

**STATE OF CONNECTICUT  
CONNECTICUT SITING COUNCIL**

**Petition of BNE Energy Inc. for a  
Declaratory Ruling for the Location,  
Construction and Operation of a 4.8 MW  
Wind Renewable Generating Project on  
Winsted-Norfolk Road in Colebrook,  
Connecticut (“Wind Colebrook North”)**

**Petition No. 984**

**May 27, 2011**

**PROPOSED FINDINGS OF FACT**  
**BY FAIRWINDCT, INC., STELLA AND MICHAEL SOMERS AND SUSAN WAGNER**

Pursuant to the Council’s invitation to the parties and intervenors to submit briefs and findings of fact by May 27, 2011, FairwindCT, Inc., Stella and Michael Somers and Susan Wagner hereby submit these proposed findings of fact regarding the petition for declaratory ruling filed by BNE Energy Inc. on December 13, 2011.

**I. Introduction**

1. BNE Energy Inc. (“BNE”) filed a petition for a declaratory ruling that no certificate of environmental compatibility of public need is required for the proposed construction, maintenance, and operation of a 4.8 megawatt wind renewal generating project at Winsted-Norfolk Road at the intersection of Rock Hall Road in Colebrook that was received by the Council on December 13, 2010. The proposed project is known as Wind Colebrook North. (Petition, page 1.)
2. BNE is a Delaware corporation headquartered at 29 South Main Street, Suite 200, West Hartford, Connecticut. The petition states that BNE was founded in 2006, though the Secretary of State’s records indicate that BNE was incorporated in 2007. According to the petition, BNE was founded in 2006 for the purpose of constructing and operating commercial wind generation projects in Connecticut, New England and beyond. (Petition, pages 2, 6.) BNE has not yet constructed or operated a wind generation project, commercial or otherwise.
3. BNE claims that its proposed project is eligible for approval by declaratory ruling because it is a grid-side distributed resources facility under 65 MW that complies with the air and water quality standards of the Connecticut Department of Environmental Protection (“DEP”). (Petition, page 1.) BNE also claims that its proposed project will not have a substantial adverse environmental effect. (Petition, page 2.)

4. The parties to this proceedings include the petitioner, the Town of Colebrook, FairwindCT, Inc. ("FairwindCT"), Stella and Michael Somers, Susan Wagner, Kristin and Benjamin Mow, Eva Villanova, David Lawrence and Jeannie Lemelin, Walter Zima and Brandy Grant and Jeffrey and Mary Stauffer. The Connecticut Light and Power Company is an intervenor. (3/22/11 Tr. 9:14-24; 4/26/11 Tr. 5:1-10.)
5. Although not required to do so by statute, the Council chose to hold public hearings on this proceeding. Public notice of the hearings was published in the Hartford Courant on February 11, 2011. (3/22/11 Tr. 6:23-7:5.)
6. The public hearings were held on March 22 and 23, 2011 at the Northwestern Regional 7 High School, Battistoni Drive, Winsted, Connecticut. The public hearings began at 6:30 p.m. and continued until 8:30 p.m. and 8:40 p.m., respectively. (3/22/11 Tr. 79:14-15; 3/23/11 Tr. 82:12.)
7. The Council and its staff conducted a field review of the proposed site on March 22, 2011, beginning at 2 p.m. The petitioner did not fly a balloon at the site. (3/22/11 Tr. 30:10-12.) The proposed turbine locations were marked with signs at ground level.
8. The evidentiary hearing on Petition No. 984 began on April 26, 2011 at 5 p.m. at the office of the Connecticut Siting Council, 10 Franklin Square, New Britain, Connecticut. The evidentiary hearing was continued on April 28 and May 5 at the office of the Connecticut Siting Council, 10 Franklin Square, New Britain, Connecticut. (4/26/11 Tr. 199:2-6; 4/28/11 Tr. 4:1-4, 218:2-3; 5/5/11 Tr. 4:2-5:1.)
9. Although the petitioner claims it was not legally required to provide notice of its filing, BNE published a legal notice of its intent to file the petition with the Council in the Litchfield County Times on or about December 3, 2010. (Petition page 33 & Ex. D; BNE Amended Responses to Council's First Set of Interrogatories, dated Feb. 24, 2011, Answer 2 & Ex. 2; 3/22/11 Tr. 6:18-20.)
10. Although the petitioner claims it was not legally required to provide notice of its filing, BNE sent notice of its intent to file the petition with the Council by certified mailing on or about November 28, 2010 to abutting property owners of record listed in its petition. (Petition, page 33 & Ex. D.) BNE received return receipts from all but two property owners, Kristin and Benjamin Mow and Thomas Cail. Because Kristin and Benjamin Mow were granted party status in this proceeding, BNE did not send them a second notice. A second notice was sent to Thomas Cail via regular mail. (BNE Amended Responses to Council's First Set of Interrogatories, dated Feb. 24, 2011, Answer 1 & Ex. 1.)
11. Although the petitioner claims it was not legally required to provide notice of its filing, BNE also sent copies of its petition to the state and local officials listed in its petition by Federal Express on December 13, 2010. (Petition page 33 & Ex. E.)

12. BNE posted a sign giving public notice of its pending petition at the site, along Rock Hall Road, on March 19, 2011. The sign included the date of the scheduled public hearings and field review and contact information for the Council. (Corey Pre-Filed Testimony, page 2; 4/28/11 Tr. 7:25-8:12.)

## **II. State Agency Comment**

13. On February 7, 2011, and again on May 6, 2011, the Council solicited comments on BNE's petition from the following state agencies: Department of Agriculture, Department of Environmental Protection ("DEP"), Department of Public Health ("DPH"), Council on Environmental Quality, Department of Public Utility Control ("DPUC"), Office of Policy and Management, Department of Economic and Community Development, Department of Transportation ("DOT") and Department of Emergency Management and Homeland Security. (Council Hearing Package, dated Feb. 7, 2011; Council Letters to State Agency Department Heads, dated Apr. 27, 2011.)
14. On March 23, 2011, a DOT representative answered on behalf of that agency, indicating that DOT had no comments on the petition. (DOT Letter, dated Mar. 23, 2011.)
15. On April 6, 2011, a DEP representative responded on behalf of that agency. DEP expressed concerns regarding the timing and duration of BNE's breeding bird surveys, which took place in June and July, and which were conducted in only five-minute intervals. DEP also demonstrated concern over BNE's acoustic bat studies and further noted that "[i]t is not possible to provide accurate conclusions on the acoustic bat survey without the final report and additional survey data that spans the migratory period. . ." No survey data that spans the migratory period has been submitted. (DEP Letter, dated Apr. 6, 2011.) Additional information related to DEP comments is provided in the findings regarding Environmental Considerations.

## **III. Municipal and Other Consultation**

16. On December 15, 2010, the Council notified the Towns of Colebrook and Norfolk of the petition. (Council Letters, dated Dec. 15, 2011.)
17. On December 16, 2010, the Colebrook Planning and Zoning Commission ("PZC") submitted a letter to the Council opposing the project, noting that the petition "presents not only several potential violations of the town's zoning regulations, but also contradicts both the spirit and intent of the state-mandated Town Plan of Conservation and Development, as approved in 2006." The PZC requested local hearings on the petition and further requested that the Council adopt a moratorium on the siting of the project pending the adoption of appropriate regulations. (PZC Letter, dated Dec. 16, 2010.) The PZC letter was forwarded by the Council to all parties and intervenors on the service list. (Council Letter regarding PZC Comments, dated Dec. 20, 2010.)

18. By letter dated December 16, 2010, the Colebrook Board of Selectmen asked the Council to conduct a local hearing on the petition prior to rendering a decision. (Board of Selectmen Letter, dated Dec. 16, 2010.) The letter was forwarded by the Council to all parties and intervenors on the service list. (Council Letter regarding Board of Selectmen Comments, dated Dec. 20, 2010.)
19. On January 2, 2011, the Colebrook Historical Society wrote a letter to the Council requesting a one year moratorium to enable the development and establishment of appropriate regulations regarding wind farms. The letter also urged the Council to hold local public hearings for citizens to share information and discuss the issues and implications of the wind turbines. (Colebrook Historical Society Letter, dated Jan. 2, 2011)
20. On January 3, 2011, the Colebrook Inland Wetlands and Watercourse Commission asked the Council to conduct a public hearing so as to provide a forum to present their concerns with the “proposed crossings of roadways and utilities lines through existing wetlands as well as proposed construction and disturbance in the 100 foot regulated wetlands upland review area.” (Inland Wetland and Watercourse Commission Letter, dated Jan. 3, 2011.)
21. On January 11, 2011, Senators Joan Hartley and Kevin Witkos, and Representatives Vickie Nardello and John Rigby, state legislators from Prospect and Colebrook, wrote a letter to the Council urging the Council to decline to consider the proposed project and to initiate regulation-making proceedings that would allow for data collection and which would ensure that public safety and environmental concerns related to the project were adequately addressed. (Legislators Letter, dated Jan. 11, 2011.)
22. On February 16, 2011, the PZC issued an order that BNE could not construct or operate a 4.8 MW wind renewable generating project until it applied to the PZC for a zone change. (PZC Order, dated Feb. 16, 2011.) This order was issued pursuant to Conn. Gen. Stat. § 16-50k(x). There is no record in this docket or any other docket of an appeal taken by BNE from the order from the PZC.
23. On March 8, 2011, Congressman John B. Larson wrote a letter to the Council expressing his opposition to the proposed project. Congressman Larson noted the fact that Connecticut consistently ranks poorly with respect to wind power capacity and the possible adverse effects on Colebrook and its residents, ultimately concluding that “the proposed construction of wind turbines in Colebrook seems to unjustly impact the community for the potential of energy generation.” (Congressman Larson Letter, dated Mar. 8, 2011.)
24. On March 22, 2011, the Colebrook Land Conservancy submitted a letter to the Council detailing problems with the petition and strongly urging the Council to deny the petition. The Conservancy stated that wind turbines are not compliant with the Town’s planning and zoning regulations or wetlands and watercourses regulations and expressed concern for the significant environmental impacts that the proposed turbines would have on the

existing habitat and land on and near the proposed site. (Colebrook Land Conservancy Letter, dated Mar. 22, 2011.)

25. On April 15, 2011, the Coalition for Sound Growth of Norfolk submitted a letter to the Council expressing its strong opposition to the petitions based on the failure of BNE to meet most if not all of the benchmarks that the President of a large and successful wind energy company stated were “absolutely essential components to a viable wind energy project.” The Coalition expressed its concern that BNE might not actually be concerned with a viable green energy alternative and that Colebrook in the end would be left with “depressed land values, unexplained liabilities, voided payments and unforeseen costs.” (Coalition for Sound Growth of Norfolk Letter, dated Apr. 15, 2011.)
26. On December 20, 2010, the Colebrook Conservation Commission submitted a letter to the Council expressing its opposition to the project based on concerns that issues related to effects on environmental and historic resources had not been adequately addressed by the petition. The Commission urged the Council to hold a public hearing on the petition and to impose a moratorium on the project pending adoption of applicable regulations and standards for wind energy projects. (Conservation Commission Letter, dated Dec. 20, 2010.) The letter was forwarded by the Council to all parties and intervenors on the service list. (Council Comments, dated Dec. 29, 2010.)
27. Thomas D. McKeon, First Selectman of the Town of Colebrook, testified regarding the Town’s concerns if the petition were to be granted, including necessary upgrades and repairs to local roads. (5/5/11 Tr. 19:9-22:1 (McKeon).)
28. John Stamberg, a witness for the Town, testified regarding the Town’s concerns if the petition were to be granted, including issues relating to decommissioning of the proposed turbines and mitigation of the impacts on nearby residents caused by the visibility, noise and flicker impacts of the wind turbines. (Stamberg Pre-Filed Testimony, pages 2-3, 8-9.)
29. During the hearing, BNE stated that it would enter into a Host Community Agreement with the town to address many of those concerns. No agreement has been reached, though Mr. Corey did make certain commitments on behalf of BNE while sworn as a witness in this proceeding. (5/5/11 Tr. 240:13-244:14 (Corey).)

#### **IV. Other Permits**

30. If this project is approved, BNE plans to file with DEP a General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities. (Petition, page 31.)
31. Two of FairwindCT’s witnesses, Michael Klein and William Carboni, testified that BNE’s plans do not conform to the requirements of the General Permit. (Klein Pre-Filed Testimony, pages 8-9; Carboni Pre-Filed Testimony, pages 3, 7-9.)

32. After the close of the evidentiary hearing in this matter, the U.S. Department of the Army Corps of Engineers informed BNE that based on the Corps' review, at a minimum the site will need to be evaluated under Category 2 of the General Permit. (FairwindCT, Inc.'s Late-Filed Request for Administrative Notice, dated May 16, 2011.)
33. BNE does not have a Department of the Army permit, and the Corps of Engineers has determined that one is required. (FairwindCT, Inc.'s Late-Filed Request for Administrative Notice, dated May 16, 2011.)
34. BNE has from the Federal Aviation Administration a December 2009 Determination of No Hazard to Air Navigation for one turbine with a 100-meter hub and 100-meter blades on the site. (Petition, page 31 & Ex. C.)
35. On October 24, 2010, BNE filed for a Determination from the FAA for all three proposed turbines. (Petition, page 31-32.) BNE received Determinations for all three turbines, by letters dated December 16, 2010. (BNE Responses to FairwindCT's First Set of Interrogatories, Answer 43 & Ex. 1; BNE Responses to FairwindCT's Third Set of Interrogatories, Answer 28 & Ex. 1.)
36. The FAA's Determinations are conditional on affixing flashing white or red lights to the nacelle of the turbine so it will be visible from 360 degrees. BNE anticipates using red lights, which it states the FAA has determined to be the most effective. (Petition, page 32; BNE Responses to FairwindCT's First Set of Interrogatories, Answer 43 & Ex. 1; BNE Responses to FairwindCT's Third Set of Interrogatories, Answer 28 & Ex. 1.) However, BNE apparently plans to use red lights for only two of its three proposed wind turbines. (Rinebold Pre-Filed Testimony, page 19.)
37. If the project is approved, BNE plans to place two lights on top of the nacelle of the turbines. The lights would blink at the same time, in a synchronized manner. (4/28/11 Tr. 71:1-10 (Corey).)
38. If this project is approved, BNE must notify the FAA within 5 days after construction reaches its greatest height. (Petition, page 32; BNE Responses to FairwindCT's First Set of Interrogatories, Answer 43 & Ex. 1; BNE Responses to FairwindCT's Third Set of Interrogatories, Answer 28 & Ex. 1.)

**V. Site Description**

39. The proposed project site consists of a 124.9-acre parcel of land located at the intersection of Winsted-Norfolk Road (Route 44) and Rock Hall Road. BNE has an option to lease agreement with the property owner. (Petition, pages 4, 7, 13.)
40. The project site is located in the southeastern corner of Colebrook, approximately 1,050 feet from the Norfolk town line and approximately 3,900 feet from the Winsted/Winchester town line. (Petition, page 4.)

41. A small strip of the property located along Winsted-Norfolk Road is presently developed with a small golf driving range. Most of the site is presently undeveloped. (Petition, page 7.)
42. The site contains six major different habitat types, including second growth northern hardwood forest, second growth northern hardwoods-hemlock-white pine forest, early successional northern hardwood forest, Palustrine forested wetlands, Palustrine scrub-shrub-emergent wetlands and maintained lawn at the developed driving range. Second growth northern hardwood forest is the dominant habitat type on the property. (Petition, page 7 & Ex. I, pages 2, 4, 6.)
43. Mill Brook, a perennial watercourse, is part of the Palustrine forested wetland habitat and flows south-southeast through the site into a large shrub swamp at the southern boundary of the site. A riparian corridor associated with Mill Brook transects the central portion of the site and comprises the dominant wetlands resource on the site. (Petition, page 7 & Ex. I, pages 2, 4, 6.)
44. BNE characterizes the topography of the site as containing moderately sloping hillsides climbing easterly and westerly from the central portion of the site. (Petition, Ex. I, page 2.)
45. The project site is within 1.25 miles of the Wolcott Preserve, which was the first Nature Conservancy preserve in the state. The Wolcott Preserve consists of approximately 198 acres of undeveloped land and contains the Beckley Bog, a National Natural Landmark. The Beckley Bog is the most southerly sphagnum-heath-black spruce bog in New England and is a relic of the early post-Pleistocene. (FairwindCT Admin. Notice Item No. 69; Franson Supp. Pre-Filed Testimony, page 5.)
46. A portion of the Algonquin State Forest is situated to the south and east of the project site. (Petition, Ex. F, Sheet C-001; Petition, Bulk Filing, Zoning Map.)
47. A portion of the project site's southwestern boundary abuts land owned by the Northwestern Connecticut Sportsmen's Association Inc., which operates a gun club on part of its property. (Petition, pages 7, 18 & Ex. F, Sheet C-001.) A portion of the site's western boundary abuts land owned by the Maasser Annual Reunion Association, which is used as a family gathering and picnicking area in the summer months. (Petition, Ex. F, Sheet C-001; 5/5/11 Tr. 281:14-282:9, 283:12-284:1.)
48. The project site is abutted by residential lots on all sides. (Petition, page 7 & Ex. F, Sheet C-001.) The project site itself is zoned residential. (Petition, page 7; 5/5/11 Tr. 28:1-6 (Garrels).)
49. The gun club predates the town's zoning regulations and the Maasser property and the driving range are permissible uses despite being residentially zoned because a "general business zone" extends approximately 100 yards on either side of Winsted-Norfolk Road.

Another narrow general business zone is located along a portion of Route 8 (Colebrook River Road). (Petition, Bulk Filing, Zoning Map; 5/5/11 Tr. 24:10-24:16 (Garrels).)

50. Colebrook has not had a permit for commercial development in either of its two general business zones in the last four to five years. There are no plans to increase the current narrow commercial zones in Colebrook. (Petition, Bulk Filing, Zoning Map; 5/5/11 Tr. 24:10-24:16, 35:12-21 (Garrels).)
51. The portion of the site upon which BNE proposes to construct the wind turbines is zoned residential and is not included within the narrow general business zone that extends over part of the property. (Petition, Ex. F, Sheet C-001 & Bulk Filing, Zoning Map; 4/28/11 Tr. 199:22-200:1 (Corey).)
52. There are 18 residential homes within 2,000 feet of the site boundary. (BNE Responses to Council's First Set of Interrogatories, dated Feb. 24, 2011, Answer 5.)
53. With the exception of the narrow general business zone located at the intersection with Winsted-Norfolk Road, Rock Hall Road is exclusively residential. (Petition, Bulk Filing, Zoning Map.) There are 174 structures within 1.25 miles of any of the six turbines proposed by BNE for Wind Colebrook North and South. (Franson Supp. Pre-Filed Testimony, page 3.)
54. With the exception of the two narrow general business zones discussed above, Colebrook is comprised of exclusively residential and conservation land. The town does not have a gas station, a bank or a traffic light, blinking or otherwise. (Petition, Bulk Filing, Zoning Map; 5/5/11 Tr. 27:16-25, 31:24-32:2 (Garrels).)
55. There are no industrial zones in Colebrook and no industrial properties in Colebrook. (Petition, Bulk Filing, Zoning Map; 5/5/11 Tr. 31:17-22 (Garrels).)
56. During the hearing, one of BNE's witnesses opined that the site could support a subdivision consisting of 15 building lots. (5/5/11 Tr. 268:24-269:3 (Jones).) Other BNE witnesses opined that such development would be more harmful to the habitat and wildlife on the site than the proposed project. (5/5/11 Tr. 267:2-269:13 (Klemens).)
57. Any proposed residential development of the site would be subject to Colebrook planning and zoning regulations and inland-wetlands regulations. (See Petition, Bulk Filing, Zoning Regulations.)
58. Colebrook has a 200-foot frontage requirement, which means that building lots must have 200 feet of frontage along a town road. (5/5/11 Tr. 30:3-10 (Garrels).)
59. Mr. Garrels, chair of Colebrook's Planning and Zoning Commission, testified that to receive a building permit in Colebrook, a developer would be required to submit a very specific site plan identifying wetlands and their boundaries, topography and solutions to



septic issues. (5/5/11 Tr. 25:22-26:12 (Garrels).) Colebrook's Inland-Wetlands and Watercourses Agency would also have concerns and requirements regarding any proposed subdivision. (5/5/11 Tr. 31:12-14 (Stanton).)

60. BNE offered no evidence that septic perc tests have been conducted on the site.

## **VI. Power Plant Description**

### **A. General Project Description**

61. The proposed project, known as Wind Colebrook North, consists of the installation of three GE 1.6 MW wind turbines and associated ground equipment, and installation of two access roads and an electrical interconnection. (Petition, page 7.)
62. BNE proposes installing three 100-meter tall turbines, each with blade lengths of up to 50 meters. Although BNE has stated that it intends to utilize 40.3-meter blades at the site, and certain of the evidence provided by BNE reflects blades of that length, BNE is seeking approval for blades of up to 50 meters in length. (Petition, pages 7-8.)
63. The turbine hubs (towers) will stand approximately 328 feet high. The equipment used to operate the turbines is contained within the nacelle, including the gearbox, a magnet generator and an automatic lubrication system. (Petition, page 7.)
64. In order to access the project from Rock Hall Road, BNE originally proposed constructing two new access driveways off of Rock Hall Road. (Petition, page 8.) BNE believes that certain improvements will have to be made to Rock Hall Road to accommodate the equipment that would be used to construct the project. (4/28/11 Tr. 31:25-32:1 (Jones).) BNE's later revision to the site plans (discussed below) proposes only one access driveway. (Jones Pre-Filed Testimony, page 6 & Ex. 2, Sheet C-200; 4/28/11 Tr. 48:10-20 (Jones).)
65. BNE proposes to construct an electrical collector yard on the site, as well as additional equipment to monitor circuit voltage and to disconnect the facility from the grid as needed to protect the system during system outage. (Petition, page 8.)
66. Interconnection would be made to CL&P's 23-kV distribution system at Winsted-Norfolk Road (Route 44). BNE has not yet completed a System Impact Study or a Transmission Study with CL&P, nor has BNE executed an Interconnection Agreement with CL&P. (Petition, page 8-9.) Interconnection would likely be underground. (4/28/11 Tr. 128:17-19 (Rinebold).)
67. The turbines can be controlled automatically or manually from either an interface located inside the nacelle or from a control box at the bottom of the tower. They can also be controlled remotely. Each turbine has emergency stop buttons located in the base of the hub and in the nacelle. (Petition, page 10.)

68. The turbine blades are controlled by a rotor that can adjust blade pitch angles during operation and brake or otherwise regulate the blade speed. A controller within the nacelle aligns the nacelle and blades to the average wind direction based on a wind vane sensor mounted on the nacelle. (Petition, page 10.)
69. BNE states that Wind Colebrook North will meet all applicable safety requirements for construction, operation and electrical interconnection and will follow all applicable GE guidelines and requirements. (Petition, page 14.)
70. The rotor blades of the turbines are equipped with lightning receptors mounted in the blade and the turbines are grounded and shielded to protect against lightning. The turbines are also built to handle seismic loads. (Petition, page 14.)
71. BNE expects to enter into an operations and maintenance agreement with GE to remotely monitor and maintain the turbines. Although BNE's petition states that operations and maintenance personnel will also be located on-site to supplement the services provided by GE, Mr. Corey testified that BNE does not plan to have dedicated personnel on-site for this project and instead will have personnel stationed at Wind Colebrook South monitor this site as well. (Petition, page 14; 4/28/11 Tr. 19:9-19 (Corey).)
72. BNE concedes that wind turbines are by definition intermittent electric energy generation facilities that operate only when there is sufficient wind to turn the rotor and produce electricity from the electric generator. (Petition, page 11.) The GE 1.6 MW turbines generate power when the wind speeds are at or above 3.5 m/s (approximately 7.8 miles per hour) and below 25 m/s (approximately 56 miles per hour). (Heraud Pre-Filed Testimony, Ex. 2, page 2.)
73. BNE claims that the GE turbines it has selected will be "available" to produce electricity 98 percent of the time and have an expected capacity factor of approximately 30 percent. Based on output from three 1.6 MW turbines, BNE states that Wind Colebrook North would produce approximately 12,614 MWh of Class I renewable energy each year. (Petition, pages 10-12.)
74. David Pressman, a witness for FairwindCT, the Somers and Susan Wagner, testified that wind's capacity factor is highly variable but typically ranges from 20 to 32 percent, and noted that BNE did not provide any details on how it reached this assumed capacity factor. (Pressman Pre-Filed Testimony, pages 5, 10.) BNE's wind data was compiled only on the Colebrook South Site, and it therefore cannot accurately demonstrate a likely capacity factor with respect to this site. (Pressman Pre-Filed Testimony, page 6.) In 2009, industrial wind projects located in the Northeast had an average capacity factor of 26.8%, and many of these projects face more favorable wind conditions than Wind Colebrook South. (Pressman Pre-Filed Testimony, page 13.)
75. Wind Colebrook North is unlikely to achieve 30 percent capacity. Based on Colebrook's wind resources, wind turbulence, and potential icing, a capacity of 22 to 26 percent is

more likely, which would significantly lower the estimated energy to be produced annually by this proposed project. (Pressman Pre-Filed Testimony, page 13.)

- 76. The proposed turbines will be built for a 20-year life, though the industry expects a lifespan of 25 to 30 years. (4/28/11 Tr. 22:23-23:5 (Corey).)
- 77. As a general rule, the industry standard is that 60 acres of land is needed for each industrial-size turbine. (BNE Responses to Council’s First Set of Interrogatories, dated Feb. 24, 2011, Answer 15.) BNE proposes to site three turbines on less than 125 acres of land, and in fact proposes to site those three turbines on an area comprising only approximately half of the total acreage of the site. (Petition, page 7; Jones Pre-Filed Testimony, Ex. 2, Sheet C-003.)

**B. Proposed Turbine Locations**

- 78. BNE proposes to site three turbines on the site, but has proposed a total of four locations for those turbines. (Jones Pre-Filed Testimony, Ex. 2, Sheet C-002.)
- 79. BNE’s original proposed turbine locations, as contained in the petition, are as follows:

<b>ID</b>	<b>Base Elevation</b>	<b>Orientation on Site</b>	<b>Distance to Nearest Site Boundary</b>	<b>Distance to Nearest Residential Property Line</b>
<b>Turbine 1</b>	1264 feet	Western (original)	330 feet	390 feet
<b>Turbine 2</b>	1322 feet	Southeastern	525 feet	525 feet
<b>Turbine 3</b>	1361 feet	Northeastern	153 feet	153 feet

(BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 6, 17 & 18.)

- 80. Note that residential property line refers to properties zoned as residential, rather than the present actual use of the property, so Turbine 1 is closest to the Maasser Annual Reunion Association property. The next closest residential property line to Turbine 1 is 160 Winsted-Norfolk Road, which is 740 feet away. (BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 6, 17 & 18.)
- 81. On March 15, 2011, BNE submitted new site plans proposing an “alternate” location for Turbine 1, purportedly in response to comments and concerns raised by parties, intervenors, the general public and the Siting Council. BNE stated that the alternate location will mitigate the visual impact of the proposed project and increase setbacks from residential property lines and residences and reduces wetlands impacts and environmental impacts associated with the need to construct a separate, second access

road for the original Turbine 1 location. (BNE Responses to FairwindCT's Third Set of Interrogatories, Answer 2; Jones Pre-Filed Testimony, page 6.)

- 82. The alternate location for Turbine 1 is approximately 805 feet north of the original location of Turbine 1. (Libertine Pre-Filed Testimony, page 2; Franson Supp. Pre-Filed Testimony, Ex. 7.)
- 83. BNE has not abandoned its originally proposed location for Turbine 1. (4/28/11 Tr. 202:20-23 (Libertine).)
- 84. For ease of reference, the originally proposed location for Turbine 1 will be referred to as Turbine 1 throughout these findings and the proposed alternate location will be referred to as Turbine 1a throughout these findings.
- 85. BNE's proposed location for Turbine 1a is as follows:

<b>ID</b>	<b>Base Elevation</b>	<b>Orientation on Site</b>	<b>Distance to Nearest Site Boundary</b>	<b>Distance to Nearest Residential Property Line</b>
<b>Turbine 1a</b>	1250.5 feet	Western (alternate)	300 feet	370 feet

(BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 6, 17 & 18.)

- 86. Again, residential property line refers to properties zoned as residential, rather than the present actual use of the property, so Turbine 1a is closest to the Maasser Annual Reunion Association property. The next closest residential property line to Turbine 1a is a parcel on Rock Hall Road owned by Christine Stauffer, which is 455 feet away. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 6, 17 & 18.)

87. The proposed turbine locations are close to each other, by general industry standards, which typically require distances of at least four to five rotor diameters between turbines. (Pressman Pre-Filed Testimony, pages 3, 7-8.) The table below shows the distances between each proposed turbine location in feet, measured from the approximate center point of each turbine tower.

	<b>Turbine 1</b>	<b>Turbine 1a</b>	<b>Turbine 2</b>	<b>Turbine 3</b>
<b>Turbine 1</b>	---	805	1910	2243
<b>Turbine 1a</b>	805	---	1310	1459
<b>Turbine 2</b>	1910	1310	---	868
<b>Turbine 3</b>	2243	1459	868	---

(Franson Supp. Pre-Filed Testimony, Ex. 7.)

88. BNE’s proposed turbine locations – calculating from center of the towers – are as close as 3.2 rotor diameters apart if the 82.5-meter diameter blades are used and as close as 2.7 rotor diameters apart if the 100-meter diameter blades are used. (Pressman Pre-Filed Testimony, page 7.) This proximity will increase turbulence and decrease output of the turbines. (Pressman Pre-Filed Testimony, pages 3, 7-8; 4/28/11 Tr. 117:7-118:5 (Pressman).) Increased turbulence will also increase noise levels. (5/5/11 Tr. 125:21-126:18 (Bahtiarian).)
89. In both sets of plans, BNE proposes to cross two intermittent streams that feed into Mill Brook to access Turbines 2 and 3. (Petition, Ex. F, Sheet C-002; Jones Pre-Filed Testimony, Ex. 2, Sheets C-003, C-500; Jones Pre-Filed Testimony, page 5.)
90. During the last two minutes of the evidentiary hearing in this proceeding, BNE stated that “the 80-meter hub height does work” on this site – an apparent reference to a different GE turbine model than proposed in BNE’s petition. BNE presented no evidence other than that “closing statement” in support of any proposal to site turbines with 80-meter hubs. (5/5/11 Tr. 325:24-326:19 (Corey).)
91. No noise, view, shadow flicker, wetlands or wildlife studies were submitted in support of the plea for turbines with an 80-meter hub height.
92. The SHPO’s adverse effect determination applies to turbines with an 80-meter hub height. (SHPO Letter, page 2.)

**VII. Cultural Resources**

93. In its petition, BNE stated that the project is not anticipated to have any impact on scenic or recreational values in the area. (Petition, page 21.) However, BNE acknowledged that “brief views may be achieved from Route 183” – a state scenic road – and that “brief

views may be achieved” along Winsted Road in Norfolk – a locally designated scenic road. (Libertine Supp. Pre-Filed Testimony, Ex. 2, page 6.)

94. In supplemental filings, a BNE witness testified that the project is likely to be visible from other “points of interest” up to 17.5 miles away, including the Haystack Mountain observation tower, John A. Minetto State Park, and Peoples State Forest. (Libertine Supp. Pre-Filed Testimony, page 3 & Ex. 2, page 6.)
95. At BNE’s request, on November 29, 2010, the Historic Preservation and Museum Division of the Connecticut Commission on Culture and Tourism, also known as the State Historic Preservation Office (“SHPO”), issued a “no effect” letter for this project. (Petition, Ex. B.) In BNE’s request, BNE informed the SHPO that its investigation into the surrounding area “did not reveal the existence of any historic resources listed or eligible for listing on the National Register of Historic Places . . . at or within 1.5 [miles] of the proposed wind turbines.” (Petition, Ex. B.)
96. In fact, Rock Hall, a property listed on the National Register of Historic Places, and located at 19 Rock Hall Road, is 2,661 feet – approximately half a mile – from the nearest turbine associated with this project. (Franson Supp. Pre-Filed Testimony, Ex. 6, page 2.) Stella and Michael Somers, who are parties to this proceeding, own Rock Hall. (Somers Pre-Filed Testimony, page 1.)
97. Rock Hall was designed and built in 1911 and 1912 as a private residence by Addison Mizner, who is known as “The Architect of Palm Beach.” The nearly 23-acre estate contains landscaping features from the original design and is home to a 10,000-square foot manor house in Mizner’s signature Spanish Mediterranean Revival style. Today, Rock Hall is the only surviving Mizner residence north of the Mason-Dixon line. (Somers Pre-Filed Testimony, pages 1-2.)
98. Because of its cultural and historic significance, Rock Hall was listed on the National Register of Historic Places in June 2010. (Somers Pre-Filed Testimony, page 1.)
99. The National Register of Historic Places was created by the National Historic Preservation Act of 1969 (“NHPA”) in order to protect districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. In passing the NHPA, Congress recognized “the spirit and direction of the Nation are founded upon and reflected in its historic heritage,” that “[t]he historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people,” and that “[t]he preservation of this irreplaceable heritage is in the public interest so that its vital legacy of cultural, educational, aesthetic, inspirational, economic and energy benefits will be maintained and enriched for future generations of Americans.” (Faude Pre-Filed Testimony, page 5; FairwindCT Admin. Notice Item No. 28.)

100. Under the NHPA, the government agencies must consider the potential adverse effects of their activities on historic properties. In order to expedite that review process, the Federal Communications Commission (“FCC”) has established an area of potential effect of 1.5 miles for the stationary communication towers within its jurisdiction that are 400 feet or higher. If a historic property is located within the area of potential effect, adverse effect is presumed. (FairwindCT Admin. Notice Item No. 6.)
101. The types of towers with which the FCC is concerned are stationary and therefore will have less significant impacts on nearby historical and cultural resources than BNE’s proposed turbines. (Faude Pre-Filed Testimony, page 4.)
102. Rock Hall is within the 1.5-mile area of potential effect of the project. (Faude Pre-Filed Testimony, page 4.)
103. On March 21, 2011, the SHPO rescinded its prior finding of “no effect.” (FairwindCT Admin. Notice Item No. 71.) The SHPO then initiated a new review of the proposed project, in consultation with BNE and counsel for the Somers. (5/5/11 Tr. 276:9-277:11 (Libertine).)
104. On May 19, 2011, the SHPO found that “the proposed Wind Colebrook North project (whether at 100 meter hub height or 80 meter hub height) has a clear and substantial presence at close proximity to the Rock Hall property. As a result, the undertaking appears to alter directly the characteristics of the historic property that qualified it for inclusion on the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” (SHPO Letter, dated May 19, 2011, page 2.)
105. In accordance with its findings, the SHPO concluded that “this office believes that the proposed Wind Colebrook North project will have an **adverse effect** on the Rock Hall property.” (SHPO Letter, dated May 19, 2011, page 3 (emphasis in original).)
106. Aside from Rock Hall, there are at least 42 sites and districts located on the National Register of Historic Places within a 5-mile radius of the project, including the Norfolk Historic District, the Phelps Farms Historic District, and the Colebrook Center Historic District. (Libertine Pre-Filed Testimony, Ex. 2, Figure 2.)
107. The center point of Beckley Bog, one of only eight designated National Natural Landmarks in Connecticut, is located within 1.5 miles of this project. (FairwindCT Admin. Notice Item No. 69; Franson Supp. Pre-Filed Testimony, Ex. 6.)
108. As “[t]he most southerly sphagnum-heath-black spruce bog in New England, Beckley Bog possesses all principal elements of a boreal bog. It is a rare relic of the early post-Pleistocene.” It was designated as a National Natural Landmark in 1977. (FairwindCT Admin. Notice Item No. 69.)

109. The National Natural Landmarks Program was established by the Secretary of the Interior in 1962, under authority of the Historic Sites Act of 1935 (16 U.S.C. 461 et seq.) to identify and encourage the preservation of the full range of geological and biological features that are determined to represent nationally significant examples of the Nation's natural heritage. Potential sites are evaluated by qualified scientists and, if determined nationally significant, recommended to the Secretary of the Interior for designation. Once a landmark is designated it is included on the National Registry of Natural Landmarks, which currently lists 586 National Natural Landmarks nationwide. (FairwindCT Admin. Notice Item No. 69.)
110. At present, Colebrook presents a pristine natural landscape, essentially untouched by any significant development. (3/23/11 Tr. 72:19-73:6 (Bernstein); 5/5/11 Tr. 33:24-34:11 (Garrels); Faude Pre-Filed Testimony, page 19.) The proposed project would alter the nature and character of the surrounding area and would thereby have an adverse impact on nearby historic and cultural resources, including Rock Hall. (Faude Pre-Filed Testimony, page 3.)

### **VIII. Environmental Considerations**

#### **A. Site Clearing**

111. In its petition, BNE stated that the area to be cleared would be approximately 9.45 acres (411,842 square feet). (Petition, Ex. F, Sheet C-002.)
112. Since that petition, BNE has revised its plans. The revision reduced the area to be cleared by approximately 1.6 acres, to a total clearing of 7.85 acres. (Jones Pre-Filed Testimony, Ex. 2, Sheet C-003; 4/28/11 Tr. 16:20-17:4 (Jones).) This number is likely subject to further revision pending BNE's planned additional changes to the site plans, which are discussed in more detail below.
113. BNE has not conducted, and currently is not conducting, a tree survey to account for trees with diameters at breast height of six inches or more that would be cleared for the project. (BNE Responses to CSC's First Set of Interrogatories, Answer 20; 4/28/11 Tr. 144:15-145:10 (M. Davison).)

#### **B. Wetlands**

114. There are four wetland systems on the site. (Petition, page 28.)
115. Wetland 1, the dominant resource on the Property, consists of a broad bordering forested wetland associated with Mill Brook. Mill Brook, a perennial watercourse, originates at a corrugated metal culvert on the south side of Rock Hall Road, is fed by seepage wetlands and flows southeast through the center of the Property. The stream is characterized as having a well-defined bank with decreasing gradient from the culvert flowing south. As Mill Brook flows south to the southern site boundary, it opens into a large emergent



marsh and scrub/shrub wetland. This wetland also contains several hillside seep wetlands and associated intermittent watercourses. These seeps convey stormwater runoff during high water events, spring melt, and sheet flow from the open field upslope to the west into Wetland 1 (Mill Brook system). The most significant seepage area includes an intermittent watercourse which flows into Wetland 1 from the north boundary of the site. This watercourse flows within a deeply scoured channel at its upper extent before discharging into Wetland 1 within a shallow braided channel. (Petition, pages 28-29; Klemens Herpetological Assessment, page 4.)

116. Wetland 2 is a small forested wetland pocket located at the base of a western facing slope. This area may be subject to shallow seasonal inundation. Wetland 2 does not pool water and is not a vernal pool, and has limited value for wildlife. (Klemens Herpetological Assessment, page 5.)
117. Wetland 3 is a small linear-shaped forested hillside seep wetland draining easterly towards Wetland 1. No surface water or wetland connections were identified between this wetland and Wetland 1. (Petition, page 29.)
118. Wetland 4 is a series of small forested hillside seep wetlands located along an eastern-facing slope. They are generally interconnected via subsurface groundwater flows or shallow surface water flows. No surface water or wetland connections were identified between this wetland and Wetland 1. (Petition, page 29.)
119. In its petition, BNE stated that two wetlands crossings are needed in order to access Turbines 2 and 3. The proposed locations of those crossings were across two intermittent streams that feed into Wetland 1. (Petition, page 30 and Ex. F, Sheet C-503.)
120. Since that petition, BNE has revised its plans, but retained its proposed crossing over the two intermittent streams that feed into Wetland 1. (Jones Pre-Filed Testimony, Ex. 2, Sheets C-003, C-500.) There was additional testimony at the hearing that indicates additional revision to the crossing area may be necessary to protect potential spring salamander habitat. (Jones Pre-Filed Testimony, page 5 and Ex. 2, Sheet C-201; 5/5/11 Tr. 197:23-198:15 (Carboni), 250:15-253:5 (Klemens).)
121. BNE's expert testified that the Mill Brook wetland system, part of Wetland 1, is extremely important ecologically, very unique and beautiful and should be protected by a wetland buffer. (5/5/11 Tr. 255:6-10 (Klemens).)
122. The interconnection of the project, which will likely run underground, could run to Route 44 in Colebrook. Mill Brook runs across the site between the turbine locations and Route 44. Running the interconnection to Route 44 would therefore require an additional crossing of the high-value Mill Brook wetland system. (4/28/11 Tr. 128:18-129:19 (Rinebold, Jones).)

123. BNE stated in its petition and during the hearing that it worked to minimize direct impacts to wetland resources on the site. (Petition, page 29; 5/5/11 Tr. 253:13 (Klemens).) However, BNE concedes that there will be significant temporary and permanent direct wetland impact. (Petition, page 30.)
124. In its petition, BNE stated that the construction of a gravel access road over Wetland 1 would require permanent direct impact to 3,194 square feet of wetlands. (Petition, page 17 & Ex. F, Sheet C-002.) Further, approximately 1,785 square feet of wetlands would be temporarily impacted. (Petition, pages 17-18 and Ex. F, Sheet C-002.) The total direct wetland impact in the petition is therefore at least 4,979 square feet.
125. Indirect wetland impact (i.e., clearing of, and building in, the area within 100 feet of wetlands) was identified in BNE's petition as 1.77 acres (77,199 square feet). (Petition, Ex. F, Sheet C-002.)
126. BNE's revised plans do not identify how the revisions would affect the area of direct and indirect wetland impact as set forth in its petition, but the plans do identify regulated activity in 4,860 square feet of wetlands. (Jones Pre-Filed Testimony, Ex. 2, Sheet C-500.)
127. FairwindCT presented a witness who testified that BNE's inadequate erosion control measures are likely to result in erosion and deposits of sediment into wetlands, having an adverse effect on wetlands not contemplated by BNE. (Carboni Pre-Filed Testimony, pages 3-7, 9, 11 and 12.)
128. Based on that evidence, BNE's calculations of the wetland areas that may suffer direct and indirect temporary and permanent impacts are not accurate.

**C. Wildlife**

129. With its petition, BNE submitted an interim bat acoustic survey, a breeding bird survey and a terrestrial wildlife habitat and wetland impact analysis. (Petition, Exs. I, K, L.)

**1. Terrestrial Wildlife**

130. BNE conducted a desktop wildlife evaluation that identified potential mammal, reptile and amphibian species that may exist on the site. (Petition, Ex. I, pages 8-9.)
131. BNE's petition stated that the site does not contain vernal pools; however, that statement was based in large part on a wetlands delineation that took place with snow cover on the ground. (Petition, Ex. I, pages 4, 12.)
132. During BNE's breeding bird survey on the Wind Colebrook South site, an incidental observation of the wood frog was recorded. (Petition, Ex. L, page 13.) The wood frog is a

vernal pool obligate species. Its presence in the Colebrook Wind Resource Area indicates that vernal pools may exist on the site. (Klein Pre-Filed Testimony, pages 4-5.)

133. BNE did not conduct an amphibian survey or an in-season vernal pool survey on the site prior to filing its petition, despite the petitioner's incidental observation of a state-listed species (Northern Leopard Frog, *Rana pipiens*). (Petition, Ex. L, page 13; Klein Pre-Filed Testimony, page 3.)
134. BNE's expert testified that often a desktop evaluation and an onsite evaluation yield different results and that there is no substitute for actual field work. (5/5/11 Tr. 251:5-14 (Klemens).)
135. During field review of the site, tracks of raccoon (*Procyon lotor*) were observed on the sandy deposits that occasionally occur at the edge of Mill Brook. Crayfish exoskeletons and detritus were also observed adjacent to raccoon tracks, suggesting that Mill Brook and its adjacent wetland habitat serve as a food source for this species. Mink (*Mustela vison*) tracks were observed along the edge of Mill Brook. Finfish were observed in Mill Brook during the investigations, but not identified to species. (Petition, Ex. I, pages 10, 11 and 13.)
136. Jeffrey Stauffer, who owns the property immediately to the north of the site, testified that he often sees deer, coyote, turkey, porcupine, fox and black bear on his property and that moose have been seen on his property. (5/5/11 Tr. 49:21-50:13 (Stauffer).)
137. Susan Wagner, owner of the abutting property to the east and southeast of the site, testified that she frequently sees turkeys, deer and bears on her property. (Wagner Pre-Filed Testimony, pages 1-2.)

## **2. Amphibians and Reptiles**

138. BNE did not conduct an amphibian survey or an in-season vernal pool survey on the site prior to submitting its petition. (Petition, Ex. I.) Instead, BNE opined that no vernal pools existed on the site based on field surveys conducted with several inches of snow on the ground. (Petition, Ex. I, pages 4, 12; Klein Pre-Filed Testimony, pages 3-5.)
139. Vernal pool obligate amphibians contribute significantly to the food chain and nutrient cycling of the forest ecosystem and require extensive areas of forested habitat surrounding their breeding sites. (Klemens Herpetological Assessment, page 1.)
140. On March 15, 2011, Michael Klein testified that this omission was significant, particularly because BNE's consultants recorded an "incidental observation" of a wood frog, which is a vernal pool obligate species. BNE's wetlands scientist also included at least one description from field surveys that was a near-textbook description of a vernal pool. (Klein Pre-Filed Testimony, pages 3-5.)

141. In response to interrogatories dated March 15, 2011, BNE revealed that it had retained the services of Michael Klemens to determine if any on-site wetland resources provide breeding habitat for obligate vernal pool amphibians. (BNE Responses to FairwindCT's First Set of Interrogatories, Answer 22.)
142. Dr. Klemens' report was filed in the afternoon of May 3, 2011, less than 48 hours before the close of the evidentiary hearing in these proceedings. (Klemens Herpetological Assessment, page 1.)
143. Dr. Klemens conducted on-site surveys on April 12 and 19, 2011. The goals of his study were to determine the suitability of the wetlands on and immediately off site to support vernal pool obligate amphibians and to assess the suitability of the site for state-listed species, including the Jefferson salamander, the spring salamander and the smooth green snake. (Klemens Herpetological Assessment, page 1.)
144. Based on their desktop wildlife analysis, BNE's consultants had determined that no vernal pools existed on site and that no state-listed amphibians or reptiles were likely to exist on the site. (Petition, Ex. I, pages 4, 12-13, 18, 21 & Attachment C.)
145. Dr. Klemens identified several species of amphibians and reptiles on site that were not included in VHB's wildlife assessment, namely wood frogs, spotted salamanders and four-toed salamanders. (Klemens Herpetological Assessment, pages 1-2; Petition, Ex. I, pages 12-13, 15.)
146. Dr. Klemens' report notes that the four-toed salamander is typically distributed in lower-lying portions of Connecticut. The discovery of four-toed salamanders at an elevation of 1220 feet is now the highest known extant population in the state, and, according to Dr. Klemens, underscores the diversity and importance of the large marsh and swamp that exists along the southern boundary of the site and extends onto the abutting property to the south. (Klemens Herpetological Assessment, page 1.)
147. Dr. Klemens' on-site survey also revealed that in fact, habitat on the site is likely to support four state-listed species: the wood turtle, the spring salamander, the smooth green snake and the eastern ribbon snake. (Klemens Herpetological Assessment, pages 3-4; 5/5/11 Tr. 246:9-247:11 (Klemens).)
148. VHB's report does not list the wood turtle, the eastern ribbon snake or the spring salamander as likely to be on site, and VHB has stated that the site does not contain habitat suitable for the smooth green snake. (Petition, Ex. I, pages 12-13, 15 & Attachment C; 4/28/11 Tr. 47:23-48:2 (Klemens).)
149. Dr. Klemens testified that the loss of even one wood turtle is significant because wood turtles exist in small populations, and are very vulnerable to incidental take and road mortality. (Klemens Herpetological Assessment, page 3; 5/5/11 Tr. 247:18-25 (Klemens).)

150. Dr. Klemens made several recommendations as a result of his conclusions regarding state-listed species that will require additional revisions to the site plans submitted by BNE. (Klemens Herpetological Assessment, pages 3-5.)
151. First, Dr. Klemens outlined a wood turtle protection plan that requires adding a silt fence around the construction and related work surrounding Turbine 1a. Dr. Klemens details additional requirements regarding education of workers, daily and weekly inspections and reporting and procedures in the event that turtles are found. (Klemens Herpetological Assessment, pages 3-4.) Before beginning work each day, the contractor will be required to inspect the site to ensure that no turtles are present. Dr. Klemens does not know how long those searches will take. (Klemens Herpetological Assessment, page 4; 5/5/11 Tr. 249:5-250:10 (Klemens).)
152. The silt fence is to be installed “as shown on the site plans.” (Klemens Herpetological Assessment, page 3.) Dr. Klemens testified that no changes have yet been made to the site plans to reflect the location and extent of the silt fence. He did not know how large the silt fence perimeter around the construction area will be. Dr. Klemens testified that the perimeter would likely be established in coordination with him during the development and management plan. (5/5/11 Tr. 248:1-249:4 (Klemens).)
153. Dr. Klemens testified that the seepage wetlands that feed Mill Brook are suitable habitat for the spring salamander. He found both dusky salamanders and two-lined salamanders in the seepage wetlands in the northern portion of the site, in the area of BNE’s proposed wetlands crossing. These smaller salamanders are key prey items for spring salamanders, and dusky salamanders are an indicator of high-quality seepage areas and streams able to support spring salamanders. (Klemens Herpetological Assessment, page 5.)
154. Based on these findings, Dr. Klemens recommended that forest clearing around the seepage areas be minimized and the loss of hemlocks, which provide shade, be especially avoided. (Klemens Herpetological Assessment, page 5.)
155. These recommendations will necessitate moving the proposed road approximately 40 feet upslope to a location where an old abandoned woods road was located. Dr. Klemens also recommended that the clearing for stormwater basins alongside the road be minimized or eliminated to protect the potential spring salamander habitat. (Klemens Herpetological Assessment, page 5.)
156. Mr. Carboni testified that moving the road as recommended by Dr. Klemens may lead to scouring on the streambed. Mr. Carboni also testified that he believes the proposed water quality basins and detention basins are already undersized, so he disagrees with Dr. Klemens’ recommendation to minimize or eliminate the clearing for stormwater basins and believes doing so will have a detrimental effect on water quality. (5/5/11 Tr. 198:1-22.)

157. Water quality is important to spring salamanders. Dr. Klemens has observed situations where poorly constructed culverts and the addition of impervious surfaces have resulted in degradation of the water quality downstream so that it is no longer suitable habitat for the spring salamander. Salamanders are sensitive to stream scouring. (5/5/11 Tr. 253:17-254:15 (Klemens).)
158. Dr. Klemens testified that additional clearing on the site is not likely to harm the smooth green snake, and in fact may be a benefit to both the smooth green snake and the eastern ribbon snake by enhancing habitat, particularly if BNE maintains the clearing areas. (Klemens Herpetological Assessment, pages 2, 5.)

### **3. Bats**

159. BNE did not conduct any bat studies at the site, instead relying on the study conducted at Wind Colebrook South by Western EcoSystems Technology, Inc. ("WEST"). (Petition, Ex. K, page i; 4/28/11 Tr. 44:13-45:10 (Tidhar); Tidhar Pre-Filed Testimony, page 2.)
160. The bat survey conducted at Wind Colebrook South cannot characterize the bat activity at Wind Colebrook North. (Reynolds Pre-Filed Testimony, page 3.)
161. BNE's expert testified that the Wind Colebrook South and Wind Colebrook North sites are substantially different, and that he would never use data collected from one site for analysis of another site, even if they were the same. (5/5/11 Tr. 245:6-11 (Klemens).)
162. There are unique habitats attractive to bats at the site that are not found at Wind Colebrook South. First, the Wind Colebrook North site has larger second-growth hardwoods than Wind Colebrook South, which is more likely to be used as roosts by bats. Second, it has three unique habitats (second-growth northern hardwood-hemlock-white pine, forested wetlands with an active brook, and maintained lawn) that do not exist at Wind Colebrook South. If Mill Brook is a truly riparian corridor system, the site is also likely to support a wide variety of bat activity. (Reynolds Pre-Filed Testimony, page 3.)
163. In addition to these unique habitats, the Colebrook North site has a section of large beech snags on the eastern side of the project site that could be ideal tree-roosting habitat for multiple bat species. (Reynolds Pre-Filed Testimony, page 3.)
164. The lack of acoustic monitoring in any of the high-activity habitats at the site would suggest that bat activity at the site would be even higher than documented activity at Wind Colebrook South. (Reynolds Pre-Filed Testimony, page 3.)
165. Without conducting any bat survey on the site, BNE concluded that the project is not in the vicinity of any known bat colonies or features likely to attract large numbers of bats. (Petition, page 13.) However, the DEP noted that the project site is not far from several known large hibernacula locations. (DEP Comment Letter, page 4.)

166. BNE hired WEST to conduct acoustic bat monitoring during the spring 2011 season. (Tidhar Rebuttal Testimony, page 7.) The results of that study will not be available to the Council before its statutory deadline for deciding this petition.
167. If this project is approved, BNE will conduct post-construction bat fatality monitoring for two spring seasons at the site. (Tidhar Rebuttal Testimony, page 7.)

#### **4. Birds**

168. BNE did not conduct any bird studies at the site, instead relying on the study conducted by WEST at Wind Colebrook South. (Petition, Ex. L, page I; BNE Responses to FairwindCT's Second Set of Interrogatories, Answers 35, 36 and 38.)
169. BNE's expert testified that the Wind Colebrook South and Wind Colebrook North sites are substantially different, and that he would never use data collected from one site for analysis of another site, even if they were the same. (5/5/11 Tr. 245:6-11 (Klemens).)
170. Without conducting any bird survey on the site, WEST concluded that the proposed project will not have undue impacts to the breeding bird populations in the Colebrook area. (Tidhar Pre-Filed Testimony, page 6.)
171. There are unique habitats attractive to birds at the Wind Colebrook North site that are not found at Wind Colebrook South. The Colebrook North site occurs at a lower elevation than Wind Colebrook South. The elevation of Wind Colebrook South ranges from approximately 1,420ft to 1,500ft. The elevation of the site ranges from 1,330ft to 1,400ft. (E. Davison Pre-Filed Testimony, pages 3-4.)
172. Wind Colebrook South contains an open water beaver pond, which is not present at the Colebrook North site. The Colebrook North site contains the habitat type "second growth northern hardwood – hemlock-white pine forest," which is not present at Wind Colebrook South. The site contains a perennial stream system (Mill Brook), which is not present on the Colebrook South site. (E. Davison Pre-Filed Testimony, pages 3-4.)
173. The failure to collect bird data at the site represents a significant lack of understanding of the avian community at the site and makes a reasonable assessment of the impacts of wind development on birds there unfeasible. (E. Davison Pre-Filed Testimony, page 4.)
174. WEST commenced a breeding bird and spring migration bird study on the site in March 2011. (BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 7, 8 and 10.) The results of that study will not be available to the Council before its statutory deadline for deciding this petition. (BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 9 and 12.)
175. BNE also commenced a spring raptor migration survey in March 2011. BNE represented that the study would be conducted at both the Colebrook South and Colebrook North

sites; however, BNE's late-filed "draft interim" spring raptor migration survey, submitted on May 25, 2011, discusses observations made only from the Colebrook South site. (BNE Late-Filed Draft Interim Report: Spring Raptor Migration Surveys, pages 3-4.)

176. The draft interim report offers no conclusions regarding the potential impact of this proposed project on the raptor population in the area. (BNE Late-Filed Draft Interim Report: Spring Raptor Migration Surveys, pages 8-9.) However, the interim observations contained in the report do report observations of eight endangered, threatened and special concern species, including golden eagle, bald eagle, peregrine falcon, American kestrel, broad-winged hawk, sharp-shinned hawk, common raven and northern harrier. (BNE Late-Filed Draft Interim Report: Spring Raptor Migration Surveys, pages 6, 8.)
177. The bald eagle, golden eagle and peregrine falcon are federal species of concern. The bald eagle, northern harrier, sharp-skinned hawk and peregrine falcon are state endangered species. (BNE Late-Filed Draft Interim Report: Spring Raptor Migration Surveys, pages 6, 8.)
178. These findings are consistent with reports of bird sightings by residents in the area who testified about frequent hawk and eagle sightings at their homes. (Wagner Pre-Filed Testimony, pages 1-2; Hemingson Pre-Filed Testimony, page 12 & Exs. 5-7; 3/22/11 Tr. 77:21-78:10 (Shelesky); 3/23/11 Tr. 23:10-16 (Layman), 58:11-18 (Hammond), 72:22-73:6 (Bernstein).)
179. A licensed bird bander who lives in Norfolk has recorded 118 species of birds on her property since 1993, including several species of hawks and three species of owls. (Hemingson Pre-Filed Testimony, Ex. 6.) An ongoing study conducted at Aton Forest in Norfolk and Colebrook has recorded 94 species of birds, including several species of hawks and two species of owls. (Hemingson Pre-Filed Testimony, Ex. 7.)
180. These findings are also consistent with the Natural Resources Inventory of Norfolk, which states that 18 of the 50 state-listed bird species have been observed in Norfolk, including the sharp-shinned hawk, northern harrier, American kestrel, bald eagle, common nighthawk and common raven. (FairwindCT Admin. Notice Item 70, page 39 page 39 & App'x 5, pages 111-14.)
181. Broad-winged hawks have been documented as fatalities at industrial wind turbine sites. (BNE Responses to FairwindCT's Second Set of Interrogatories, Answer 38; 5/5/11 Tr. 261:7-264:8 (Tidhar).)
182. WEST's raptor surveys to date have been conducted for only six hours at a time, between the hours of 9 a.m. and 5 p.m. (BNE Late-Filed Draft Interim Report: Spring Raptor Migration Surveys, page 5.) The surveys do not, and will not, therefore, report on the density and diversity of nocturnal species, such as the state-listed northern sawwhet owl and barn owl, which have been reported in the area. (See FairwindCT Admin. Notice



Item 70, page 39 & App'x 5, pages 111-14; Hemingson Pre-Filed Testimony, Exs. 6 & 7.)

**IX. Noise**

- 183. Noise is unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work or recreation. (Petition, Ex. M, page 1.)
- 184. Sound levels are most often measured on a logarithmic scale of decibels (“dB”). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall sound level. (Petition, Ex. M, page 1.)
- 185. A 3 dB increase is a doubling of acoustical energy and is the threshold of perceptibility of the average person. (Petition, Ex. M, page 1.)
- 186. A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person. (Petition, Ex. M, page 1.)
- 187. BNE’s noise evaluation assumed that the Emitter Zone for the proposed wind turbines is Class C (Industrial) and that the Receptor Noise Zone for the receptor location is Class A (Residential). (Petition, Ex. M, page 4.)
- 188. The zoning classification for the site is R-2, Residential. (Petition, Bulk Filing, Zoning Map; Petition, page 17.)
- 189. Thomas Wholley of VHB, BNE’s noise consultant, had noise monitoring conducted using a Larson Davis 824 Type I sound level analyzer to determine background noise levels. (Petition, Ex. M, page 6.)
- 190. BNE’s monitoring was done on Flagg Hill Road starting at 2:55 p.m. on April 1, 2010 and took a total of 20 minutes. (Petition, Ex. M, App’x (Noise Monitoring Summary), unnumbered page 3.)
- 191. BNE did additional monitoring on Flagg Hill Road starting at 1:15 a.m. on April 2, 2010 for a total of 15 minutes. (Petition, Ex. M, App’x (Noise Monitoring Summary), unnumbered page 3.)
- 192. Mr. Wholley interpreted the results to establishing existing sound levels at the L<sub>90</sub> decibel level as follows:

<b>Monitoring Location</b>	<b>Daytime Sound Level</b>	<b>Nighttime Sound Level</b>
Flagg Hill Road (M1)	37	38

(Petition, Ex. M, page 7.)

193. Mr. Wholley then used the noise level of 106 dB as maximum noise level for the operation of three 1.6 MW wind turbines and then calculated projected sound levels at various receptor locations. (Petition, Ex. M, pages 7-9.)
194. Mr. Wholley did the analysis using a 100-meter diameter blade on the turbines. (4/28/2011 Tr. 75:4-13 (Wholley).) He looked at no other alternative. (4/28/2011 Tr. 75:14-17 (Wholley).)
195. Mr. Wholley was of the opinion that once one was more than 100 feet from a turbine, the use of 82.5-meter or 100-meter diameter blades had no effect because the nacelle is the dominating noise source. (4/28/2011 Tr. 77:4-15 (Wholley).)
196. Mr. Wholley assumed that the location of the wind turbines would be optimal, so they would operate without turbulence. (4/28/2011 Tr. 171:9-19 (Wholley).) Therefore, Mr. Wholley's analysis did not assume wind turbulence. (4/28/2011 Tr. 172:10-11 (Wholley).)
197. Mr. Wholley selected receptor locations where people sleep, rather than receptor locations at the site's property lines. (4/28/2011 Tr. 184:2-15 (Wholley).)
198. State regulations provide: "General Prohibition. No person shall cause or allow the emission of excessive noise beyond the boundaries of his/her Noise Zone so as to violate any provision of these Regulations." RCSA § 22a-69-3.1.
199. State regulations also provide: "(g) Measurements taken to determine compliance with Section 3 shall be taken at about one foot beyond the boundary of the Emitter Noise Zone within the receptor's Noise Zone." RCSA §22a-69-4(g).
200. FairwindCT, the Somers and Susan Wagner offered Michael Bahtiarian, INCE Bd. Cert., Vice President at Noise Control Engineering, Inc., as its expert witness with respect to noise and acoustical matters. Mr. Bahtiarian has a Masters of Science in mechanical engineering from Rensselaer Polytechnic Institute and a Bachelor of Science in mechanical engineering from Pennsylvania State University and has reviewed wind turbine noise studies in the towns of Falmouth, Wareham, Bourne and Brewster, Massachusetts. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, pages 1-2.)
201. Mr. Bahtiarian is a Board Certified Member of the Institute of Noise Control Engineering. The certification is the equivalent to a Professional Engineering license for the field of noise and vibration. The requirements for receiving the certification are more than four years of experience, recommendations from colleagues and the passing of a rigorous 8-hour written examination. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 2.)

202. Mr. Bahtiarian undertook a peer review of the noise evaluation performed by VHB of the Wind Colebrook North wind turbine project. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 2.)
203. Mr. Bahtiarian's review of the VHB report and found unsubstantiated claims, incorrect use of noise regulations, questionable computation methods and only a token study of existing conditions. Based on his own computations of expected noise levels from the project, Mr. Bahtiarian concluded that sound levels will exceed the DEP noise regulations. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, pages 2-3.)
204. Mr. Bahtiarian found a violation of the Connecticut nighttime noise limit. He also testified that wind turbines have other acoustical characteristics such as low-frequency sound, amplitude modulation and wind turbine sound directionality. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, pages 8-9.)
205. Amplitude modulation as it relates to wind turbines is sound pressure from aerodynamic action of the turbine blades. This sound is sometimes distinguished as a "swishing noise" or "thumping." Amplitude modulated noise is characterized by a fluctuation sound amplitude having a period equivalent to the blade passage frequency (rotational speed of the hub multiplied by the number of blades). (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 10.)
206. Mr. Bahtiarian testified that the turbine manufacturer had not provided sufficient data to evaluate infrasound and pure tones from the wind turbines. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 10.)
207. Directionality is important to analysis of noise levels because sound emitted from a source is often not equal in magnitude in all directions. For example, a stereo speaker has much higher sound output from the front of the speaker than the rear of the speaker. Mr. Bahtiarian criticized the VHB noise evaluation for assuming that directionality was uniform in all directions. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, pages 10-11.)
208. Directionality plays a significant role in analysis of BNE's proposed project because wind turbines constantly change direction in response to the wind. Thus, at any single location, the levels of sound will vary with changes in both wind speed and wind direction. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 11.) This is an important factor in annoyance because it is just not sound amplitude but sound variability that creates annoyance. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 11.)
209. Mr. Bahtiarian opined that directionality is a very significant issue, especially for homes located between this proposed project and BNE's concurrently proposed project located approximately half a mile south, known as Wind Colebrook South. Mr. Bahtiarian testified that the large number of homes located between the Colebrook South and Colebrook North projects will be impacted nearly all of the time from at least one of the

projects. Having homes surrounded by wind turbines is an atypical situation, which may result in higher levels of impact (stress, sleep loss, and annoyance) than observed at other sites. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 11.)

210. There are no noise control treatments such as barriers, silencers or acoustic cladding that can be added after the wind turbine is installed to reduce the noise. The only method of minimizing noise after the fact is to shut the turbine down during windy conditions. (Bahtiarian Pre-Filed Testimony, dated Mar. 15, 2011, page 12.)
211. Mr. Bahtiarian testified that any suggestions that people may be able to insulate their houses against wind turbine noise are ridiculous because residents would need to insulate every square foot of the exterior of the house, including the roof and would need to install triple-pane windows that would not open. (5/5/11 Tr. 185:25-186:15 (Bahtiarian).)
212. In addition to conducting a peer review of BNE’s noise evaluation, Mr. Bahtiarian did his own analyses of the proposed project. First, he measured the distance from each turbine to the surrounding property lines by using BNE’s site plans to establish the approximate distance to each property line receptor. (See Petition, Ex. F, Sheet C-003.) Then, using a hub height of 328 feet, a sound power level of  $L_w=106$  decibels and an absorption coefficient of  $a=0.005$  dB/m (the same inputs used by BNE), he modeled the nighttime conditions to obtain projected noise levels from each proposed turbine location to the nearest property line. (Bahtiarian Third Supp. Pre-Filed Testimony, dated Apr. 28, 2011.)
213. Mr. Bahtiarian also modeled the noise levels using not his own estimation of the distances from proposed turbine locations to property lines, but those provided by BNE in response to interrogatories. (BNE Response to FairwindCT’s Third Set of Interrogatories, Answer 17; Bahtiarian Post-Hearing Supp. Pre-Filed Testimony, dated May 12, 2011, page 1.) Those modeling results are shown below.

	PL-N1A	PL-N1	PL-N2	PL-N3
<b>Total SPL, dB(A)</b>	<b>54</b>	<b>54</b>	<b>51</b>	<b>55</b>
Residence-to-Residence limit	45	45	45	45
<b>Excess above limit</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>10</b>
Industrial-to-Residence limit	51	51	51	51
<b>Excess above limit</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>4</b>

(Bahtiarian Post-Hearing Supp. Pre-Filed Testimony, dated May 12, 2011, Ex. 9.)

214. These results show that even using the industrial-to-residence limit, as BNE proposes, three of the four possible turbine locations included in the proposed project will violate

DEP noise regulations. (Bahtiarian Post-Hearing Supp. Pre-Filed Testimony, dated May 12, 2011, Ex. 9.)

215. Mr. Bahtiarian also undertook his own background noise monitoring program in Colebrook. The equipment was installed on the afternoon of Friday, March 25, 2011 and was removed on the afternoon of Monday, April 4, 2011. (Bahtiarian Second Supp. Pre-Filed Testimony, dated Apr. 14, 2011, pages 1-2.)
216. One device was located at the end of Flagg Hill Road in the vicinity of VHB's monitoring location M1. The other was installed near BNE's receptor R8. (Bahtiarian Second Supp. Pre-Filed Testimony, dated Apr. 14, 2011, page 1.)
217. The results from Mr. Bahtiarian's monitoring showed that the average background noise level at BNE's monitoring location M1 was 30 dB(A), not 37 dB(A) while the average background noise level near BNE's receptor R8 was 31 dB(A). The background noise level dropped to as low as 22 dB(A) for three of the seven nights and 28 dB(A) for the four remaining nights at M1. The background noise level dropped to as low as 27 dB(A) each night for R8 and down to 24 dB(A) one night. (Bahtiarian Second Supp. Pre-Filed Testimony, dated Apr. 14, 2011, page 2.)
218. Mr. Bahtiarian concluded that Colebrook location M1 is extremely quiet, much quieter than indicated by the brief sampling done by the BNE. (Bahtiarian Second Supp. Pre-Filed Testimony, dated Apr. 14, 2011, page 3.)
219. The significance of these measurements is that the proposed wind turbine operation will raise noise levels approximately 20 dB higher than the background noise level. A 10 dB increase is perceived as a doubling of loudness, so a 20 dB increase will be a quadrupling in loudness. This is extreme. (Bahtiarian Second Supp. Pre-Filed Testimony, dated Apr. 14, 2011, page 3.)
220. Dr. Arline Bronzaft testified on behalf of FairwindCT, the Somers and Ms. Wagner concerning the psychological effects of noise on people. (Bronzaft Pre-Filed Testimony, page 2.)
221. Dr. Bronzaft has a PhD and MA from Columbia University, has been a consultant on noise abatement to the New York City Transit Authority and has written chapters in eight books mostly on noise and its effects on people. She has been an invited speaker at several conferences. (Bronzaft Pre-Filed Testimony, pages 1-2 & Ex. 1.)
222. Based upon her review of the noise reports in this matter, her review of the literature linking noise to adverse mental and physical health and well-being and her many years of experience in the noise field, Dr. Bronzaft testified that residents in the area of the proposed wind turbine project may very well suffer ill effects from the noise generated by the turbines, including physiological health impacts, stress and a diminished quality of life. (Bronzaft Pre-Filed Testimony, pages 2-3.)

223. In addition to documented physiological health impacts, noise may dramatically affect an individual's quality of life. Individuals living near a constant noise source may not yet have measurable physiological symptoms, but their quality of life may be substantially diminished. (Bronzaft Pre-Filed Testimony, page 7.)
224. In a study by Dr. Bronzaft on the effects of noise on people living in a flight pattern community, those identified as being bothered by the noise reported having sleep difficulty. While night flights are of special concern in the area of sleep deprivation, the young, the old and the infirm often tend to sleep during the day, and thus day flights may prove intrusive to these individuals. Sleep difficulties as experienced by the subjects in a study done by Dr. Bronzaft show that these individuals may have long-term health consequences. (Bronzaft Pre-Filed Testimony, pages 7-8.)
225. Dr. Bronzaft cited a study from 1997 that suggested that psychological disorders of residents living around Kadena Air Base were due to noise exposure. In a paper published in the year 2000, Dr. Bronzaft noted that individuals identified six emotional responses to noise with annoyance ranking first and anger second. (Bronzaft Pre-Filed Testimony, pages 8-9.)
226. Dr. Bronzaft opined that nearly doubling of nighttime noise will prove intrusive and lead to sleep disturbance. Sleep is essential to good health. (Bronzaft Pre-Filed Testimony, page 14.)
227. In BNE's petition to site turbines in Prospect, known as Wind Prospect (Petition No. 980), several fact witnesses who live near 1.5 MW or 1.65 MW wind turbines testified as to the noise created by the wind turbines that result in sleep disturbance and headaches and other health effects suffered by each of those witnesses. This testimony was administratively noticed in this record. (See Andersen Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 50; A. Cool Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 52; M. Cool Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 53; Ford Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 54; Hobart Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 55; Hobart Amended and Supplemental Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 56; Lindgren Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 57; Meyer Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 58.) /
228. These witnesses live within the following distances to the nearest wind turbines:

<b>Name</b>	<b>Town</b>	<b>Wind Turbine</b>	<b>Distance in feet</b>
Neil Anderson	Falmouth, MA	1.65 MW	1320
Annie Hart Cool	Falmouth, MA	1.65 MW	1620

<b>Name</b>	<b>Town</b>	<b>Wind Turbine</b>	<b>Distance in feet</b>
Michael Cool	Falmouth, MA	1.65 MW	1620
John J. Ford	Falmouth, MA	1.65 MW(1)	3485
		1.65 MW(2)	2745
		1.65 MW(3)	4065
Sue Hobart	Falmouth, MA	1.65 MW	1620
Cheryl Lindgren	Vinalhaven, ME	1.65 MW	2440
Gerry R. Meyer	Brownsville, WI	1.5 MW(1)	1560
		1.5 MW(2)	3200
		1.5 MW(3)	3300
		1.5 MW(4)	2480
		1.5 MW(5)	3200

(Andersen Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 50; A. Cool Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 52; M. Cool Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 53; Ford Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 54; Hobart Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 55; Hobart Amended and Supplemental Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 56; Lindgren Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 57; Meyer Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 58.)

229. Gerry R. Meyer provided his wind turbine diary as Schedule 2 to his Pre-Filed Testimony. A portion of that diary is reproduced below.

July 7 - 5:10 AM Wind S. Fairly quiet yet annoying. 9:00 AM Wind S. Similar sound as earlier. 5:20 PM Jet sound. 9:50 PM It is raining. Wind S. Sound is audible. 12:50 AM Wind S Turbines 4, 6, 73 and 74a are giving off the loud jet sound ripping the sky apart. I can hear 73 & 74a from the computer room. From our family room I can hear turbines 6 & 4.

July 8 - 6: 15 AM The first words from my wife's mouth were "I'm going to go back to sleep";. "I didn't sleep half the night and was up at 2:00 AM". That is not a surprise considering when we went to bed we could hear the industrial wind turbines in all parts of our house. 5:15 PM Wind SW Jet sound from turbine 4. 11:15 PM wind NW. It is loud again tonight. Turbines 6 & 4 are a very loud jet sound with thumping sound from # 6. And .. how exciting (not really) that tonight I can hear an additional turbine #75a which is also  $\frac{3}{4}$  of a mile from our house. If

you have been paying attention you have figured out we have turbines almost in a 360 degree circumference of our house. It is getting worse. Not better.

July 9 - 5:15 AM Our 13 year old son is up. He should be in bed sound asleep at this time. He said he has been up since 2:00 AM. He said he was woke up by the wind turbines. That is not a surprise considering how loud they were last night. 5:40 AM. I can hear # 4 & 6. 8:55 AM Wind NW. I can hear #4 whooshing and humming. The wind is not strong. 4:00 PM. Our son and I are leaving chess camp in Shorewood. Robert got sick. It was very unusual. He was very anxious and worried about his pulse, heart, blood clots, blood not moving in his body, he was sweating and thirsty, kept checking his stomach by pulling up his shirt. Remember in the beginning of this diary I commented that especially my wife was concerned as soon as she heard about turbines coming to our area the health effects it may have on our son due to the trauma he experienced before social services entered his life? I believe today is a direct result of the wind turbines affecting his life due to headaches, lack of sleep and just plain stress and anxiety created by the constant sound. Part of this sound is rarely mentioned which is the low vibration sound we may not even feel. 9:05 PM. Most of the 86 turbines are moving slow or are stopped. There is almost no wind from the W. My wife and I discussed where the wind is operating the turbines or are they being back fed with electricity to make them appear they are producing? 10:40 PM. There is no wind on the ground.

July 10 - 6:30 AM Almost no breeze. Turbines tuning slow. 11 :40 AM I can hear #'s 4 & 73 at my computer. We got home 30 minutes ago and I thought the turbines were fairly quiet. Now I hear both IN THE HOUSE. 1: 15 AM It's disgusting and very aggravating. I can hear turbines 4, 6, 73 and 74a inside the house and outside and is like being at O'Hare airport listening to the jet sounds. Very loud.

July 11 - 6:30 AM Turbine 4 not turning. 7:10 AM Wind S quiet. Turbine # 4 turning, but slow with only a hum, but easily heard from 1560' away. 10:15 AM I can hear # 4 in our dining room. 5:15 to 7:15 PM While changing oil in the cars I could hear #'s 4 and 73 the whole time. 9: 1 0 PM Wind SE. I can hear # 4. 10:05 PM Turbines 4 and 73 loud jet sound. 12:10 AM I am hearing a vibration, thumping vibration, thumping sound from turbines 4,6 & 73 in all parts of our house. Very, very sad and aggravating.

(Meyer Pre-Filed Testimony, FairwindCT Admin. Notice Item No. 58, Schedule 2, pages 13-14.)

230. The testimony of these witnesses demonstrates that wind turbine noise adversely affects residents living within at least 3300 feet of turbines.



231. Mark A. Franson provided testimony in which he provided distances to all seven proposed wind turbine locations in Petition Nos. 983 and 984. Mr. Franson identified a total of 174 structures within 1.25 miles of any the seven proposed wind turbine locations. (Franson Supp. Pre-Filed Testimony, page 3.)
232. Mr. Franson's testimony includes a table of distances from BNE's proposed turbine locations to various houses and other structures found in Colebrook and Norfolk, Connecticut. Part of the table is reproduced below. Where either Turbine 1 or Turbine 1a is the closest to a house or structure, the other location is also provided, since BNE has not committed to one location for its western turbine.

Address	Nearest Turbine		
	Turbine	Direction	Distance (feet)
16 Rock Hall Road	3	SSE	3199
20 Rock Hall Road	3	SSE	3024
19 Rock Hall Road	3	SSE	2661
28 Rock Hall Road	3	SSE	2890
32 Rock Hall Road	3	SSE	2701
40 Rock Hall Road	3	SE	2525
44 Rock Hall Road	3	SE	2261
112 Rock Hall Road	1	SE	908
112 Rock Hall Road	1a	E	1466
49 Rock Hall Road	1a	S	1178
49 Rock Hall Road	3	SE	1415
39 Pinney Street	3	SW	3485
42 Pinney Street	3	SE	3648
49 Pinney Street	3	WSW	3168
78 Pinney Street	3	WNW	3892
Pinney Street	3	WSW	3153
Pinney Street	3	W	3390
117 Pinney Street	2	NW	3165
114 Pinney Street	2	WNW	4388
150 Winsted-Norfolk Rd	1	N	1082
150 Winsted-Norfolk Rd	1a	NNE	1701

Address	Nearest Turbine		
	Turbine	Direction	Distance (feet)
154 Winsted-Norfolk Rd	1	NNE	992
154 Winsted-Norfolk Rd	1a	NNE	1681
160 Winsted-Norfolk Rd	1	NE	851
160 Winsted-Norfolk Rd	1a	NE	1603
177 Winsted-Norfolk Rd	1	E	1348
177 Winsted-Norfolk Rd	1a	ENE	2123
602 Greenwoods Rd Ext	1	SSE	3039
602 Greenwoods Rd Ext	1a	ESE	3594
32 Greenwoods Tpke	1	NNW	2386
17 Greenwoods Tpke	1	N	1903
17 Greenwoods Tpke	1a	N	2324
12B Greenwoods Tpke	1	N	1419
12B Greenwoods Tpke	1a	N	1886
10 Greenwoods Tpke	1	N	1461
10 Greenwoods Tpke	1a	NNE	2008
1 Greenwoods Tpke	1	N	1627
1 Greenwoods Tpke	1a	NNE	2232
4 Greenwoods Tpke	1	N	1461
4 Greenwoods Tpke	1a	NNE	2078
12A Greenwoods Tpke	1	N	1064
12A Greenwoods Tpke	1a	NNE	1615

(Franson Supp. Pre-Filed Testimony, Ex. 6.)

233. In the table above, 37 locations are within 3300 feet of one turbine; some are within that distance or less of two turbines. Some are within that distance of a least one turbine from Wind Colebrook North and Wind Colebrook South.

**X. Air Quality**

234. If constructed, the project will comply with air quality standards because it will have no air emissions. (Petition, pages 1, 3, 10, 34.)

## **XI. Water Quality**

235. DEP water quality standards are contained in several publications, the most expansive of which are the 2004 Connecticut Stormwater Quality Manual and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. (Council Admin Notice Item Nos. 9 (“2002 Guidelines”), 25 (“2004 Manual”).)
236. The goals of these water quality standards are to provide guidance on methods and techniques for minimizing erosion and sedimentation, and to protect the waters of the State of Connecticut from the adverse effects of post-construction stormwater runoff, thereby preventing pollution to the waters of the State. (2004 Manual at 1-2; 2002 Guidelines at 1-1.)
237. If a project complies with the 2004 Connecticut Stormwater Quality Manual and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, it is unlikely to have adverse effects on the waters of the State. (2004 Manual at 1-2; 2002 Guidelines at 1-1.)
238. BNE has revised its original site plans during the course of this proceeding. BNE has also revised the accompanying stormwater management plan with stormwater pollution prevention plan (SMP) and erosion and sediment control plan (ECP). (Petition, Exs. F-H; Jones Pre-Filed Testimony, Exs. 2-4.)
239. As discussed above, in its revisions, BNE proposed an “alternate” location for Turbine 1 that is approximately 805 feet north of the originally proposed location. (Libertine Pre-Filed Testimony, page 2; Franson Supp. Pre-Filed Testimony, Ex. 7.) The proposed alternate location is referred to as Turbine 1a throughout.
240. BNE stated in its petition that its project, then including the original site plans, SMP and ECP, met DEP water quality standards. (Petition, page 1-2, 30-31, 34-35.) Those original plans, submitted with its petition, were conceptual drawings not intended to be used for construction. (Petition, Ex. F.)
241. Mr. Carboni testified that the original plans did not comply with the water quality standards, including but not limited to the 2002 Guidelines, the 2004 Manual and the General Permit. (Carboni Pre-Filed Testimony, pages 3, 6-10, 13, 20.)
242. Mr. Carboni’s most significant concern regarding the original plans concerned the lack of sedimentation and outlet protection facilities. BNE’s plans provided for only silt fences and one sediment trap to prevent sedimentation at discharge points on the site. Mr. Carboni testified that at least six sediment traps, two sediment basins and three geotextile silt fences would be required under the 2002 Guidelines. BNE’s proposed solitary sediment trap and silt fences would not prevent sedimentation and would result in pollution of the waters of the state. (Carboni Pre-Filed Testimony, pages 3-5, 9.)

243. Mr. Carboni also expressed particular concern about one discharge area on the site: the proposed wetlands crossing at the crane road, where four road side ditches discharge directly into the wetlands. The 2002 Guidelines require that one discharge point have a sediment basin and that two of the other three points have temporary sediment traps. BNE proposed no sedimentation facilities at the wetland crossing. (Carboni Pre-Filed Testimony, pages 5-6.)
244. The basin required by the 2002 Guidelines would need to be 97 feet by 97 feet, a size that will be difficult to fit on the site at the necessary location and will necessitate clearing an additional half acre of the site. At the proposed wetlands crossing, the lack of sedimentation facilities would result in sedimentation of the wetlands; adding appropriate facilities would increase the direct wetlands impact. (Carboni Pre-Filed Testimony, pages 5-6.)
245. The same wetlands crossing proposed by BNE also lacked dewatering facilities and energy dissipators and inadequate information was provided by BNE regarding the appropriate size of the box culverts to be placed at the crossing. (Carboni Pre-Filed Testimony, pages 6-7.)
246. Mr. Carboni also expressed concerns about slope stabilization. BNE used 1:1 slopes extensively throughout the site in its original plans and the first revised plans. (Carboni Pre-Filed Testimony, pages 9-12.) The 2002 Guidelines require slopes of 2:1 or shallower in the absence of geotechnical analysis that shows steeper slopes will be stable with engineered design features. (2002 Guidelines, 5-2-5.) BNE had not done any geotechnical analysis at the time the original plans were prepared. (4/28/11 Tr. 131:9-14 (Jones).)
247. Mr. Carboni also expressed concerns regarding structural fabrication, road section, water quality swale, hydrology, water quality and stormwater quantity. (Carboni Pre-Filed Testimony, pages 12-19.)
248. BNE then revised its original plans. The revised plans were prepared by Civil 1, a different engineering firm than had prepared the original plans. (Jones Pre-Filed Testimony, Ex. 2.)
249. Mr. Jones of Civil 1 testified that the revised plans met DEP water quality standards. (Jones Pre-Filed Testimony, pages 7-8, 10-11; 4/28/11 123:23-124:3.) He later qualified his testimony to note that the plans were preliminary in nature are not to be construed as final construction plans. (Jones Supp. Pre-Filed Testimony, page 2-3; 4/28/11 Tr. 132:22-220:14 (Jones).)
250. Changes made in the revised plans included proposing relocating Turbine 1 closer to the beginning of the access road for Turbines 2 and 3, which reduced land clearing requirements for the project, and decreasing the width of the access road, revising the locations of the temporary laydown areas, crane pads and turnarounds, changing 1:1 slopes to 2:1 and 3:1 slopes, including sediment traps and conveyance swales and

providing for post-construction bioretention ponds to treat stormwater. (Jones Pre-Filed Testimony, pages 5-6 & Ex. 2.)

251. Mr. Carboni testified that the revised plans, although an improvement, still failed to comply with the 2002 Guidelines and the 2004 Manual. (Carboni Supp. Pre-Filed Testimony, pages 1-2, 5-6.) He also testified that the revised plans show that the original plans do not comply with water quality standards. Mr. Carboni testified that many of his concerns about the first set of plans had not been alleviated by the revisions. (Carboni Supp. Pre-Filed Testimony, pages 1-2.)
252. Mr. Carboni's most significant concerns regarding the revised plans relate to the sizing of the stormwater detention facilities and Mr. Jones' apparent significant underestimation of the areas tributary to the sedimentation facilities. (Carboni Supp. Pre-Filed Testimony, pages 2-3.)
253. Mr. Carboni testified that BNE's plans will result in a project that will, within a reasonable degree of engineering certainty, lead to pollution of the waters of the State. (Carboni Pre-Filed Testimony, page 20.)
254. BNE has not done a geotechnical investigation of the site, collected test pit or infiltration data or determined the depth of the season-high groundwater on the site. (4/28/11 Tr. 131:9-21 (Jones).) BNE cannot design the bioretention ponds until that data is collected. (2004 Manual, Chapter 11-P1-4 & -5.)
255. BNE will need to do additional field topographic work before completing a final design. (Jones Supp. Pre-Filed Testimony, pages 3, 6.) BNE will also need to gather detailed geotechnical information, complete final design of the dewatering features at the proposed wetlands crossing and obtain subsurface information for final road and drainage design. (Jones Supp. Pre-Filed Testimony, pages 4, 7-9; 5/5/11 Tr. 323:12-24 (Jones).)
256. Additional revisions to the site plans will be necessary due to Dr. Klemens' on-site herpetological study and eventual interconnection to the grid, as discussed above. The road will need to be moved approximately 40 feet to the north of the site to protect potential spring salamander habitat, sedimentation facilities may need to be relocated or reduced in size to protect the same habitat, geotextile silt fencing must be installed around the construction area for Turbine 1a and an additional wetlands crossing will be required for interconnection. (Klemens Herpetological Assessment, pages 3-5; 4/28/11 Tr. 128:18-129:19 (Rinebold, Jones); 5/5/11 Tr. 248:1-249:4 (Klemens).) BNE has not submitted those additional/revised plans. (5/5/11 Tr. 323:1-11 (Jones).)
257. Mr. Carboni testified that these additional revisions are likely to have an increased detrimental effect on water quality on the site. (5/5/11 Tr. 198:1-22 (Carboni).)

**XII. Visibility**

- 258. A total of 175 acres will have visibility of the turbine hubs above the tree canopy during leaf-on conditions. At their apexes, turbine blades will be visible from 329 acres. Approximately 1,389 acres of land will have visibility of the proposed turbine hubs during leaf-off conditions. (Petition, Ex. J.)
- 259. Approximately 86 residential properties may have at least partial views of the turbine hub during leaf-on conditions. (Libertine Pre-Filed Testimony, Ex. 2.)
- 260. Residential visibility is further demonstrated in the following chart, which lists BNE’s reported numbers of residential properties within 1 mile of the project:

	<b>Year-round Visibility</b>	<b>Leaf-off Visibility</b>
<b>Hub height</b>	26	97
<b>Hub plus 100-meter diameter blades</b>	24	N/A
<b>Hub plus 82.5-meter blades<sup>1</sup></b>	30	N/A

(Petition, Ex. J, page 6; Libertine Pre-Filed Testimony, Ex. 2, page 6.)

- 261. The dynamic nature of the turbines’ moving blades causes a more significant visual impact than projects that are static. (4/28/11 Tr. 76:19-77:3 (Libertine).)
- 262. At least two residential properties – located at 12A and 12B Greenwoods Turnpike – will be subject to year-round views of six wind turbines, based on the location of those residences in between Wind Colebrook South and that proposed in Petition 984, known as Wind Colebrook North. (Mow Pre-Filed Testimony, page 1; Grant Pre-Filed Testimony, page 1; Zima Pre-Filed Testimony, page 1; Chalder Supp. Pre-Filed Testimony, Ex. 2, Figures H & I.) Additional residential properties are likely to be subjected to similar visibility, including residential properties on Pinney Street and several other residential properties along Greenwoods Turnpike. (Chalder Pre-Filed Testimony, Ex. 3, Figures 11 & 12.)
- 263. Eight structures are located within half a mile of turbines associated with both this project and the Wind Colebrook South project. (Franson Supp. Pre-Filed Testimony, page 4.)

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<sup>1</sup> The data referenced in the chart regarding views of the turbine hub plus 82.5-meter blades is taken from Mr. Libertine’s Supplemental Visual Resource Analysis. While the chart on page 6 of that analysis references 50 meter blades, that is assumed to be a typographical error in light of Mr. Libertine’s Pre-Filed Testimony, which states that the purpose of the supplemental analysis is to reflect 82.5-meter diameter blades.

### **XIII. Public Health and Safety Issues**

#### **A. Setbacks**

264. Some states have setback standards for the siting of industrial wind turbines. (Supplemental Pre-Filed Testimony of Joel Rinebold, pages 15-18.)
265. In Dixmont, Maine, each wind turbine must be set back at least 2,500 feet from the property line of any non-participating property (unless waived by the property owner in writing) and at least 1,500 feet from any public way. (FairwindCT Supp. Admin. Notice Item No. 12 (Town of Dixmont, Maine, Wind Energy Facility Ordinance).)
266. In Jackson, Maine, each wind turbine greater than or equal to 1 MW, or a turbine height greater than or equal to 300 feet must be set back from the property line of any nonparticipating landowner a distance of no less than 13 times the turbine height (unless waived by the property owner in writing) and set back from any public road a distance no less than 4 times the turbine height. (FairwindCT Admin. Supp. Notice Item No. 13 (Town of Jackson, Maine, Wind Turbine Ordinance (Amended), Feb. 25, 2010).)
267. In Thorndike, Maine, each wind turbine must be set back at least 1,800 feet from the property line of any non-participating property (unless waived by the property owner in writing) and at least 1,500 from any public way. (FairwindCT Supp. Admin. Notice Item No. 15 (Thorndike, Maine, Wind Energy Facility Ordinance).)
268. The Montville (Maine) Wind Turbine Generator Ordinance states that “[s]etbacks to property lines are a minimum buffer of one mile from the Project Boundary. This is assuming a 1.5 MW industrial wind turbine, which has a Turbine Height of approximately 400 feet. However, larger wind turbines are louder, so a varying setback basis is required. A one mile setback is approximately equal to 13 times the turbine height for a 400 foot turbine. Therefore, the Setback Distance is defined as “the larger of one mile or 13 times the Turbine Height, measured horizontally from the Project Boundary to the nearest property line.” Furthermore, wind turbines must be “set back from any public road a distance no less than 4 times the turbine height, measured horizontally.” (FairwindCT Supp. Admin. Notice Item No. 16 (Montville, Maine, Wind Turbine Generator Ordinance).)
269. In February 2010, House Bill 677, “An act relating to wind energy plants” was introduced in the Vermont legislature. The bill proposes minimum setback requirements for wind energy plants that exceed 0.49 MW. The setbacks proposed in the bill include (1) one and one-quarter miles (6,600 feet) from an occupied building if the elevation change between the wind turbine and the occupied building is equal to or less than 500 feet, (2) two miles (10,560 feet) from an occupied building, if the elevation change between wind turbine and the occupied building exceeds 500 feet, (3) one-half mile (2,640 feet) from the closest boundary of the parcel on which the wind turbine will be located, and (4) one-third of a mile (1,759 feet) from any public highway or right-of-way

and from any above-ground utility line or facility. Under this bill, a property owner may waive one or more of the setback requirements by signing a written waiver of rights. (FairwindCT Supp. Admin. Notice Item No. 17 (Vermont House Bill 677 as Introduced (2010)).)

270. In November 2010, Senate Bill 2374, “An act concerning wind energy and supplementing Titles 13 and 40 of the Revised Statutes” was introduced in the New Jersey legislature. The bill states that no state “entity may approve any plan, proposal, or permit application for a wind energy structure if that wind energy structure will be erected or installed at a site that is closer than 2,000 feet from any residence or residentially zoned property.” (FairwindCT Supp. Admin. Notice Item No. 18 (New Jersey Senate Bill 2374 (2010)).)
271. An ice fragment can be thrown an estimated 285 meters (935 feet) or more from the GE 1.6-100 and 265 meters (869 feet) or more from the GE 1.6-82.5. (Heraud Pre-Filed Testimony, page 3.)
272. At the property boundary of the site, modeled noise conditions demonstrate that the proposed wind turbines will be in excess of 6 to 10 dB above the permissible residential-to-residential nighttime noise and up to 4 dB above the permissible industrial-to-residential nighttime noise. (Bahtiarian Post-Hearing Supp. Pre-Filed Testimony, dated May 12, 2011, Ex. 9.)
273. If icing is likely at the wind turbine site, GE Energy recommends a setback distance of  $1.5 \times (\text{Hub Height} + \text{Rotator Diameter})$ . (FairwindCT Admin. Notice Item Nos. 13 (GE Energy, Setback Considerations) & 16 (GE Energy, Ice Shedding and Ice Throw – Risk and Mitigation).) This calculates to 273.75 meters (approximately 898 feet) for the 82.5-meter blade diameter and 300 meters (approximately 984 feet) for the 100-meter blade diameter. There are both residences and property lines within those distances from the proposed turbine locations. (BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.)
274. One of BNE’s witnesses testified that 1,040 feet to the nearest residential dwelling is an adequate buffer to protect public health and safety, and noted that this buffer would also meet a setback equal to 1.5 times the maximum height of the tower plus the diameter of the blade with either an 82.5-meter diameter blade or a 100-meter diameter blade. (Rinebold Pre-Filed Testimony, pages 13-14.) This same witness testified in Petition No. 983 that 984 feet was an adequate buffer and testified in Petition No. 980 that 920 feet was an adequate buffer. (FairwindCT Admin. Notice Items No. 72 (Petition No. 980, Rinebold Supp. Pre-Filed Testimony, page 1) & 73 (Petition 983, Rinebold Pre-Filed Testimony, page 13).)



275. Eleven property lines, all of which are zoned for residential use, are within 1,040 feet of one or more of the four proposed turbine locations, as shown in the table below.

Address	Property Owner	Distance from Turbine to Abutting Property Line			
		Turbine 1	Turbine 1a	Turbine 2	Turbine 3
49 Rock Hall Rd	Jeffery W. Stauffer & Mary E. Hubbard		480 ft	990 ft	153 ft
160 Winsted-Norfolk Rd	James F. & Judith A. Tierney	740 ft			
154 Winsted-Norfolk Rd	Thomas F. Cail	837 ft			
12A Greenwoods Tpke	Kristin & Benjamin Mow	970 ft			
117 Pinney St	Susan N. Wagner			880 ft	
Pinney St	Susan N. Wagner			525 ft	660 ft
Pinney St	Helen L. Plager Trust			725 ft	530 ft
177 Winsted-Norfolk Rd	Northwestern CT Sportsman's Association	900 ft			
112 Rock Hall Rd	Maasser Annual Reunion Association	390 ft	370 ft		
150 Winsted-Norfolk Rd	Julianne & Jeffery Lepkowicz	990 ft			
Rock Hall Rd	Christine L. Stauffer	830 ft	455 ft		

(BNE Responses to FairwindCT's Third Set of Interrogatories, Answer 17.)

**B. Ice Throw**

276. Ice can be and has been thrown from wind turbines. Ice throw is a safety issue with wind turbine projects. (Heraud Pre-Filed Testimony, Ex. 2, pages 6, 9 & Ex. 3, pages 6, 9.)

277. Connecticut has weather conditions that will result in ice buildup on the proposed wind turbines if they are built. (Petition No. 983, 4/14/11 Tr. 81:25-82:3 (Heraud).)

278. Ice typically forms between 28 and 36 degrees Fahrenheit and in high-humidity conditions. Both glaze ice and rime ice are safety concerns. (Heraud pre-Filed Testimony, Ex. 2, pages 5-6 & Ex. 3, pages 5-6; Petition No. 983, 4/14/11 Tr. 49:16-50:5 (Heraud).)
279. With appropriate setbacks and mitigation measures, the risk of injury to people and property due to ice throw can be reduced to zero. (Petition No. 983, 4/14/11 Tr. 82:4-8 (Heraud).)
280. BNE submitted ice throw reports for both the 82.5-meter and 100-meter blade diameter. (Heraud Pre-Filed Testimony, Exs. 2 & 3) Those reports calculated the probability that ice would drop or throw and hit a one square meter “receptor.” (Heraud Pre-Filed Testimony, Ex. 2, page 8 & Ex. 3, page 8.)
281. BNE did not submit ice throw reports showing the locations of Turbine 1, although Dr. Heraud ran that analysis and generated figures showing the ice danger zones for that turbine location. (4/28/11 Tr. 135:22-136:20 (Heraud).)
282. Dr. Heraud, BNE’s witness, determined the probability of ice throw and ice drop based on a two-step process. The first step involved a Monte Carlo analysis, in which inputs, or assumptions, regarding the size and shape of the possible ice throw were used. This analysis was conducted using internal software developed by Dr. Heraud’s employer, rather than publicly available software programs such as WindPRO and WindFarmer. (Heraud Pre-Filed Testimony, Ex. 2 & Ex. 3; 4/28/11 Tr. 133:19-24 (Heraud).)
283. The Monte Carlo analysis assumed that ice would throw or drop in 0.5 and 1 kilogram chunks. The analysis also assumes no lift. (Heraud Pre-Filed Testimony, Ex. 2, pages 7, 10 & Ex. 3, pages 7, 10.)
284. The Monte Carlo analysis also assumes a constant rate of ice accretion along the whole length and leading edge of the turbine blades. (Heraud Pre-Filed Testimony, Ex. 2, page 10 & Ex. 3, page 10.)
285. In the second step of Dr. Heraud’s analysis, he looked at climate data obtained from the met tower data from one winter season at the site. Based on the total amount of corrupted data from the met tower at the proposed Colebrook South site, which was provided to him by another of BNE’s consultants, Dr. Heraud assumed a total of 12 icing days per year at the site. (4/28/11 Tr. 141:14-143:2 (Heraud).)
286. Because Dr. Heraud used the wind data from the proposed Wind Colebrook South site, his conclusions regarding the distance ice could potentially drop and be thrown from the proposed turbine locations at the Wind Colebrook North site are identical. (Heraud Pre-Filed Testimony, Ex. 2, page 6 & Ex. 3, page 6; 4/28/11 Tr. 134:21-135:2 (Heraud).)

287. Dr. Heraud did not check with the Town of Colebrook garage to see how many days or hours trucks were dispatched each winter season to treat roads for icing conditions. (4/28/11 Tr. 143:7-144:2.)
288. Using a larger number of icing days in the analysis would proportionately increase the probability of the risk of ice throw injury. (4/28/11 Tr. 144:7-13 (Heraud).)
289. The maximum distance ice could drop with the 100-meter diameter blades is 120 meters, or approximately 394 feet. (Heraud Pre-Filed Testimony, Ex. 2, page 10.) There are two residential property lines and a town road located within that distance from proposed turbine locations. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)
290. Turbine 3 is just 153 feet from a residential property line to the north of the site, located at 49 Rock Hall Road. Turbine 1 is just 390 feet from the Maasser Annual Reunion Association property, located at 112 Rock Hall Road. Turbine 1a is 20 feet closer to the Maasser property. Rock Hall Road is just 300 feet from Turbine 1a and 330 feet from Turbine 1. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18; 4/28/11 Tr. 138:3-23 (Heraud).) Ice could therefore drop beyond the boundaries of the site onto two residential properties and a local town road.
291. The "typical range" for ice throw from the 100-meter diameter blades is up to 160 meters, or about 525 feet. (Heraud Pre-Filed Testimony, Ex. 2, page 10.) There is a town road and four property lines located within that distance from proposed turbine locations. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)
292. In addition to the properties and the town road listed above, two other residential property lines are within the typical ice throw zone. Turbine 1a is 455 feet from a residential property located across Rock Hall Road owned by Christine L. Stauffer. Turbine 2 is 525 feet from a parcel owned by Susan Wagner at Pinney Street. The residential property located at 49 Rock Hall Road is located within the typical ice throw zone for both Turbine 1a and Turbine 3. Ice could therefore be typically thrown beyond the boundaries of the site onto four different residential properties.
293. A fifth residential property line is just 5 feet outside the typical ice throw zone. The residential property located on Pinney Street and owned by the Helen L. Plager Trust is 530 feet from Turbine 3. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)
294. The maximum distance ice could be thrown with the 100-meter diameter blades is 285 meters, or approximately 935 feet. (Heraud Pre-Filed Testimony, Ex. 2, page 10.)

There are nine residential property lines located within that distance from proposed turbine locations, as well as two public roads and two structures, one of them a residence. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)

295. In addition to the properties listed above, five additional residential property lines are within that distance from the proposed turbine locations, as is Winsted-Norfolk Road. Christine Stauffer's property on Rock Hall Road is 455 feet from Turbine 1a and 830 feet from Turbine a. The gun club's property at 177 Winsted-Norfolk Road is 900 feet from Turbine 1. One residential parcels on Pinney Street owned by Susan Wagner is 880 feet from Turbine 2, and a second parcel owned by Ms. Wagner is 525 feet from Turbine 2 and 660 feet from Turbine 3. Thomas Cail's property at 154 Winsted-Norfolk Road is 837 feet from Turbine 1. Property owned by Judith and James Tierney at 160 Winsted-Norfolk Road is 740 feet from Turbine 1. The residential property located on Pinney Street and owned by the Helen L. Plager Trust is 530 feet from Turbine 3 and 725 feet from Turbine 2. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)
296. Turbine 1 is 840 feet from the residence located at 160 Winsted-Norfolk Road and 900 feet from one of the pavilions on the Maasser Annual Reunion Association's property at 112 Rock Hall Road. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)
297. Both Rock Hall Road and Winsted-Norfolk Road (Route 44) are within the maximum ice throw range. (BNE Responses to FairwindCT's First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT's Third Set of Interrogatories, Answers 17 & 18.)

298. These findings for the 100-meter diameter blade are summarized in the below chart. Note that references to residential property lines refers to zoning of the property. The Maasser Annual Reunion Association property and the gun club property are therefore included in the residential property count.

	<b>Distance</b>	<b>No. of Structures w/in Range</b>	<b>No. of Property Lines w/in Range</b>	<b>No. of Residential Property Lines w/in Range</b>	<b>No. of Roads w/in Range</b>
Maximum ice drop range	0 to 120 meters (0 to 394 feet)	0	2	2	1
Typical range of ice throw	0 to 160 meters (0 to 525 feet)	0	4	4	1
Maximum range of ice throw	0 to 285 meters (0 to 935 feet)	2	9	9	2

(Heraud Pre-Filed Testimony, Ex. 2, page 10; BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.)

299. The maximum distance ice could drop with the 82.5-meter diameter blades is 114 meters, or approximately 374 feet. (Heraud Pre-Filed Testimony, Ex. 3, page 10.) There are two residential property lines located within that distance from proposed turbine locations, listed above. (BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.) Ice could therefore drop beyond the boundaries of the site onto two different residential properties.
300. The “typical range” for ice throw from the 82.5-meter diameter blades is up to 140 meters, or about 459 feet. (Heraud Pre-Filed Testimony, Ex. 3, page 10.) There are three residential property lines located within that distance from proposed turbine locations, listed above. (BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.) Ice in the “typical range” for ice throw could therefore cross the boundaries of the project site onto three different residential properties.
301. The maximum distance ice could be thrown with the 82.5-meter diameter blades is 265 meters, or approximately 869 feet. (Heraud Pre-Filed Testimony, Ex. 3, page 10.) There are seven residential property lines located within that distance from proposed turbine locations, listed above. (BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.) Ice in the maximum range for ice throw could

therefore cross the boundaries of the project site onto seven different residential properties.

302. These findings for the 82.5-meter diameter blade are summarized in the below chart. Note that references to residential property lines refers to zoning of the property. The Maasser Annual Reunion Association property is therefore included in the residential property count.

	<b>Distance</b>	<b>No. of Structures w/in Range</b>	<b>No. of Property Lines w/in Range</b>	<b>No. of Residential Property Lines w/in Range</b>	<b>No. of Roads w/in Range</b>
Maximum ice drop range	0 to 114 meters (0 to 374 feet)	0	2	2	1
Typical range of ice throw	0 to 459 meters (0 to 140 feet)	0	3	3	1
Maximum range of ice throw	0 to 265 meters (0 to 869 feet)	1	7	7	2

(Heraud Pre-Filed Testimony, Ex. 3, page 10; BNE Responses to FairwindCT’s First Set of Interrogatories, Answers 38 & 39; BNE Responses to FairwindCT’s Third Set of Interrogatories, Answers 17 & 18.)

**C. Blade Throw**

303. Blades can be thrown and have been thrown from wind turbines. (FairwindCT Admin. Notice Item No. 60, pages 35-37.)
304. BNE did not submit a blade throw analysis. (4/28/11 Tr. 135:8-10.) Nor did it respond to the Council’s interrogatory asking for the approximate distance that parts of the blades could be thrown from a turbine. (BNE Amended Response to Council’s Interrogatories, Set One, Answer 26.)
305. Blades have been thrown distances beyond the wind-industry recommended setback of 1.5 times total hub and blade height. (FairwindCT Admin. Notice Item No. 60, page 37.)

**D. Shadow Flicker**

306. “Shadow flicker,” an annoyance unique to wind turbines, is defined as the effect of alternating changes in light intensity of the sun caused by the rotating blades of the turbine casting a moving shadow to a nearby area. (Libertine Pre-Filed Testimony, Ex. 3, pages 1-2.)

307. Michael Libertine of VHB did the shadow flicker analyses for BNE. (Libertine Pre-Filed Testimony, page 1.) The collection of shadow flicker analyses done for BNE are the first shadow flicker studies ever undertaken by Mr. Libertine. (Petition No. 980, 3/3/11 Tr. 121:22-25 (Libertine).)
308. Under certain circumstances, shadow flicker can be cast through an unobstructed window of a home, so that a room could experience repetitive changes in brightness. Shadow flicker can also occur outside by casting alternating shadows. (Libertine Pre-Filed Testimony, Ex. 3, page 2.)
309. The frequency of shadow flicker is determined by a rotor's speed and the number of blades on the rotor. The frequency is measured in Hertz (Hz), with 1 Hz being equivalent to one flicker per second. (Libertine Pre-Filed Testimony, Ex. 3, page 3.)
310. Initially, Mr. Libertine did a shadow flicker analysis for the blade diameter of 100 meters for proposed Turbines 1, 2 and 3. (BNE Amended Responses to Council's Interrogatories, Set One, Answer 18 & Ex. 3.) Several weeks later, BNE submitted a shadow flicker analysis for the 82.5-meter diameter blades for proposed Turbines 1a, 2 and 3. (Libertine Pre-Filed Testimony, Ex. 3, page 2.) BNE never submitted a shadow flicker analysis of the 100-meter blade diameter for proposed Turbine 1a; nor did it submit a shadow flicker analysis for the 82.5-meter blade diameter for proposed Turbine 1.
311. Mr. Libertine did the BNE shadow flicker analysis for the blade diameter of 82.5 meters using a nominal speed range of 9.75 to 16.18 revolutions per minute. (Libertine Pre-Filed Testimony, Ex. 3, page 3.)
312. That rotation speed corresponds to a flicker frequency of or 0.49 to 0.94 Hz. (Libertine Pre-Filed Testimony, Ex. 3, page 3.) However, with the 100-meter blades, Mr. Libertine reports a nominal speed range of 9.75 to 16.18 revolutions per minute, which corresponds to a flicker frequency of 0.49 to 0.81 Hz. (BNE Amended Responses to Council's Interrogatories, Set One, Answer 18 & Ex. 3, page 3.) The difference in the flicker frequency measurements was never explained.
313. Flicker frequencies within this range may be considered an annoyance under certain circumstances. (Libertine Pre-Filed Testimony, Ex. 3, page 3.)
314. An analysis of potential shadow flicker occurrences in the surrounding area resulting from the proposed project was conducted using the SHADOW module of WindPRO software. WindPRO is a modular-based software package developed by EMD International that was designed for the wind industry for the planning and evaluation of wind power projects. The software model claims that it can determine the duration of shadow flicker experienced at a specific viewing location, by using a geometric analysis which accounts for the relative positions of the sun (throughout the time of year and day), the locations of the wind turbines, and the viewing location. The SHADOW module

calculates the duration of time that shadow flicker could occur at receptor locations within the program's default distance of 2,000 meters (6,561 feet) from the wind turbine locations. The 2,000-meter distance was used in Mr. Libertine's analysis as the "Study Area." (Libertine Pre-Filed Testimony, Ex. 3, page 3.)

315. The WindPRO analysis purports to calculate predicted shadow flicker occurrences for specific receptor locations. A "receptor" is defined as an occupied structure within the 2,000 meter (6,561 feet) radius study area. The receptors were located using a combination of aerial photography, online assessor information and selective field verification. Each receptor was modeled using the WindPRO SHADOW module's "greenhouse" mode. The greenhouse mode sensors can "see" in all directions, as if the receptor were an entirely glass structure (similar to a greenhouse), with no obstructions to block incoming light (or shadows). (Libertine Pre-Filed Testimony, Ex. 3, pages 3-4.)
316. A total of 136 receptors were identified within the 2,000 meter radius study area for the 82.5-meter blade diameter and 138 receptors were identified within the 2,000 meter radius study area for the 100-meter blade diameter shadow flicker analyses. (Libertine Pre-Filed Testimony, Ex. 3, page 3; BNE Amended Responses to Council's Interrogatories, Set One, Answer 18 & Ex. 3, page 8.)
317. Mr. Libertine claims the modeling offered by BNE assumes that at distances greater than a 2,000 meter (6,561 feet) radius from the turbines, the frequency of shadow flicker occurrence is low enough and its intensity faint enough to not be a distraction to human activities. (Libertine Pre-Filed Testimony, Ex. 3, page 4.) He offered no evidence to verify the adequacy of the 2,000-meter default radius.
318. Mr. Libertine did not do a shadow flicker analysis using a 3,000-meter radius. (4/28/2011 Tr. 113:10-16 (Libertine).)
319. Mr. Libertine did not know of any studies on the effects of shadow flicker on domesticated field animals. (4/28/2011 Tr. 114:9-11 (Libertine).)
320. Mr. Libertine viewed the WindPRO software as a "worst-case scenario" and then did a modified analysis using a 50% reduction factor to produce what he labeled a "probable case scenario." Mr. Libertine testified that the 50% reduction factor was reasonable given historic weather statistics and accounting for periodic operational limitations. (Libertine Pre-Filed Testimony, Ex. 3, page 5.) He cited no historic weather statistics in evidence to verify this claim.
321. The 50% reduction factor was not based on any specific formula, even though partly cloudy days occur 20% to 25% annually in Colebrook (according to Mr. Libertine). (Libertine Pre-Filed Testimony, Ex. 3, page 6.) He offered no scientific justification to support the 50% reduction factor.



322. There are no federal or State of Connecticut standards for exposure to shadow flicker. (Libertine Pre-Filed Testimony, Ex. 3, pages 5-6.)
323. According to Mr. Libertine, some other countries have adopted standards that limit shadow flicker to amounts ranging from 8 hours per year to 30 hours per year at an occupied structure. (Libertine Pre-Filed Testimony, Ex. 3, pages 6-7.)
324. The 30-hour per year standard relied upon by Mr. Libertine, however, comes with an additional limitation that no one receptor may be subjected to more than 30 minutes per day of shadow flicker. Denmark has an unofficial guideline of 10 hours per year and Sweden uses 8 hours per year. (Petition No. 983, 4/26/2011 Tr. 126:11-127:10 (Libertine).)
325. The map showing “Probable Case Shadow Flicker” for the 82.5-meter diameter blades was not created using the values found in Table 4 Shadow Flicker Results-Receptor Locations, but was “developed using a raster image created from the WindPRO software calculations. The WindPRO raster image of shadow flicker is a 10 m x 10 m grid cell dataset that contains the values based on the tabulator report values. Due to the 10 m resolution of the grid cells, the resulting raster image is not as accurate as it tabulated values, and thus has been incorporated into Figure 1 to depict the generalization of the shadow flicker results.” (Libertine Pre-Filed Testimony, Ex. 3, page 6.)
326. The proposed 82.5-meter blade diameter was analyzed to determine the potential for shadow flicker impacts at the 136 receptors located within the Study Area using a combination of worst-case scenario modeling and incorporating a probable-case scenario. In the 82.5-meter blade diameter analysis, a total of 10 receptors are predicted to experience shadow flicker at some time during the year, with annual durations ranging from 53 minutes to nearly 43 hours, worst case. One receptor is predicted to experience more than 30 hours per year with a maximum day at 31 minutes. (Libertine Pre-Filed Testimony, Ex. 3, Table 4.)
327. In the 100-meter blade diameter analysis, a total of 11 receptors are predicted to experience shadow flicker at some time during the year, with annual durations ranging from 1 hour to 41 hours, worst case. Two receptors are predicted to experience more than 30 hours per year and over 31 minutes per day on the worst days. (BNE’s Responses to Council’s Interrogatories, Set One, Ex. 3, page 8 & Table 4.)
328. Other properties that are within the 82.5-meter blade diameter Study Area are not included in Table 4, but are included in the raster image map. (Libertine Pre-Filed Testimony, Ex. 3, Figure 1.) Receptor AL is the dwelling at 117 Pinney Street. Under the probable case scenario for the 82.5-meter diameter blades, that property will be assaulted more than 9 hours of shadow each year. (Libertine Pre-Filed Testimony, Ex. 3, Figure 1 & Table 4.) Under the worst-case scenario, 117 Pinney Street will be assaulted with 18.3 hours of shadow flicker between May 16 in July 27 every year. Flicker will occur on 73 of 365 days. (Libertine Pre-Filed Testimony, Ex. 3, Table 4, App’x A & App’x B.)

329. If BNE constructs Wind Colebrook North using the 82.5-meter diameter blades, Susan Wagner, the owner of 117 Pinney Street and a party to this proceeding, can expect to have worst-case shadow flicker every evening between May 16 and July 27. Depending on the day, Ms. Wagner may experience between 2 minutes and 18 minutes of shadow flicker every evening during this period. The same property is expected to have shadow flicker from Wind Colebrook South for less than 10 hours per year. BNE never provided the days of the year for flicker intrusion from Wind Colebrook South. (Libertine Pre-Filed Testimony, Ex. 3, App'x B (receptor AL); see also Petition No. 983, Libertine Pre-Filed Testimony, Ex. 3, App'x B (receptor B).)
330. Other areas will experience 10 to 20 hours of shadow flicker each year, including portions of Route 44. BNE did not calculate the times of year or day during which that flicker will be experienced, so one cannot draw conclusions as to the effects on traffic. (Libertine Pre-Filed Testimony, Ex. 3, Figure 1.)
331. BNE's shadow flicker analysis for the 82.5-meter diameter blades contains other values for other receptors and does not show cumulative values for Wind Colebrook South and Wind Colebrook North. (Libertine Pre-Filed Testimony, Ex. 3, Table 4 & App'x A.)
332. Worst-case impacts for each of the non-participating properties are listed below. Note that in Table 4 of his report, Mr. Libertine reports the Shadow Number of Days Per Year from his SHADOW-Main Result report as the maximum minutes of flicker per day. The table below corrects the report and supplies values from Mr. Libertine's Appendix B, SHADOW-Calendar reports for each receptor, to report values for the maximum minutes of flicker per day.

<b>Map ID</b>	<b>Site Address</b>	<b>Worst Case Hours / Year</b>	<b>Worst Case Max Minutes / Day</b>	<b>Worst Case Days / Year</b>
P	177 Winsted-Norfolk Rd	44:42:20	31	114
AL	117 Pinney Street	18:20:00	19	73
BE	Pinney Street	10:27:00	17	28
BA	98 Pinney Street	10:21:00	16	52
CA	94 Stillman Rd	9:20:00	14	46
AU	105 Pinney Street	6:02:00	17	28
DK	599 Greenwoods Rd Ext	5:02:00	12	39

<b>Map ID</b>	<b>Site Address</b>	<b>Worst Case Hours / Year</b>	<b>Worst Case Max Minutes / Day</b>	<b>Worst Case Days / Year</b>
AY	102 Pinney Street	2:35:00	12	18
BP	1 Bunnell St Ext	2:06:00	10	18
BZ	109 Rockwell Rd	0:53:00	5	12

(Libertine Pre-Filed Testimony, Ex. 3, Table 4 & App'x A (analysis reported for 82.5-meter blade diameter and proposed Turbines 1a 2 and 3).)


333. BNE's shadow flicker analysis for the 100-meter diameter blades contains other values for other receptors and does not show cumulative values for Wind Colebrook South and Wind Colebrook North. Worst-case impacts for each of the non-participating properties are listed below.

<b>Map ID</b>	<b>Site Address</b>	<b>Worst Case Hours / Year</b>	<b>Worst Case Max Minutes / Day</b>	<b>Worst Case Days / Year</b>
O	112 Rock Hall Road	82:03:00	68	95
P	177 Winsted-Norfolk Rd	61:56:00	4731	114
AL	117 Pinney Street	15:23:00	19	72
AR	114 Pinney Street	5:55:00	15	40
AT	108 Pinney Street	12:53:00	16	63
BE	Pinney Street	9:48:00	17	53
BA	98 Pinney Street	n/a	n/a	n/a
CA	94 Stillman Rd	9:29:00	11	46
AV	105 Pinney Street	5:45:00	17	26
AU	105 Pinney Street	2:34:00	10	20
DK	599 Greenwoods Rd E	13:34:00	19	86

Map ID	Site Address	Worst Case Hours / Year	Worst Case Max Minutes / Day	Worst Case Days / Year
BS	7 Bunnell St Ext	2:50:00	11	22
AY	102 Pinney Street	n/a	n/a	n/a
BP	1 Bunnell St Ext	n/a	n/a	n/a
BZ	109 Rockwell Rd	n/a	n/a	n/a

(BNE Amended Responses to Council’s Interrogatories, Set One, Ex. 3, Table 4, App’x A & B (analysis reported for 100-meter blade diameter and proposed Turbines 1, 2 and 3).)

334. Receptors with “n/a” values have shadow flicker in the 82.5-meter blade diameter analysis for the indicated receptor, but none in the 100-meter blade diameter analysis. Others some have shadow flicker in the 100-meter blade diameter analysis but none in the 82.5-meter blade diameter analysis. (BNE Amended Responses to Council’s Interrogatories, Set One, Ex. 3, Table 4, App’x A & B.)

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**CERTIFICATION**

I hereby certify that a copy of the foregoing document was delivered by first-class mail  
and e-mail to the following service list on the 27th day of May, 2011:

Lee D. Hoffman  
Paul Corey  
Thomas D. McKeon  
David M. Cusick  
Richard T. Roznoy  
David R. Lawrence and Jeannie Lemelin  
Walter Zima and Brandy L. Grant  
Eva Villanova

and sent via e-mail only to:

John R. Morissette  
Christopher R. Bernard  
Joaquina Borges King

  
Emily A. Gianquinto