Direct Pre-filed Testimony of Lisa Linowes
February 7, 2007

1) Please state your name and address for the record.

My name is Lisa Linowes, and my address is 286 Parker Hill Road, Lyman, NH 03585.

2) Please summarize your education and background as it relates to this matter.

I am a director of the NH Association of Conservation Commissions, and serve on the Town of Lyman’s Planning Board and Conservation Commission. Prior to moving to Lyman, NH in 2006, I served on the Town of Windham Planning Board and Conservation Commission. I am also a founder of Industrial Wind Action Group, an organization focused on monitoring and raising awareness of the potential impacts of utility-scale wind energy development if improperly sited. My formal education includes a B.S. in Software Science from Rochester Institute of Technology and an MBA from Southern New Hampshire University. Since 1997, I have been actively involved in land use and conservation issues within the State of New Hampshire.

3) Why did you petition to become an intervenor in this matter before the NH SEC?

With New Hampshire’s recent reinstatement of PILOT agreements and legislative efforts to a Renewable Portfolio Standard, the regulatory groundwork is being laid for more wind facilities to enter the state. Yet, New Hampshire, like many states, has no consistent regulatory process in place for reviewing these projects to ensure our environmental, societal, and economic interests are protected. The work the NH SEC has agreed to undertake in reviewing this application is precedent setting. How the committee approaches its review and the weight it places on arguments presented by all sides will impact other developments in the State as pertains to renewable energy projects.

There are a multitude of conflicting issues at play when considering any wind project. My commitment to this process is to help provide, to the best of my ability, valuable and timely information that will assist the Committee in making an informed decision on this application.

4) Do you oppose wind energy?

No. There is a place for generation powered by wind. However, such development must be properly sited to ensure sufficient benefit that can justify any qualitative and quantitative environmental and societal impacts. I am hopeful that these proceedings before the NH SEC will reach some conclusive understanding of the project’s benefits and costs.
5) Are you satisfied that pre-construction avian surveys conducted by the applicant correctly identified risk to migrating diurnal (daytime) birds?

No.

6) Please explain your concerns regarding diurnal migratory birds i.e. raptors.

According to the Hawk Migration Association of North America (HMANA), peak migration in New Hampshire, particularly for broad-wings, occurs during the first three weeks of September. Migration is dependent upon many variables, with continental weather conditions being one of the most impacting factors. Since there is no “best” time of day to observe migration, experienced observers spend full days watching for activity.

Appendix 31 of the Lempster Wind application includes a report on Pre- and Post-Construction Avian Survey prepared by the Louis Berger Group, Inc. This report asserts that an on-site fall migration survey was conducted during 10 days of 2005: September 19 and 20, October 2 thru 6 inclusive, and October 21 thru 23 inclusive. Page 9 of the report states, “Fall 2005 raptor migration was only 3.3 raptors per hour which indicates that Lempster Mountain is a relatively minor raptor migration site”.

Since so few days were included in the survey period, and the survey days did not correspond to the peak migration period, the conclusion drawn in the report cannot be substantiated.

In written correspondence with Mr. Gil Randell (Appendix A attached), Chairman of the Conservation and Education Committee of Hawk Migration Association of North America (HMANA), Mr. Randell stated this about the Berger study:

The Lempster Wind Power project is proposed for an area where little data are available on either diurnal or nocturnal migration, although recent early fall, migration season observations indicate at least some raptor migration activity. Especially in light of the lack of adequate information regarding migration in the vicinity of the project, bird studies performed in conjunction with the project appear inadequate for establishing an understanding of risk to migrating raptors.

The Berger study of migrating raptors was far from being sufficiently rigorous to justify the conclusions reached in their bird report. There is no way of knowing how much of the migration was missed by limiting days of study to 10 days between September 19 and October 23 and 10 days between April 28 and May 9, but judging from observations from sites affiliated with the Hawk Migration Association of North America (HMANA) and reporting to www.hawkcount.org, significant periods at the beginning and end of both spring and fall migration were missed.

Although the protocol for each of the surveys, adhering as it purportedly did to that established by HMANA, might have been appropriate, the limited numbers of surveys, missing significant portions of the migration season, were inadequate to document migrant raptors’ use of the project area. As an example of the poor timing of the surveys, the migration season in New Hampshire for Golden Eagles might have been mostly missed (e.g., all but one of Pack Monadnock’s 11 Golden Eagles in the fall of 2006 were seen after October, 23, the end date of the Berger study’s fall surveys).
Considering the very fragile nature of the northeastern Golden Eagle population, how little is known about their movements and their particular vulnerability to wind turbine projects (as documented by high Golden Eagle mortality rates at turbine sites in the west), this is a serious lapse in the avian risk study.

The U.S. Fish and Wildlife Service supports these comments from HMANA in its July 28, 2006 letter sent to Lempster Wind L.L.C. (Mr. Jeff Keeler) from Vernon Lang of the U.S. Fish and Wildlife Service (Appendix 12 Consolidated Intervenor’s pre-file submission). In it, Mr. Lang states:

“In a like manner, the fall 2005 raptor survey was not initiated until September 19 when the migration season was in progress. A similar raptor study at the Hoosac Wind Project in western Massachusetts in fall 2004 indicates that early and mid-September dates were peak days for raptor migration at that site that year. Accordingly, we do not think the fall 2005 raptor study can be considered as necessarily being representative. In addition, it is not clear if the 10 days of observation were spaced to include the most favorable weather periods after the passage of frontal systems, e.g., 1-3 days after the passage of a cold front. We recommend that the raptor migration study be continued in fall 2006, and include observations from more than one site in the project area. The study should be conducted between September 1 and October 31. Survey dates should be scheduled for the most favorable weather periods after the passage of frontal systems. Since there is no way to know in advance how many frontal systems and favorable migration days will occur in this period, it is likely that more than 10 days of survey effort may be necessary. We suggest that you expand the level of effort to allow for three weeks (21 days) of survey time. We agree that the observers should attempt to identify and record all birds seen when conducting the survey. The behavior of the birds with respect to updrafts, wind speed and wind direction, e.g., where their flight path is with respect to the ridge or hilltop, e.g., east-, west-, north-, southside, or directly over the ridge, should be recorded, in addition to flight height, time of day, and other standard hawk watch parameters.”

Further, the Berger report attempts to characterize Lempster Mountain’s importance (or not) as a raptor migration site by comparing it to three other sites including Pack Monadnock in NH, Blueberry Hill in MA, and Hawk Mountain in PA. Again, given the vagueness of flight patterns year after year, comparisons to these other sites is not a meaningful metric. There can be significant differences in hawk counts from one season (e.g. fall) to another at the same migration watchsite and between watchsites. It is for this reason that USFWS interim guidelines\(^1\) and other organizations recommend multiple seasons of observation (minimum 3 years by USFWS) on which to draw conclusions as to the relative importance of a raptor migration watchsite. (The Migrations of Hawks (1986. Indiana University Press, Bloomington, IN) by Donald S. Heintzelman; and Guide to Hawk Watching in North America (2004. Falcon Guide/Globe Pequot Press, Guilford, CT) by Donald S. Heintzelman).

To further demonstrate the inadequacy of the Berger survey, HMANA was fortunate to obtain raptor count information from an experienced volunteer observing from a field located just east of Lempster in the Town of Washington. The HMANA data was collected during the first two weeks of September in both 2005 and 2006. This data supplied to me by HMANA and included in Appendix B shows raptor counts five-times that

\(^1\) Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines. [http://www.fws.gov/habitatconservation/wind.pdf](http://www.fws.gov/habitatconservation/wind.pdf)
documented in the Berger report. These same numbers exceed the counts observed at Blueberry Hill (MA) for the same time period in 2005. While this data, collected less than 5 miles from the project site, is not conclusive, it demonstrates that much more raptor activity may be present at and around the project site than the Berger report detailed.

In short, the NH SEC, our NH State Agencies, and the public have no meaningful data on which to evaluate the risk to diurnal migratory birds.

7) What about the potential impact to nocturnal migrants if the project were built?

I have very serious concerns regarding the potential risk to nocturnal migrants, including bats and birds.

Also documented in the July 28 letter from USFWS cited above, Vernon Lang described in detail the most appropriate method of surveying the site using radar for assessing nighttime migrant activity and the risk to migrants should the project be built. In the letter, he states:

> With respect to specific details of the radar study protocols, we recommend 45 days of data collection during the period April 15-June 5, and 60 days of data collection during the August 15-October 31 period. Our preference is for radar equipment that is designed for 24/7, constant operation in horizontal and vertical modes with automated electronic storage of raw radar data.

While I am pleased the applicant conducted a radar survey in fall 2006, the survey period was for only 32 days between September 6 and October 15, half the number of days requested by USF&W for a fall survey and a full 61 days less than the realistic migration period, which extends from at least August 1 (mainly for bats) through at least the end of October (for birds), totaling 93 nights. I understand that no samples were recorded during 8 days of the survey period due to inclement weather or equipment failures.

Still, despite the limited survey period, the results as document in the January 2007 report prepared by Woodlot Alternatives, Inc. (Woodlot) revealed important information about nocturnal migrants flying over Lempster Mountain.

The overall mean passage rate for the entire survey was 620±65 targets per kilometer per hour (t/km/hr), representing one of the highest mean passage rates recorded in radar studies conducted for this purpose. Woodlot correctly characterized the survey as providing an “index to the abundance of migrants” to mean the passage rates estimates were useful for comparisons with previous studies and other radar studies that use similar equipment and methodology. Table 2-1 of the Woodlot report lists the average passage rates for 31 separate projects. These include Mars Hill, ME, Sheffield, VT, and Deerfield/Searsburg, VT with fall mean passage rates of 512, 114, and 178 t/km/hr respectively. All three studies were conducted by Woodlot suggesting the same methodology was employed.
Thus, given the limitation in days and the timing of the survey, passage rates over Lempster Mountain were still very high. On September 26 alone, 20,000 migrants were recorded flying over the site suggesting the targets were following the topography. While most of these targets were flying above the turbines, if a fog or low-ceiling cloud event set in causing the targets to drop their elevation, the potential for collision would be great.

The mean flight direction through the project area is also important. This was recorded at of 206 degrees +/- 84 degrees, suggesting the direction of the south-bound fall migrants was oriented in the same direction as the ridgeline of Lempster Mountain. Any collision risk would be greatly elevated because birds and bats would likely encounter multiple wind turbines when passing through the project area.

8) Is mean passage rate the indicator of collision risk? What about flight height?

First, I’d like to clarify the purpose of the radar study and how it helps us in determining risk to migratory birds and bats. Turbines are not selective of the species they kill (as far as we know); hence all targets that pass a turbine are vulnerable. The numbers at risk (exposure) are the numbers that pass within the rotor-sweep space of the turbine. The Gamesa G87 2.0 MW turbine planned for Lempster has a sweep area of 5945 m² or 1.47 acres and reaches up to 125 meters tall. Without radar data no one knows how many birds are exposed to the proposed turbines and that data cannot be collected by any other means with the same accuracy. Thus, radar is the best tool to do this census of exposure.

The number of migrants passing in the area and the percentage that flies within the rotor space of the turbines represent two key factors to be determined from the radar study.

Woodlot documented the mean flight height hourly as well as the percent of targets that flew below 125 meters. The mean flight height of all targets was 387 meters (1270 feet) with a ‘seasonal’ average of targets flying below 125 meters at 8%.

Appendix C details the number of nocturnal migrants potentially at risk should the turbines be erected.

9) What conclusion would you draw from this information?

It appears that Lempster Mountain may pose a very high risk to nocturnal migratory birds and bats. Again, at 620 t/km/hr and a mean 8% flying at 125 meters, Lempster represents the highest number of nocturnal migrants flying within the rotor space of the other studies cited in the report. Based on the numbers in the report, the seasonal number of nocturnal migrants at risk during this survey period is 21,811 targets.
However, Woodlot’s seasonal information is not complete for three reasons:

1. the survey did not sample any days from early August to early September;
2. the horizontal risk area for the project was limited to a sample space of 1km;
3. the survey was conducted for only one season, fall migration 2006.

There is nothing I can do about reason 3 above. However, in Appendix C, I made corrections to the figures to better reflect the potential number of seasonal targets that might fly within the rotor space. To do this I first adjusted the number of days to include the more realistic migration period from August 1 through at least to the end of October -- 93 nights. Using the same mean passage rate (620 t/hr/km) and mean percent flying within the rotor space (8%), the potential migrants at risk changed to 53,047.

(For this adjustment, I used an average number of hours between sunset and sunrise of 11.5 hours based on http://aa.usno.navy.mil/data/docs/RS_OneYear.html#formb.)

In the same table, I also adjusted the figures by expanding the horizontal window to 1.6km (1 mile) to better represent the space around the project area. In doing so, the potential number of migrants at risk rose to 84,876.

To highlight the possible risk to migratory targets in the Lempster Wind project area, it’s worth noting the letter included in Appendix D dated September 20, 2006 from Virginia’s Department of Game and Inland Fisheries (VA DGIF) to Joel Peck of the State Corporation Commission regarding risks to wildlife should the Highland New Wind Development LLC facility be approved. The nighttime radar study for that project reported an average passage rate of 385 targets/hour/km, 40% lower than the Lempster figure (620 t/hr/km), and a mean of 11.5% flying below 125 meters.

While some may argue possible differences in methodology from one study to the next, there is no question VA DGIF was concerned about fatality rates. On page 2 of the letter, it states, “The applicant’s data and data from existing wind farms in the Alleghenies provide evidence that there likely will be large fatality rates at this site.” It further states on the same page: “In the absence of studies that compare pre- and post-construction data, we presume a significant positive correlation between passage rates and fatality rates.”

This statement is consistent with this assertion by Wildlife Biologist Daniel Boone who, in his August 4, 2006 letter to the Maryland Public Service Commission wrote:

“…using the long-standing practice of evaluating collision risk based on the numbers of birds and bats that pre-construction studies determined would be within the rotor-swept area of a proposed windplant (as is recommended in the USFWS Guidelines and likewise implied in the NWCC “Guidance Document” – see p. 67: “…it may be assumed that the more time a species spends flying at heights encompassed by the rotor swept area of turbines, the more risk the species faces in a wind plant.”). The MD Siting Guidelines need to be revised to specify that “the potential for high risk"
of collision with wind turbines is directly related to whether large numbers of low-flying birds and bats occur within the project area of a proposed windplant.”

In light of potential high risks to migrant targets, I reserve the right to provide in supplemental testimony a list of recommendations for mitigation practices that could minimize risk to birds and bats should this project be approved. These recommendations require an analysis of the wind speed data during the periods of peak migration.

10) Are there any other concerns pertaining to the radar study you wish to raise?

Yes, I have two issues that are more technical in nature and go to the question of the radar study’s accuracy. The first has to do with the calibration of the equipment. The second relates to Woodlot’s use of Ceilometer measurements.

**Calibration:**

During discovery, the consolidated intervenors asked the applicant to explain in detail the steps followed to calibrate the radar so as to ensure accurate measurements of altitude of detected targets. From the discussion above, it should be clear the importance of accurate altitude measurements. Woodlot’s response: “Calibration of the radar equipment included daytime visual observations, during dusk and dawn hours, to obtain visual confirmation of targets to verify flight heights as measured by radar.” Relying on daytime visual observations to calibrate the equipment is inherently error-prone and calls into question the accuracy of flight heights reported in the entire study, particularly targets flying below turbine height (8% mean). Examples of accepted radar calibration methods include a) flying balloons at preset altitudes, b) measuring a target at known range (ex: a building), or c) by using electronic timing equipment.

It would have been helpful if Woodlot had provided a breakdown of cumulative percentages of targets within 25-meter altitude categories up to 250 meters as has been done with other similar studies. We know from this, and other studies, that migrants do not fly at a steady flight height once airborne but the amount of variation below and around the 125-meter threshold for the Lempster survey is not clear.
**Ceilometer observations:**

In the report, Woodlot states that it used “Ceilometer observations involving directing a one-million candlepower spotlight vertically into the sky in a manner similar to that described by Gauthreaux (1969).” The purpose of the Ceilometer was to “document and characterize low-flying (below 125 meter) targets”. On page 10 of the Woodlot report, the authors stated that these observations “resulted in only five bird and one bat sightings in the beam.”

This methodology, while standard, is not without limitations that Woodlot did not document. For example, it assumes that bats and insects are not attracted to light, which they are, making counts biased. It also assumes birds will not avoid light, which some species do. Others might be attracted to light but mainly under lower light conditions. In other similar studies to Woodlot’s, night-vision goggles are used to assess relative numbers and proportions of birds to bats flying at lower altitudes. Also, using an infrared lens filter on the beam to keep the light from influencing target behavior would have been advised. It is not clear from the report what Woodlot did with the Ceilometer observations. There was no information in the report that detailed what percentage of migrant activity was from birds or bats.

11) Regardless your concerns with the pre-construction study, isn’t it true that bird mortality per year at wind facilities is very low?

The Berger report cites the National Wind Coordinating Committee’s Nov 2004 document entitled: “Wind Turbine Interactions with birds and bats: A Summary of Research Results and Remaining Questions” (also known as the “Avian fact sheet”. This document states that the average number of birds dying due to collision with turbines is 2.3 birds per turbine per year. However, this average is based on 12 post-construction studies. Only 2 of the 12 studies were conducted in the East vs. the Northwest (4), Rocky Mountains (2), and Upper Midwest (4). The average number of birds killed per year per turbine for the East was more than double the averages from the three other geographic locations (See Tables in Appendix E).

Gil Randall, Chairman of the Environmental Committee, HMANA, had this to say:

> We still do not know with any certainty what kind of risk turbines pose to migrating and resident birds in the northeast. But the risks to birds could be significant in the northeast, where migration tends to be much more concentrated and less spread out than in the west. We don’t know what effect turbine developments might have on the northeast’s rebounding American Bald Eagle population, either, but recent reports from Europe on White-tailed Sea Eagle fatalities caused by turbines are alarming.

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2 Cooper, Brian A. 1995. Use of Radar for Wind Power-Related Avian Research
12) And what of average bat mortality rates at wind facilities in the U.S?

Referencing the tables in Appendix E, bat mortality at wind facilities in the East, on average, is very high at 46 bats per turbine per year as compared to other locations in the Northwest (1.2), Rocky Mountains (1.2), and Upper Midwest (1.7). As the 2005 Berger report correctly noted, “two wind parks located in the ridge-and-valley region of Pennsylvania and West Virginia have documented annual mortality of between 2,000 and 4,000 bats per wind park for the last two years.” Merlin Tuttle, director of Bat Conservation International in Austin, Texas said of the WV bat mortality in 2003: “[This is] by far the largest bat mortality event I know of worldwide and, as far as I know, the biggest mortality event of any animal.”

Referencing the VA DGIF letter in Appendix D: “High fatality rates … would be particularly devastating to bats because of their reproductive strategy, which is atypical of a small mammal … [Unlike most small mammals], They have small litters (typically one or two young), only one litter per year, and life expectancy of 12-15 years. With this strategy, the impact of the loss of individuals is much greater, especially within small populations.”

The New Hampshire Wildlife Action Plan (Appendix F), under Wildlife Risk Assessment, the State raised issue with these high numbers as well. The chapter on Energy and Communication Infrastructure states that Wind energy and communication tower infrastructure “are considered a chronic to serious local threat for a variety of species and habitats but could be potentially serious for some species (e.g., American marten, bats, spruce grouse, and migratory birds including osprey) and habitats (e.g., alpine, high elevation spruce fir, talus slope/rocky ridges.

13) Does the habitat in the project area raise any concerns regarding resident wildlife? Explain.

Yes. All pre-construction reports prepared for the applicant including the Curry & Kerlinger Phase I Avian Risk Assessment, the Berger report, and Woodlot’s report described the project site as mostly unbroken forest consisting of varying aged growth. The Curry & Kerlinger report states on page 7: “Overall, the forests are generally large and relatively contiguous… The fact that the forests are a mosaic of ages, suggests that they support a very diverse assemblage of species. The habitat must be considered relatively high quality nesting habitat for birds and other forest animals.” [emphasis added]

Pre-construction wildlife reports for the project are focused on impact to birds and bats, thus suggesting the applicant has not adequately (if at all) evaluated the impacts of permanent changes to the project area on local wildlife. Mr. Vernon Lang, U.S. Fish and Wildlife Service, stated in the July 28, 2006 letter:

We have described the Lempster site as an interesting area from an ecological perspective because much of the area, including hills and ridges, is dominated by red spruce of various age classes instead of a northern hardwoods association. Balsam fir while present is a minority component of this boreal type system. The northern hardwoods forest type is present, but usually on the south- and
west-facing slopes and at lower elevations. Several boreal forest species may be present in this system, including spruce grouse, Bicknell’s thrush, and the pine marten. Field surveys should be scoped for these species and others, e.g., plant surveys, and conducted at appropriate times to determine presence/absence. If any are present, additional field study would be needed to determine functions provided by the project area. We note that a single Bicknell’s thrush was observed in the fall of 2004.

...Other wildlife species that may be affected by habitat fragmentation include bobcat, black bear, moose, and fisher. Moose tracks were observed frequently during our September 21 and November 18, 2005 field visits to the site. A bear-clawed beech tree was observed near the trail leading to Kennedy Hill during the November 18 field visit. Each of these species are either known or expected to occur, and their presence and abundance should be confirmed by field study, as well as functions provided by the project area.

The presence of a Bicknell’s Thrush is significant and may be a breeding bird on the project site. According to the Berger report, this is a species of special concern stating: “Bicknell’s Thrush is one of the rarest songbirds in North America.” In comments by the Maine Appalachian Trail Club and Appalachian Trail Conservancy to the Main Land Use Regulation Commission regarding the Redington Wind project, the MATC and ATC stated: “The only place Bicknell’s Thrush is found in the United States is in the high elevation spruce fir habitats of the mountains of the Northeast. Recent data collected by the Vermont Institute of Natural Science indicates that the Bicknell’s Thrush are in sharp decline.” They go on to state “Given the rarity of Bicknell’s Thrush and the rarity of its habitat plus the fact that there is no information about the tolerance of the bird to modern wind energy installations, we believe the precautionary principle should apply. That is we should take precautions to protect an environment we know has rare habitat for an imperiled bird…”

14) In response to data requests, the applicant asserted that “…it is very difficult to identify prior to project construction what level of impact a Project would have on certain species under certain conditions, and what remedial measures would be appropriate. Do you agree with this assertion?

No. While it’s true we do not have sufficient information as to all types of bird and bat species using and flying within the project area, it appears Lempster Mountain has notable migration activity and the periods of migration are fairly well defined. Based on actions taken in other states, it should not be necessary to build the project first before we can begin to understand and mitigate for potential impacts to wildlife. The VA DGIF letter included in Appendix D is one example where a State agency recommended pre-construction remedial measures.
15) What are some of the consequences of forest habitat fragmentation at the site?


The potential for negative impacts resulting from habitat modification and presence of turbines should not be taken lightly as forest fragmentation is an important and timely conservation issue among wildlife managers and conservation organizations. The fact that many forest interior species are declining is significant, especially with wind power development being proposed for forested areas of the northeast. The question of interest to conservationists and agency regulators is whether these species can coexist with turbines.”

Forest interior habitat, the habitat deep in woodlands and secluded from the influences of forest edges and open space, is becoming increasingly rare. This habitat is now home to certain forest-dependent wildlife that require it to survive. The short, informative document included in Appendix G entitled “Conserving the Forest Interior: a Threatened Wildlife Habitat” explains that for every opening in a forested area, a full 100 meters from the forest’s edge inward converts to edge habitat. For the Lempster project area, there will be approximately 20 acres of forest interior habitat lost per turbine.

16) The applicant has asserted that the road will be built with a working area of 11 meters wide, but that it will be permitted to re-vegetate back to 5 meters (16-foot). In time, wouldn’t this lessen the impact to forest interior habitat?

This project is designed to add 5 miles of expansive 11-meter (36 feet) wide roads between the turbines, and to create permanent clearings for wind turbines. A 36-foot wide road is at least as wide as a 3 lane interstate in New Hampshire, however, in this case the road is being built through a densely, largely contiguous forested area, on a ridgeline, in a community of 1000 residents.

While the applicant has asserted the roads will be permitted to re-vegetate to a 16-foot width, it is not at all apparent what that means. According to pre-file testimony by Martin Risley of Clough Harbour & Associates, the steep slopes and rocky soils cause water to run down the Lempster Mountain ridgeline. By building the road perpendicular to the direction of flow, comprehensive measures were needed to control and slow the runoff to “prevent erosion of the project roads and facilities”. These included culverts (66 culverts in all over a length of 5 miles), waterbars, swales. Since the road will be built to 36-feet wide, the culverts will be at least that length, and perhaps wider to address road shoulders. Side-slopes of 2-to-1 are detailed on the plan outside the 36-foot travel surface.

The project roads will need to be constructed to withstand the size and weight of the turbine components as well as the necessary transport and lifting vehicles. Given the road’s subsurface and related compaction of
road surface, it’s unlikely the area will support growth beyond shallow grasses. It’s also uncertain whether there’s sufficient soil in the area that would enable growth beyond the road area to occur quickly or easily after construction.

It is surprising that organizations, which have opposed the expansion of I-93 due to impacts on already disturbed environments, have not shown the same level of concern for this construction.

It should be noted that while the application has omitted information pertaining to transporting the turbine components to the site, portions of Route 10 and Mountain Road in Lempster, an old mountain road although paved, would likely not withstand the impact of moving the turbine components along them. Further, it is not certain how the transports vehicles will achieve 90-degree turns when carrying loads which extend in length to 128-feet. Additional wetland impacts and site-specific issues may result.

I reserve the right to comment further on the road layout and design after reviewing an updated storm water management plan expected to be submitted to DES Site-Specific by the applicant.

17) Are these specifications (11-meter wide roads) comparable to what’s been done at other ridgeline wind facilities?

While it’s possible that roads at other sites are being built to this specification, we know from aerial photographs of recently constructed ridgeline wind facilities that the swath cut through the forest, and the area prepped for roads, is much larger than 11 meters (36 feet). In fact, the aerial photos from 2005 of the Bear Creek, PA facility, a 12-turbine, 24MW site partially owned by the applicant, clearly shows a road structure cut through the forested area that is at or near 100-feet wide. (See Appendix H for before / after photos). There are also photo images available from Mars Hill, ME that show clearings up to 100-feet wide for roads.

While it may be the intent of the applicant to clear for an 11-meter road, the practice utilized in building these facilities on ridges appears to require much larger cuts. The applicant has indicated that the Lempster site will resemble their Bear Creek facility in terms of road construction. If that is the case, there may be reason for concern. Should this project be permitted to proceed, careful oversight on construction would be necessary to ensure the Site-specific permit and conditions are adhered to.

18) Moving on to the project’s purpose, do you have any comment on generation from wind?

I am an advocate of renewable energy and other clean sources of generation; however, it’s fundamental that the generation that gets built be able to contribute to our growing capacity needs in the region. ISO NE’s
CEO Gordon van Welie stated last year that “Electricity demand throughout New England is growing by the equivalent of one large power plant every year,” and that “as New England’s electricity supplies decrease, the price of wholesale electricity will increase and reliability will be threatened.”

Wind energy is an intermittent resource that will generate capacity only when the wind is blowing and within a specific speed. If the winds are light, we get little or no generation from the facility. If the winds are gusty with considerable fluctuation within limited intervals (10-15 minutes) the intermittency becomes more pronounced. The Lempster Wind LLC power project represents the first application before the NH Site Evaluation Committee that will be fueled by an intermittent energy source. While traditional sources of electricity generation produce within 5-10% of nameplate capacities, the electricity output for a wind-powered facility, and the timing of that output is a function of the local wind profile. The nameplate capacity represents only the maximum production of the generator. The applicant has asserted before the Committee that anticipated average capacity factors for the project would range from 33-38% across one year. According to production reports to the Federal Government, no reporting wind project in the Appalachian Mountain/Eastern States achieved a 33%-38% average capacity value in 2005. It is essential that the applicant’s proposed production numbers be thoroughly examined to determine the average and effective capacities of the generator for the region.

The State of New York conducted a study on wind energy to determine the availability of the resource and whether there were any transmission limitations to building wind in the state. In that report, New York stated that onshore wind could be expected to produce at an effective capacity of 10% (Appendix I) “due to both the seasonal and daily patterns of wind generation being largely “out of phase” with the NYISO load patterns”. In other words, the ability of the onshore wind resource to reliably contribute capacity during peak periods (summer, mid-afternoon) was only 10%.

The Electric Reliability Council of TX (ERCOT), presented similar conclusions before the Texas legislature in 2005 where they said:

“In addition to meeting the state’s energy needs (MWh), the electric system must also meet expected peak demand (MW). Generation resources other than wind will be needed to meet most of the projected growth in peak demand, as maximum output from wind resources does not correspond to system peak demand. ERCOT currently assigns 10% of the installed capacity of wind turbines to its calculation of the ERCOT peak capacity reserve margin. Based on a review of historical data of actual wind turbine generation during ERCOT system peaks (from 4 p.m. to 6 p.m. in July and August), the average output for wind turbines was 16.8% of capacity. However, the data also showed that for any hour during these months, the output of the wind turbines could range from 0% of installed capacity to 49% of installed capacity. Stakeholders comprising the ERCOT Generation Adequacy Task Group have expressed concern that use of an average number (i.e., 16.8%) was too


optimistic because it fails to adequately recognize the intermittency of wind generation. Accordingly, the group is working to assign a peak capacity value for wind using an appropriate “confidence factor.” While the group has not yet formally made a recommendation to the ERCOT Technical Advisory Committee, it is currently considering recommending a wind capacity value of 2%. In summary, in order to reliably meet system peak demand, dispatchable resources (such as gas, coal, biomass) would be required to replace the wind resources when wind is not blowing."

The ISO NE, in its Stakeholder Scenario Planning initiated last fall, has expressed uncertainty as to the effective capacity to assign wind on the grid. For the scenario process, the ISO set the figure at 20% and will be evaluating wind data in the region to validate this assumption. While the applicant has asserted the project will generate at 33-38% capacity on average, this does not tell the ISO, or us, how much generation we can reliably expect from the facility during periods of peak demand.

While the applicant has stated average capacity anticipated from the project, the submitted information does not attempt to prove this point. Nowhere in the application are the wind characteristics at the project site qualified. How often does the wind blow? when does it blow (time of day, time of year)? at what speeds? and at what variability? are all basic questions to be answered before the true benefit of the project can be determined and whether that benefit outweighs attendant impacts.

The New Hampshire Wildlife Action Plan made specific note of this in the chapter on Energy and Communication Infrastructure (Appendix F). Under Research Needs, the plan states this:

Conduct a cost-benefit analysis for each proposed wind energy project and determine its effects on the environment. Benefits should clearly outweigh environmental costs before a project proceeds.

I am grateful the applicant has agreed to provide me with the wind data so I can verify the analysis. I hope to provide the Committee with the results of my analysis as input into its deliberations on the project. I will be submitting these findings in my supplementary testimony. Analysis of the wind information is also an important element in proposing mitigation conditions that avoid or reduce the impact on wildlife.

19) In addition to asserting a 33-38% average capacity figure, the applicant stated a 2MW wind turbine will displaced nearly 3,600 tons of carbon dioxide each year, and that such is equivalent to planting 2 square miles of forest. Do you take issue with that point?

Yes. A wind turbine does not add CO2 to the air, nor does it absorb and remove it. Using a number, in this case 3,600 tons, in isolation and not considering the time of day and time of year of the generation, or the other power facilities on the grid at the time the wind was blowing, presents an overly simplistic and inaccurate description of how the grid operates. While wind generation can offset fossil fuel use, which here in New England is likely natural gas, and perhaps hydro, any emission reduction would need to be evaluated
in the context of the New England grid system. The sum reduction (or offset) in greenhouse gases should this wind project proceed is not a certainty.

I hope to evaluate the anticipated performance of the facility against other power units on the grid based on time of year, time of day production to arrive at a better understanding of emissions offset. It’s my hope that this analysis will prove beneficial to the Committee during these proceedings. This analysis will be included in my supplementary testimony.

20) Will building this project enable New England to avoid having to build other power facilities to meet energy demand?

Since wind is an intermittent generator, the firm capacity it can supply to the grid is inherently limited, and will not eliminate the need to build more reliable forms of generation in the region. In other words, if we build wind turbines and accept their attendant impacts, it will still be necessary to build more substantial generation, whether it be renewables (biomass, land fill gas, small hydro, and even solar which can produce during peak demand), or more traditional generation (nuclear and clean coal technology).

The ISO NE 2006 Regional System Plan (RSP06) was very clear (pg 5) in stating: “Without adding new resources to the system, the frequency and severity of responding to a capacity deficiency would increase over time and vary with changes in demand and other factors.” Using the ISO’s 20% figure (still an assumption to be validated) the Lempster Wind project can be expected to produce only 4.8MW, representing 0.017% of the New England grid’s peak demand reached on August 2, 2006 (28,127 MW).

It’s worth noting that the RSP06 also makes this point: “Locating generators near areas of relatively high demand provides the capacity needed to meet demand while minimizing the need for transmission expansion.” Wind energy projects must be built where the wind resource is, and for onshore wind in New England, this typically means siting the facilities far from the demand centers.

21) Are there any further comments you would like to make at this time?

No.

22) Does this complete your pre-filed testimony?

Yes.