27.0 PUBLIC SAFETY

27.1 INTRODUCTION

Maine law requires a demonstration that the proposed generating facilities will be constructed with setbacks adequate to protect public safety.[1] Subsequent guidance from the Maine Department of Environmental Protection (MDEP) specifies that the development must be designed to conform to applicable industry standards and that the development will not present an unreasonable safety hazard to adjacent properties or adjacent property uses.[2] Documentation must include evidence that the turbine design meets acceptable safety standards, evidence describing the design and function of overspeed control and related safety mechanisms that are part of the turbine design, and evidence that the turbines have been sited with appropriate safety related setbacks from adjacent properties and adjacent existing uses. Each of these categories is discussed below.

27.2 TURBINE DESIGN CERTIFICATION

The project will use either Vestas V112-3.0 turbines or Siemens SWT-3.0-113 turbines. The conformity of the Siemens SWT-3.0-113 turbines with International Electrotechnical Commission standards has been certified by Det Norsk Veritas (Exhibit 27A). Renewal of certification is in-progress for the Vestas V112-3.0 turbines (Exhibit 27B). As seen in the Exhibit 27B, the Vestas V112-3.0 turbine has been designed in accordance with IEC 61400-22 and has been previously certified by Det Norsk Veritas. In addition, the Vestas V112-3.0 includes the same nacelle and the same blades as the Siemens SWT-3.0-113 which is currently certified.

27.3 SAFETY CONTROLS

Both the Vestas and Siemens turbines are three-bladed, horizontal-axis, upwind, variable-speed, pitch-regulated turbines.

The speed and power output are controlled primarily by an active, hydraulic pitch regulation system. The blades are mounted on pitch bearings and can be feathered for shutdown purposes. Each blade has its own independent pitching mechanism capable of feathering the blade under any operating condition. The independent pitch mechanism on each of the blades provides for redundancy.

The wind turbine operates automatically. It is self-starting when the wind speed reaches an average of 3 to 4 meters per second (m/s) (about 10 miles per hour [mph]). The output increases approximately linearly with the wind speed until the wind speed reaches 12 to 13 m/s (about 30 mph). At this point, the power is regulated at rated power.

[1] 38 M.R.S.A. §484(10)(B).
[2] MDEP *General Instructions* for a Site Location of Development Application, Supplemental Requirements for Wind Energy Developments Only.

If the average wind speed exceeds the maximum operational limit of 25 m/s, the wind turbine will shut down automatically by feathering of blades. The aerodynamic brakes are redundant due to the ability to brake with one blade. When the average wind speed drops back below 20 m/s, the systems reset automatically. The turbine is designed to withstand gusts of 55 m/s (180 mph).

The mechanical disc brake is fitted to the high-speed gearbox shaft and has two hydraulic calipers. The rotor hub is sufficiently large to provide a comfortable working environment for two service technicians during maintenance of blade roots and pitch bearings from inside the structure.

27.4 PUBLIC SAFETY SETBACKS

Guidance from the MDEP requires evidence that the wind turbines have been sited with appropriate safety-related setbacks from adjacent properties and adjacent existing uses. The guidance recommends minimum setbacks from the property line equal to the local setback requirements or 1.5 times the maximum turbine blade height, whichever is greater. The property setback requirements in the unorganized and deorganized areas, where the project is located, are 25 feet from side and rear, 104-061 CMR 10.26, (d)(2)(e), which is less than 1.5 times the maximum turbine blade height.

The project has been sited with appropriate safety related setbacks. The MDEP recommended setback of 1.5 times the maximum blade height is 738 feet for the Vestas turbines, which, with a maximum turbine height of 492 feet, is the taller of the two candidate turbines. The turbines are more than 810 feet from abutting property lines of non-participating landowners. The closest residential structure beyond the project boundary is 1,410 feet away.

27.5 FIRE SAFTETY MEASURES

There are a number of turbine and project design features that will minimize the risks of fire and fire-related damage, as well as specific operational fire prevention and suppressions protocols that the Applicants will utilize to minimize and address fire risks.

First, the turbines will be equipped with state-of-the-art lightning protection and fire prevention systems. The turbines will also be equipped with a system that provides continuous monitoring of external and internal turbine conditions, and will instantly detect deviations from normal operating conditions, including temperature changes. This will allow for immediate response to any issues should they arise. Regular maintenance and inspections will also be utilized to identify any issues before they arise. The turbine operating conditions are monitored remotely 24 hours per day, 7 days per week by both the Applicants and the turbine manufacturer.

Second, the clearing associated with construction of the turbine pads and the permanent impervious surface of the pads will create an area around each turbine that is generally free of materials that could be ignited in the unlikely event of a turbine fire. Similarly, the access roads and crane paths will also act as “fire breaks,” preventing the spread of any fire to adjacent areas.

Third, the Applicants have developed and successfully implemented fire protection plans at their operating wind turbine facilities in Maine, and will use that experience to incorporate and implement effective fire safety measure on this project. For example, the Operations and Maintenance building will have an automatic fire suppression system in the rack room and a fire alarm system that monitors all office and shop space. Portable fire extinguishers will be properly located throughout the facility and employee vehicles will be outfitted with portable fire extinguishers. The Applicants regularly train contractors and employees on fire prevention and response protocols, and the employees must demonstrate an understanding of the training and their ability to use all equipment before they are allowed to perform work requiring identified fire prevention equipment. The Applicants also have established emergency communications and response protocols with emergency response providers to ensure timely notification, access and coordination if an incident occurs.

Finally, and consistent with the Applicants' practices at their operating facilities, representatives will meet with local fire response personnel to discuss specific fire prevention and response in the project vicinity. The Maine Forest Service has indicated that the project will have little if any impact on services provided in the region, and need for additional fire protection services will be minimal and consistent with the services currently provided. See letters from District Rangers and Bingham Fire Department attached as Exhibit 27C.

Local outreach and training will continue following project construction. By way of example, the Applicants have engaged in a robust outreach program with fire responders in and around the Stetson I and II projects. The town of Danforth provides fire response services at Stetson I and II with backup from other local departments. The Applicants' personnel have met with Towns of Danforth and Lee Fire Department personnel to discuss emergency response, site access, life flight response, and general site concerns. The Applicants have sponsored the "Life Flight in Maine" emergency helicopter response team training day at the Stetson projects. The training day, which included a "Ground Safety Course" was attended by the Towns of Danforth and Lee Fire Departments, Penobscot Valley EMS, Maine Forest Service (responsible for forest fire fighting and prevention near Stetson) and Maine Search and Rescue, included discussion on site access, emergency communications, and emergency response time among various other fire and emergency response criteria. The Applicant intends to conduct these kinds of activities with the communities in the area of this project as well.

In summary, fire risk from the proposed project is small and there will be appropriate protective measures in place to minimize the risk of fires or damages resulting from any fires.

Exhibit 27A: Siemens SWT-3.0-113 IEC Certification

DET NORSKE VERITAS

TYPE CERTIFICATE

SWT-3.0-113 DD

TC-230701-A-0
Type Certificate number

2013-03-22
Date of issue

Manufacturer:

Siemens Wind Power A/S
Borupvej 16
DK-7330 Brande

Valid until: 2018-03-22

Conformity evaluation has been carried out according to **IEC 61400-22: 2010 "Wind Turbines - Part 22: Conformity Testing and Certification".** This certificate attests compliance with IEC 61400-1 ed. 3: 2005 incl. A1 and IEC 61400-22 concerning the design and manufacture .

Reference documents:

Final Evaluation Report:	PD-2307-15N96DX-20
Design Basis Conformity Statement:	DB-230701-A-0
Design Evaluation Conformity Statement:	DE-230701-A-0
Type Test Conformity Statement:	TT-230701-A-0
Manufacturing Conformity Statement:	MC-230701-A-0

Wind Turbine specification :

IEC WT class: IIA. For further information see Appendix 1 of this Certificate.

Date: 2013-03-22

Christer Eriksson

Management Representative
Det Norske Veritas, Danmark A/S

DANAK
PROD Reg. no. 7031

Date: 2013-03-22

Trine Bjerre Pedersen

Project Manager
Det Norske Veritas, Danmark A/S

Exhibit 27B: Vestas V112-3.0 IEC Certification

DET NORSKE VERITAS

APPROVAL

FOR TEST AND DEMONSTRATION

V112-3.0 MW

Location for installation:
Lem Kær, Holmgaarde, 6940 Lem

C-DNV-219701-0
Type Certificate number

19-03-2010
Date of issue

Manufacturer:
Vestas Wind Systems A/S
Alsvej 21
DK-8940 Randers SV

Valid until: 19-03-2013

This certificate attests compliance with DS/EN 61400-1:2006 concerning the design and manufacture. The certification has been carried out according to Executive order no. 651 of 26 June 2008, "Bekendtgørelse om teknisk godkendelsesordning for konstruktion, fremstilling, opstilling, vedligeholdelse og service af vindmøller". Use of the installation is conditional upon no unauthorized changes being made to the wind turbine certified.

Reference documents:

Reference documents for approval:	See PD-642197-122PQ01-32
DNV Verification Report:	PD-642197-122PQ01-32

Wind Turbine specification:

IEC WTGS class: S. For further information see the Appendix of this Certificate.

Date: 2010-03-19

for **Claus F. Christensen**
Management Representative
Det Norske Veritas, Danmark A/S
Tuborg Parkvej 8, 2900 Hellerup

PRODUCTS
RvA C257

Date: 2010-03-19

Torben Søndergaard
Project Manager
Det Norske Veritas, Danmark A/S
Tuborg Parkvej 8, 2900 Hellerup

DET NORSKE VERITAS, DANMARK A/S

APPENDIX WIND TURBINE SPECIFICATION

General:

Wind turbine address:	Lem Kær, Homgaarde, 6940 Lem
Wind turbine owner, Name:	Lem Kær Vind K/S
Address:	Holmgaarde, 6940 Lem
IEC WT class:	S (IEC WT class 2A except for temperature range)
Rotor diameter:	112 m
Rated power:	3000 kW
Rated wind speed V_r:	12.0 m/s
Hub height(s):	94 m
Operating wind speed range V_{in}-V_{out}:	3 – 25 m/s
Design life time: 20 years	3 years

Wind conditions:

V_{ref} (hub height):	42.5 m/s
V_{e50} (hub height):	59.5 m/s
V_{ave} (hub height):	8.5 m/s
I_{ref} at V_{hub} = 15 m/s:	0.16 (IEC 61400-1 turbulence class A)
Mean flow inclination:	8

Electrical network conditions:

Normal supply voltage and range:	3 x 650 V 10-35 KV
Normal supply frequency and range:	50 Hz ± 6%
Voltage imbalance:	IEC 61000-3-6- TR max 2%
Maximum duration of electrical power network outages:	Two 3 months periods
Number of annual electrical network outages :	52 per year

Other environmental conditions (where taken into account):

Air density:	1.225 kg/m^3
Normal ambient temperature range:	-20°C to +40°C
Normal ambient temperature range:	-40°C to +50°C
Relative humidity:	100%
Solar radiation:	1000 W/m^2
Salinity:	Present
Design conditions in case of offshore WT (water depth, wave conditions etc.)	Not relevant – Onshore turbine
Description of lightning protection system	Designed according to IEC 61400-24,

	Protection level 1 and 61312-1
Earthquake model and parameters:	Not Relevant

Main components:

Blade type:	Vestas 55m blade
Gear box type:	Bosch Rexroth GPV 570D (i=1:113.257
Generator type:	Winergy AQWA-560LS-08A
Tower type:	Tubular Steel Tower (dwg: 0002-7694)
Service lift:	Avanti Shark or Power Lift Sherpa-SD
Crane:	Type / Not present
Foundation:	Reinforced Concrete Gravity Structure

Exhibit 27C: Fire Response Service Letters

Maine Forest Service Kingsbury Plantation

Maine Forest Service Mayfield Township

Bingham Fire Department

MAINE FOREST SERVICE

Department of Agriculture Conservation and Forestry

Dale Knapp, Project Manager

Stantec Consulting Services Inc.

30 Park Drive

Topsham, Me. 04086

207-729-1199

Re: Impact of wind farm project on area wildland fire suppression

Dear Mr. Knapp:

I have reviewed the project map for the Bingham Wind Project sent to me by Danielle Tetreau. The portion of the project that will be in Kingsbury Plantation falls under my responsibility for wildland fire suppression. The area has an extensive road system for forest management, which would be utilized in this project. I do not believe the overhead and underground summit collector system would hamper suppression efforts.

It does not appear that this project would have any negative impacts on wildland fire suppression efforts. If you have any further questions or concerns please feel free to contact me at 827-1800 or at ranger.ben.goodwin@gmail.com.

Thank You

Ben Goodwin

Forest Ranger

Maine Forest Service

MAINE FOREST SERVICE

Department of Agriculture Conservation and Forestry

Dale Knapp, Project Manager

Stantec Consulting Services Inc.

30 Park Drive

Topsham, Me. 04086

207-729-1199

Re: Impact of wind farm project on area wildland fire suppression

Dear Mr. Knapp:

I have reviewed the project map for the Bingham Wind Project sent to me by Danielle Tetreau. The portion of the project that will be in Mayfield Twp. falls under my responsibility for wildland fire suppression. The area has an extensive road system for forest management, which would be utilized in this project. I do not believe the overhead and underground summit collector system would hamper suppression efforts.

It does not appear that this project would have many if any negative impacts on wildland suppression efforts. If you have any further questions or concerns please feel free to contact me at 1-800-750-9777 or at ranger.shane.nichols@gmail.com.

Thank You

Shane Nichols

Forest Ranger

Maine Forest Service

Bingham Fire Department
13 Murray Street
P O Box 404
Bingham, ME 04920

Dale Knapp
Bingham Wind Project
Project Manager

Re: Impact of Bingham Wind Farm Project on Local Fire Protection Services

Dear Mr. Knapp,

I, and the officers of The Bingham Fire Department, have reviewed the material given us on The Bingham Wind Project at a meeting on April, 9th. Our department is responsible for windland fire suppression and structural fire suppression for the area shown on the map.

The officers and I feel that our department can handle any fire situations that could arise as a result of the project. We see little, if any impact on the services that we provide to this area.

The project does not appear to necessitate any additional resources or requirements on our agency's part, nor does it appear that any alteration or modification of current prevention or suppression efforts or practices be required.

If you have any further questions or concerns, please feel free to contact me at 207-612-8553 or you can email to binghamfd@live.com.

Sincerely,

Scott T Laweryson
Fire Chief
Bingham Fire Department