

The Black Nubble Wind Farm

**Section 13: Maintenance of Property
and Facilities**

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1.0 Components of the Maintenance Plan

1.1 Maintenance of Facilities by Owner or Operator

Site Owner or Operator

Redington Mountain Windpower (RMW) is the landowner. Maine Mountain Power (MMP), a joint development company between Endless Energy Corporation and Edison Capital, will own the turbines, electrical equipment, power lines and the maintenance facility.

Contact information is:

57 Ryder Road
Yarmouth, ME 04096
Phone 207-847-9323
FAX 207-846-6081

1.2 Contact Person Responsible for Maintenance

The contact person for maintenance during the construction phase will be an individual identified by the General Contractor overseeing the overall construction. The General Contractor for the project has not yet been selected.

The contact person for maintenance during wind farm on-line operation will be an individual hired for local site management by MMP.

In the interim, any questions should be directed to Mr. Harley Lee, President, Endless Energy Corporation, at the address and phone numbers listed above.

1.3 List of Facilities to be Maintained

The following Black Nubble Wind Farm facilities will be maintained:

- Wind turbines, including the towers, nacelles and blades
- Access roads from State Route 16 to the turbine sites:
 - Winter access, via snow packing and grooming
 - Ditches, culverts and drainage along the roads
 - Riprap slope protection along the access roads, cut and fill areas
- Electrical equipment and power lines:
 - Power line corridors, including proper vegetation clearances
 - Power line wires and pole structures
 - Substation electrical equipment
 - Communication wiring and equipment
- Maintenance Facility:
 - General building upkeep
 - Parking lot plowing, in winter
 - Vehicle maintenance, including snowcats, snowmobiles and ATVs.

2.0 General Inspection and Maintenance Requirements

Maintenance personnel will visually inspect wind towers and the substation monthly. Once a year, each turbine will receive a detailed inspection of all components, as required by the manufacturer. Also annually in early summer, a road and cut/fill slope inspection will be conducted after the spring melt. All necessary repairs will be scheduled at that time.

A detailed substation inspection will be done twice each year. The inspection will include a detailed review of all oil-containing equipment and spill-containment measures. A Spill Prevention Control and Countermeasure (SPCC) Plan will be developed within 6 months of the beginning of oil storage activities at the substation.

2.1 Inspection and Maintenance Tasks for the Wind Turbines

The Vestas wind turbines will need only light maintenance in normal operation, consisting of routine fluid checks and bulb replacements. On-site wind technicians hired for this purpose will perform the maintenance and light repair.

Once a year, each wind turbine will require a detailed inspection and maintenance review. Plans call for one scheduled maintenance per year on the Model V90. Because the turbine was primarily designed for offshore use, keeping manual maintenance and turbine visits to an absolute minimum was emphasized. Many turbine design features allow auto-lubrication as a result. During the annual scheduled maintenance, technicians will do the following:

Change gearbox, generator and yaw-system lube oil (as needed) or top off the reservoirs.

Change hydraulic and lube oil filters.

Replace automatic greasing cartridges.

Check calibrations of various sensors such as pitch, power, vibration, VARS, yaw rotation, etc.

Check tower and other key bolt torques.

Check blades for damage or cracks.

Check hydraulic actuators for function and leaks.

Check operation of emergency shutdown system.

Check operation of hydraulic power unit.

Check function of anemometers, vane and any FAA warbling lights.

Check operation of SCADA system.

Check condition of all wires as well as oil, glycol and hydraulic hoses.

Check for leaks in all fluid systems.

Clean the turbine.

2.2 Inspection and Maintenance Tasks for Access Roads

Road traffic will be heaviest during construction. After initial construction of the wind farm, the access roads will require minimal maintenance, due to the wind farm's limited use.

2.2.1 Roadways, Ditches, Culverts and Catch-basin Systems

Refer to Deluca-Hoffman's Stormwater document in Section 12 for details on standard inspection and maintenance procedures.

2.2.2 Access Roads and Parking Surfaces

Due to limited use, the maintenance facility parking lot will not require much maintenance. Wind farm employees will access the site on a daily basis in the summer months.

In the winter, the roads from State Route 16 to the maintenance center including the parking lot will be plowed to allow for normal automobile access. The roads from the maintenance building to the turbine sites will not be plowed but "groomed," as ski areas do, to allow access to the turbine sites by snowcat, snowmobile, ATV or tracked vehicles (but not necessarily automobiles). The groomed and packed roads will allow cranes and all-terrain heavy haulers to reach the turbine sites, should any serious repair of a turbine be required during the winter months.

The access roads and cut/fill slopes will be inspected frequently during the spring melt and after heavy rain, to catch any roadway and/or cut/fill slope deterioration before the damage becomes too extensive.

During spring thaw conditions, to avoid damage to the travel surfaces, access will be limited as much as possible to tracked or all-terrain vehicles.

2.2.3 Stormwater Detention and Retention Facilities

The Electric Harvest substation will contain 1 or more large oil-cooled transformers, which will be mounted in a retention system to contain any accidental oil spills. This retention system will also include a stormwater bypass, to ensure stormwater does not enter and overtax the system.

2.3 Inspection and Maintenance - Power Lines

Maintenance for the wind farm's power lines will consist of a number of different inspections at different periods. In general, a power line visual inspection must be done from the ground or the air (helicopter) annually, and each time there is an outage on the lines. The inspection looks for damage to wires, insulators, and structural components.

Vegetation clearing must be done every four years, to control vegetation height in the corridors. This is a four-step process that trims the corridor sides, trims screens around roads and streams, trims tall softwoods within the corridors, then selectively sprays to kill hardwoods and tall brush.

An infrared inspection must also be done every four years, with the lines near full load, to assess corrosion and possible early failure of electrical connections from increased thermal heating.

Finally, a detailed climbing inspection of poles and crossarms must be done every ten years, to assess structural condition, wood decay and biological (woodpecker) damage.

2.3.1 Inspection and Maintenance - Substation

The Electric Harvest substation will be constructed with two 50 MVA transformers which will contain insulating mineral oil in excess 1320 gallons. The substation will be equipped with oil pollution abatement

to prevent oil from reaching the ground water table and adjacent streams. The abatement will consist of a dug pit with an impervious liner around the transformer foundation consistent with IEEE 980-1994.

All high and medium voltage circuit breakers will be gas insulated and will pose no oil contamination issues.

Maintenance for the wind farm's Electric Harvest substation will consist of visual checks of the electrical equipment and the stormwater bypass portion of the spill-retention system, done monthly and for any outage. On a semi-annual basis, a detailed inspection of all electrical equipment and the spill retention / stormwater bypass system will be done.

2.3.2 Power Line Maintenance Plan – E-Pro

Long term maintenance of the transmission line generally consists of vegetation management and transmission line maintenance.

Routine vegetation maintenance of the right of way is required for continued integrity and functionality of the line and access for emergency repairs and safety inspections. Vegetation maintenance is typically the most predominant activity and is preformed by utilizing a combination of hand cutting and selective herbicide applications. Mechanical mowing may occasionally be used in unusual circumstances to regain control of vegetation, should the routine procedures be insufficient.

Vegetation management approaches will be influenced by:

- o wetlands and water bodies;
- o areas that contain rare plant populations and identified unique natural communities; and
- o specified areas for visual screening

To minimize any negative environmental impacts, vegetation will be allowed to remain in place to the extent practicable. This practice typically involves selectively removing "capable species," "dead", or "danger trees." Capable species are defined as those plant species that are capable of growing tall enough to reach within the required clearance between the conductors and established vegetation.

Generally, anything that can grow in excess of 8'-10' is considered a capable species. Vegetation management will typically be performed on a four or five-year cycle, depending on condition of the R-O-W.

Maintenance of the height of vegetation on the R-O-W will be significantly achieved by hand cutting. Limited use of motorized equipment will be employed in areas that are directly accessible from public or private access roads or from a vegetated access way established in the middle of the ROW.

In addition to vegetation maintenance, the transmission line itself will require inspections and maintenance. During the first 10 to 20 years of service, the transmission line will typically require very little maintenance and will generally consist of routine annual line inspections. Such inspections will be conducted by individuals, either on foot or on an ATV.

As the transmission line ages, inspections may become more frequent, depending on the condition of the line. If a pole has been found to be damaged or substantially deteriorated, the pole will be replaced. If insulators and guy wires are found to be failed, this hardware will require replacement. Replacement will involve construction techniques comparable to initial installation.

2.3.3 10 Year Maint Cycle for 34.5kV and 115kV Power Lines

Inspection	Period	34.5 kV 3.9 miles	115 kV 7.8 miles
		Times per 10 Year Period	Times per 10 Year Period
1. Ground/ Helicopter Regular Flight	Spring	10	10
2. Ground/ Helicopter Special Flight	2 year	5	5
3. Infrared / Helicopter Patrol	4 year	2.5	2.5
4. Vegetation Clearing	4 year	2.5	2.5
5. Ground Line / Pole Inspection	10 year	1	1

6. Crossarm Inspection	10 year		1		1
7. Woodpecker Repair	10 year		1		1
10 Year Total			34.5 kV		115 kV

Power Line Maintenance Table – Descriptions

1. Annual helicopter inspection - to determine visually if any component of the structures/conductors is about to fail. Cost assumes inspection flights are on a shared basis with other customers.
2. Outage Patrol - after each outage on a transmission section, Transmission Line Owners are required to perform an aerial patrol, i.e., helicopter patrol. Estimate is 1 outage every 2 years, covering both 34.5 and 115kV lines.
3. Infrared Inspection - this process determines if any electrical component is corroding via increased heating of that component. Cost assumes a helicopter flight, done in the spring under full-output conditions.
4. Vegetation Clearing - this is a 4-step process to control vegetation in the corridors, consisting of a) trimming the corridor sides for grown-in branches, b) trimming vegetation screens around roads, streams and wetlands, c) trimming high softwoods within the corridor, and d) spraying hardwoods and high brush.
5. Ground Line Inspection - this involves a pole inspection performed at the ground level, including any remedial treatment required to prevent wood decay.
6. Crossarm Inspection - each pole is climbed, to inspect the pole above 8' as well as the crossarm.
7. Woodpecker Repair - this process repairs woodpecker holes made in poles, done concurrently with #6.

2.4 Inspection and Maintenance Tasks - Maintenance Facility

The Maintenance Facility will require the normal upkeep associated with a heated building, parking lot and landscaping. Within the garage, there will be light maintenance and repair of winter snowcats and snowmobiles and year-round ATVs. Oils and other maintenance fluids will be isolated for proper disposal, and a sand/oil separator is included in the building plans, for filtering the snowmelt expected from vehicles when parked in the garage.

Maintenance Logs

Maintenance and inspection logs will be kept at the maintenance facility, and will be available for inspection.