. Conservative factors were applied for ground absorption assuming a mix of hard and soft ground. The surfaces of nearby lakes were specifically mapped and assigned no ground absorption as appropriate for a hard, reflective surface. The model calculations exclude attenuation from foliage, which has the potential to reduce sound levels. The stated accuracy of sound level attenuation calculations per IISO 9613-2 is plus or minus 3 dBA.

To compensate for accuracy inherent in the calculation and measurement methods, 3 dBA has been added to the specified sound power levels. This is in addition to the plus 2 dBA uncertainty factor from the GE specification. Consequently, the overall adjustment to the rated sound power levels from GE specifications (Table 2) is plus 5 dBA yielding a sound power level of 109 dBA for model calculations. This adjustment reflects the range of sound levels for the proposed wind project based on RSE sound level measurements of similar operating wind turbines under a variety of weather and site conditions.

Using the model, sound level contours for operation of the proposed wind project were calculated for the entire study area. These results are presented in Figure 7 with the sound level contours of 55 dBA and 45 dBA highlighted to correspond to MDEP quiet daytime and nighttime limits. Information for the project study area as presented on Figure 7 includes the turbine locations, USGS topographic contours, dwelling locations, public and private roads, and water bodies. A legend indicating the map symbols is provided on Figure 7.

From model contours, the expected sound level from full operation of the wind turbines can be determined for any point within the study area. For comparison to MDEP sound level limits, four receiver points were selected as shown in Figure 1. Receivers R1 and R2 are located along the boundary of Township T8 R4 NBPP at points nearest to proposed wind turbines. There are no protected locations between these points and the proposed wind turbines. R3 is located close to the nearest dwelling to the project along Route 169. Receiver 4 is located on Upper Hot Brook Lake adjacent to the nearest lakeside dwelling to the project. This receiver was located on the lake surface as sound levels are one to two dBA higher than along the shoreline due to the reflective water surface.

Calculated sound levels at the receiver points are annotated on Figure 7. Table 3 provides the estimated sound levels at the receiver points shown of Figure 7 and distance from the nearest proposed wind turbine

TABLE 3

ESTIMATED SOUND LEVELS FROM WIND TURBINE OPERATION

Receiver Position	Distance to Nearest Wind Turbine, Feet	Estimated Hourly Sound Level, $L_{Aeq\text{-}Hr}$
R1	3,270	41
R2	3,620	42
R3	6,270	35
R4	6,100	38

The results from Table 3 indicate that sound levels at full operation of the wind project will be below the MDEP nighttime noise limit of 45 dBA at the receiver points and at all points outside the boundary of Township T8 R4 NBPP.

There are likely to be large fluctuations in wind speed from the hub height of the wind turbines at 262 feet above the ridge to the regulated height of four to five feet above ground level. This can be a significant factor in sound emissions and outdoor propagation from both the wind project and ambient, non-turbine sound levels. The quietest periods of the day or night generally occur when the winds are light or calm. In addition, as the wind speed incident on a wind turbine drops below 9 meters/second, sound levels from the turbine are reduced. Ambient, non-turbine sound levels, particularly from wind forces acting on trees and vegetation, can increase significantly when the turbine wind speed reaches 9 meters per second or greater, as required for full sound power.

Variations in wind speed with elevation (wind gradient) may result in very different wind speeds near the ground than at turbine/rotor heights. In addition, there may be areas near the ground that are shielded from winds at certain directions. For example, with the general ridge line direction running north-south, lower land to the east would be protected from a westerly wind. Under these conditions, high winds may be present near the top and to the west of the wind turbines, but winds may be relatively calm just east of the ridgeline. Consequently, the degree of masking by wind-induced ambient sound will fluctuate depending on the wind speed, direction, and location.

A regulated tonal sound occurs when the sound level in a one-third octave band exceeds the arithmetic average of the sound levels in the two adjacent one-third octave bands by a specified dB amount based on octave center frequencies (ref. MDEP 375.10.G.24). Turbine performance specifications indicate some potential for tonal sounds to occur in the 160 Hz third-octave band. Both the specifications and measurements of operating turbines by RSE indicate that the tonal threshold of 8 dBA is not likely to be exceeded, therefore, the wind turbines are not expected to generate regulated tonal sounds.

Short duration repetitive (SDR) sounds are a sequence of sound events each clearly discernible that causes an increase of six dBA or more in the sound level observed before and after the event. SDR sound events are typically less than 10 seconds in duration and occur more than once within an hour. Measurements and observations by RSE during wind turbine operations indicate that sound levels can fluctuate over brief periods as noted by the passage of wind turbine blades. Observed measurements further indicate that these sound level fluctuations typically range from 2 to 4 dBA and thus do not result in the 6 dBA increase required to be SDR sounds regulated by MDEP 375.10.

9.0 CONSTRUCTION SOUND LEVELS

Sound from construction activity is both temporary and variable. Many construction machines operate intermittently and equipment varies with each construction phase. A variety of construction equipment will be used to build the wind project including earth-moving equipment for land clearing, excavation, and site grading, and cranes to erect the wind turbines. Typical earth moving equipment and cranes generate sound levels of 75 to 88 dBA at a distance of 50 feet.

Sound levels from construction may be noticeable in the vicinity of the site, especially during blasting, excavation and grading. Local traffic during construction is expected to increase on some public roads along with associated sound levels from construction vehicles. Because of the temporary nature of construction, no adverse or long-term effects are anticipated.

The mobile nature of construction equipment and the manner in which construction work must be done makes complete control of construction sound infeasible. With the possible exception of nighttime blade lifts, construction activity will occur between the hours of 7 a.m. and 7 p.m. or daylight hours, and therefore is not subject to MDEP sound limits. Sound from nighttime crane lifts is not expected to exceed sound levels from routine operation.

Other measures to mitigate construction sound levels will include compliance with federal regulations limiting sound from trucks and portable compressors, and ensuring that equipment and sound muffling devices provided by the manufacturer (or equivalent) are kept in good working condition.

10.0 FINDINGS AND RECOMMENDATIONS

The primary objectives of the Sound Level Assessment were to determine applicable sound level limits at protected locations, estimate future sound levels from the proposed wind power project, and evaluate compliance with applicable sound level limits.

Existing land uses were identified using a combination of site maps, aerial images, and field observations. Ambient sound levels were measured at positions representing project boundaries and nearby protected locations. Sound level limits for quiet areas of 45 dBA nighttime and 55 dBA daytime apply at protected locations per MDEP 375.10 based on measured pre-development sound levels. Sound level estimates of future wind operation were calculated using a terrain-based acoustic model.

The results of this assessment indicate that sound levels from operation of the Stetson II Wind Project will not exceed MDEP sound levels limits during construction or routine operation. Specifically, model estimates show that sound levels from the wind project will be below the MDEP nighttime limit of 45 dBA at the boundary of Township T8 R4 NBPP and nearby protected locations.

Due to the remote project site, the distance from protected locations, conservative model assumptions and sound level measurements of similar wind turbine operations under a variety of conditions, post-construction sound level measurements are not recommended.

FIGURE 1. VICINITY SITE PLAN

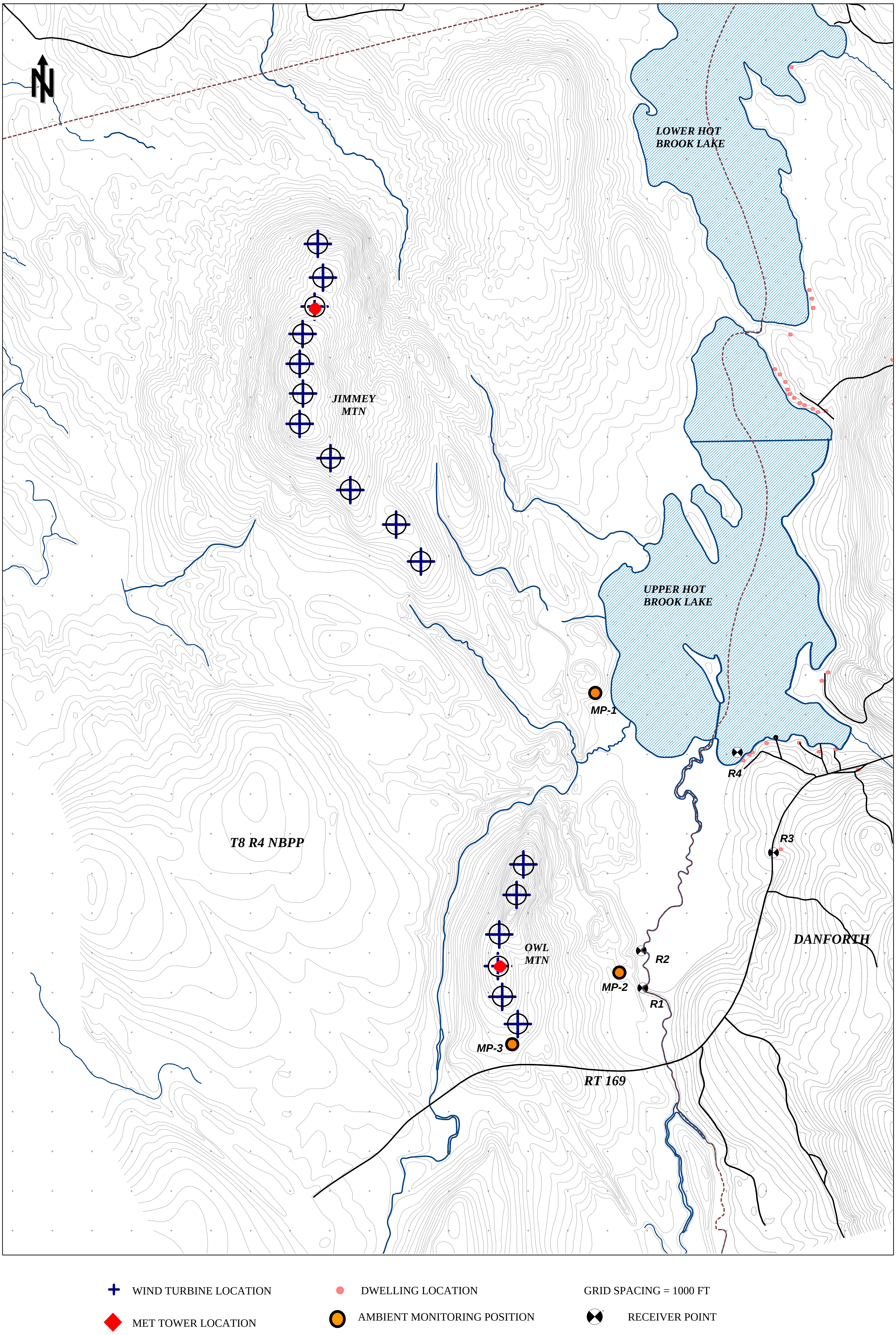
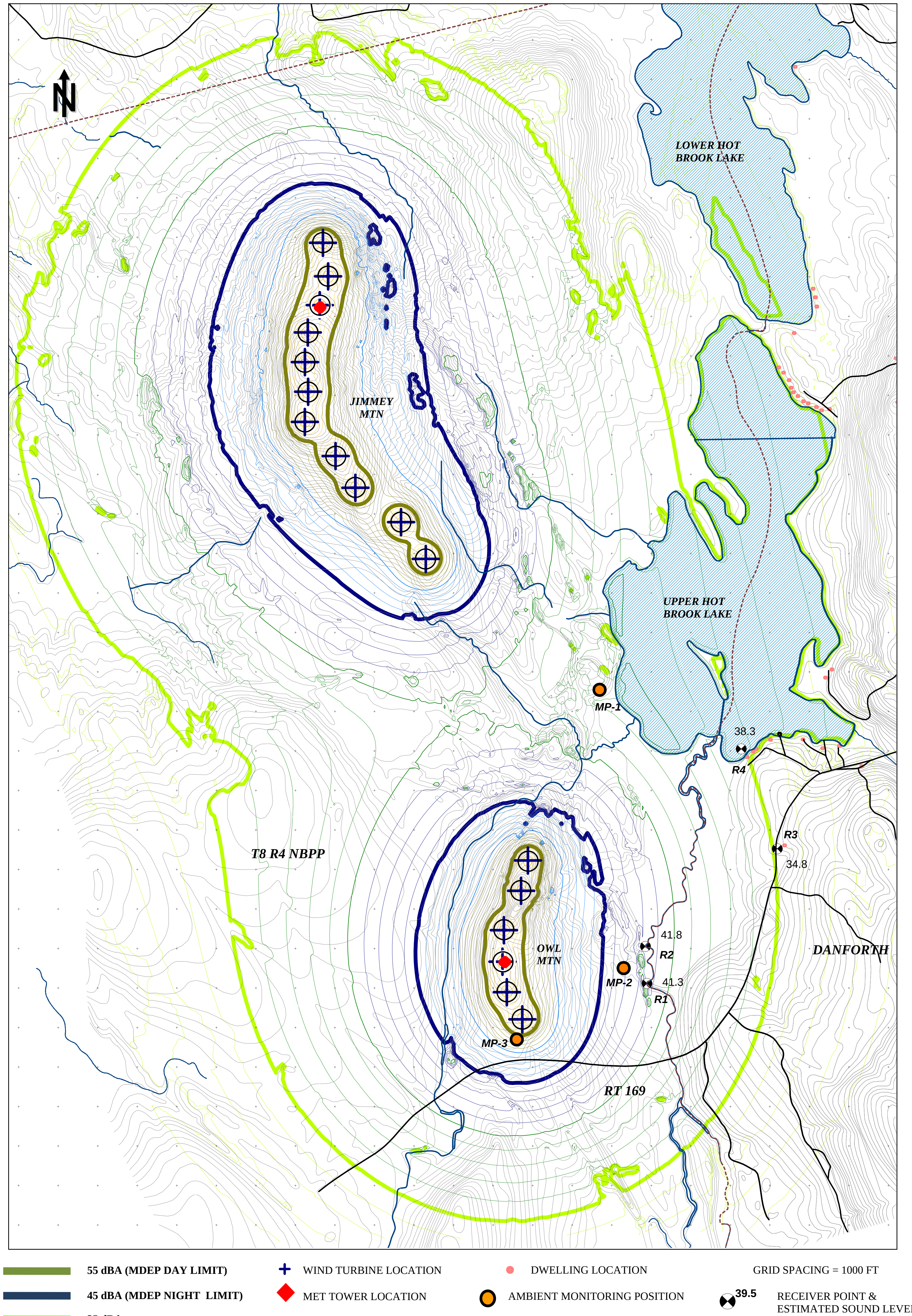


FIGURE 7. ESTIMATED SOUND LEVEL CONTOURS



1.0 EXECUTIVE SUMMARY

Stetson Wind II, LLC is proposing a 17-turbine, 25.5-megawatt (MW) wind project on Owl and Jimmey Mountains in T8 R4, NBPP in northern Washington County, Maine. This project is located 0.5 mile north of the 38-turbine wind project on Stetson Mountain in T8 R3, NBPP, which is currently under construction. The Stetson II Wind Project will consist of the following actions.

- Six turbines will be installed along approximately 4,200 feet of the ridge of Owl Mountain at elevations varying from 605 to 780 feet. Eleven turbines will be installed along approximately 9,200 feet of the ridge of Jimmey Mountain at elevations varying between 630 and 910 feet. The turbines will be mounted on 80-meter towers with a rotor diameter of 77 meters (253 feet) and a total height of approximately 390 feet. All components of the turbine will be painted white, similar to the existing turbines on Stetson Mountain. The turbines will be General Electric 1.5 MW models.
- Red warning lights will be installed following Federal Aviation Administration (FAA) guidelines, mounted on the top of some of the nacelles and may also be necessary on the permanent meteorological towers. The final lighting plan is determined by FAA approval.
- Two existing roads on the north side of Route 169 will be upgraded to access Owl and Jimmey Mountains. A new 32-foot± wide gravel road will be constructed to provide access along the ridgelines of both Owl and Jimmey Mountains.
- A 34.5-kilovolt collector line connecting Jimmey Mountain to Owl Mountain that will carry the power generated from the project across Route 169 to the Stetson Wind Project substation located at the south end of Stetson Mountain. The substation will be completed later this year as part of the Stetson project.

The majority of the land within eight miles of Owl Mountain and Jimmey Mountain is privately owned and managed for timber production, a use that is highly compatible with the installation and operation of a wind project. There is only one scenic resource of state or national significance within eight miles that would have a view of the project area, i.e., the Million Dollar View Scenic Byway (U.S. Route 1), in the town of Weston, 6.7 miles northeast of the nearest turbine on Jimmey Mountain. There are no lakes or ponds identified by the state as ‘Significant or Outstanding’. There are no river segments that are noted for their scenic value by the Maine Rivers Study. There are no parks, designated hiking trails, or similar public facilities within eight miles of the project. There is only one property on the National Registry of Historic Places within eight miles of the project (Union Hall in Danforth) and it will not have a view of the turbines.

There is only one scenic resource of state or national significance within the viewshed of the project, and the impact there (the southerly overlook of the Million Dollar View Scenic Byway) will be slight. Impacts have been minimized to the maximum extent practicable, and will not be unduly adverse. The turbines will not be visible from any lakes, ponds, or rivers that have been rated as significant or outstanding for scenic resources. Throughout the majority of the study area, views of the project are consistently blocked by topography, roadside vegetation, and limitations on access.

The Stetson II Wind Project has been conceived and designed to have minimal visual impacts on designated scenic resources within the study area and will not have an unreasonable adverse impact on scenic values and existing uses of scenic resources of state or national significance.

1.0 INTRODUCTION

Stetson Wind II, LLC is proposing a 25.5-megawatt (MW) wind project on Owl Mountain and Jimmey Mountain in T8 R4, NBPP in northern Washington County, Maine. This project is located 0.5 mile north of the 38-turbine wind project on Stetson Mountain in T8 R3, NBPP, currently under construction.

Six turbines will be installed along approximately 4,200 feet of the ridge of Owl Mountain at elevations varying from 605 to 780 feet. Eleven turbines will be installed along approximately 9,200 feet of the ridge of Jimmey Mountain at elevations varying between 630 and 910 feet. The turbines will be mounted on 80-meter towers with a rotor diameter of 77 meters (253 feet) and a total height of approximately 390 feet.

The methodology for assessing the visual impacts of the wind project involves the judgment of experienced landscape architects in the selection of factors chosen to evaluate scenic quality and determine the magnitude of visual impact. This approach, widely used in permitting work in Maine and elsewhere throughout the country, is based upon current studies of what constitutes scenic landscapes and visual impacts.

2.0 REGULATORY REQUIREMENTS

On April 18, 2008, the Governor signed into law LD 2283 *An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development*. This statute created a process to expedite wind power projects in places where they are most compatible with existing patterns of development and resource values. As part of this legislation, the Legislature found that certain aspects of the State's regulatory process for determining the environmental acceptability of wind energy projects should be modified to encourage the siting of projects in Expedited Permitting Areas.

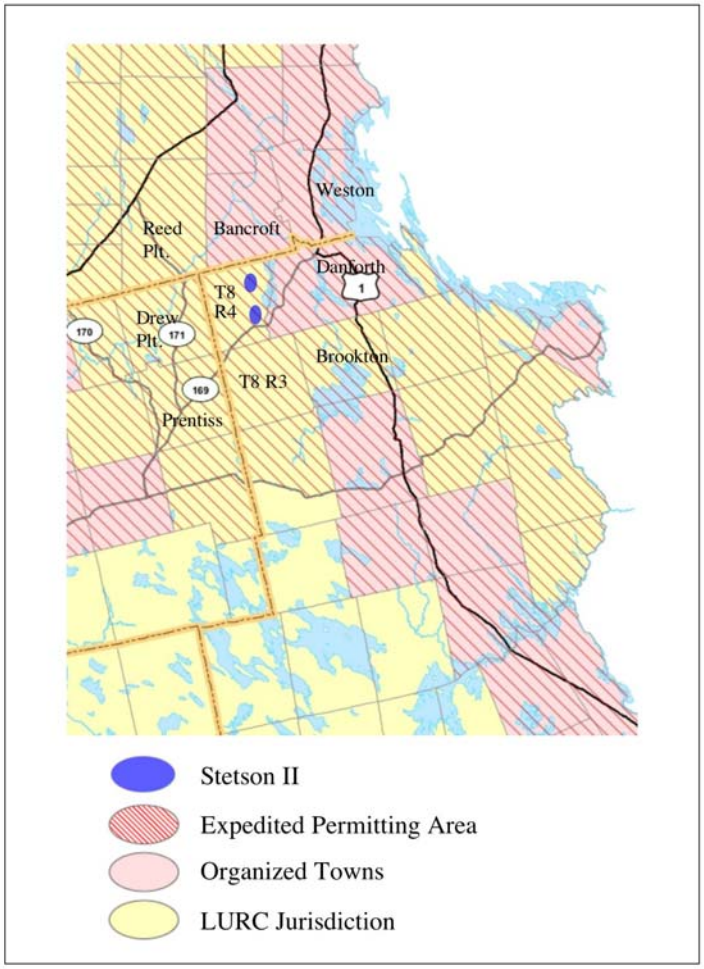
2.1 Expedited Permitting

Expedited Permitting Areas include most of the organized areas of the State and specific places within Land Use Regulation Commission (LURC) jurisdiction. The entirety of T8 R4, NBPP, as well as every surrounding town and township, is designated as an Expedited Wind Power Permitting Area, making wind power an allowed use in that township. See Figure 1: Expedited Wind Power Permitting Areas in Vicinity of Stetson II Project on the following page.

Modifications to the permitting process include, but are not limited to:

A. Making wind energy development an allowed use within certain parts of the State's unorganized and unorganized areas;
B. Refining certain permitting procedures of the Maine Department of Environmental Protection (MDEP) and LURC; and
C. Recognizing that wind turbines are potentially a highly visible feature of the landscape that will have an impact on views, judging the effects of wind energy development on scenic character and existing uses related to scenic character should be based on whether the development will have an unreasonable adverse impact on scenic values and existing uses of scenic resources of state or national significance.

Figure 1: Expedited Windpower Permitting Areas in Vicinity of Stetson II Wind Project



2.2 Scenic Resources

"Scenic resources of state or national significance" as defined under State law means:

A. A national natural landmark, federally designated wilderness area or other comparable outstanding natural and cultural feature, such as the Orono Bog or Meddybemps Heath;
B. A property listed on the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966, as amended, including, but not limited to, the Rockland Breakwater Light and Fort Knox;
C. A national or state park;
D. A great pond that is:
   (1) One of the 66 great ponds located in the State's organized area is identified as having outstanding or significant scenic quality in the "Maine's Finest Lakes" study; or
   (2) One of the 280 great ponds in the State's unorganized or deorganized areas designated as outstanding or significant from a scenic perspective in the "Maine Wildlands Lakes Assessment";
E. A segment of a scenic river or stream identified as having unique or outstanding scenic attributes listed in Appendix G of the "Maine Rivers Study";

F. A scenic viewpoint located on state public reserved land or on a trail that is used exclusively for pedestrian use, such as the Appalachian Trail, that the Department of Conservation designates by rule adopted in accordance with section 3457;
G. A scenic turnout on a scenic highway constructed by the Department of Transportation; or
H. Scenic viewpoints located in the coastal area that are ranked as having statewide significance or national importance in terms of scenic quality in: (1) One of the scenic inventories prepared for and published by the Executive Department, State Planning Office: "Method for Coastal Scenic Landscape Assessment with Field Results for Kittery to Scarborough and Cape Elizabeth to South Thomaston," Dominie, et al., October 1987; "Scenic Inventory Mainland Sites of Penobscot Bay," DeWan and Associates, et al., August 1990; or "Scenic Inventory: Islesboro, Vinalhaven, North Haven and Associated Offshore Islands," DeWan and Associates, June 1992; or (2) A scenic inventory developed by or prepared for the Executive Department, State Planning Office.

The only scenic resources of state or national significance within the project study area are a) the southerly scenic turnout on the Million Dollar View Scenic Byway in Weston (see G above) located 6.7 miles from the closest turbine and b) one National Register historic property in Danforth (see B above) located six miles from the closest turbine, but with no views of the Stetson II Wind Project.

2.3 Regulatory Standard

In making findings regarding the effect of an expedited wind energy development on scenic character and existing uses related to scenic character, LURC shall determine whether the development significantly compromises views from a scenic resource of state or national significance such that the development has an unreasonable adverse effect on the scenic values and existing uses related to scenic character of a scenic resource of state or national significance. The Legislature specifically removed the requirement that a wind energy development fit harmoniously into the existing natural environment in terms of potential effects on scenic character and existing uses related to scenic character. If LURC determines that the associated facilities (i.e., access roads and transmission line) have unreasonable adverse effects on scenic character and existing uses, they may be evaluated under traditional standard found in 12 MRSA §685-B(4)(C). Otherwise, the associated facilities are reviewed under the modified scenic impact standard applicable to the wind generating facilities.

2.4 Rebuttable Presumption

The wind power legislation requires an applicant for an expedited wind energy development to provide LURC or MDEP with a visual impact assessment of the development that addresses the evaluation criteria (above) if LURC or MDEP determines such an assessment is necessary. There is a rebuttable presumption that a visual impact assessment is not required for those portions of the development's generating facilities that are located more than three miles, measured horizontally, from a scenic resource of state or national significance. LURC or MDEP may require a visual impact assessment for portions of the development's generating facilities located more than three miles and up to eight miles from a scenic resource of state or national significance if it finds there is substantial evidence that the pertinent scenic resource of state or national significance is significant and there is the potential for significant adverse effects. In determining whether an applicant for an expedited wind energy project must provide a visual impact assessment, LURC or MDEP shall consider:

A. The significance of the potentially affected scenic resource of state or national significance;
B. The existing character of the surrounding area;
C. The expectations of the typical viewer;
D. The project purpose and the context of the proposed activity;
E. The extent, nature and duration of potentially affected public uses of the scenic resource of state or national significance and the potential effect of the generating facilities' presence on the public's continued use and enjoyment of the scenic resource of state or national significance; and
F. The scope and scale of the potential effect of views of the generating facilities on the scenic resource of state or national significance, including but not limited to issues related to the number and extent of turbines visible from the scenic resource of state or national significance, the

distance from the scenic resource of state or national significance and the effect of prominent features of the development on the landscape. A finding by LURC or MDEP that the development's generating facilities are a highly visible feature in the landscape is not a solely sufficient basis for determination that an expedited wind energy project has an unreasonable adverse effect on the scenic values and existing uses related to scenic character of a scenic resource of state or national significance. *In making its determination, LURC or MDEP shall consider insignificant the effects of portions of the development's generating facilities located* ***more than 8 miles****, measured horizontally, from a scenic resource of state or national significance.* (Emphasis added).

First Wind elected to conduct a visual impact assessment even though there were no scenic resources of state or national significance within three miles of the project.

3.0 DATA COLLECTION

Terrence J. DeWan and Associates (TJD&A), landscape architects in Yarmouth, Maine, prepared the visual impact assessment. Field data to supplement their earlier work for the Stetson Mountain wind project was collected by a variety of means during site visits on November 30, 2007, and June 13, 2008. Field work concentrated on examining scenic areas of state or national significance, i.e., the Million Dollar View Scenic Byway (Route 1) in the town of Weston. A selection of representative views within the study area is included in Appendix A, Study Area Photographs.

This report is based upon topographic mapping and design plans for the proposed Stetson II Wind Project prepared by the James Sewall Company, with input from other professional members of the design team. Stantec provided a GIS-based viewshed analysis map (included as Figure 3) to help determine the limits of potential project visibility.

TJD&A used the three-dimensional resources of Google Earth Pro to look at the study area from the air and on the ground. Although the photographic imagery for this section of Washington County is still rather crude relative to the rest of the state, this tool does give reviewers the capability to experience the overall physical characteristics of the landscape, and thereby better understand the setting of Owl and Jimmey Mountains. Cross sections based upon USGS topographic data were also used to estimate the degree of turbine visibility in certain areas, most notably the views from the Million Dollar View Scenic Byway overlook in Weston.

4.0 PROJECT STUDY AREA

4.1 Site Context

The visual resource study area is defined as the potential viewshed within eight miles of the Stetson II Wind Project, which is illustrated on Map 1. It generally extends from Weston on the north, Route 1 from Danforth to Brookton on the east, Kossuth and Carroll Plantations on the south, and Kingman and Drew Plantations on the west. The regional character is described by the existing landforms, water resources, vegetative patterns, and cultural character.

- *Landform*. The characteristic landscape within eight miles of the proposed facility consists of low rolling hills and ridges (averaging 350± feet in height) covered by dense second growth woodlands and open fields, and broad depressions supporting freshwater wetlands. Stetson Mountain is the most pronounced of these landforms, although its maximum height is only 500 feet above the surrounding terrain. Owl Mountain is a relatively low local landform, rising approximately 300 feet above the surrounding terrain. Similarly, Jimmey Mountain is one of a series of low hills running in a north-south direction in the general area. Its maximum height is approximately 475 feet above the surrounding landscape.

- *Water Resources*. The characteristic landscape contains a number of fairly large shallow lakes surrounded by low hills and ridges. Significant water resources in the vicinity of the project include Upper Hot Brook Lake, Lower Hot Brook Lake, Baskahegan Lake, Crooked Brook Flowage, Mattawamkeag River, and Baskahegan Stream.

None of the lakes and ponds within the study area have been rated 'Outstanding' or 'Significant' for scenic character by either the Maine Wildlands Lake Assessment or The Maine Lakes Study. None of the rivers or streams within the study area have been noted for their scenic value by the Maine Rivers Study.

- *Vegetative patterns*. The predominant forest cover in the study area is mixed second growth with some deciduous trees and old field growth. Extensive forested wetlands surround the site on the west. Owl Mountain and Jimmey Mountain are typical of commercial forestland in the area that has been extensively logged over the past 20 years.

- *Cultural character.* Cultural features within eight miles of the project are typically small in scale and intensity. These include small towns (e.g., Danforth), lakeside cottages (Kinney Cove and Spinney Cove on Upper Hot Brook Lake), scattered residential development (e.g., Irish Settlement and Snow Mountain), and occasional farms. Recreational areas tend to be informal and small scale. The largest man-made element in the visible landscape is the Stetson Mountain wind project, which starts 3,000 feet south of the first turbine on Owl Mountain. There are no existing structures in the development site area other than two temporary meteorological towers erected by Stetson Wind II, LLC on both mountains. The closest residences (1.1 miles to the closest turbine) are at Spinney Cove at the southern end of Upper Hot Brook Lake.

4.2 Distance Zones

The concept of distance zones is based upon the U.S. Department of Agriculture Forest Service visual analysis criteria for forested landscapes and on the amount of detail that an observer can differentiate at varying distances.[1] The distance zones used for the study of the Stetson II Wind Project are defined as the following.

- *Foreground: 0 to 1/2 mile in distance.* Within the foreground, the observer would be able to detect surface textures, details, and a full spectrum of color. For example, the details of the turbines (blades, nacelles, support towers) would be readily apparent. There are no scenic resources of state or national significance within the foreground.

- *Midground: 1/2 mile to 4 miles in distance*. The midground is a critical part of the natural landscape. Within this zone the details found in the landscape become subordinate to the whole: individual trees lose their identities and become forests; buildings are seen as simple geometric forms; roads and rivers become lines. Edges define patterns on the ground and hillsides. Development patterns are readily apparent, especially where there is noticeable contrast in scale, form, texture, or line. Colors of structures become somewhat muted and the details become subordinate to the whole. This effect is intensified in hazy weather conditions, which tend to mute colors and de-sharpen outlines even further. In panoramic views, the midground landscape is the most important element in determining visual impact. There are no scenic resources of state or national significance within the midground.

- *Background: greater than 4 miles*. Background distances provide the setting for panoramic views that give the observer the greatest sense of the larger landscape. However, the effects of distance and haze will obliterate the surface textures, detailing, and form of project components. Objects seen at this distance will be highly visible only if they present a noticeable contrast in form or line and weather conditions are favorable. Due to the thinness of the design, the ends of the turbine blades will be minimally visible in the background. The only scenic resource of state

[1] Landscape Aesthetics: A Handbook for Scenery Management. USDA Forest Service. Agricultural Handbook Number 701. December 1995.

or national significance (i.e., the Weston overlook on the Million Dollar View Scenic Byway) occurs within the background of the wind project.

5.0 SCENIC RESOURCES OF STATE OR NATIONAL SIGNIFICANCE

The following is an inventory of the scenic resources of state or national significance (as defined by LD 2283 *An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development)* within eight miles of the wind project.

A. ***National natural landmarks*** (NNL), federally designated wilderness area or other comparable outstanding natural and cultural feature. According to the NNL website (www.nature.nps.gov), there are no National Natural Landmarks within eight miles of the wind project. The closest NNL's are Orono Bog and Passadumkeag Marsh, both in Penobscot County, 30± miles away.

B. ***A property listed on the National Register of Historic Places.*** The Historic Architectural Reconnaissance Survey Stetson Wind Farm Project by PAL (January 2007) indicated that there are three properties on the National Register of Historic Places within ten miles of Stetson Mountain. Of these three, only one is within eight miles of the site for Stetson II Wind Farm, i.e., Union Hall in Danforth[2]. This structure will not have a view of either wind project. The Historic Architectural Reconnaissance Survey Stetson II Wind Farm Project by PAL (August 2008) concluded that there are no other properties on the National Register that would be affected by the project.

C. ***National or State Parks.*** There are no National or State Parks within eight miles of the project. The closest unit of the National Park Service (NPS) is the Saint Croix Island International Historic Site (IHS) in Calais, approximately 50 miles away.

D. ***Specified Great Ponds.*** While there are lakes and ponds near the wind project, there are no great ponds within eight miles of the wind project that are identified as having outstanding or significant scenic qualities, either within the organized areas (Banforth, Brookton, Danforth, and Weston), as determined by the "Maine's Finest Lakes" study or the unorganized areas (T8 R4, T8 R3, Prentiss Plt., Drew Plt., and Reed Plt.) as determined by the Maine Wildlands Lakes Assessment.

E. ***Specified Scenic Rivers.*** There are no scenic rivers or streams identified as having unique or outstanding scenic attributes, as listed in the "Maine Rivers Study", within eight miles of the wind project.

F. ***Scenic viewpoints or specified trails.*** There are no scenic viewpoints located on state public reserved land within eight miles of the wind project. There are no trails exclusively for pedestrian use within eight miles of the proposed wind project. The Appalachian National Scenic Trail is located 48 miles to the west and will not be affected by the wind project.

G. ***Scenic turnouts*****.** There is one scenic turnout on a scenic highway constructed by the Department of Transportation within eight miles of the wind project. The Million Dollar View Scenic Byway (Route 1 in Weston, north of Danforth) features two scenic overlooks that were recently installed to promote tourism in the area. (See Map 1 for location.) Portions of the eleven turbines on Jimmey Mountain will be visible from the southerly overlook at a distance of 6.7 miles and a horizontal arc of 11. The turbines will not block or interfere with the view of Mt. Katahdin. The photosimulation of the view from the overlook demonstrates that there will be a relatively minor impact on the view. The wind project will not be visible from the northerly overlook (Grand Lake view).

[2] The other two properties are the Romanzo Kingman House in Kingman (11± miles from Stetson II) and the Springfield Congregational Church in Springfield (15± miles from Stetson II).

H. ***Scenic viewpoints located in the coastal area***. Not Applicable: The wind project is greater than eight miles from the coastal area.

6.0 PROJECT DESCRIPTION

The following section describes the visible components of the Stetson II Wind Project.

6.1 Wind Turbines

Stetson Wind II, LLC is seeking approval for a total of 17 General Electric turbines (6 on Owl Mountain, 11 on Jimmey Mountain) with an output of 1.5 MW per turbine. The model selected is a 3-blade system mounted on an 80-meter tower affixed to a 24±-foot diameter foundation. The turbines will have a blade diameter of 77 meters (253 feet) and a total height of approximately 390 feet. By using a constant tower height, each of the nacelles will be roughly parallel to the ridgeline, creating a sense of order throughout the project. The turbines are controlled electronically so they always face into the wind. Components of the turbine will be painted white, the same as the turbines being installed on Stetson Mountain.

The blades will spin very slowly in low wind and will begin producing power when the wind velocity reaches approximately nine miles per hour. After the wind reaches a certain maximum velocity, which will vary with the intensity of turbulence, the machines will cut out. The turbines may not be operational at other times, such as when the winds are in-line (wind direction is parallel to the string, which limits the number of turbines that can operate) or when they are taken out of service for repair.

Depending upon the wind velocity, the blades will rotate at 11-20 revolutions per minute (RPM), which is equivalent to one revolution every 3-5.5 seconds. Under proper viewing conditions individual blades will be clearly visible with virtually no detectable blurring while they rotate.

The turbines will be spaced a minimum of two rotor diameters apart (154 meters/505 feet). Turbine spacing is a function of meteorological considerations related to wind speed and direction, interference from adjacent turbines, and other technical factors. The siting of individual turbines has taken into account the wind resource, site-specific topography, access road locations, proximity to wetlands, and other site conditions.

6.2 Project Lighting

Lighting for the project will follow the FAA recommendations for aviation safety. Red lights will be mounted on the top of some of the nacelles in accordance with an FAA approved lighting design. Under normal operations, the lights will be red, flashing, with a slow-on, slow-off profile.

6.3 Ridgeline Roads

Each wind turbine will be linked by an approximately 32-foot wide gravel road designed to provide safe travel by the construction crane to the structures throughout construction. In some instances the topography will dictate a circuitous route to accommodate the engineering requirements of the installation equipment and minimize site disturbance. The ridgeline roads will be screened by existing vegetation in most locations and will not be highly visible from outside the immediate area.

6.4 Access Roads

Two existing gravel roads off Route 169 will provide access into the sites to minimize disturbance at the construction entrance. The access roads will be modified to accommodate the delivery and construction vehicles needed for the project, including limited pull outs for passing of large vehicles. The access roads should not be visible to the general public beyond the immediate intersection with Route 169.

6.5 Electrical Collection System

Underground conductors will connect the turbines to an above ground collection line that will deliver the generated electricity to the substation at the south end of Stetson Mountain. The collection line will have 40-50 foot poles located within a 100 foot cleared right-of-way. The line will cross Route 169 at the Atlas Road, and then continue down the Atlas Road to connect into the Stetson Mountain project. Fiber optic communications cabling, telephone lines, and other communication lines to service the facility will also be mounted on the utility structures.

6.6 Meteorological Towers

The two existing meteorological towers are temporary and will be removed during construction. Three permanent 80-meter (262 feet) towers will be constructed and remain for the life of the project. If necessary, these towers will be lighted in accordance with to FAA requirements, and be of a guyed lattice construction, with a triangular cross section approximately 18 inches across. Their slim profile and light color will greatly reduce their visibility at distances greater than one mile.

6.7 Crane Pads and Crane Assembly Area

A cleared and level pad area up to 1.13 acres will be required at the base of each turbine for staging, crane movement, and turbine installation. An additional 0.28 acre will be needed in some areas to account for cut/fill slopes. In addition, two crane assembly areas will be required for crane assembly. Following construction these crane assembly areas will be reseeded.

6.8 Laydown Areas

The design calls for up to 10 laydown areas to be used for temporary storage of turbine and/or electrical components to accommodate the need to potentially store equipment and materials during construction. These areas will be reseeded after construction.

7.0 PHOTOSIMULATION OF WIND PROJECT

A photosimulation (computer-altered photograph) has been prepared to illustrate the anticipated change to the Million Dollar View Scenic Byway overlook in Weston. The following section describes the methodology used to develop this image.

- Stantec prepared a GIS-based viewshed map of the eight-mile study area to determine where any part of any of the turbines may be visible. This diagram does not account for the screening effects of existing vegetation, which will block views of the project from most roads and population centers. (See Figures 3, Stetson II Wind Project 8-Mile Turbine Viewshed.)
- Fieldwork by TJD&A determined that the project may be visible from the overlook.
- Photographs from the overlook were taken by TJD&A using a Nikon D300 digital camera, recording at the highest resolution. The lens was set to record images equivalent to those taken by a film camera with a 50 millimeter (i.e., a ‘normal’) lens.
- Photographs were merged into a panorama using Photoshop to provide a more realistic view of the landscape.
- A three-dimensional digital model of the project was created with Google Earth Pro and Google SketchUp, using the site plan and topographic data developed by the James Sewall Company.
- A cross-section from the overlook to the wind project was created to get a more accurate understanding of how much of the turbines would be visible. Maximum tree heights between the overlook and the wind project were assumed to be in the 40 to 50-foot range.
- The computer-generated model was imported into Photoshop and merged with the existing conditions photographs. Lighting was adjusted to match the time of day and lighting conditions at the time the photographs were taken. Photographs of actual turbines were then

substituted for the computer-generated models, matching the size and lighting conditions. Adjustments were made in Photoshop to account for atmospheric perspective (haze), sun angle, and other factors.

8.0 VIEWER EXPECTATION

As noted above, the only scenic area of state or national significance where the turbines will be visible from is at the southernmost overlook on the Million Dollar Scenic Byway (Route 1) in Weston. From this viewpoint the tops of the 11 turbines on Jimmy Mountain will be visible at distances of 6.7 to 7.4 miles.

Viewer expectation on this section of Route 1 should be moderate to high, due to the publicity surrounding the scenic byway and the experience of driving through a landscape characterized by long views of rolling hills, farmland, large lakes, and the occasional glimpse of Mount Katahdin. Observant motorists may also see the existing turbines on Stetson Mountain from a short distance (< 0.2 miles) one-half mile south of the overlook. At that location the turbines are 9-15 miles away and barely visible to the unaided eye.

The other recently constructed overlook (several miles to the north), which offers a more dramatic panorama of Grand Lake, will not have a view of the Stetson II wind project.

9.0 VISUAL IMPACT ASSESSMENT

There is only one scenic resource of state or national significance within eight miles of the wind project that will have any visual contact with the Stetson II project, i.e., the southerly overlook of the Million Dollar View Scenic Byway in Weston. As seen on the photosimulation from this viewpoint, the tops of the eleven turbines on Jimmey Mountain will be visible from the southerly scenic overlook at distances of 6.7 to 7.4 miles. Due to the effect of distance and the intervening vegetation, the turbines will not be perceived as dominant elements in the landscape. The turbines will not block the view of Mount Katahdin, which is 50 miles to the west northwest. The visual impact to this scenic resource should be slight. Table 1 summarizes the anticipated visual impacts from the Stetson II Wind Project.

There are no lakes or ponds rated as either ‘Outstanding’ or ‘Significant’ for scenic quality by Maine Wildlands Lake Assessment, the LURC Comprehensive Land Use Plan, or the Maine Lakes Study within 8 miles of the project. The wind project will not be seen from any river segments or streams that are identified for their scenic value by the Maine Rivers Study.

Table 1. Summary of Visual Impacts of Stetson II Project on Scenic Resources

RESOURCE	VIEWERS	VISUAL IMPACT
National Register of Historic Places: Union Hall in Danforth	Local residents of Danforth; occasional tourists.	No visual impact. Wind project will not be visible.
Million Dollar View Scenic Byway Overlook in Weston	Route One motorists; local residents	The eleven turbines on Jimmey Mountain will be visible from the scenic overlook at distances of 6.7 to 7.4 miles. The turbines will not block the view of Mount Katahdin, 50 miles to the WNW. The visible portions of the turbines will create minor contrasts in color, form, and line. Due to their distance and relatively small apparent size, they will not dominate the landscape or create an unreasonable contrast in scale. Visual impact should be slight.

The only associated facilities for this project are the access roads and the electrical collector system line. Neither of these associated facilities will be visible from any scenic resource of state or national significance. The access roads to Owl and Jimmey Mountains are the two existing roads off Route 169. The transmission line will be visible as it crosses Route 169, in an area with an existing roadside electrical distribution line. Neither of these associated facilities is of a scope, scale, or location that will cause an unreasonable adverse impact on scenic character or existing uses, and they are properly considered in conjunction with, and according to the standard for, the generating facilities.

10.0 MITIGATION MEASURES

Mitigation is defined as any action taken or not taken to avoid, minimize, rectify, reduce, eliminate, or compensate for actual or potential adverse environmental impact. The main mitigation measure was selecting a site with a network of existing logging roads to minimize potential construction impacts; only one scenic resource of state or national significance with views of the project, at a distance of 6.7 miles; no lakes or ponds identified by the state as 'Significant or Outstanding'; and no parks, designated hiking trails, or similar public facilities within eight miles.

11.0 CONCLUSION

There will be a very limited view of a portion of the Stetson II Wind Project from one scenic resource of state or national significance within eight miles. The view of the tops of the turbines at a distance of over six miles will not have an unreasonable adverse effect on the scenic character or existing uses related to the scenic character of the resource. Similarly, associated facilities do not have an unreasonable adverse impact on any scenic resources of state or national significance. Finally, the project location and layout have been selected to minimize impacts to the extent practicable. Based upon this assessment, we conclude that the Stetson II Wind Project will not have an unreasonable adverse impact on scenic values and existing uses of scenic resources of state or national significance.

Panoramic view looking southwest from the southerly overlook on the Million Dollar View Scenic Byway in Weston toward Jimmey Mountain.

Photosimulation 1a: Panoramic view looking southwest from the southerly overlook on the Million Dollar View Scenic Byway in Weston toward the proposed Stetson II Wind Project on Jimmey Mountain. Portions of ten of the eleven proposed turbines on Jimmey Mountain will be visible from this viewpoint at distances of 6.7 to 7.4 miles. The turbines on Owl Mountain will not be visible. The ridgelines of neither Jimmey Mountain nor Owl Mountain are visible from this viewpoint. See Figure 1b.

Photo by TJD&A, 06.13.08

Photosimulation 1: Million Dollar View Scenic Byway

STETSON II WIND PROJECT

First Wind, LLC

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Figure 1a

Photosimulation 1b: Normal view from the Million Dollar View Scenic Byway of the proposed Stetson II Wind Project on Jimmey Mountain. This image (in 11x17 format) should be held approximately 17” from the viewer’s eyes to replicate the actual view.

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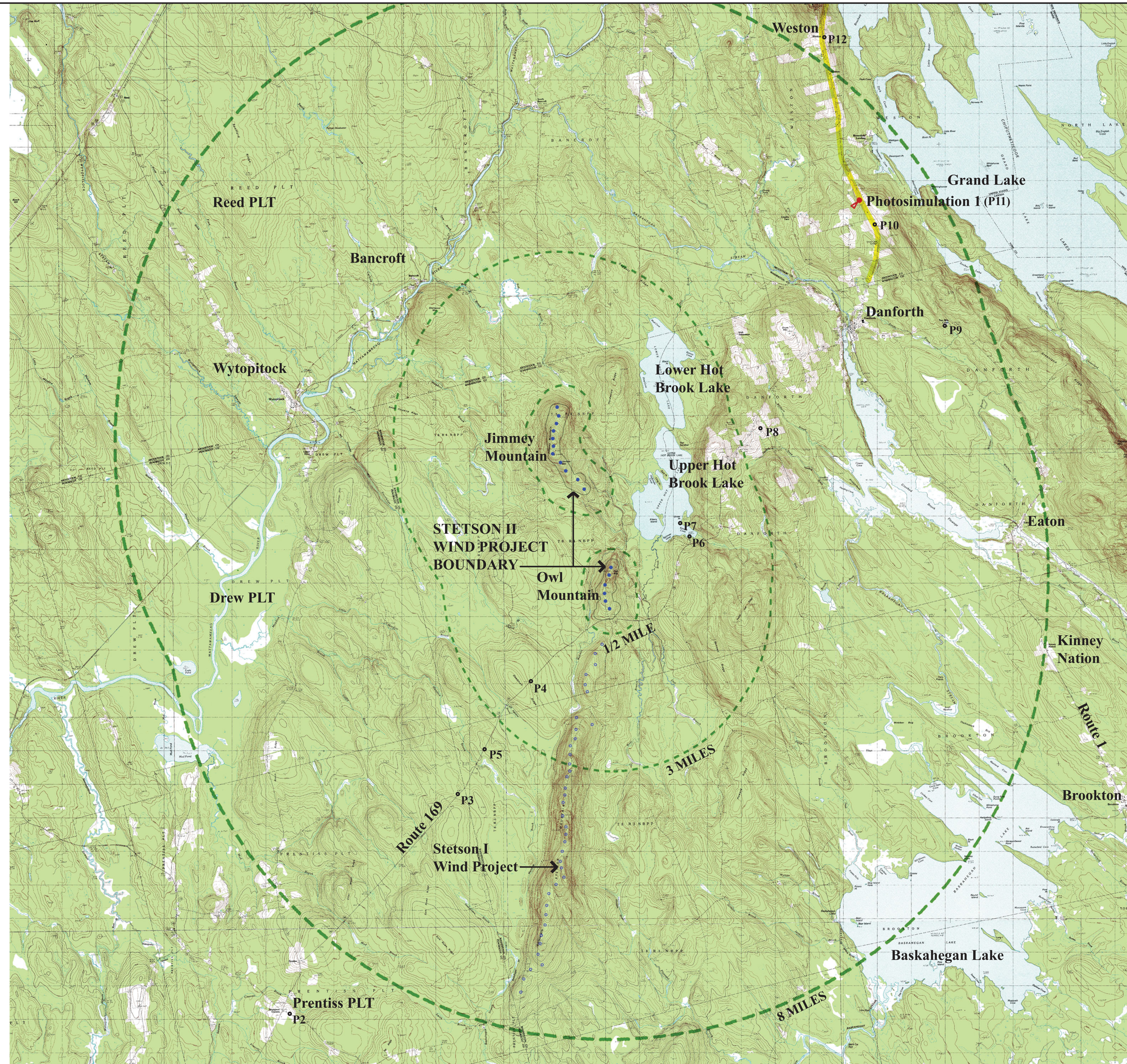
Figure 1b

KEY

- **P#** — Location of photo (See Appendix A)
- Stetson II turbines (17 total)
- Stetson Mountain turbines (38 total)
- Location of Photosimulation and viewing angle
- ‘Million Dollar View’ Scenic Byway (Weston)



Note: Photo 1 (P1) is 10 miles from Owl Mountain and 12 miles from Jimmey Mountain and is off this study map.

Study Area Map

U.S.G.S. Quadrangles: Wytopitlock, Jimmey Mountain, Danforth, Potter Hill, Stetson Mountain, Brookton, Bowers Mountain, Dill Hill, and Farrow Mt.

STETSON II WIND PROJECT

Evergreen Wind V, LLC

tjd&a

Terrence J. DeWan & Associates
Landscape Architects & Planners

Map 1

1.0 OBJECTIVE

The objective of this casualty monitoring protocol is to document injuries and fatalities of birds and bats once the Stetson II Wind Project becomes operational.

2.0 BACKGROUND

This post-construction monitoring protocol is based on the development of similar post-construction monitoring plans at existing or proposed projects in Maine and Vermont. Those plans were developed in consultation with natural resource agencies in both states. The draft guidance of the Maine Wind Power Advisory Group was also considered. This draft guidance includes contributions by several recognized experts in the field of wind energy and wildlife interaction and other State-sponsored wind-wildlife survey protocols, such as the Pennsylvania Game Commission's post-construction monitoring protocols. Finally, other recent studies of bird and bat fatalities at wind power projects in the U.S. and Europe were reviewed with regard to methods and search techniques (*e.g.*, Arnett *et al.* 2008, Arnett 2005, Kerns and Kerlinger 2004, Barrios and Rodriguez 2004, de Lucas *et al.* 2004, Krewitt and Nitchs 2003, and Osborn *et al.* 2000).

3.0 PROPOSED CASUALTY MONITORING PROTOCOL

At a minimum, Stetson II proposes to fund and conduct the following wildlife casualty monitoring protocols during Year 1 operations:

1) Standardized searches during peak activity periods for birds and bats (spring migration, summer nesting and pup-rearing, late-summer swarming, and fall migration);

2) Searcher efficiency trials to estimate the percentage of carcasses found by searchers in each habitat surrounding the turbines; and

3) Carcass removal trials to estimate the length of time that carcasses remain in the field for possible detection.

Other survey methods will also be employed in Year 1. These methods will include documentation of casualties outside the standard search plots and monitoring of weather conditions (see Additional Survey Methods, below). A more detailed work scope for these surveys will be developed in consultation with the Maine Department of Inland Fisheries and Wildlife (MDIFW) between the time that construction is initiated and the first spring survey period that occurs after construction (currently planned as Spring 2010). This will allow for the incorporation of survey results from two years of post-construction monitoring at the Mars Hill Wind Project and one year of monitoring at the Stetson Mountain Wind Farm. Monitoring will be beginning at the Rollins Wind Project during this same period.

In addition, Stetson II proposes to conduct follow-up monitoring in Year 3. The scope and timing of the follow-up monitoring will be determined in cooperation with the MDIFW based on the findings, with consideration of current research priorities within the industry and the region.

3.1 Standardized Searches

Monitoring will entail regular, systematic searches of the area beneath a subset of turbines and the two guyed meteorological measurement towers (met towers) by trained technicians. As requested by MDIFW, search preference will be given to those turbines located centrally within the largest clearings/openings, and the same locations will be monitored throughout the duration of the monitoring.

3.2 Schedule and Search Effort

Monitoring will be conducted during the first full year following completion of the project to operational status. Subsequent survey efforts will be evaluated based upon the number of casualties documented during the initial year of survey, indications of correlations between casualties and weather, or indications of correlations between casualties and bird or bat activity.

Four distinct survey periods will occur. The timing of these periods will result in a total of 24 consecutive weeks of surveys. These survey periods are as follows:

- April 15 – May 31 for spring migration;
- June 1 – July 14 for summer bird nesting and bat pup-rearing;
- July 15 – August 15 for late-summer bat activity; and
- August 15 – October 15 for fall bird and bat migration.

During each time period, all 17 turbines will be searched weekly. Additionally, the cleared area under one of the met towers (which primarily lies directly underneath the guy wires) will be searched once per week.

3.3 Search Plot Sizes

Fatalities may be found at considerable distances from the base of the turbine, *e.g.*, at distances equal to or greater than the total height of the turbine and rotor, commonly in the range of 300-400 feet (Erickson *et al.* 2004, 2003 and 2000, Johnson *et al*. 2000a and 2000b). The General Electric 1.5-megawatt turbines proposed for the Stetson II Wind Project have a maximum structural height of approximately 119 meters (389 feet) for the tower and rotor combined. Extending outward from the base this distance would yield a plot size significantly larger than the laydown area that will be cleared and leveled for each turbine (typical diameter of up to 75 meters or 250 feet). For example, a square plot based on the full tower height would measure approximately 238 meters (780 feet) on a side, and amount to approximately 14 acres. Plots of this size at Owl and Jimmey Mountains would include substantial areas of forest cover (primarily recently-selection cut areas) and steep terrain for many turbines. In comparison, many of the published studies conducted at existing projects in the western U.S. are situated in relatively level agricultural landscapes, where searches are not hindered by terrain or tree cover.

As noted in the draft Maine Audubon guidelines, conducting searches at this level of intensity may simply be impractical in hilly and forested terrain. For similar reasons, Kerns *et al.* (2005) scaled down their search areas in consideration of existing site constraints. Offsetting this problem somewhat is the fact that most fatalities are being found much closer to the turbines. For example, working at the Meyersdale project in Pennsylvania, Kerns and Kerlinger (2004) reported that the majority of bird and bat fatalities were found within about 30 meters (100 feet) of the turbine bases, and Kerns *et al.* (2005) reported that greater than 80 percent of bat fatalities were found within 40 meters (131 feet) of turbines at Meyersdale, PA and Mountaineer, West Virginia. The NEG Micon 1.5 MW wind turbines at Meyersdale and Mountaineer are similar in size to those proposed for Rollins Mountain.

In light of the above, options for tailoring the monitoring methods at the Stetson II Wind Project have been considered. It is currently anticipated that the standardized searches will focus on monitoring the cleared and leveled lay-down areas around each turbine and applying a correction factor to account for fatalities that fall outside of the smaller search plots. The methods for calculating this correction factor will be determined through further discussions with MDIFW and will incorporate survey results targeting this issue at turbines located in field habitat at the Mars Hill Wind Farm in 2008. In addition, the group of turbines selected can be weighted to include those turbines located in the direct center of the lay-down areas to maximize the chances of fatalities falling within these areas where carcasses are easier to find.[1]

[1] The effect of targeting 'centered' turbines on overall survey results is currently being investigated during the 2008, Year 2 monitoring at the Mars Hill Wind Farm.

3.4 Search Timing and Frequency

As noted above, systematic searches will be conducted weekly at all 17 turbines and one met tower during four survey periods. These survey periods are essentially consecutive time periods ranging from four to eight weeks in length that represent different time periods in the activity and habits of birds and bats. The result will be approximately 24 weeks of consecutive casualty monitoring and a total of 408 individual turbine searches and 24 met tower searches.

3.5 Standardized Searches

Plots will be searched by walking along parallel transects located at regular intervals across the turbine laydown area. Initially, transects will be set at six to eight meters apart. A searcher will walk at a rate of approximately 45-60 meters a minute along each transect, searching on both sides out to 3-4 meters for casualties. Depending upon whether casualties are found, it should take an average of 60 minutes to search each plot and then travel to the next. The distance between transects will be modified, if needed, based on vegetation development within the plots.

All casualties found will be documented on standardized field forms, photographed, collected and, if a state- or federally-listed species, reported within 24 hours of identification. The type of observation or condition of carcasses will be recorded, such as intact carcass, scavenged, or feather spot. The bearing to the center of the wind turbine being searched will be recorded and the distance to the turbine will be determined using a laser range finder and recorded.

All casualties found incidentally during normal on-site operations at the project will also be recorded and collected. Operations personnel will be instructed on the proper handling and notification requirements for these occurrences.

3.6 Searcher Efficiency Trials

Searcher efficiency trials will be conducted in the same area as the searches to estimate the percentage of avian and bat casualties that are found by searchers. The trials will consist of periodic placement of carcasses at the search turbines the night before searches occur (to reduce the likelihood of scavenging). Carcasses will be placed within all available ‘search habitats’ under the turbines, including the gravel access way immediately surrounding each turbine and the restored (loamed, seeded, and mulched) portions of the lay-down areas. Searchers will be unaware of the timing of these trials. Over the course of the full survey period a target of 25-50 carcasses (targeting up to 25 birds and up to 25 bats, if available) will be placed in the search plots. The number of carcasses placed for searcher efficiency trials will be modified, if necessary, based on the number of searchers used over the course of the surveys.

The carcasses used for these trials will be obtained during earlier searches at Stetson II or other facilities and will be marked with a small piece of black electrical tape placed around a leg. If too few carcasses are available then surrogate species of similar size as native species will be obtained. Estimates of searcher efficiency will be used to adjust for detection bias using methods similar to Kerns *et al.* (2005).

3.7 Carcass Removal Trials

Two carcass removal trials will be performed during the survey, one in spring and one in fall, independently of the searcher efficiency trials. The objective will be to estimate the percentage of bird and bat fatalities that disappear from study plots due to scavengers. Estimates of carcass removal will be used to adjust the number of carcasses found, thereby correcting for this removal bias.

For each trial, a minimum of 6 but preferably 25 carcasses (species composition as noted for searcher efficiency trials), will be placed near search plots (but not in plots to avoid contamination from blowing feathers, etc.). Carcasses will be checked on days 1, 2, 3, 4, 5, 7, 10, and 14, or until all evidence of the carcass is absent. On day 14, carcasses, feathers, or parts will be retrieved and properly discarded.

Finally, weather conditions will be recorded throughout the duration of the survey effort to evaluate if correlations with casualty exist. Weather parameters that will be recorded at the on-site met towers or at the wind turbines themselves will include wind speed and wind direction. Temperature at or near hub height and near the ground will also be recorded. Additional weather data that will be recorded will include barometric pressure, relative humidity, and precipitation.

4.0 REPORTING

A report will be provided after the full year (spring-fall) of monitoring. The report will summarize the methods and results of monitoring. Estimates of the total number of wind turbine-related fatalities will be based on three components: 1) observed number of carcasses; 2) searcher efficiency expressed as the proportion of trial carcasses found by searchers; 3) removal rates expressed as the length of time a carcass remains in the study area and is available for detection by searchers, and possibly factors such as the proportion of casualties likely to land or move outside the plot (such as forested portions beyond the cleared area surrounding turbines); and 5) an estimate of the number of carcasses found by observers where cause of death could not be attributed to wind energy development, and calculations of the number of bird and bat fatalities on a per turbine per year basis or other possible measurement methods (i.e., per MW per year). Calculation methods are presented in Kerns *et al.* (2005).

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1.0 Anticipated Life of Wind Turbines

Megawatt-scale wind turbines are designed and certified by independent agencies for a minimum expected operational life of 20 years.

As the wind turbines approach the end of their expected life, it is expected that technological advances will make available more efficient and cost-effective generators that will economically drive the replacement of the existing generators.

Following the commencement of operation of the project, absent the existence of a Force Majeure event, as defined herein, there will be a rebuttable presumption that owner shall decommission the project in the event that there is an absence of electricity generated by the Project for a continuous period of twelve (12) months. In addition to the Force Majeure exception, the owner may also provide reasonable evidence that the project has not been abandoned and should not be decommissioned.

“Force Majeure” as used herein shall mean fire, earthquake, flood, tornado or other acts of God and natural disasters; strikes or labor disputes; war, civil strife or other violence; any law, order, proclamation, regulation, ordinance, action, demand or requirement of any government agency; suspension of operations of all or a portion of the project for routine maintenance, overhaul, upgrade or reconditioning; or any other act or condition beyond the reasonable control of a party.

2.0 Estimated Cost of Decommissioning

The cost of decommissioning the wind turbines is offset by the salvage value of the towers and the turbine components. As of the date hereof, estimated cost of decommissioning, minus salvage value is $374,000 as laid out in Table 1 below.

Category	Decommissioning Cost	Salvage Value	Net
Project Management (contractor costs, equipment, etc)	$ 600,000.00	$ -	$ (600,000.00)
Site work/Civil (site reclamation)	$ 2,833,000.00	$ 322,000.00	$ (2,511,000.00)
Wind Turbine Foundations	$ 670,000.00	$ 77,000.00	$ (593,000.00)
Wind Turbine Generators (towers/hub/nacelle/blades/etc.)	$ 4,636,000.00	$ 8,758,000.00	$ 4,122,000.00
Electrical Collection System	$ 1,970,000.00	$ 1,178,000.00	$ (792,000.00)
Totals			$ (374,000.00)

3.0 Ensuring Decommissioning and Site Restoration Funds

On or prior to December 31 of each calendar year beginning with the calendar year in which the project commences commercial operations through and including calendar year 7, an amount equal to $27,000 shall be reserved for decommissioning and site restoration. Such amount may be in the form of a performance bond, surety bond, letter of credit, parental guaranty or other acceptable form of financial assurance (the “Financial Assurance”).

On or prior to the end of calendar year 15 of the project’s operation, the estimated cost of decommissioning (minus salvage value) will be reassessed and an amount equal to the balance of such updated estimated cost of decommissioning (minus salvage value) less the amounts reserved pursuant to the immediately preceding paragraph will be reserved for decommissioning and site restoration.

The Financial Assurance shall be kept in place until such time as the decommissioning work has been completed, provided, however, to the extent available as liquid funds, the Financial Assurance may be used to offset the costs of the decommissioning.

4.0 Decommissioning Process Description

Decommissioning and restoration activities will adhere to the requirements of appropriate governing authorities, and will be in accordance with applicable federal, state, and local permits.

The decommissioning and restoration process comprises removal of above-ground structures; removal of below-ground structures to a depth of 24 inches; grading, to the extent necessary; restoration of topsoil and seeding;

The process of removing structures involves evaluating and categorizing all components and materials into categories of recondition and reuse, salvage, recycling and disposal. In the interest of increased efficiency and minimal transportation impacts, components and material may be stored on-site in a pre-approved location until the bulk of similar components or materials are ready for transport. The components and material will be transported to the appropriate facilities for reconditioning, salvage, recycling, or disposal.

Above-ground structures include the turbines, overhead collection or transmission lines, and meteorological towers. Below-ground structures include turbine, foundations; collection system conduit and cable; fiber optic facilities; and subterranean drainage structures (if any). The above-ground structures and below-ground structures are collectively referred to herein as the “Wind Project Components”.

In connection with the decommissioning of the Wind Project Components and removal as further set forth below, in the event that on or prior to decommissioning owner provides evidence of a plan of continued beneficial use of any of the Wind Project Components, such items shall be excepted from the requirements of decommissioning and the existing license shall be amended to reflect such revisions.

Turbine removal. Access roads to turbines will be widened to a sufficient width to accommodate movement of appropriately sized cranes, trucks, and other machinery required for the disassembly and removal of the turbines. Control cabinets, electronic components, and internal cables will be removed. The rotor, nacelle and tower sections will be lowered to the ground where they may be transported whole for reconditioning and reuse, or disassembled/cut into more easily transportable sections for salvageable, recyclable, or disposable components.

Turbine and substation foundation removal. Topsoil will be removed from an area surrounding the foundation and stored for later replacement, as applicable. Turbine foundations will be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete to a depth of 24 inches below grade. The remaining excavation will be filled with clean sub-grade material of quality comparable to the immediate surrounding area. The sub-grade material will be compacted to a density similar to surrounding sub-grade material. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area.

Underground collection cables. The cables and conduits contain no materials known to be harmful to the environment. As part of the decommissioning, these items will be cut back to a depth greater than 24 inches. Cable and conduit buried greater than 24 inches will be left in place and abandoned.

Overhead collection lines. The conductors, insulators, and other pole-top material will be removed. The supporting poles will be removed and the holes filled in with compatible sub-grade material. In areas where environmental damage from complete removal may outweigh the benefits, the poles will be sawed flush with the surrounding grade. Line components may be stored on site during deconstruction of the line, but will then be transported off site for salvage or disposal.

Access roads and construction pads. After decommissioning activities of a turbine site are completed, access gates shall remain operational until completion of decommissioning, at which time they will be removed unless required by the landowner that they remain. Ditch crossings connecting access roads to public roads will be removed unless required that they remain by the landowner.

Improvements to Town and County roads that were not removed after construction at the requested of the Town or County will remain in place.

5.0 Site Restoration Process Description

Topsoil will be removed prior to removal of structures from all work areas and stockpiled, clearly designated, and separate from other excavated material. The topsoil will be de-compacted to match the density and consistency of the immediate surrounding area. The topsoil will be replaced to original depth, and original surface contours reestablished where possible. Any topsoil deficiency and trench settling shall be mitigated with imported topsoil consistent with the quality of the affected site.

Following decommissioning activities, the sub-grade material and topsoil from affected areas will be de-compacted and restored to a density and depth consistent with the surrounding areas to a maximum depth of 24 inches. The affected areas will be inspected, thoroughly cleaned, and all construction-related debris removed.

Disturbed areas will be reseeded to promote re-vegetation of the area to a condition reasonably similar to the original condition, reasonable wear and tear excepted. In all areas restoration shall include, as reasonably required, leveling, terracing, mulching, and other necessary steps to prevent soil erosion, to ensure establishment of suitable grasses and forbs, and to control noxious weeds and pests.

Memo

Stantec

To:	Brooke Barnes Stantec Consulting Ltd. Topsham, ME	From:	Theo Kindermans Stantec Planning and Landscape Architecture, PC Wellesley, MA
File:	Stetson II Wind Project	Date:	October 27, 2008

Reference: Shadow-Flicker Modeling
Stetson II Wind Project, Penobscot County, Maine

Introduction

This memorandum provides a brief explanation of the shadow-flicker phenomenon, the modeling approach employed for the site in Washington County, ME and relevant explanations and results. The site layout was provided by Stantec Consulting Ltd., located in Topsham, ME, showing 17 turbines, GE model sle, with an 80 meters high hub and a 77 meter diameter rotor.

Shadow-Flicker Background

Shadow-flicker from wind turbines is defined as alternating changes in light intensity caused by rotating blades casting shadows on receptors on the ground and stationary objects such as a window at a dwelling. When the sun is obscured by clouds or heavy fog, or when the turbine is not operating, no shadows will be cast.

Shadow-flicker can occur on project area receptors when the wind turbine is located near the receptor and when the turbine blades interfere with the angle of the sunlight. The most typical effect is the visibility of an intermittent light reduction on the receptor facing the wind turbine and subject to the shadow-flicker. Obstacles such as terrain, trees, or buildings between the wind turbine and a potential shadow-flicker receptor significantly reduce or eliminate shadow-flicker effects. No shadow flicker is present when the rotor of the turbine is parallel to the line from the sun to the receptor.

The spatial relationship between a wind turbine and a receptor, as well as wind direction are key factors related to shadow-flicker time. Shadow-flicker time is most commonly expressed in hours per year. At a distance of 1000 feet, shadow flicker usually only occurs at sunrise or sunset when the shadows cast are sufficiently long.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensities diminish with increased distance from turbine to receptor and with lower visibility weather conditions such as haze or fog. Closer to a turbine the shadow will appear to be darker and wider as the rotors will block out a larger portion of sunrays. The shadow on receptors that are located further away will appear fainter, lighter and less distinct.

The analysis provided in this report does not evaluate the flicker intensity, but rather focuses on the total amount of time (hours and minutes per year) that shadow flicker can potentially occur at receptors regardless if the shadow flicker is barely noticeable or clearly distinct. As a result, it is likely that receptors will experience less shadow-flicker impact than modeled and reported, especially those that are further away from the turbines. It is very likely that marginally affected receptors may not be able to identify shadow-flicker at all.

The speed of the rotor and the number of blades determine the frequency of the flicker of the shadow. The shadow-flicker results in this memo are based on GE Energy's 3-blade model 1.5 sle, with a turbine height of 80 meters. The diameter of the rotors is 77 meters. The nominal rotor speed of 20.4 RPM which translates to a blade frequency of 1 Hz (about 1 alternation per second)

Modeling Approach

For the shadow flicker modeling a module of the WindPRO software was used. The computer model simulates the path of the sun over the course of the year and assesses at regular intervals the possible shadow flicker across a receptor. The color coded map that was produced by the computer model, shows a very conservative estimate of the number of hours per year that shadows could be cast by the rotation of the turbine blades.

A worst case approach has been adopted for modeling the shadow flicker; the model assumes that the sun is shining all day, from sunrise to sunset, and that the rotor plane is always perpendicular to the line from the wind turbine to the sun. It is further assumed that the turbine is operating continually. Additional general site and receptor-specific conditions such as obstacles (vegetation), and seasonal cloud and fog patterns which could further reduce the reported shadow flicker impacts have also not been included. The analysis assumes windows are situated in direct alignment with the turbine-to-sun line of sight. Even when windows are so aligned, the analysis does not account for the difference between windows in rooms with primary use and enjoyment (e.g. living rooms) and other less frequently occupied or un-occupied rooms or garages.

The shadow-flicker model uses the following input:

- Turbine locations
- Shadow flicker receptor (residence) locations (coordinates)
- Aerial photography using GIS data
- USGS 1:24,000 topographic and USGS DEM (height contours)
- Turbine rotor diameter
- Turbine hub height
- Joint wind speed and direction frequency distribution
- Sunshine hours (long term monthly reference data)

The model calculates detailed shadow flicker results at each assessed receptor location and the amount of shadow-flicker (hours/year) everywhere surrounding the project. A receptor in the model is defined as a 1 square meter 1 meter above ground level. This omni-directional approach produces shadow-flicker results at a receptor regardless of the direction of windows and provides similar results as a model with windows on various sides of the receptor.

Reference: Shadow-Flicker Modeling

The sun's path with respect to each turbine location is calculated by the software to determine the cast shadow paths every minute, daily over one full year.

The turbine run-time and direction (seen from the receptor) are calculated from the site's long-term wind speed and direction distribution.

Output from the model includes the following information:

- Calculated shadow-flicker time at selected receptors,
- Tabulated and plotted time of day with shadow flicker at receptors,
- Map showing turbine locations, selected shadow-flicker receptors and iso-line contours indicating projected shadow-flicker time (hours per year).

Conclusion

The shadow-flicker model assumptions applied to this project are very conservative and as such, the analysis is expected to over-predict the impacts. Additionally, many of the modeled shadow flicker hours are expected to be of very low intensity.

There are no receptors close to or within the area subject to shadow flicker, as shown on the attached figures.

For clarifications and more detailed analysis of expected influence at selected receptors please do not hesitate to contact me.

STANTEC PLANNING AND LANDSCAPE ARCHITECTURE P.C.

Theo Kindermans, RLA, LEED ap
Principal
theo.kindermans@stantec.com

Attachment: Shadow Flicker Study Area, Northern Project Area Map
Shadow Flicker Study Area, Southern Project Area Map

c. file

Stetson II Wind Project
Washington County, Maine

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Shadow Flicker Study - Northern Project Area

Date 7.22.2008

Data Source: "Maine Office of GIS (MEGIS) - GIS Executive Council and Maine GeoLibrary Board"

Stantec

Stantec Consulting, LTD
Landscape Architecture. Civil Engineering. Site Planning
70 Walnut Street
Wellesley, MA 02481

N

0 500 1,000 2,000 Feet

Stetson II Wind Project
Washington County, Maine

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Shadow Flicker Study - Southern Project Area

Date 7.22.2008

Data Source: "Maine Office of GIS (MEGIS) - GIS Executive Council and Maine GeoLibrary Board"

Stantec Consulting, LTD
Landscape Architecture. Civil Engineering. Site Planning
70 Walnut Street
Wellesley, MA 02481

Stantec

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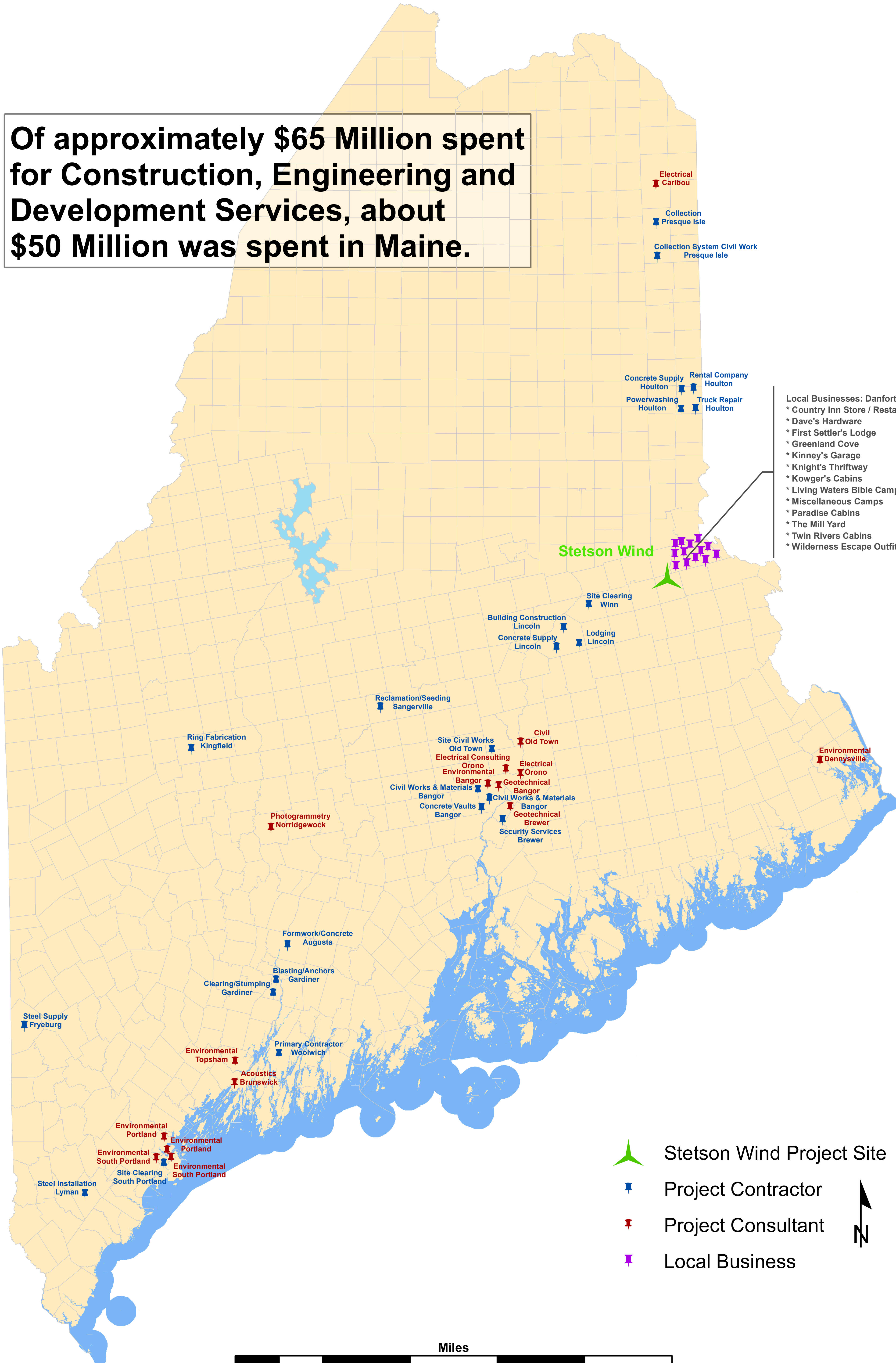
0 500 1,000 2,000 Feet

Maine Businesses Benefitting from Stetson Wind

Of approximately $65 Million spent for Construction, Engineering and Development Services, about $50 Million was spent in Maine.



GE
Energy

1.5MW
Wind Turbine

a product of
ecomagination℠

imagination at work

The industry workhorse

With energy demand increasing, fuel costs rising and growing pressure to address greenhouse gas emissions, the world needs a reliable supply of cleaner, reliable power, which is why GE continues to drive cutting-edge wind turbine technology.

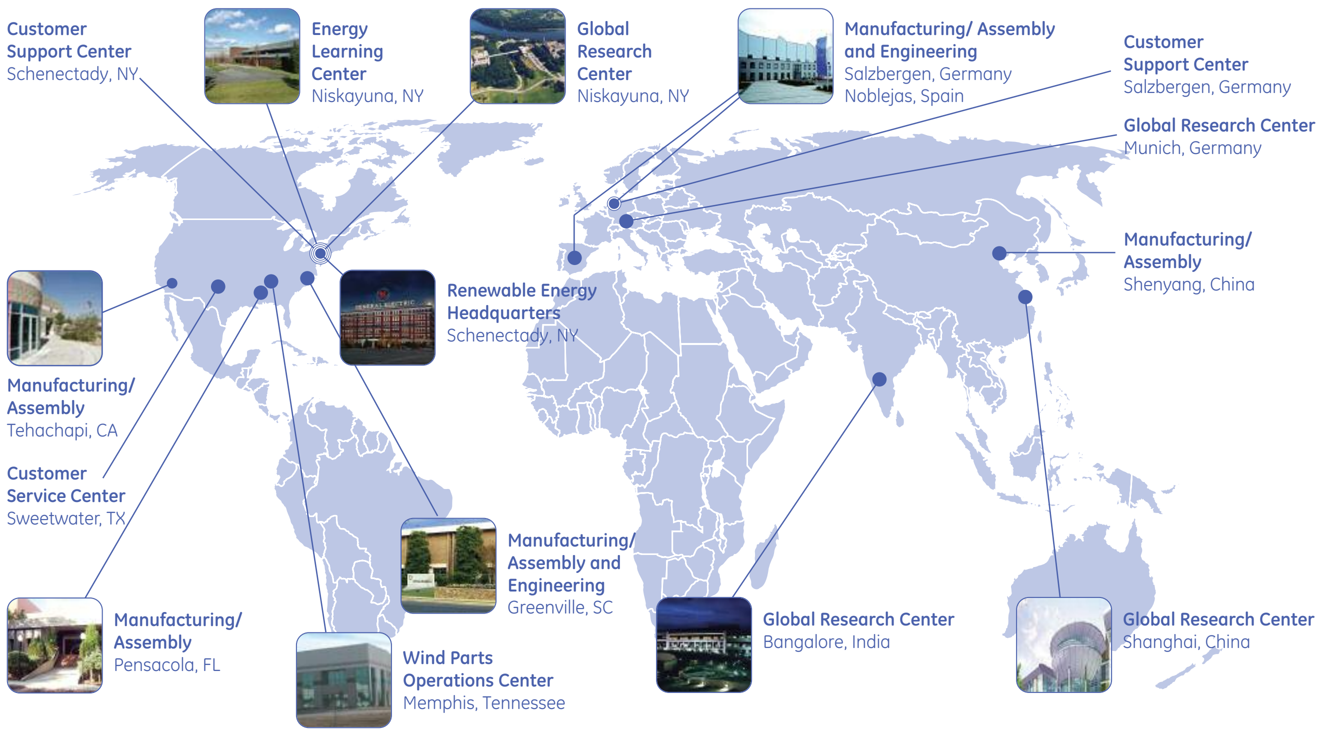
Building on a strong power generation heritage spanning more than a century, our 1.5 MW wind turbine—also known as the industry workhorse—delivers proven performance and reliability, creating more value for our customers.

Our product strategy is focused on results that contribute to our customers' success. Every initiative we pursue bears our uncompromising commitment to quality and innovation, and our reputation for excellence can be seen in everything we do.

Global footprint

GE Energy is one of the world's leading suppliers of power generation and energy delivery technologies—providing comprehensive solutions for coal, oil, natural gas and nuclear energy; renewable resources such as wind, solar and biogas, and other alternative fuels. As a part of GE Infrastucture—which also includes the Water, Transportation, Aviation and Oil & Gas businesses—we have the worldwide resources and experience to help customers meet their needs for cleaner, more reliable and efficient energy.

GE has six wind manufacturing and assembly facilities in Germany, Spain, China and the United States. Our facilities are registered to ISO 9001:2000 and our Quality Management System, which incorporates our rigorous Six Sigma methodologies, provides our customers with quality assurance backed by the strength of GE. We believe wind power will be an integral part of the world energy mix throughout the 21st century and we are committed to helping our customers design and implement energy solutions for their unique energy needs.



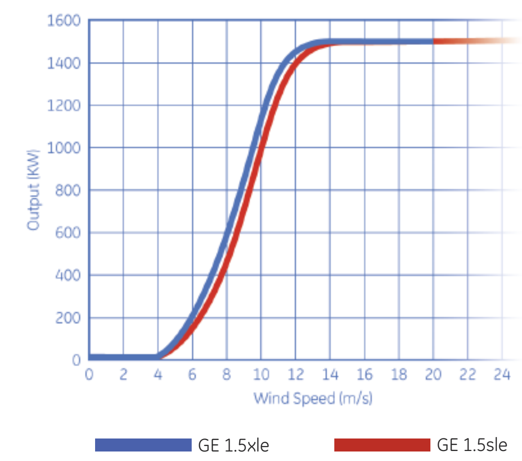
Proven technology

Drawing from our extensive manufacturing and operations experience, proven design and optimized components, and ongoing technology advancements in performance and reliability, GE's 1.5 MW wind turbine continues to be one of the most widely used wind turbines in the world.

Technical data

		1.5sle	1.5xle
Operating Data			
Rated Capacity:		1,500 kW	1,500 kW
Temperature Range: (with Cold Weather Extreme Package)	Operation: Survival:	-30°C – +40°C -40°C – +50°C	-30°C – +40°C -40°C – +50°C
Cut-in Wind Speed:		3.5 m/s	3.5 m/s
Cut-out Wind Speed (10 min avg.):		25 m/s	20 m/s
Rated Wind Speed:		14 m/s	12.5 m/s
Wind Class — IEC:		IIa (V_{e50} = 55 m/s V_{are} = 8.5 m/s)	IIIb (V_{e50} = 52.5 m/s V_{ave} = 8.0 m/s)
Electrical Interface			
Frequency		50/60 Hz	50/60 Hz
Voltage		690V	690V
Rotor			
Rotor Diameter:		77 m	82.5 m
Swept Area:		4657 m^2	5346 m^2
Tower			
Hub Heights:		65/80 m	80 m
Power Control		Active Blade Pitch Control	Active Blade Pitch Control

Power Curve



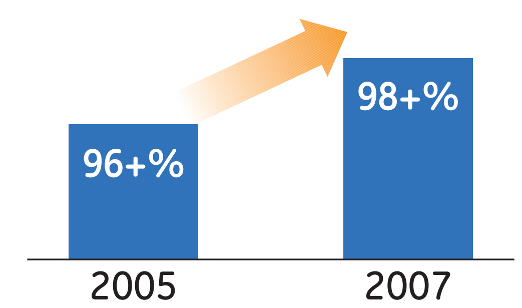
1.5sle — *Classic workhorse, an efficient and reliable machine with proven technology*

1.5xle — *Built on the success of the 1.5sle platform, captures more wind energy with 15% greater swept area*

Driving performance

GE's 1.5 MW wind turbine is designed to maximize customer value by providing proven performance and reliability. With continuous technology enhancement programs, the 1.5 MW wind turbine has established itself as one of the most reliable turbines in the industry. This is evident through our model year performance trend, where availability performance significantly improves each year.

1.5sle model year availability

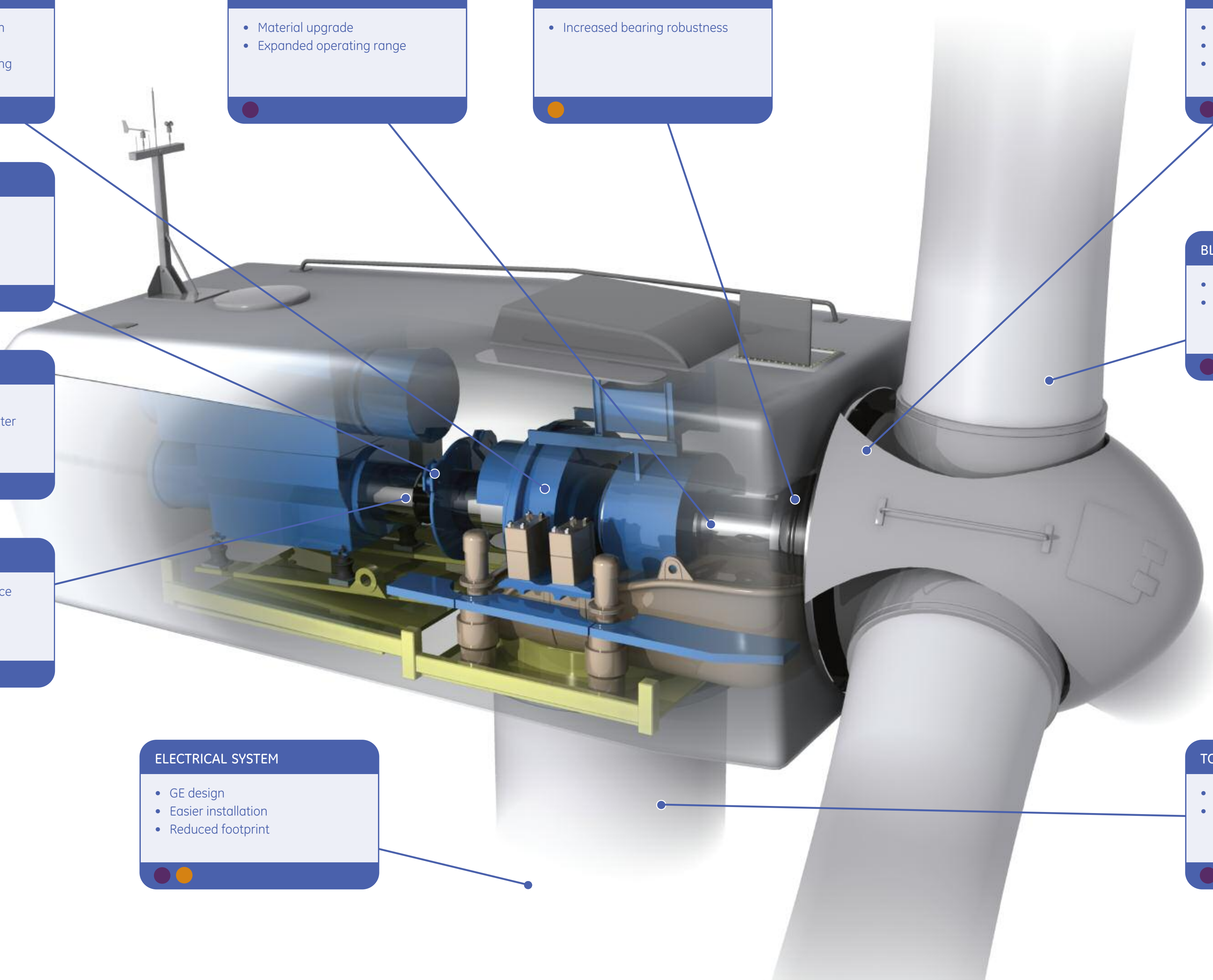


Performance and reliability

With technology centers of excellence in the United States, Europe, India and China, our teams of engineers and scientists use Six Sigma methodology, coupled with the latest computational modeling and power electronic analysis tools, to manufacture wind turbines with the performance and reliability necessary to meet the challenges our customers face in today's energy environment.

GE's commitment to customer value and technology evolution is demonstrated in our ongoing investment in product development. Since entering the wind business in 2002, GE has invested over $750 million in driving reliable and efficient wind technology.

GE also utilizes the expertise of our four global research centers, located in Germany, China, India, and the United States. Global Research has been the cornerstone of GE technology for more than 100 years, and is focused on developing breakthrough innovations in the energy industry.



GEARBOX
- HALT testing on every design
- Cylindrical roller bearings
- Improved oil filtration, heating and cooling

MAIN SHAFT
- Material upgrade
- Expanded operating range

MAIN BEARING
- Increased bearing robustness

PITCH
- GE designed pitch electronics
- Increased pitch drive robustness
- Greater torque

SOFT BRAKE SYSTEM
- Hydraulic secondary brake

BLADES
- GE design
- Improved capacity factor

CONTROL
- GE Mark VIe controller
- Integrated pitch and converter diagnostics

COUPLING
- Slip coupling design to reduce gearbox loads

ELECTRICAL SYSTEM
- GE design
- Easier installation
- Reduced footprint

TOWER
- Modular tower system
- Hub height flexibility

Designed for
- ● performance
- ● reliability

GE 1.5 MW...the most widely used wind turbine in its class

- 1 turbine shipped every **3** hours
- As of June 2008, **more than 8,500** turbines are in operation worldwide
- **19** countries
- **115+** million operating hours
- **70,000+** GWh produced

Technological expertise

GE Infrastructure

Energy
- Controls, materials, power electronics
- Fulfillment & logistics capability
- Efficient supply chain management

Aviation

Aerodynamic and aero-acoustic modeling expertise

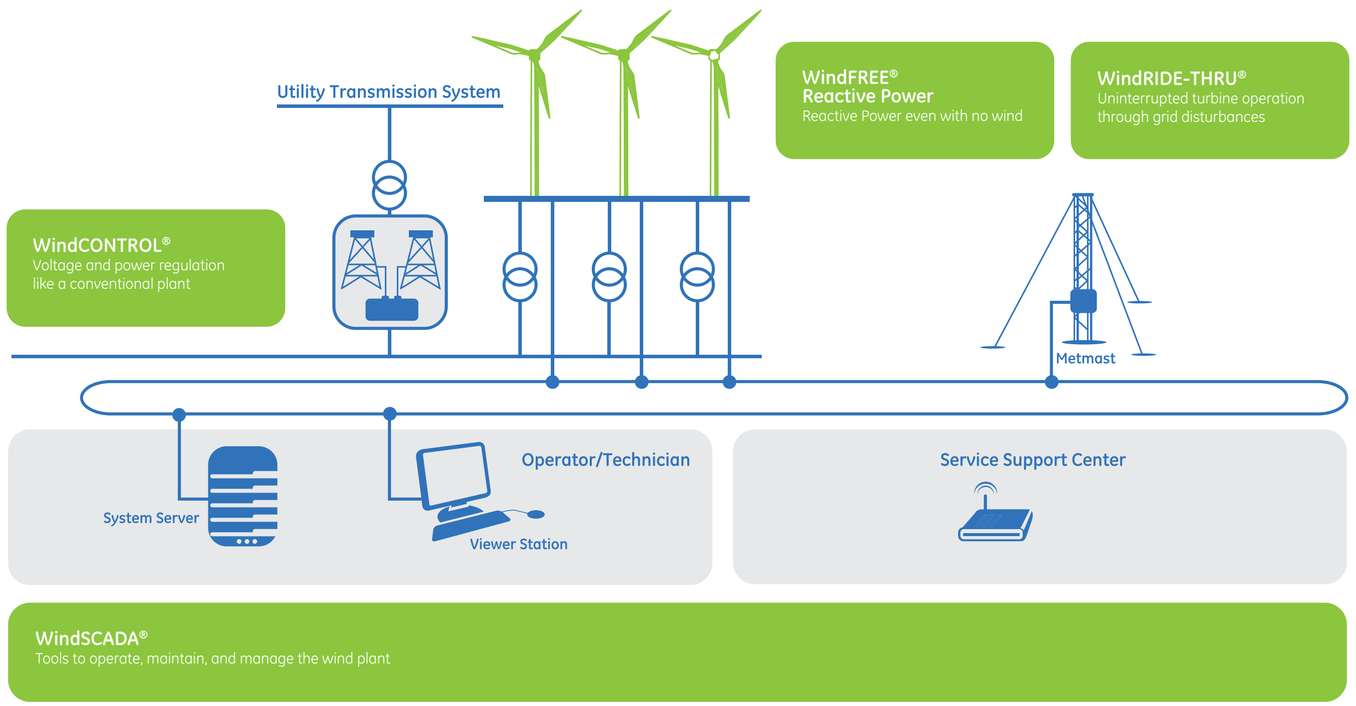
Rail

Gearbox and drive train technologies

GE Global Research
- Energy conversion
- Material sciences
- Smart grids

Optimized wind power plant performance

Wind turbine performance is a critical issue in light of increasingly stringent grid requirements. GE's unrivaled experience in power generation makes us the industry leader in grid connection. By providing a sophisticated set of grid-friendly benefits similar to conventional power plants, GE's unique integrated suite of controls and electronics take your wind power station to the frontline of performance and seamless grid integration.



FEATURE	DESCRIPTION	BENEFITS
WindRIDE-THRU® Turbine Operation System	Uninterrupted turbine operation through grid disturbances Offered in two standard packages: • Low Voltage Ride Through • Zero Voltage Ride Through	Meets present and emerging transmission reliability standards similar to those demanded of thermal generators
WindCONTROL® Power Regulation System	Voltage and power regulation like a conventional power plant	Provides frequency droop and power ramp limiters to help stabilize power system frequency Reduces BOP costs
WindFREE Reactive Power® System	Provides reactive power even with no wind	Provides smooth fast voltage regulation by delivering controlled reactive power through all operating conditions Eliminates the need for grid reinforcements specifically designed for no-wind conditions, and may allow for more economic commitment of other generating resources to enhance grid security
WindSCADA® System	Tools to operate, maintain and manage the wind power plant	Intuitive operation and maintenance control Secure user-access

Project execution

GE understands that grid compatibility, site flexibility, and on-time delivery are critical to the economics of a wind project. That's why the 1.5 MW wind turbine has been engineered for ease of integration and delivery to a wide range of locations, including those with challenging site conditions.

Our global project management and fulfillment expertise offer customers on-time delivery and schedule certainty. Regardless of where wind turbine components are delivered, GE's integrated logistics team retains ownership and responsibility for this critical step. Utilizing the GE Energy Power Answer Center, our engineering and supply chain teams are ready to respond to any technical, mechanical or electrical questions that may arise.

As one of the world's largest power plant system providers, GE is uniquely positioned to provide customers with full-service project management solutions. With offices in North America, Europe, and Asia, our world class Power Plant Systems division utilizes decades of fulfillment expertise in project management, logistics, plant start-up and integration from Gas Turbine, Combined Cycle, Hydro, and Aero plants.

Here are some examples of how GE has worked with customers to solve project challenges and maximize their value through on-time delivery and advanced logistic capabilities:

Challenge:
Site with late grid availability due to project location change

GE's solution:
Pre-commissioning service: GE can bring portable generators on site and pre-commission turbines even without back feed power

Customer benefit:
Faster commissioning once grid became available

Challenge:
Project site with difficult geographic access

GE's solution:
Well-choreographed team with challenging terrain transportation expertise

Customer benefit:
More site flexibility; schedule target met

World-class customer service

GE's wind turbine fleet is one of the fastest growing and best-run fleets in the world. Utilizing our decades of experience in product services in the power generation industry, GE provides state-of-the-art solutions to ensure optimal performance for your wind plant.

24x7 Customer Support

GE's customer support centers in Europe and the Americas provide remote monitoring and troubleshooting for our installed fleet of wind turbines around the world, 24 hours a day, 365 days a year. The customer support centers are able to quickly perform remote resets for over 250 turbine faults. It is one of the most effective ways to ensure continuous monitoring and fault resets of your wind assets by qualified technology experts.

Technical Skills and In-depth Product Knowledge

GE's wind customer support centers have dedicated teams to dispatch for troubleshooting, repair and maintenance, available 24 hours a day, 365 days a year. This model ensures wide coverage of large wind turbine fleets without compromising technical skills or quality.

GE taps into our extensive product knowledge for timely resolution of many issues. All turbine faults are investigated using a structured technical process, which is then escalated as necessary. We also use feedback from this process in product development.

Operations and Maintenance Support

Driven by a highly skilled work force and the operating knowledge of over 8,500 1.5 MW wind turbines, GE offers a wide range of services tailored to the operation and maintenance needs of your wind assets. Our offerings range from technical advisory services, transactional services and remote operations to full on-site operations support including availability guarantees.

Parts Offerings

GE has utilized the extensive Parts and Refurbishment experience of its Energy Services business to establish a global center of excellence for wind parts operations. The wind parts resources are aligned to provide a full range of offerings for all types of parts and refurbishment needs, including routine maintenance kits, consumables and flow parts, and key capital parts such as gearboxes and blades.

With the launch of our 24/7 parts call center, and the development of online ordering tools, we are increasing the channels that our wind plant operators can utilize to order required wind turbine parts, including emergency requests for down-turbine needs.

For wind plant operators looking for additional benefits that a contractual parts relationship with GE can offer, the wind parts team has developed tailored offerings that can provide ongoing inventory-level support and parts lead-time guarantees. One of the exciting advantages of a GE wind parts and refurbishment program is membership in the capital parts pool, with a priority access to often hard-to-source capital parts.

Conversions, Modifications and Uprates (CM&U)

Continuous technological improvements are key for GE to be a world leader in the wind industry. Our CM&U offerings utilize the new technology developments in the 1.5 MW platforms to improve the performance of existing assets. These offerings are designed to improve reliability and availability, and increase turbine output and improve grid integration.

Long-Term Asset Management Support

GE is your reliable partner as we strive to build long-term relationships with asset managers. Utilizing our strengths, we can provide parts solutions, field technician and customer training, and a wide range of specialized services to complement local on-site capabilities.

Environmental Health and Safety, a GE commitment

Maintaining high Environmental Health and Safety (EHS) standards is more than simply a good business practice; it is a fundamental responsibility to our employees, customers, contractors, and the environment we all share.

GE is committed to maintaining a safe work environment. We incorporate these values into every product, service and process, driving EHS processes to the highest standards.

Powering the world…responsibly.

For more information, please visit
www.ge-energy.com/wind

* Mark, WindCONTROL®, WindFREE®, WindRIDE-THRU® and WindSCADA® are registered trademarks of General Electric Company.

GEA-14954A (3/08)

NOTICE OF FILING OF DEVELOPMENT APPLICATION FOR APPROVAL

This is to notify you that Stetson Wind II, LLC (Stetson II), c/o First Wind Energy, LLC, 85 Wells Avenue, Suite 305, Newton, MA 02459-3210, has filed an Grid Scale Wind Energy Development Permit Application with the Maine Land Use Regulation Commission pursuant to the provisions of 35-A MRSA Section 3451 et seq. and 12 MRSA Section 685-B to build a wind power project on Owl Mountain and Jimmey Mountain in T8R4 NBPP. This area is zoned (M-GN) General Management Subdistrict, with areas of Wetland Protection Subdistrict (P-WL2, P-WL3) and Shoreland Protection Subdistrict (P-SL).

Stetson II is seeking development permit approval from the Land Use Regulation Commission for 17 General Electric wind turbines with a potential output of 1.5 megawatts (MW) per turbine and a combined potential output of 25.5 MW. The development would include wind turbines, meteorological towers, access roads, power collection system, and general and turbine-specific lay down areas.

The Grid Scale Wind Energy Development Permit Application will be filed for public inspection at the Maine Land Use Regulation Commission office in Augusta on or about November 4, 2008. Stetson II can be contacted directly at (207) 541-1940.

Written comments from interested persons should be sent to the Maine Land Use Regulation Commission, Department of Conservation, 22 State House Station, Augusta, Maine 04333-0022, within two weeks of filing the Application.

Requests for a public hearing must be submitted in writing to the Commission within two weeks of the application being deemed complete for processing. If you have question about how to request a public hearing, please contact the Maine Land Use Regulation Commission staff by calling (207) 287-2631.

NOTICE OF FILING OF DEVELOPMENT APPLICATION FOR

NOTICE OF FILING OF DEVELOPMENT APPLICATION FOR APPROVAL This is to notify you that Stetson Wind II, LLC (Stetson II), c/o First Wind Energy, LLC, 85 Wells Avenue, Suite 305, Newton, MA 02459-3210, has filed an Grid Scale Wind Energy Development Permit Application with the Maine Land Use Regulation Commission pursuant to the provisions of 35-A MRSA Section 3451 et seq. and 12 MRSA Section 685-B to build a wind power project on Owl Mountain and Jimmey Mountain in T8R4 NBPP. This area is zoned (M-GN) General Management Subdistrict, with areas of Wetland Protection Subdistrict (P-WL2, P-WL3) and Shoreland Protection Subdistrict (P-SL). Stetson II is seeking development permit approval from the Land Use Regulation Commission for 17 General Electric wind turbines with a potential output of 1.5 megawatts (MW) per turbine and a combined potential output of 25.5 MW. The development would include wind turbines, meteorological towers, access roads, power collection system, and general and turbine-specific lay down areas. The Grid Scale Wind Energy Development Permit Application will be filed for public inspection at the Maine Land Use Regulation Commission office in Augusta on or about November 4, 2008. Stetson II can be contacted directly at (207) 541-1940. Written comments from interested persons should be sent to the Maine Land Use Regulation Commission, Department of Conservation, 22 State House Station, Augusta, Maine 04333-0022, within two weeks of filing the Application. Requests for a public hearing must be submitted in writing to the Commission within two weeks of the application being deemed complete for processing. If you have question about how to request a public hearing, please contact the Maine Land Use Regulation Commission staff by calling (207) 287-2631. November 15, 2008

Appeared in: ***Bangor Daily News*** on Saturday, 11/15/2008

Lakeville Shores, Inc.		PO Box 96		Winn	ME	04495
Berthol	Boucher	388 Tibbetts Hill Rd		Goffstown	NH	03045
John & Jean	Burrill	PO Box 36		Topsfield	ME	04495
Preston	White	PO Box 403		Leicester	NC	28748
Richard	Kimball	16 Halls Way		Nottingham	NH	03290
Kespatek Holdings, LLC		PO Box 10		Danforth	ME	04424
Charlotte	Basgall, Et Als	334 N Seitz St		Russell	KS	67665
David & Marcia	Snow	73 Pine St		Bath	ME	04530
Dellis & Jessica	Huff	PO Box 103		Danforth	ME	04424
William	Jamison	49 Atlantic Ave		Old Orchard Beach	ME	04064
Steven & Diana	Gonzalez	13326 SW 28th St		Davie	FL	33390
David	Guay	Sheraton Drive		Hudson	NH	03051
Dale & Annette	Giguere	234 Fisher Farm Rd		Sabattus	ME	04280
Timothy & Cheryl	Peaslee	6 Ancona Ave		Bath	ME	04530
Colby & Cynthia	Noyes	PO Box 101		Danforth	ME	04424
Colby	Noyes	PO Box 101		Danforth	ME	04424
Cynthia	Noyes	PO Box 436		Danforth	ME	04424
Harrison & Marilyn	Roper	35 High St		Houlton	ME	04730
Colby & Trent	Noyes	PO Box 101		Danforth	ME	04424
Anthony & Lisa	Olmstead	70 River Rd		Lisbon	ME	04250
Timothy & Amanda	Kelly	1083 Torringford St		Torrington	CT	06790
Kenneth & Sherry	Williams	23 Phillips Rd		Glenburn	ME	04401
Eric & Jennifer	Gilman	PO Box 301		Danforth	ME	04424
Jerry	Staggs	15 Currier Dr		Londonderry	NH	03053
Kevin & Rhonda	Whitman	121 Fay Rd		New Salem	MA	01355
Howard & Frances	Phillips	83 McCormack Ave		Medford	MA	02155
Lisa	Rouse, Et Als	c/o John McEwen	184 Maple St	Danforth	ME	04424
Thomas & Claire	Hopkinson	244 Gaston St		Medford	MA	02155
Maxine	Giberson	3 Heywood St		Houlton	ME	04730
Audrey	Michaud	4 Bayberry Rd		Danvers	MA	01923
Kathy Merrill Trust		3 Larve Dr		Freeport	ME	04032

John & Kimberly	Santosuosso	23 Walnut St		Townsend	MA	01469
Kinney Family Trust		105 Tapawingo Rd SE		Vienna	VA	22180-5962
Richard	Fenton	3 North Eaglewood Dr		Galloway	NJ	08205
Dev of Eugene	O'Sullivan	56 Brown Ave		Blackwood	NJ	08012
Michael	Bonner	20 North Ridge Dr		East Bridgewater	MA	02333
Barbara	Bonner	PO Box 236		Danforth	ME	04424
Vernon & Linda	Jones	310 Boston Post Rd	Unit #14	Waterford	CT	06385
Richard & Joanne	Stanley	527 Highland St		Northbridge	MA	01534
Dev of Vera	Bonner	c/o Robert Bonner	24 Huff Rd	Danforth	ME	04424
John	Reilly	159 Montieth Rd		Bridgewater	ME	04735
William	Julian	863 Barlow Track		Depford	NJ	08096
Irina	Shatravka	119 Springfield Rd		Danforth	ME	04424
Maine 7 Rod & Gun Club		Attn: Dan Rau	911 Cummings Ave	Blenheim	NJ	08012
Timothy Brothers		121 Rollstowe Rd		Fitchburg	MA	01420
Cheryl	Parker	PO Box 251		Danforth	ME	04424
Paul	Hansen	10 Two Rivers Ln		Verona Island	ME	04416
Erik	Hansen	5971 Hibiscus Rd		Orlando	FL	32807
David & Christine	Collamore	353 Tate Rd		Corinth	ME	04427
Woodland Ridge Lake Land		PO Box 188		Ft McCoy	FL	32134
Roger & Estelle	Fontaine	PO Box 369		Danforth	ME	04424
Andrew	Coates	26 Otis Ave		Dedham	MA	02026
William	Frasca	2401 Colington Rd		Kill Devil Hills	NC	27948
Peter & Jodie	Perfect	PO Box 224		Springfield	ME	04487
John & Mary	Yanan	6302 Fourth St		Greene Lane	PA	18054
David	Beaumont	PO Box 352		East Millinocket	ME	04430

firstwind

CLEAN ENERGY. MADE HERE.

invites you to tour our wind energy project on Stetson Mountain.

Wednesday, August 27
11:30 am – 1:00 pm

11:30	Meet at Danforth Town Office Transportation to and from Stetson Mountain will be provided
12:00-1:00	Luncheon and Tour

RSVP by August 25 to Michelle at 207-221-8225

See for yourself what a commercial wind turbine looks like up close, how it works, and what it means for our energy future.

Stetson II Wind invites you to attend our

Open House

for discussion and updates on First Wind's proposed wind energy project

firstwind
STETSON
CLEAN ENERGY. MADE HERE.

Venue: Danforth Town Hall
52 Depot Street

Date: September 25, 2008

Time: 6:00pm to 9:00pm