PETITION NO. 984 - BNE Energy, Inc. petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of a 4.8 MW Wind Renewable Generating facility located on Winsted-Norfolk Road (Route 44), Colebrook, Connecticut.	}	Connecticut
	}	Siting
	}	Council
		June 9, 2011

FINDINGS OF FACT

INTRODUCTION

Administrative Procedures

1. BNE Energy Inc. (BNE), in accordance with provisions of Connecticut General Statutes (CGS) § 16-50k and § 4-176(a), submitted a petition (Petition) to the Connecticut Siting Council (Council) on December 13, 2010 for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need (Certificate) is required for the construction, operation, and maintenance of a 4.8 megawatt (MW) Wind Renewable Generating facility located on Winsted-Norfolk Road (Route 44) and Rock Hall Road in Colebrook, Connecticut. The project is referred to as Wind Colebrook North (refer to Figure 1). (BNE 1, vol. 1, p. 1)

2. Prior to filing its Petition for Wind Colebrook North, BNE filed a similar petition for another Wind Renewable Generating Facility proposed for a property in Colebrook off of Flagg Hill Road and known as Wind Colebrook South (Petition 983). (Transcript, March 22, 2011, 6:39 p.m. [Tr. 1], p. 5)

3. BNE is a Delaware corporation with its principal place of business in West Hartford, Connecticut. It was founded in 2006 for the purposed of constructing and operating commercial wind generation projects in Connecticut, New England, and beyond. (BNE 1, vol. 1, pp. 2, 6)

4. The parties in this proceeding are BNE, the Town of Colebrook (Town), Stella and Michael Somers, Susan Wagner, FairwindCT, Inc. (FairwindCT), Kristin and Benjamin Mow, Jeffrey and Mary Stauffer, Eva Villanova, Dr. David Lawrence and Jeannie Lemelin, Walter Zima, and Brandy Grant. The Connecticut Light and Power Company (CL&P) is an intervenor. For this proceeding, FairwindCT, Stella and Michael Somers and Susan Wagner were grouped as one party; Dr. David Lawrence and Jeannie Lemelin, Jeffrey and Mary Stauffer, and Eva Villanova were grouped as one party; and Walter Zima and Brandy Grant were grouped as one party. (Transcript, April 26, 2011, 5:30 p.m. [Tr. 3], pp. 4-5)

5. The purpose of the proposed project is to provide a source of renewable energy to help the state meet its adopted renewable portfolio standards (RPS), to lessen the country's dependence on foreign energy resources, and to reduce the environmental impacts associated with the use of fossil fuels for energy generation. (BNE 1, vol. 1, p. 3)

6. BNE submitted a proposal to the Connecticut Clean Energy Fund for Wind Colebrook in response to its Call for Applications for Renewable Energy Projects in Pre-Development, and the proposal was approved on July 17, 2008. (BNE 8 – Pre-Filed Testimony of Paul Corey, p. 2)

7. At the same time it filed its petition with the Council, BNE notified all abutting property owners via certified mail of its filing. (BNE 1, vol. 1, p. 33)

8. BNE received return receipts from all but two property owners to whom it sent notices of its intent to file a petition with the Council. One of these property owners became a party to the petition proceeding. BNE re-sent a notice of its filing a petition with the Council to the other property owner via regular mail. (BNE 2, A1)

9. BNE submitted copies of its petition to local and state officials who are normally required to receive notice of applications for a Certificate of Environmental Compatibility and Public Need under CGS § 16-50*l* (b). (BNE 1, vol. 1, p. 33)

10. BNE published a legal notice of the filing of its petition with the Council in the Litchfield County Times on December 3, 2010. (BNE 1, vol. 1, p. 33; BNE 2, A2 and Exhibit 2, Affidavit of Publication)

11. On March 9, 2011, BNE posted a sign at the intersection of Route 44 and Rock Hall Road. that included information about the application, the scheduled hearing, and how to contact the Council. (BNE 8 [Corey], A4; Tr. 4, p. 8)

12. The Council, its staff, participants in this proceeding, and members of the public conducted an inspection of the proposed site on March 22, 2011, beginning at 2:00 p.m. BNE attempted to fly a balloon approximately midway between the two easterly turbine locations. BNE intended to fly the balloon at a height of 200 feet, but weather conditions were not conducive for a successful flight. (Tr. 4, pp. 8-9)

13. Pursuant to Section 16-50j-21 and 16-50j-40 of the Regulations of Connecticut State Agencies, the Council, after giving due notice thereof, held public hearings on March 22, March 23, April 26, April 28, and May 5, 2011. The hearings on March 22 and 23 were held at the Northwest Regional High School, Battistoni Drive, Winsted, Connecticut and were reserved for public comment. The evidentiary hearing for this petition commenced on April 26. and was held at the Council offices at Ten Franklin Square, New Britain, Connecticut. This hearing was continued on April 28 and on May 5. The evidentiary hearing concluded on May 5. (Transcript, March 22, 2011, 6:39 p.m.[Tr. 1], p. 4; Transcript, March 23, 2011, 6:30 p.m. [Tr. 2], p. 4; Tr. 3, p. 3; Transcript, April 28, 2011, 11:10 a.m. [Tr. 4], p. 3; Transcript, May 5, 2011, 11:10 a.m. [Tr. 5], p. 3)

14. BNE filed technical documentation in support of its petition that was subject to a Protective Order issued by the Council on April 26, 2011. The documentation included: a Mutual Non-Disclosure Agreement, Specifications for Site Road and Crane Pad, Noise emission characteristics for the GE 1.6xle wind turbine, Calculated Power Curve for the GE 1.6xle wind turbine, Technical Description & Data for the GE 1.6xle wind turbine, a Calculated Power Curve 1.6-100, Setback Considerations for Wind Turbine Siting from GE Wind, confidential wind data, and sodar data for the Wind Colebrook North site. (Council Protective Order of April 26, 2011)

State Agency Comments

15. Pursuant to CGS § 16-50j (h), on February 7, 2011 and 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, Office of Policy and Management, Department of Economic and Community Development (DECD), the Department of Transportation DOT), and the Department of Emergency Management and Homeland Security. (CSC Hearing Package dated February 7, 2011; CSC Letter to State Department Heads dated May 6, 2011)

16. DEP submitted comments on April 6, 2011. Its comments addressed air emissions, natural features of the site, visual impacts, the bat survey, the bird survey, species listed on the natural diversity data base, watercourse crossings, and the proposed upland meadow vegetative treatment. (DEP Letter from Frederick Riese, dated April 6, 2011)

17. DOT submitted correspondence stating that it had no comments on the proposed project. (DOT Letter from Sohrab Afrazi, dated March 23, 2011)

18. In response to a request from counselors representing the parties of FairwindCT, Inc., Stella and Michael Somers, and Susan Wagner, DOT reviewed the shadow flicker analysis submitted as part of this petition. After its review, DOT concluded that the potential effect of shadow flicker would not be detrimental to motorists. (DOT Letter from Sohrab Afrazi, dated May 4, 2011)

19. The DECD fully supports the state's initiative to develop alternative energy sources. (DECD Letter dated May 5, 2011)

20. Other than DEP, DOT and DECD, no other state agencies responded to the Council's solicitation for comments. (Record)

Municipal Consultation

21. Prior to filing its petition with the Council, BNE submitted preliminary information about its proposed Wind Colebrook North project to the Town on October 8, 2010. (BNE 1, vol. 1, pp. 32-33)

22. At the request of the Town's First Selectman, BNE conducted a legally noticed, public informational meeting at the Colebrook Town Hall on November 10, 2010 (BNE 1, vol. 1, p. 33; BNE 8 – Pre-Filed Testimony of Paul Corey, p. 2)

23. BNE applied to the Town of Colebrook for a special permit to install a meteorological (Met) tower on the Wind Colebrook South Property at 29 Flagg Hill Road. The permit for the Met tower was approved on November 24, 2008, and the Met tower was installed on or about December 12, 2008. The Met tower permit was subsequently appealed and the Zoning Board of Appeals held a public hearing on February 4, 2009. The Met tower permit was unanimously upheld. The Zoning Board of Appeals decision was appealed to Superior Court, but subsequently withdrawn. (BNE 8 [Corey], p. 2)

24. BNE would be willing to enter into a host community agreement with the Town that could include, among other provisions, annual payments in lieu of taxes in the event that legislation is passed in the state making wind projects exempt from municipal taxes, responsibility for any improvements needed to Rock Hall Road because of the project, and reimbursing the Town for reasonable for engineering consulting services to help in the evaluation and monitoring of the project's construction plans and progress. (Tr. 5, pp. 266 - 284)

Site Search

25. BNE spent more than a year investigating potential sites in Connecticut that might be suitable for commercial wind production. BNE's search for potential sites included locations along Connecticut's shoreline and multiple properties with high elevations in Prospect, and communities in northwest Connecticut including Colebrook, Norfolk, Canaan, Falls Village, Lakeville, Kent, Cornwall, and Sharon. (BNE 2, A4)

26. In its search for potential sites, BNE reviewed a study conducted for the Connecticut Clean Energy Fund of wind resources in New England. This study, and other publicly available information on wind energy potential, led BNE led BNE to focus its efforts in Colebrook. (Tr. 4, pp. 9-10)

27. Factors BNE considered when evaluating a property's potential for a wind energy project included expected wind resources, land availability, size of the parcel, cost of land, proximity to the electrical grid, and proximity to the center of town and residences. (BNE 2, A4)

28. In the spring of 2010, BNE was contacted by the owner of the Property on which the Colebrook North wind energy project would be located. This property is located in close proximity to the Colebrook South property (approximately 0.8 miles to the south), and has similar topographical characteristics. BNE entered into a long-term lease with the Property owner in July 2010. (BNE 2, A4; BNE 8 [Libertine], Exhibit 2; FairwindCT 18. Fig. A; Tr. 4, pp. 10-11)

29. The respective population densities of Connecticut, Litchfield County, and the Town of Colebrook are shown in the table below.

Location	Estimated 2008 Population	Land Area (Square Miles)	Population Density (Pop./Sq. Mi.)
Connecticut	3,501, 252	4,845.4	723
Litchfield County	187,745	920.0	204
Town of Colebrook	1,520	31.5	48

(Council Administrative Notice #46 - Connecticut Population, Land Area, and Density by Location, Department of Economic and Community Development; Department of Public Health, Estimated Populations in Connecticut as of July 1, 2008)

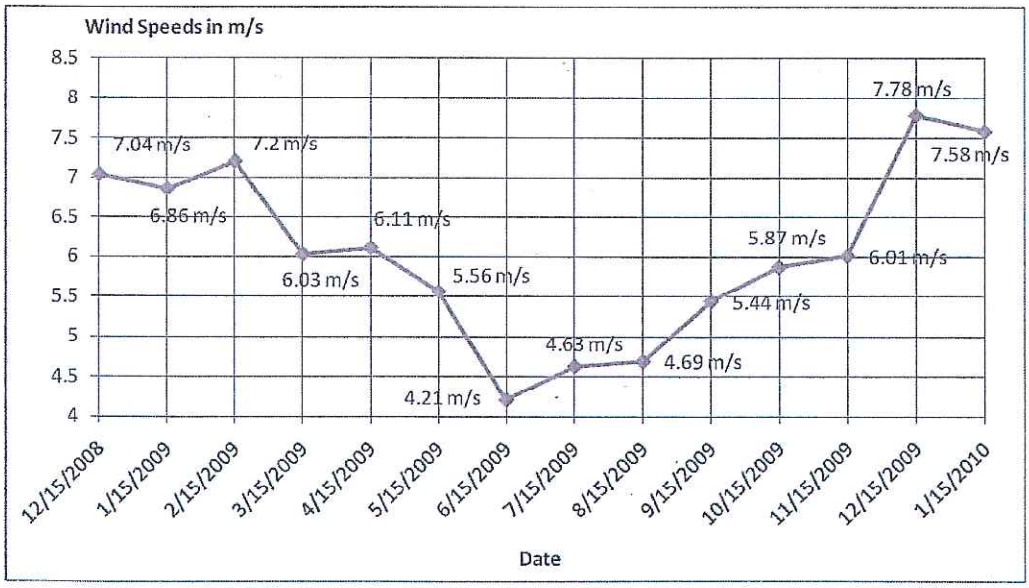
Wind Assessment

30. In order to evaluate the proposed site's viability for a wind power generation project, BNE commissioned a wind assessment for which a meteorological tower was installed on the property where the Colebrook South wind energy project is proposed. Wind measurements were taken over a 13.4 month period, from December 12, 2008 to January 24, 2010. Wind data collected at the Colebrook South property was used to estimate the wind available at the Colebrook North Property. (BNE 1, vol. 3, Exhibit M, Colebrook, CT Wind Assessment, p. 1; BNE 2, A29)

31. BNE also utilized data collected by a Triton Profiler Sodar unit, which measures wind speeds up to a height of 120 meters by using sound waves. The Sodar unit was initially located approximately 95 meters (300 feet) northwest of the meteorological tower on the Colebrook South property and was subsequently moved to a location on the Colebrook North Property in August of 2010. The sodar data from the Colebrook South property covered a period of 3.4 months, from October 30, 2009 to February 10, 2010. (BNE 1, vol. 3, Exhibit M, Colebrook, CT Wind Assessment, p. 1; BNE 2, A29; Tr. 4, pp. 19-20)

32. During the 13-month data collection period, the meteorological tower measured average wind speeds of approximately 6.02 meters per second at a height of 60 meters. The predominant wind direction was from the northwest. (BNE 1, vol. 3, Exhibit M, Colebrook, CT Wind Assessment, p. 1)

33. The highest average monthly wind speeds were recorded in December and January. The lowest average monthly wind speeds were recorded in June and July. (See following table)



(BNE 1, Exhibit M – Wind Assessment, Figure 7)

34. Using collected wind data, BNE calculated capacity factors using various scenarios based on different types of turbines and different assumptions about wind speed. Calculated

capacity factors ranged from 29.7% to 39.9%. (BNE 1, vol. 3, Exhibit M, Colebrook, CT Wind Assessment, p. 2)

35. BNE is targeting a capacity factor of 30% for its project to be commercially viable. Capacity factor is the actual amount of time the project would be operating at full output compared to its theoretical maximum output. (BNE 2, A22; Tr. 5, p. 211)

36. GE performed mechanical load assessments for BNE's originally proposed turbine positions and for the turbine layout with the proposed alternate location for Turbine 1. The assessments determined that the turbine locations were acceptable. (Tr. 4, pp. 23-24)

SCOPE OF PROJECT

Site Description

37. The proposed site consists of a 124.9 acre parcel located at the intersection of Route 44 (Winsted-Norfolk Road) and Rock Hall Road. This parcel is zoned R-2, a single-family residential district requiring minimum lot areas of two acres, and is largely undeveloped, with a small portion along Route 44 used as a golf driving range. (See Figures 2 and 3) (BNE 1, vol. 1, pp. 7, 17; Exhibit A)

38. The Property is owned by Rock Hall Associates, LLC, with which BNE has entered into a long-term lease agreement for wind energy generation. (BNE 2, A4)

39. Land use in the area surrounding the proposed facility is characterized by sparse residential development and some commercial development along Route 44. The Northwestern Connecticut Sportsman's Association owns land to the west of the Property. (BNE 1, vol. 1, pp. 18-19; BNE 2, A4)

40. Eighteen residences are located within 2,000 feet of the boundary of the Rock Hall Associates property on which BNE would locate its wind energy project. Nine residences are located within 2,000 feet of the proposed turbine locations. (BNE 2, A5)

Project Description

41. At the proposed site, BNE proposes to install three GE 1.6 MW wind turbines, referred to as Turbine 1, Turbine 2, and Turbine 3, and an electrical collector yard. (BNE 1, vol. 2, Tab F)

42. Subsequent to the filing of its petition, BNE proposed a revision to the location Turbine 1, moving it approximately 805 feet to the northeast, in response to comments and concerns raised by parties, intervenors, the general public, and the Council. The revised location would accomplish several goals, including: further increasing setbacks from residential property lines and residences; and reducing wetlands impacts, reducing environmental impacts associated with the need to construct a separate, second access road for the original Turbine 1 location. In the remainder of this document Turbine 1 will refer to this alternate location. (BNE 11, A2; BNE 11, A6)

43. The three turbines would be located on the Property as follows: Turbine 1 is located on a small knoll east of Mill Brook, is Turbine 2 is located on flat area on the lower slope of a ridge; and Turbine 3 is located on the upper slope of the ridge. Geographical information is as follows:

	Turbine 1	Turbine 2	Turbine 3
Longitude and Latitude Coordinates	41° 58' 34.481"N 73° 8' 16.085 W	41° 58' 29.702" N 73° 7' 59.969"W	41° 58' 38.061"N 73° 7' 57.378"W
Ground Elevation Above Mean Sea Level	1250.5 feet	1322 feet	1361 feet

(BNE 11, A6; BNE 8 [Jones], Sheets C-101, C-102, C-103)

44. The distances from the three proposed wind turbines to the nearest structure and property lines are shown in the following table.

Property Address	Distance from Wind Turbine to Structure (feet)			Distance from Wind Turbine to Property Line (feet)		
	WT 1	WT 2	WT 3	WT 1	WT 2	WT 3
49 Rock Hall Road	1,095	1,600	1,050	480	990	153
160 Winsted-Norfolk Road	1,595	2,435	2,965	1,500	2,338	2,862
154 Winsted-Norfolk Road	1,665	2,375	2,990	1,538	2,258	2,845
12A Greenwoods Turnpike	1,595	2,170	2,780	1,400	1,760	2,435
12B Greenwoods Turnpike	1,850	2,165	2,885	1,170	1,980	2,700
Winsted-Norfolk Road	No building	No building	No building	1,845	1,297	2,165
117 Pinney Street	4,448	3,195	3,160	1,544	880	1,450
Pinney Street	No building	No building	No building	1,815	525	660
177 Winsted-Norfolk Road	2,235	3,255	3,680	1,705	2,690	3,120
112 Rock Hall Road	1,450	2,744	2,895	370	1,700	1,520
150 Winsted-Norfolk Road	1,670	2,280	2,911	1,615	2,240	2,856
Rock Hall Road	No building	No building	No building	455	1,720	1,485

(BNE 3, A38)

45. The closest structure to a proposed wind turbine is a garage/workshop located 1,050 feet from Turbine 3 at 49 Rock Hall Road. It is owned by Jeffrey Stauffer and Mary Hubbard. (BNE 3, A38; BNE 1, Exhibit D)

GE 1.6 MW Turbine Characteristics/Operations

46. Each of BNE's turbines would consist of a hub (tower), nacelle, and rotor with three blades. The turbine hub would be approximately 100 meters (328 feet) in height. All of the equipment used to operate the turbine—including the gearbox, a magnet generator, and an automatic lubrication system—would be contained within the nacelle. (BNE 1, vol. 1, pp. 7-8; BNE 1, vol. 1, Exhibit C)

47. Turbines with hubs that are 80 meters in height would be feasible at the Colebrook North site. (Tr. 5, p. 384)

48. The turbine blades would be 40.3 meters (132 feet) in length and have an 82.5 meter (270 feet) rotor diameter. BNE requests approval, however, for rotor blades up to 50 meters (164 feet) in length for a rotor diameter of 100 meters (328 feet) to provide flexibility should GE's specifications change. (BNE 1, vol. 1, pp. 7-8; BNE 1, vol. 1, Exhibit C; Tr. 4, pp. 16-17)

49. The total height of the proposed turbines with the 82.5 meter rotor diameter at its highest point would be approximately 140 meters or 460 feet. The total height of the proposed turbines with the 100 meter rotor diameter at its highest point would be approximately 150 meters or 492 feet. (BNE 1, pp. 7-8)

50. The turbine towers would be designed to withstand extreme gusts for a three-second period of 56 meters per second (over 125 mph) and ten minutes of 40 meters per second (over 89 mph), according to existing engineering standards. (BNE 2, A26)

51. The turbines could be controlled automatically or manually from either an interface located inside the nacelle or from a control box at the bottom of the tower. Control signals could also be sent from a remote computer via a Supervisory Control and Data Acquisition (SCADA) System with local lockout capacity provided at the turbine controller. Emergency stop buttons located in the tower base and in the nacelle could be activated to stop the turbine in the event of an emergency. (BNE 1, vol. 1, p. 9)

52. Rotors would utilize independent electric pitch motors for each rotor blade to provide adjustment of the rotor blade pitch angle during operation. The pitch controller would enable the turbine rotor to brake and regulate speed by allowing the rotor blade to spill excess aerodynamic lift when needed. The turbine would also be equipped with a mechanical brake located at the output shaft of the generator, which would only be applied as an auxiliary brake to the main aerodynamic brake and to prevent rotation during certain service activities. (BNE 1, vol. 1, pp. 9-10)

53. The nacelles would be capable of rotating 360 degrees. (Tr. 4, p. 32)

54. Planetary yaw drives would be provided to steer the turbine. A controller would activate the yaw drive to align the nacelle to the average wind direction. Automatic yaw brakes would engage to prevent overloading from turbulent winds. (BNE 1, vol. 1, p. 10)

55. The "cut in" speed, or the speed at which the turbines' rotor blades would begin to produce electricity is 3.5 meters per second. The "cut in" speed would be the same for either the 82.5 meter diameter or 100 meter diameter rotor blades. However, the power curve for the 100 meter diameter rotor blades is greater and would result in a greater annual production of electricity on the site. (BNE 2, A17)

56. The "cut out" speed, or the speed at which the turbines' rotor blades would stop operating for safety purposes in high wind conditions, is 25 meters per second, which is approximately 55 miles per hour. In high wind conditions, the rotor blades would be allowed to feather in order to avoid damaging the turbines. (Tr. 4, pp. 30-31; Tr. 4, p. 210)

57. The operations of the proposed turbines would be remotely monitored by GE from its regional offices in Schenectady, New York. BNE would also have a facility at the proposed Colebrook South site for maintenance and storage purposes, from which it could

also monitor the performance of the turbines. BNE would have personnel on call at all times in case emergency service is required. (Tr. 4, pp. 20-21)

58. BNE would be willing to purchase and install optional fire suppression systems for the turbines. (Tr. 5, pp. 280-281)

59. In order to optimize turbine reliability and availability, BNE has selected a technology that has an availability exceeding 98 percent, a 20+ year service life, rapid Return-to-Service (RTS), and an expected annual capacity factor of approximately 30 percent. (BNE 1, vol. 1, p. 9)

60. At a capacity factor of 30 percent, the three 1.6 MW turbines would generate approximately 12,614 megawatt hours (MWh) of Class I renewable energy annually. (BNE 1, vol. 1, p. 10; BNE 2, A22)

61. Based on an electricity output of approximately 12,614 MWh from three 1.6 MW GE turbines at a capacity factor of 30 percent, BNE estimates that the proposed facility would result in a reduction of 3,532 (lbs/yr) total nitrogen oxides (NOx), 7,190 (lbs/yr) total sulfur oxides (SO_2), and 6,332 (tons/yr) total carbon dioxide (CO_2) when compared to conventional fossil fueled electricity generation. (BNE 1, vol. 1, pp. 10-11; BNE 2, A23)

Site Access

62. All three turbines would be accessed by a new, 20-foot wide road extending from Rock Hall Road. From Rock Hall Road, the road accesses Turbine 1 on the small knoll, descends to cross a wetland, and then ascends a ridge to access Turbines 2 and 3. (BNE 8 – Pre-Filed Testimony of Curtis Jones, A9, p. 6, site plans)

63. It is probable that Rock Hall Road would need improvements to be able to accommodate the construction equipment and material needed to erect the proposed turbines. (Tr. 5, p. 266)

64. BNE would be willing to make what improvements will be needed for Rock Hall Road at its expense. (Tr. 5, p. 267)

Electrical Interconnection

65. The proposed project would include an electrical collector yard constructed on the Property, at a location to be determined. At the point of common coupling with CL&P, BNE would provide a utility class circuit breaker or a recloser equipped with a multifunctional relay to serve as the Interconnection Interruption Device. Revenue metering would be provided on the utility side of the breaker. A gang-operated disconnect switch would be provided on the utility side of the metering. Additional equipment to monitor circuit voltage and to disconnect the facility from the grid would also be installed as needed on existing grid circuits to protect the system during system outage. (BNE 1, vol. 1, p. 8; BNE 8)

66. The interconnection of BNE's proposed facility to CL&P's 23-kV distribution system would be in accordance with all applicable CL&P technical standards and State of Connecticut, ISO-NE, and FERC requirements. The interconnection would be made pursuant to CL&P's and UI's Guidelines for Generator Interconnection. (BNE 1, vol. 1, p. 8)

Cost

67. The total cost of the Colebrook North wind energy project is estimated to be $12,000,000. This total is based on an estimated cost of $2,500 per kW of installed capacity. The cost of the Colebrook North wind energy project would very likely be distributed among different project components in the following manner:

Turbines, FOB USA	49%
Construction costs	22%
Towers (tubular steel)	10%
Interest costs during construction	4%
Interconnection and substation costs	4%
Development activity	4%
Financing & legal fees	3%
Design & engineering	2%
Land transportation	2%

(BNE 2, A6)

Decommissioning

68. At the end of the turbines' projected life span, BNE would evaluate the status of its equipment to determine if decommissioning of the project would be necessary. Decommissioning would include removal of the turbines from the Property, removal of the foundation below grade, generally two to three feet below grade, and restoration of the site as near as possible to its original condition. (Tr. 5, pp. 278-279)

69. Decommissioning costs would include the reasonable cost of evaluating the then adequacy of Rock Hall Road prior to decommissioning and the cost of road modifications, repairs, and reconstructions of Rock Hall Road, if any, that may be needed as part of the decommissioning process. (Tr. 5, p. 279)

70. Decommissioning costs may also include reasonable costs incurred by the Town for engineering consultants it may need to retain in connection with the decommissioning process. (Tr. 5, pp. 279-280)

71. BNE would be responsible for the costs of decommissioning the project. (Tr. 5, p. 279)

ENVIRONMENTAL CONSIDERATIONS

State and Federal Permits

72. The proposed project would comply with air and water quality standards of the DEP. (BNE 1, Vol. 1, p. 1; BNE 8 (Jones), A. 11)

73. BNE would register under DEP's General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities and would request coverage under an existing Connecticut General Permit – DEP-PED-GP-015 by submitting a complete and accurate General Permit Registration Form and Transmittal in accordance with applicable rules. (BNE 1, Vol. 1, p. 31)

74. BNE may need a permit from the Army Corps of Engineers under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act for its construction activities within wetland boundaries. (Letter from Department of Army Corps of Engineers, May 11, 2011)

75. The Federal Aviation Administration (FAA) determined that BNE's proposed wind turbines would not be hazards to air navigation. This determination is conditioned upon the turbines being marked and/or lighted in accordance with FAA requirements. (BNE 3, Exhibit 1; BNE 11, A28 and Exhibit 1)

76. The turbines would be painted white in compliance with FAA recommendations and to avoid the need for lighting during daylight hours. (BNE 1, p. 32)

77. To comply with FAA lighting requirements, BNE would prefer to utilize flashing red rather than white lights on the proposed turbines. The lights would be placed on the turbine nacelles and would flash 20 or 30 times per minute. (BNE 5, A10; BNE 6, A7)

Site Disturbance/Restoration

78. Approximately 7.8 acres would be disturbed to develop the project. Approximately 4.8 acres would be restored by re-contouring and the planting of native vegetation. (BNE 4, A122; BNE 1, p. 21; BNE 15 – Rebuttal Testimony of Curtis Jones, A21, p. 3)

79. A New England Conservation/Wildlife Mix, containing native grasses and forbs, would be used to stabilize areas cleared during the construction period. Once exposed soils have been stabilized, erosion control measures would be removed so as not to impede migration of wildlife utilizing the Property. (BNE 1, Exhibit I – Terrestrial Wildlife Habitat & Wetland Impact Analysis, p. 26; BNE 4, A122)

80. The total volume of cut required by the proposed project would be 4,950 cubic yards. The total volume of fill that would be required would be 9,600 cubic yards. (BNE 4, A86)

81. BNE anticipates that blasting would be required for the proposed wind power development. (BNE 8 – Pre-filed testimony of Douglas Roy, A2)

82. Prior to any blasting, BNE's blasting contractor would conduct a pre-blast survey of habitable structures within 500 feet of the location of the proposed blasting. The blasting

contractor would repeat the survey following the completion of blasting to determine if any damage was done to the structures which had been surveyed. (BNE 8 [Roy], Exhibit 2, Controlled Blasting Specification, Section 1.06)

83. The blasting contractor would also conduct pre- and post-blasting surveys of all wells within 500 feet of the areas where blasting would occur. (BNE 8 [Roy], Exhibit 3, Well Survey Specification, Section 1.02)

Wetlands

84. There are four wetland areas on the Property, identified as Wetlands 1, 2, 3, and 4 (refer to Figure 6). No vernal pools were identified. (BNE 1, vol. 1, p. 28; BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 1)

85. Wetland 1 is a large wetland corridor bordering Mill Brook, a perennial watercourse that comes onto the Property at a corrugated metal culvert on the south side of Rock Hall Road at a point along the northwest edge of the Property, flows through the entire Property, bisecting it diagonally, and exiting to the southeast. It is one of the Property's most significant landscape features; a forested wetland dominated by eastern hemlock and characterized by hummock-hollow topography, with numerous small upland inclusions. Where Mill Brook nears the southern edge of the Property, Wetland 1 opens out into an emergent marsh and shrub-scrub wetland. (BNE 1, vol. 1, pp. 28-29; BNE 1, vol. 3, Exhibit I, Figure 2 (Habitat Type Map).

86. The area identified as 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, but it is not deep enough to support amphibian breeding habitat. (BNE 1, vol. 1, p. 29)

87. The area identified as Wetland 3 is a small linear shaped forested hillside seep wetland draining easterly towards Wetland 1. There appears to be no surface water or wetland connections between this wetland and Wetland 1. (BNE 1, vol. 1, p. 29)

88. The area identified as Wetland 4 is a series of small forested hillside seep wetlands located along an eastern facing slope. The seeps are generally interconnected via subsurface groundwater flows or shallow surface water flows. There appears to be no connection between these seeps and Wetland 1. (BNE 1, vol. 1, p. 29)

89. There are also several hillside seep wetlands and associated intermittent watercourses on the Property. These seeps convey storm water runoff during high water events, spring melt, and sheet flow from the open field upslope to the west into Wetland 1. The most significant seepage area includes an intermittent watercourse that flows into Wetland 1 from the northerly Property boundary. (BNE 1, vol. 1, p. 29)

90. The construction of the gravel access road leading to Turbines 2 and 3 would necessitate disturbance to a portion of Wetland 1 toward the north of the Property, an area containing two intermittent watercourse features that flow south towards Mill Brook within narrow bordering wetlands. The access road would need to cross these two intermittent watercourses. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, pp. 21-25)

91. Permanent direct impacts to Wetland 1 from the construction would be approximately 3,194 square feet. Temporary direct impacts, consisting mainly of tree clearing, would add another 1,785 square feet. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, pp. 21)

92. Updated topographic information led BNE to propose moving the original location of the access road approximately 50 feet to the north. This relocation would allow for the proposed access road to intersect the easternmost and more significant watercourse at an historic logging road crossing. In conjunction with a reduction of the access road width to accommodate a narrow-tracked crane, the relocation would result in a negligible increase in square footage of wetland impacts from the previous access road location. More importantly, locating the crossing at the intersection of an existing logging road would minimize tree clearing and potential impacts to the watercourse feature. (BNE 8 [Davison], A6; BNE 14)

93. One or two minor relocations for the access road through Wetland 1 have been proposed in order to further minimize impacts to wetlands and wildlife, and that the final route will be determined during the final design phase of the project, if it were approved. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 4

94. Three-sided box culverts would be utilized to span each of the intermittent watercourses. The two crossings would be constructed in accordance with DEP's Inland Fisheries Division Stream Crossing Guidelines, dated February 26, 2008. As specified in these guidelines, unconfined in-stream work associated with the culvert installation would occur between June 1 and September 30. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, p. 25; BNE 8 – Pre-Filed Testimony of Matthew Davison, A6)

95. Erosion and sedimentation controls as outlined in the 2002 Connecticut Guidelines for Erosion and Sediment Control, established by the Connecticut Council for Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection, would be installed prior to construction. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, p. 25; BNE 8 – Pre-Filed Testimony of Matthew Davison, A6 Response)

96. Following construction activities, cleared or disturbed streambanks would be stabilized and planted with native shrubs and herbaceous vegetation and under-sown with New England Conservation/Wildlife grass seed mix. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, p. 25; BNE 1, vol. 2, Exhibit F, Sheet C-316)

97. BNE would hire an independent, third-party contractor to conduct environmental inspections and monitor erosion and sedimentation controls during the project's construction. (Tr. 4, p. 58)

98. A conservation easement around the Mill Brook portion of Wetland 1 would be beneficial to protect this ecologically important resource. (Tr. 5, p. 299-302)

Wildlife

99. The site is at a relatively high elevation, approximately 1330 to 1450 feet, which selects for certain wildlife species. Generally, the Property contains a second-growth, northern hardwood forest. Mill Brook is one of the most prominent features of the Property, running within well-defined banks through the Property's central portion, from northwest to southeast. Northward, the stream runs swiftly, and provides an important water source for wildlife, although where the tree canopy is closed or hemlock predominates the understory is not developed and does not provide significant foraging opportunities or cover. Southward, the stream feeds a marshy area, with permanent water, as well as fish populations. Here, the site offers some of the best foraging opportunities and excellent cover. (BNE 1, vol. 3, pp. 12, 19, 22)

100. The site has moderate to high wildlife habitat value with good interspersion (i.e. intermixing) of habitat types, including upland and wetland forest habitats of varying age, intermittent watercourses, a perennial stream, and shrub swamp. Good interspersion generally attracts a greater diversity of wildlife species. Thus, the site has the potential to support several dozen species of wildlife ranging from amphibians and reptiles to large mammals. (BNE 1, vol. 3, Tab I, p. 18)

101. If the site was developed for residential use as permitted by the Town zoning regulations, the development would have a detrimental effect on the site's sensitive habitat areas. (Tr. 5, pp. 313-316)

Amphibians and Reptiles

102. According to the DEP's Natural Diversity Data Base (NDDB), the smooth green snake (*Liochlorophis* [*Opheodrys*] *vernalis*), a state species of special concern, has been reported to occur in the vicinity of the site. (BNE 1, vol. 3, Exhibit I, Terrestrial Wildlife Habitat & Wetland Impact Analysis, p. 13)

103. Portions of the Property encompass areas of open grassy habitat that could support both the smooth green snake and the eastern ribbon snake (*Thamnophis sauritus*), another State-listed species of special concern. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 2)

104. The clearing required for the proposed project would enhance habitat for both of the special concern snake species as they require unforested open habitats. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 2)

105. A portion of the Property, upstream of the confluence of Mill Brook with the area identified as Wetland 1, contains habitat well-suited for wood turtles. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 3)

106. BNE would follow an established protocol for protecting wood turtles during construction of the proposed project. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 3; Tr. 5, pp. 292-295, 316-317)

107. The seep wetlands feeding Wetland 1 provide suitable habitat for the Spring Salamander (*Gyrinophilus porphyriticus*), a state-listed Threatened species. Relocating the proposed access road approximately 40 feet upslope onto an old woods road would minimize impacts to the area where the seep wetlands are located. (BNE 13 - Herpetological Assessment of Colebrook Wind Energy North Site, p. 4)

Bats

108. Acoustic surveys of bat activity were conducted by BNE only at the Colebrook South property. The Colebrook South site is similar to the Colebrook North site in land cover, surrounding land use, and habitat types. The two properties are also very close to each other. Therefore, the results of the acoustic bat survey conducted at Colebrook South were assumed to be indicative of bat species composition and relative abundance on the Property. (BNE 1, vol. 1, p. 22; vol. 3, Exhibit K: Bat Acoustic Studies for the Colebrook Wind Resource Area Litchfield County, Connecticut, p. 1)

109. A bat survey performed from June 25 to November 1, 2010 identified six species of bats utilizing the site. Three of these species, the eastern red bat, hoary bat, and silver-haired bat, are listed as state-designated species of special concern. (BNE 8 [Tidhar], Exhibit 2 – Bat Acoustic Studies for the Colebrook Wind Resource Area, p. ii; Council Administrative Notice No. 29)

110. The peak of bat activity occurred in mid-July and again in late September. (BNE 8 [Tidhar], Exhibit 2 – Bat Acoustic Studies for the Colebrook Wind Resource Area, p. ii

111. The proposed project is not far from several hibernacula locations. This increases the likelihood that cave bats could be moving through the area at certain times of the year. (DEP Comments dated April 6, 2011)

112. The closest known hibernaculum to the Property is located in Winsted. Others within Litchfield County are in Morris, New Milford, Roxbury, and Terryville. All of these are within reach of the site for a migrating bat. All of them have other possible forage sites located nearby. The extent that cave bats might use the Property for drinking or foraging is not known. (BNE 2, A30; BNE 14, pp. 1-2.)

113. Forested wetlands and permanent water are high-value habitat for bats. Turbines within or close to such areas habitats may be particularly harmful to bats. (FairwindCT 23, p. 14; BNE 8 [Tidhar], pp. 4-5; Tr. 4, pp. 48-49)

114. Most recorded bat fatalities at wind turbine sites are of migratory tree-roosting species, generally during post-breeding and migratory periods. The most affected species (75% of reported fatalities) are the eastern red, hoary, and silver-haired bats. (BNE 8 [Tidhar], Exhibit 2 – Bat Acoustic Studies for the Colebrook Wind Resource Area)

115. Based on experience from post-construction monitoring at similar-sized wind turbines, such as the ones at Leominster, NH, bat fatalities would be expected to be about 3 bats per MW of project output per year. (Tr. 4, p. 83)

116. DEP did not have BNE's final report on the bat acoustic study at the time it commented on the PE 984. Based on its review of the interim report, the DEP noted that some negative impacts to bat species are likely. DEP recommended, at a minimum, that post-construction monitoring be performed to document bat mortality and allow for adaptive management, if possible. DEP's Wildlife Division would prefer to be consulted with respect to the post-construction monitoring and would like access to the site to search for bat carcasses. (DEP Comment Letter [April 6, 2011], pp. 4-5)

117. Minimizing tree clearance can reduce adverse impacts to bats. (BNE 8 [Tidhar], p. 5)

118. Bat mortality rates experienced at wind turbine projects range from 30 to 39 bats per megawatt (based on nameplate capacity) per year in the mid-Atlantic and southeastern regions of the United States to five to seven bats per megawatt per year at the Lempster project in New Hampshire. (Tr. 4, pp. 47-48)

119. BNE would conduct additional acoustic bat surveys at the Colebrook North Property from approximately April 18 through October 31 during 2011. A final report would be expected to be complete by December 15, 2011. BNE would file the results with the Council and with the DEP. (BNE 11, A33; BNE 8 – Pre-Filed Testimony of David Tidhar, pp. 2-3)

120. BNE would conduct post-construction bat activity monitoring and fatality monitoring at both Colebrook North and Colebrook South projects to determine seasonal bat activity patterns and fatality estimates of bats, respectively. All pre- and post-construction reports would be shared with the DEP. (BNE 8 – Pre-Filed Testimony of David Tidhar, p. 3; DEP Comment Letter [April 6, 2011], pp. 4-5)

121. If post-construction monitoring determines that unacceptably high levels of bat mortality are occurring, some mitigation measures can be adopted, such as changing the cut-in speed during low wind-speed nights both before and after storm events. Electronic devices to ward off bats are also being developed and may become useful. (DEP Comment Letter [April 4, 2011]; Tr. 4, pp. 138, 290)

Birds

122. Bird surveys were conducted by BNE during 2010 at the Colebrook South property. The Colebrook South site is similar to the Colebrook North site in land cover, surrounding land use, and habitat types. The two properties are also very close to each other. Therefore, the results of the bird surveys conducted at Colebrook South were assumed to be indicative of bird species composition and relative abundance on the Property. It is possible, however, that the Property may contain larger numbers of species that utilize edge habitats and disturbed grasslands, due to the presence of the golf driving range. Species that utilize such areas are regionally common, since Southern New England and Central Connecticut have a high proportion of disturbed and edge habitats. (BNE 1, vol. 1, pp. 24-25)

123. The surveys recorded a total of 461 individual observations within 443 separate groups, representing 39 unique bird species. No state or federal listed sensitive species were recorded during the surveys. (BNE 1, vol. 1, p. 25)

124. The Colebrook North project is not located near any Important Bird Areas as identified by the Connecticut Audubon Society. (BNE 2, A28)

125. The Colebrook North project is not identified as a Waterfowl or Waterbird Focus Area by the Atlantic Coast Joint Venture, a partnership of 18 state and federal agencies, regional conservation groups, and others coordinating to protect habitat for native birds in the Atlantic Flyway. (BNE 4, A32)

126. There are a few hawk watch sites, identified by the Northeast Hawk Watch Association (NEHWA) and the Hawk Migration Association of North America (HMANA), located in northern Litchfield County in the general region of the Project site, including Booth Hill in Hartland, Pine Mountain in Barkhamsted, and Middle School in Torrington. These sites range from approximately 9.5 to 11 miles to the northeast, east, and southeast of the Project site respectively. (BNE 4, A32)

127. BNE would conduct additional bird studies during 2011 including: spring and fall raptor migration surveys to document numbers and species of diurnal raptors (including kites, accipiters, buteos, harriers, eagles, and falcons) and vultures migrating over the project; and migrating and breeding bird surveys intended to provide an estimate of the type and number of species moving through the area in the spring and fall, and using the project during nesting. (BNE 11, A8)

128. While wind turbines do cause collision-induced bird mortalities, it has not been shown that this would result in population-level effects. (DEP Comment Letter [April 4, 2011]; BNE 8 [Tidhar], p. 6)

129. BNE would conduct bird post-construction studies. Post-construction monitoring would be completed over a two-year period following completion of all construction activities and during the operational phase of the Project. All pre- and post-construction reports would be shared with the CTDEP. (BNE 11, A32; 8 – Pre-Filed Testimony of David Tidhar, pp. 5-6)

Noise

130. The extent of regulation regarding noise emissions from wind turbines, the structure of such regulation, and the nature of authority over such regulation, varies widely around the world. The US does not have federal standards regarding noise emissions from wind turbines. Foreign countries are not consistent in their approaches to regulating wind-turbine noise. No international bodies have set standards for wind-turbine noise emissions world-wide, although several international bodies have set recommended guidelines (for example, American National Standards Institute [ANSI], International Organization for Standardization [ISO]) do issue technical protocols and specifications for measuring such noise. The World Health Organization (WHO), an internationally-recognized agency that has developed guidelines for protecting human health against adverse environmental impacts in general, including noise, has also issued such guidelines specifically directed to wind-turbine noise. (Pre-Filed Testimony of Dr. David Lawrence, p. 6: "Simple Guidelines for Siting Wind Turbines to Prevent Health Risk," Kamperman and James, pp. 1, 6-8)

131. DEP administers noise control regulations which the Council follows that identify the limits of sound that can be emitted from specific premises. The noise control regulations are contained in the Regulations of Connecticut State Agencies (RCSA), Title 22a, §§ 22a-69-1 to 22a-69-7. (BNE 1, vol. 3, Exhibit M – Noise Evaluation, p. 4)

132. DEP's noise regulations designate three different noise zones: a Class A zone in which land use is generally residential; a Class B zone in which land use is generally commercial; and a Class C zone in which land use in generally industrial. (BNE 1, vol. 3, Exhibit M – Noise Evaluation, p. 4)

133. The DEP standards for acceptable levels of noise emission in the respective noise zones as measured in A-weighted decibels (dBA) are identified in the table below.

Emitter Zone	**Receptor Noise Zone**			
	Class A (Daytime)	**Class A (Nighttime)**	**Class B**	**Class C**
Class A (Residential)	55	45	55	62
Class B (Commercial)	55	45	62	62
Class C (Industrial)	61	51	66	70

(BNE 1, vol. 3, Exhibit M – Noise Evaluation, p. 4)

134. To predict the sound-level of the proposed turbines, BNE conducted noise modeling in accordance with the ISO-9613-2 standard using sound levels contained within GE's specifications. (BNE 1, vol. 3, Tab M, pp. 5, 7)

135. BNE estimates that the highest noise levels that would be generated by the proposed wind turbines would occur when the turbine rotor blades are turning at a wind speed of 9 meters per second or greater. (BNE 1, vol. 3, Exhibit M – Noise Evaluation, p. 7; BNE 8 [Wholley], Exhibit 2 – Wind Colebrook North Noise Evaluation, p. iv)

136. The noise levels predicted were based on the cumulative noise impact of the six proposed turbines — the three turbines of the Colebrook South project and the three turbines of the Colebrook North project. (Tr. 4, pp. 64-65)

137. The estimated noise levels that would be generated by the proposed facility as measured at the nearest residential receptors are shown in the following table. This table is based on the Property being considered a Class C emitter. Nighttime noise levels are based on worst case conditions (refer to Figure 8).

Noise Receptor Address	Daytime Noise Criteria (dBA)	Nighttime Noise Criteria (dBA)	Maximum Daytime/Nighttime Sound Levels (dBA)
R1 – Rock Hall Road	61	51	41
R2 – Rock Hall Road	61	51	41
R3 – Greenwoods Turnpike	61	51	41
R4 – Greenwoods Turnpike	61	51	42
R5 - Greenwoods Turnpike	61	51	41
R6 - Greenwoods Turnpike	61	51	40
R7 – Winsted-Norfolk Road	61	51	34
R8 – Pinney Street	61	51	34
R9 - Pinney Street	61	51	32
R10 - Pinney Street	61	51	33
R11 – Stillman Hill Road	61	51	32
R12 – Rock Hall Road	61	51	36
R13 – Rock Hall Road	61	51	39
R14 – Rock Hall Road	61	51	46

(BNE 8 [Wholley], A. 3, Exhibit 2)

138. The results show that the project would generate sound levels ranging from 32 dBA to 46 at the nearest residences. These values are below the daytime or nighttime noise criteria of 61 and 51 dBA, respectively. (BNE 8 [Wholley], Exhibit 2, p. 8)

139. There are no DEP criteria regarding the time limit for the type of noise produced by an emitter. Turbine noise can occur repeatedly as long as it meets the noise level criteria. In the case of the BNE project, the turbines would emit their maximum noise level (46 dBA) for 11 percent of their operating time during a year. The remaining 89 percent of the time, they would emit less than 46 dBA. (Council Administrative Notice 42 [CT DEP Noise Regulations]; BNE 8 [Wholley], Exhibit 2, p. 9; Tr. 4, p. 74; Tr. 5, pp. 292-294)

140. The highest noise levels generated by the proposed turbines would occur approximately 11% of the time over the course of a year. (Tr. 4, p. 65; Tr. 5, p. 259-260)

141. In addition to establishing general noise limits, DEP's noise regulations prohibit the emission of infrasonic sound (sound having frequencies below the audible range for humans, generally below 20 Hz) and ultrasonic sound (sound having frequencies above the audible range for humans, generally higher than 20,000 Hz). Two other types of sound with special noise limits are impulsive noise and prominent discrete tones (pure tones). (Council Administrative Notice 42 [CT DEP Noise Regulations])

142. Impulsive noise and ultrasonic noise are not of concern for wind turbines. (FairwindCT 10, R. 14; Tr. 4, pp. 63-64)

143. Infrasonic noise for the GE 1.6 turbine would be well below DEP's limit of 100 dBA. BNE reached this conclusion after estimating infrasound from the one-third octave bands supplied by GE and studying data from other engineers who had monitored built turbines similar to the GE 1.6. (Tr. 4, p. 72; Tr. 5, p. 367)

144. A prominent discrete tone, in general terms, is acoustic energy concentrated in a narrow frequency range. This type of noise shows up on the graph of one-third octave bands as a noticeable feature in which one band diverges sharply from its neighboring bands. The graph of one-third octave bands for the GE 1.6 MW turbine does not display this feature. (FairwindCT 10, A. 32; Tr. 4, pp. 103-104; Tr. 5, pp. 365-366)

145. If the proposed project is approved, BNE would provide two years of post-construction sound monitoring. (Tr. 5, p. 319)

146. BNE would conduct post-construction studies to determine the noise levels emitted by the wind turbines over a two-year period. (Tr. 5, pp. 281-282)

Noise Mitigations

147. Noise mitigation can be accomplished through adding air-conditioning, insulating or rebuilding walls, or insulating around windows at the receptor. (Tr. 4, pp. 247-251)

148. Neither landscaping nor sound barriers at the receptor are effective to screen noise from wind turbines, given the turbines' height. (Tr. 4, p. 248)

Shadow Flicker

149. Shadow flicker from wind turbines is 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. The shadow may be perceived as a "flicker" due to the repeated shadow being cast by the rotating blades. Shadow flicker occurs under a special set of circumstances when the sun passes behind the hub of a wind turbine and casts a shadow over neighboring terrain. (BNE 8 [Libertine], Exhibit 3 – Supplemental Shadow Flicker Analysis, pp. 1-2)

150. Shadow flicker could occur up to 1.2 miles from the turbines. (BNE 8 [Libertine], Figure 1)

151. Based upon the type of GE turbines to be used in this project, flicker frequency would be below the frequencies at which flicker can trigger seizures in individuals suffering from photosensitive epilepsy. (BNE 8 [Libertine], Exhibit 3, p. 3)

152. There are no Federal or State of Connecticut standards for shadow flicker. Some communities in various parts of the county have adopted standards that range from 10 hours per year to 30 hours per year at an occupied structure. (BNE 8 [Libertine], Exhibit 3)

153. In its analysis of the potential for shadow flicker, BNE first developed a "worst case" scenario that assumed the sun is always shining, the wind is always blowing, and the turbines are always functioning at optimum capacity. BNE then applied a 50% reduction factor to account for historic weather statistics and periodic operational limitations to provide a more realistic, or "probable case" scenario. (BNE 8 [Libertine], Exhibit 3 – Supplemental Shadow Flicker Analysis, pp. 4-5)

154. Approximately 136 receptors were identified within 1.25 miles of the turbines. A receptor is defined as an occupied structure. (BNE 8 [Libertine], Exhibit 3, p. 3)

155. There are ten receptors that are predicted to experience shadow flicker from the Colebrook North project. The annual durations of the time when shadow flicker would be experienced at these receptors range from less than one-half hour to approximately 22.5 hours (refer to Figure 7). (BNE 8 [Libertine], Exhibit 3, p. 7)

156. The highest number of annual shadow flicker hours would be experienced at the Northwestern Connecticut Sportsmen's Association lodge at 177 Winsted-Norfolk Road. This property would likely experience approximately 22 hours and 21 minutes of shadow flicker per year. (BNE 8 [Libertine], Exhibit 3, p. 7)

157. Of the remaining nine receptors that could be expected to experience shadow flicker, three properties would likely experience between five and ten annual hours; five properties would likely experience between one and four hours; and one receptor would likely experience less than one-half hour. (BNE 8 [Libertine], Exhibit 3, p. 7)

158. Shadow flicker could occur for over 40 hours per year along Rock Hall Road northwest of the site. Approximately 30-40 hours of shadow flicker could occur in the open area of the abutting property to the north. (BNE 8 [Libertine], Exhibit 3, p. 7)

Ice Drop/Throw

159. Ice can build up on wind turbine rotor blades, even if they are operating, when appropriate conditions of temperature and humidity exist. (BNE 8 [Héraud], Exhibit 2, p. 9)

160. Melting ice that could fall from a stationary turbine would typically fall to a distance of 115 feet from the base of the turbine (assuming 82.5m rotor diameter). Exceptional ice drop (10% of the time) could extend to a distance of 374 feet. An undeveloped portion of the abutting property to the north is within this exceptional range. (BNE 8 [Héraud], Exhibit 2, p. 9)

161. With an 82.5-meter rotor blade diameter, the maximum distance ice fragments could be thrown would be 265 meters, or approximately 870 feet. Ninety percent of ice fragments potentially thrown from the turbines would fall within 140 meters, or 460 feet. (BNE 8 [Héraud], Exhibit 2, p. 3, 9)

162. With a 100-meter rotor blade diameter, the maximum distance ice fragments could be thrown would be 285 meters, or approximately 935 feet. Ninety percent of ice fragments potentially thrown from the turbines would fall within 160 meters, or 525 feet. (BNE 8 [Héraud], Exhibit 2, p. 3)

163. There are no residential structures located within the maximum distance ice could be thrown from 100-meter diameter rotor blades. (Tr. 4, p. 66)

164. Rock Hall Road is within the maximum distance ice could be thrown from either the 82.5-meter or 100-meter diameter rotor blades. (Tr. 4, p. 66)

165. The probability of a car traveling on Rock Hall Road being hit with ice thrown from the 82.5-meter diameter rotor blades is once in 1,400 years. (Tr. 4, pp. 66-67)

166. Based on an estimated 12 days of icing per year, the probability of an ice fragment striking a stationary person located at the overhang distance and present for all icing events is once in 40 years with the 100-meter rotor blade diameter and once in 31 years with the 82.5-meter rotor blade diameter. (BNE 8 [Héraud], Exhibit 2, p. 3)

167. The turbines would have controls that would monitor for the occurrence of icing and make adjustments to operate safely when icy conditions are present. In addition to automatic controls, GE would monitor the wind turbines remotely, and BNE would monitor the turbines on site to ensure safe operation under icy conditions. (BNE 2, A25)

168. BNE would adopt procedures to minimize the possibility of ice throw. These procedures would include: monitoring weather forecasts for conditions which are favorable to producing icing events; monitoring the total aggregate output of the facility in comparison to the actual wind speed to determine if icing is occurring; installing vibration sensors to detect rotor blade imbalances that could indicate icing has occurred; installing the capability to shut down the turbines remotely or manually on-site. (BNE 5, A9)

169. If icing should occur, BNE would: assess the operating conditions of the turbines; monitor the turbines until the ice has fallen from the rotor blades and the turbines can resume normal operating conditions; and have a designated technician present at the turbine site to assess the possibility for any potential impact to adjacent individuals or property before and after an iced turbine is started up. (BNE 5, A9)

170. In extreme conditions, BNE could curtail or shut down turbines in advance of subjecting the turbines to ice build-up on the turbine rotor blades and risk of ice throw. Depending on the wind direction and conditions of the icing event, turbines could be manually positioned (by yawing) out of the upwind position to reduce direct ice build-up on the turbine and rotor blades. (BNE 5, A9)

Visibility

171. At least one of the 100-meter tall hubs of the proposed turbines would be visible year-round from approximately 159 acres in the area within a five-mile radius of the Property. At their apex, the 82.5 meter diameter rotor blades of the wind turbines would be visible year-round from approximately 292 acres within the same area. (BNE 8 [Libertine], Exhibit 2, p. 5)

172. The majority of the area from which the proposed wind turbines would be visible is located on and in close proximity to the Property. Select locations along and adjacent to Route 44 (Winsted-Norfolk Road), Rock Hall Road, Greenwood Turnpike, Pinney Street, and Stillman Road (Route 182) would have views of the proposed turbines. (BNE 8 [Libertine], Exhibit 2, p. 5)

173. Approximately 86 residential properties within the five-mile radius area could have at least partial year-round views of at least portions of the turbine hub(s) and associated blades. Approximately 26 of these residential properties are located within one mile of the Property. An additional four residential properties within one mile of the Property could have views of the only the rotor blades at their apex above the trees. (BNE 8 [Libertine], Exhibit 2, p. 5)

174. The proposed turbines would be seasonally (leaf off) visible from an additional approximately 1,365 acres within a five-mile radius of the Property. (BNE 8 [Libertine], Exhibit 2, p. 5)

175. Of the total acreage with potential leaf off visibility, nearly 86%, or 1,176 acres, are located within one mile of the Property (refer to Figure 9). (BNE 8 [Libertine], Exhibit 2, p. 5)

176. If 100-meter diameter rotor blades were used on the turbines, the areas of visibility would extend outward by approximately 500 feet. (Tr. 5, p. 317)

177. Approximately 71 additional residential properties within a mile of the site could have at least partial, leaf-off views of the proposed turbine hubs. (BNE 8 [Libertine], Exhibit 2, p. 5)

178. There are two state-designated scenic roads with a five-mile radius of the Property: portions of Route 183 in Colebrook and Route 272 in Norfolk. No views of the proposed turbines would be expected from Route 272, which is located approximately three miles to the west of the Property. Brief views of the turbines might be achieved from a short section of Route 183, approximately 2.5 miles southwest of Property. (BNE 8 [Libertine], Exhibit 2, p. 5)

179. Winchester Road in Norfolk is a locally-designated scenic road. Brief views of the turbines might be possible from an open height along this road approximately three miles to the southwest of the Property. (BNE 8 [Libertine], Exhibit 2, p. 6)

180. There is also a Winchester Road in Winchester (Winsted), which is also a locally-designated scenic road. No views of the turbines would be anticipated from this road. (BNE 8 [Libertine], Exhibit 2, p. 6)

181. Haystack Mountain State Park, which includes several hiking trails and an observation tower, is located approximately four miles to the northwest of the Property. No views of the turbines would be anticipated from the hiking trails. However, there would be views of the turbines from the observation tower (refer to Figure 12). (BNE 8 [Libertine], Exhibit 2, p. 6)

182. Dennis Hill State Park, which has a system of hiking trails, is located approximately 3.5 miles to the southwest of the Property. No views of the turbines would be anticipated from this park. (BNE 8 [Libertine], Exhibit 2, p. 6)

Historic/Cultural Resources

183. The two nearest historical resources to the site are the Colebrook Center Historic District, approximately two miles northeast of the site and the Rock Hall property, approximately a half-mile from the site. The site would be visible from small portions of the Colebrook Center Historic District and is not expected to have shadow flicker effects. (BNE 8 [Libertine], Exhibit 2, Exhibit 3; BNE 17, pp. 1-2)

184. Rock Hall, located at 19 Rock Hall Road, is a property listed on the National Register of Historic Places. It was designed and built in 1911 and 1912 as a private residence by Addison Mizner. Rock Hall is a 10,000 square foot manor house designed in Mizner's signature Spanish Mediterranean Revival style. The property was listed on the National Register of Historic Places in July, 2010. (Pre-Filed Testimony of Stella Somers, A3)

185. The distance calculated from the Rock Hall main house to the nearest turbine (Turbine 3) is 2,661 feet, and the distance from the Rock Hall property line and the nearest turbine (Turbine 3) is 2,198. (FairwindCT 20, A. 27; Tr. 4, p. 123)

186. The respective distances the proposed wind turbines are located from the pool on the Rock Hall property are: Turbine 1 – 3,010 feet; Turbine 2 – 3,430 feet, Turbine 3 – 2,590 feet. (BNE [Libertine], Exhibit 4 – SHPO Submission, View 4)

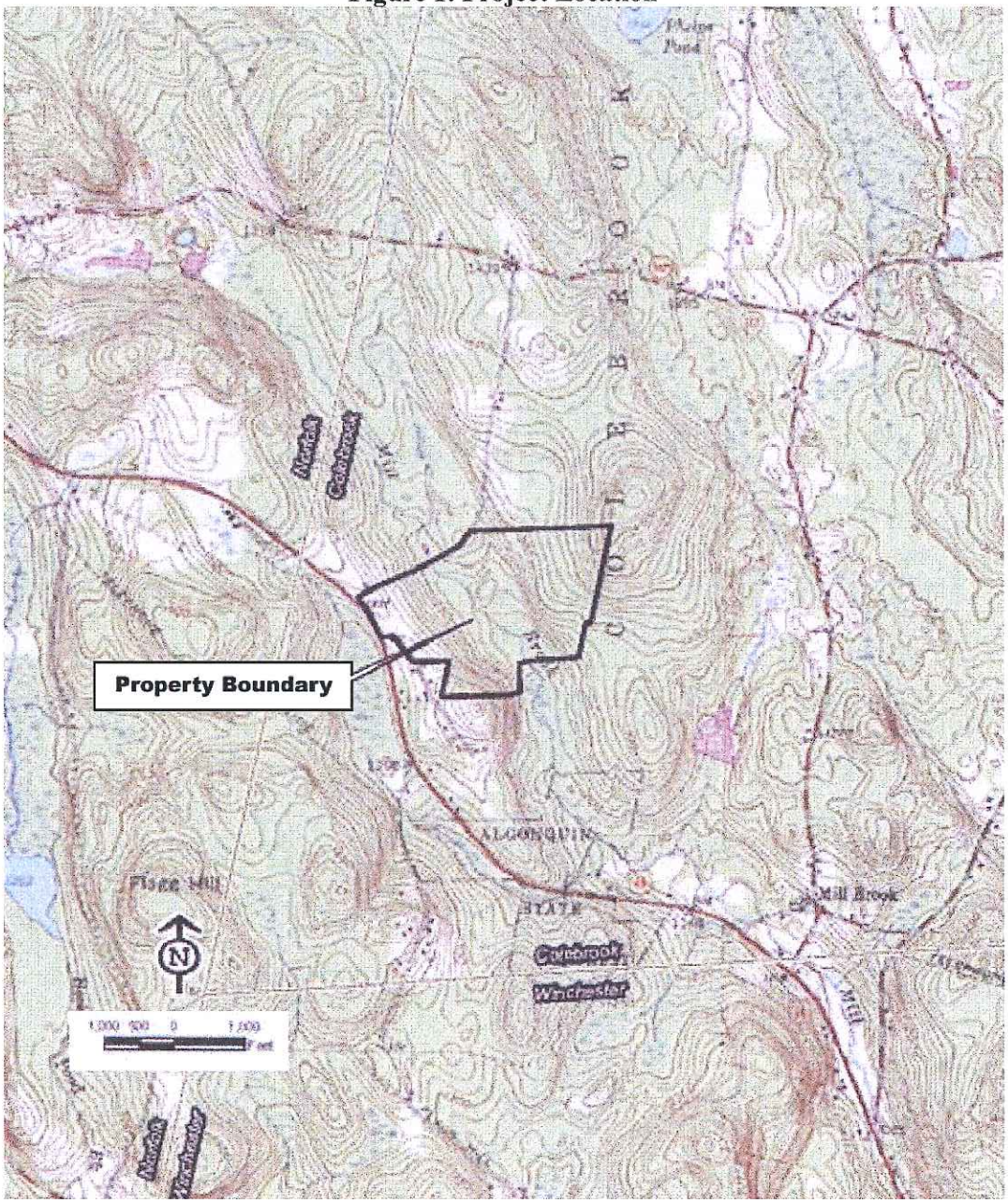
187. The upper portion of a rotating blade from one or two turbines at Colebrook North might be seen above the tree canopy from locations adjacent to the pool. During leaf-off conditions, one of the Colebrook North turbine hubs might be seen through the trees from select locations of the property (refer to Figures 13 & 14). (BNE 8 – [Libertine] Exhibit 2, A 10; BNE 17, Exhibit 2)

188. The worst-case noise levels expected to occur at the Rock Hall historic property are estimated to be in the mid-30 decibel range. (Tr. 4, p. 65)

189. The Rock Hall property would not experience shadow flicker. (BNE 8 [Libertine, Exhibit 3]: Figure 1; Table 5, p. 1; Table 4; Appendix A, p. 3)

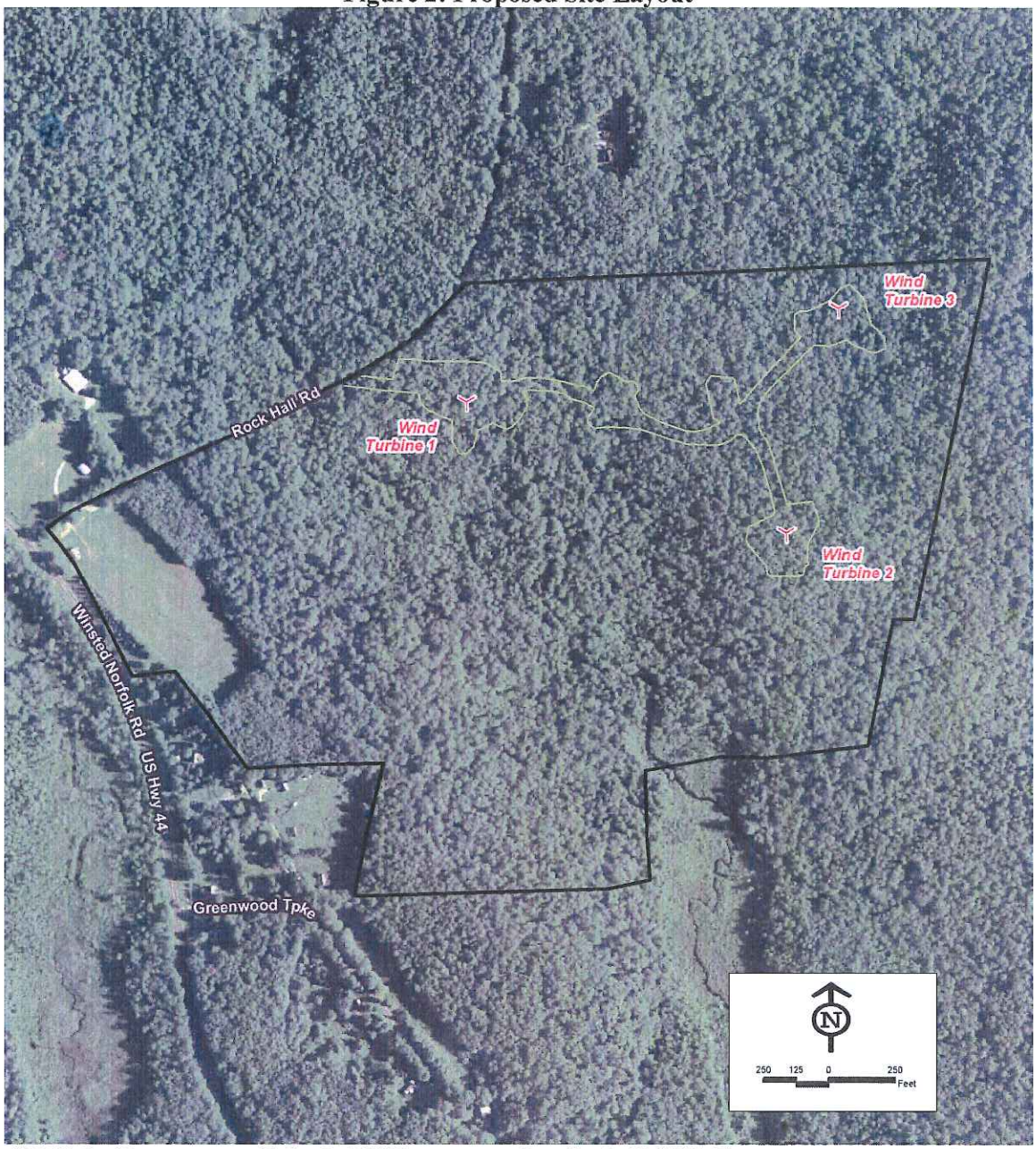
190. The State Historic Preservation Office determined that the proposed project would alter directly the characteristics of the Rock Hall property in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. (Letter from State Historic Preservation Office, dated May 19, 2011)

Figure 1: Project Location



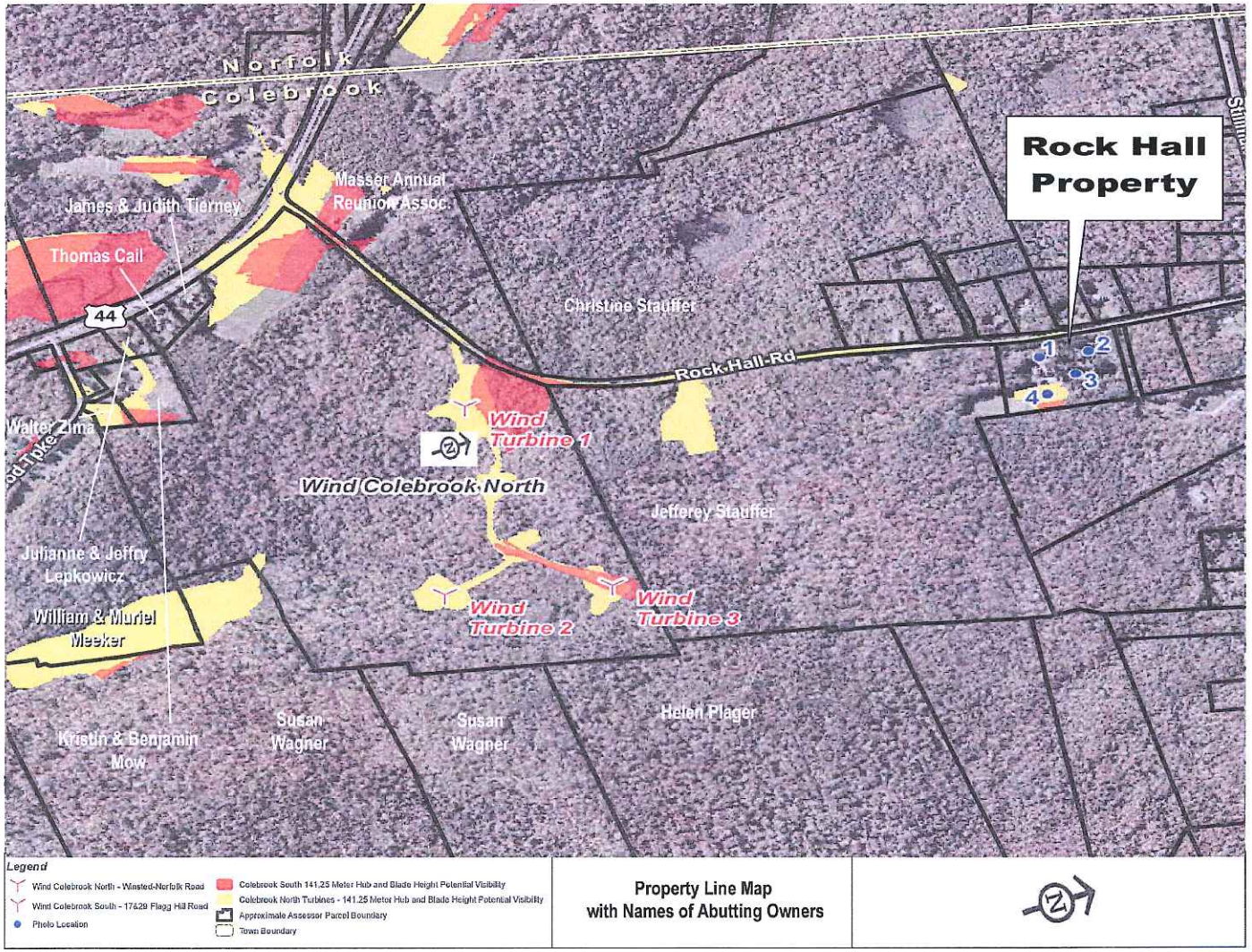
(BNE 1, p. 4)

Figure 2: Proposed Site Layout



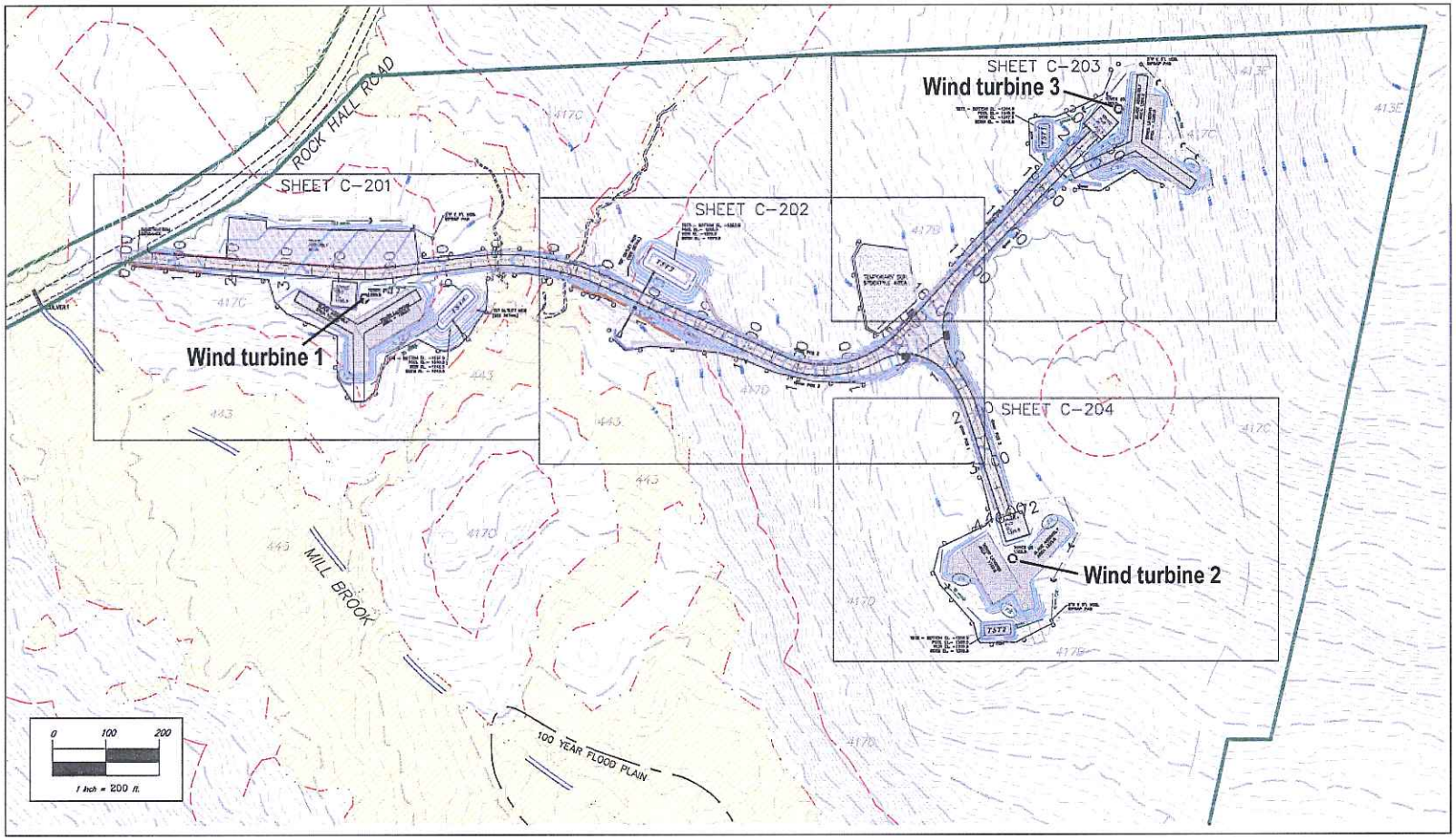
(BNE 4 – Responses to FairwindCT Interrogatories, Set 2, Exhibit 2)

Figure 3: Map Showing Boundary Lines of Nearby Properties



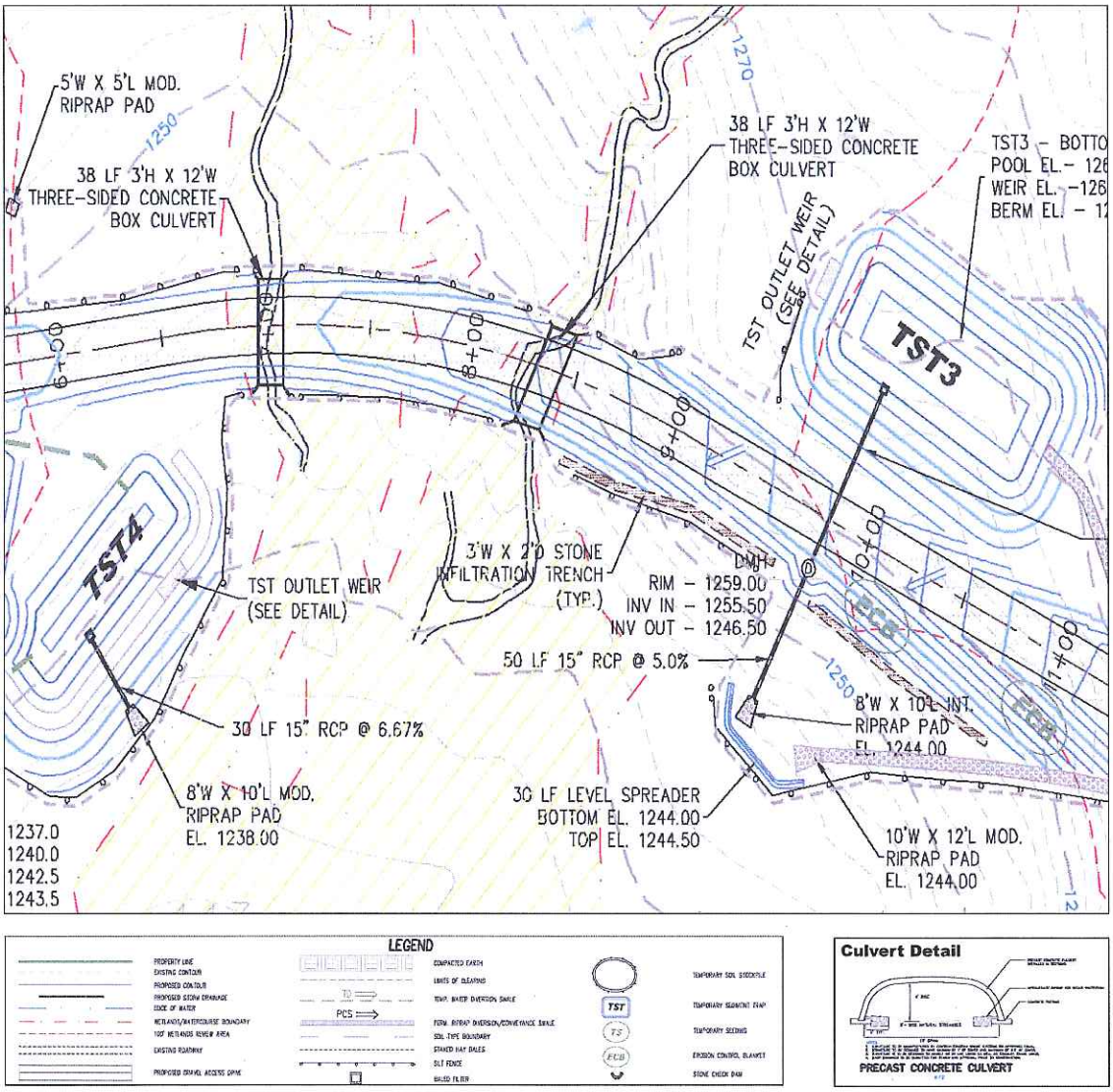
(BNE 8 [Libertine], Exhibit 4: SHPO Submission, Photo Log Map; BNE 1, Vol. 2, Exhibit F, Sheet C-001)

Figure 4: Project Site Plan



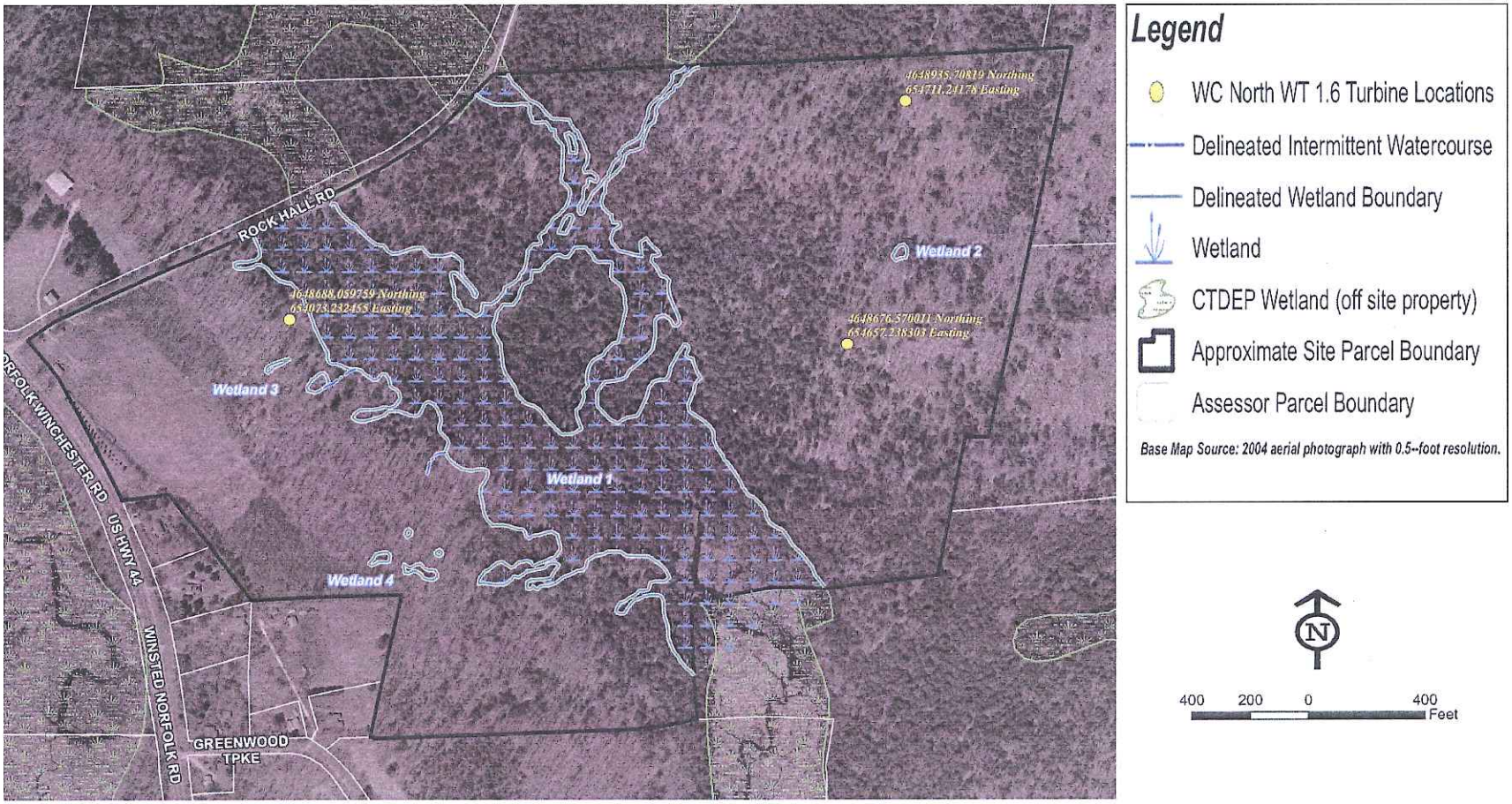
(BNE 8 – Pre-Filed Testimony of Curtis Jones, Exhibit 2 – Sheet C-200)

Figure 5: Site Plan – Wetland Crossing Detail



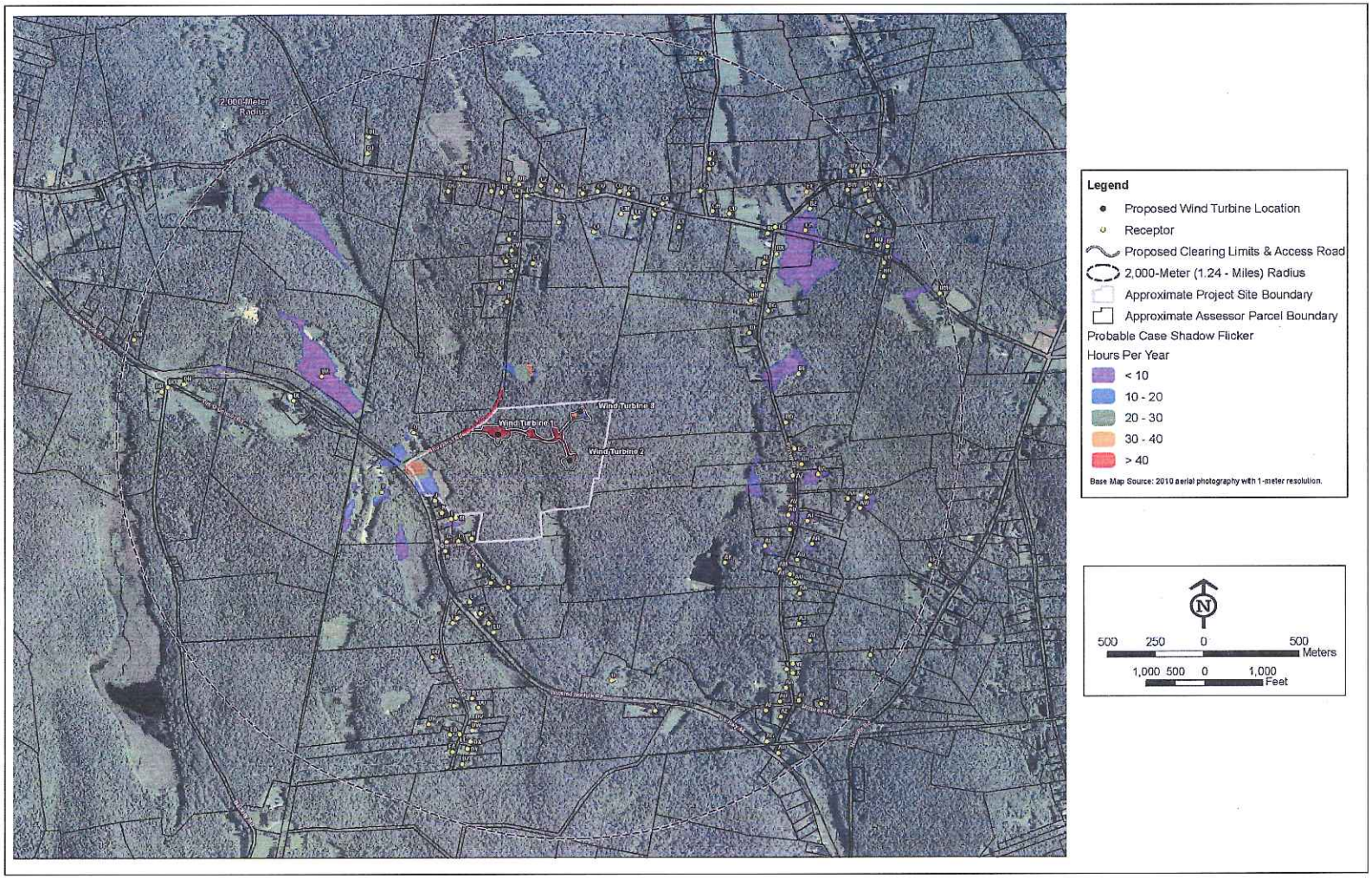
(BNE 8 [Jones], Exhibit 2 – Sheets C-201, C-202, and C-503)

Figure 6: Wetlands Resources Map



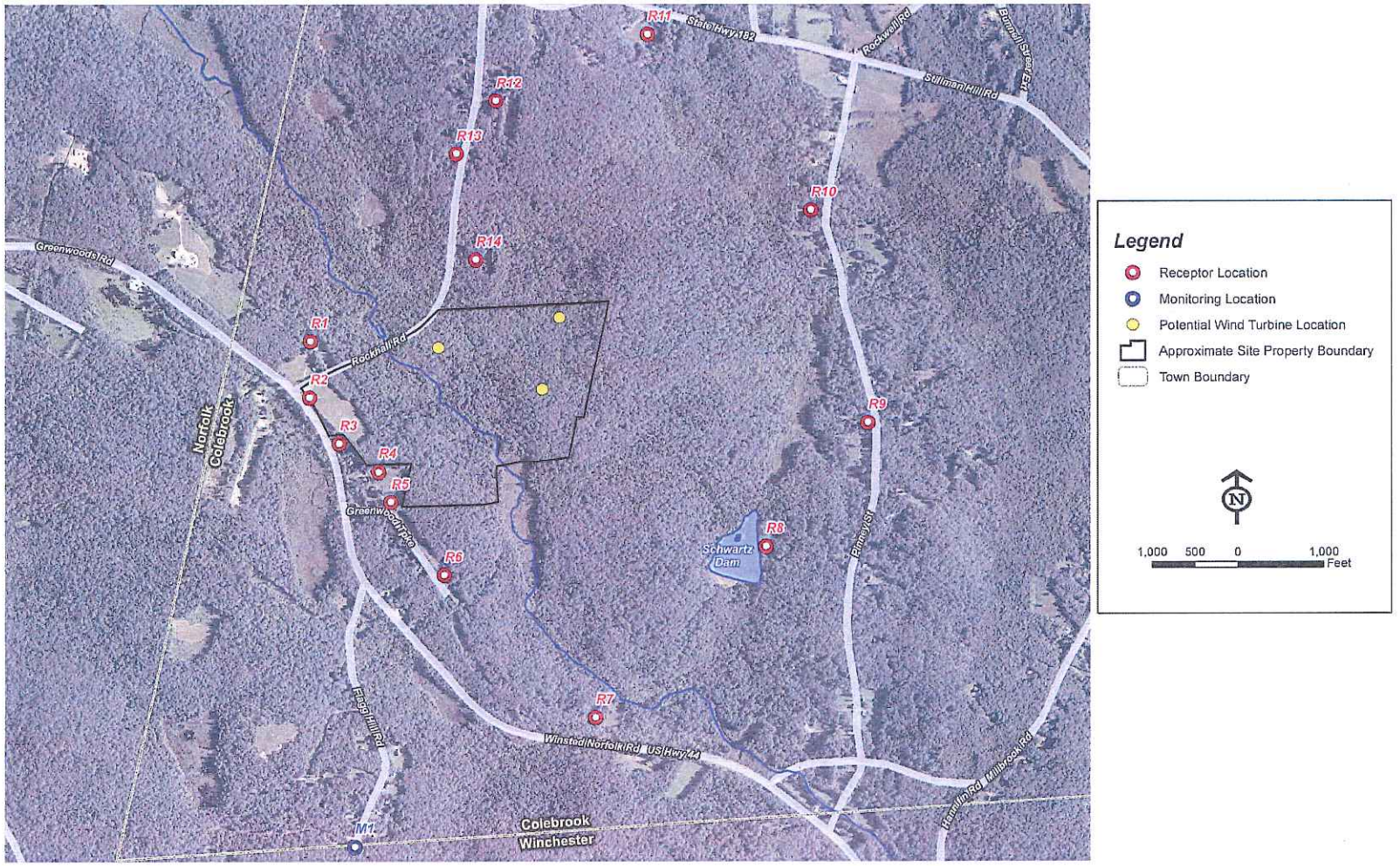
(BNE 1, Exhibit I – Terrestrial Wildlife Habitat & Wetland Impact Analysis)

Figure 7: Shadow Flicker Analysis Map



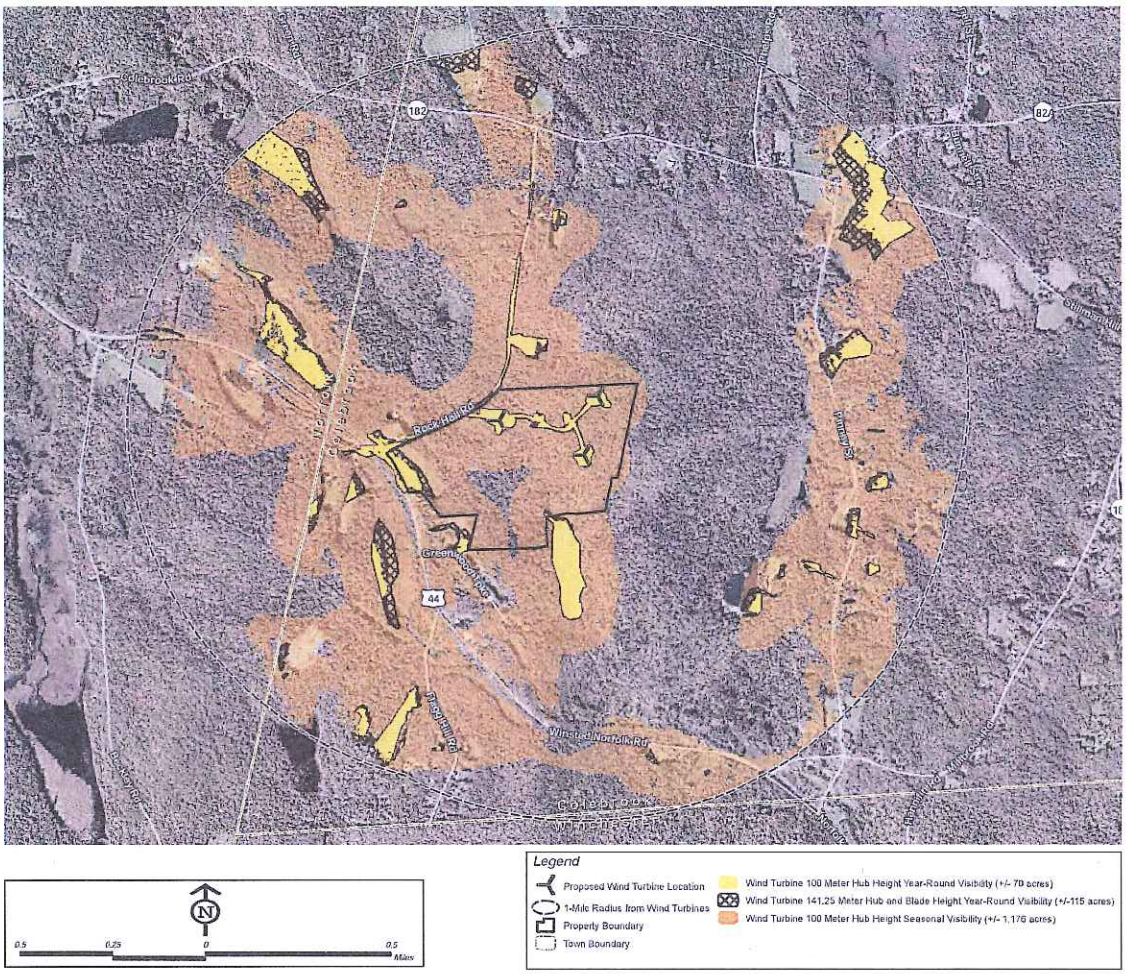
(BNE 8 [Libertine], Exhibit 3 – Supplemental Shadow Flicker Analysis)

Figure 8: Noise Receptors



(BNE [Wholley], Exhibit 2 – Noise Impact Evaluation, Figure 1)

Figure 9: Visibility within One Mile

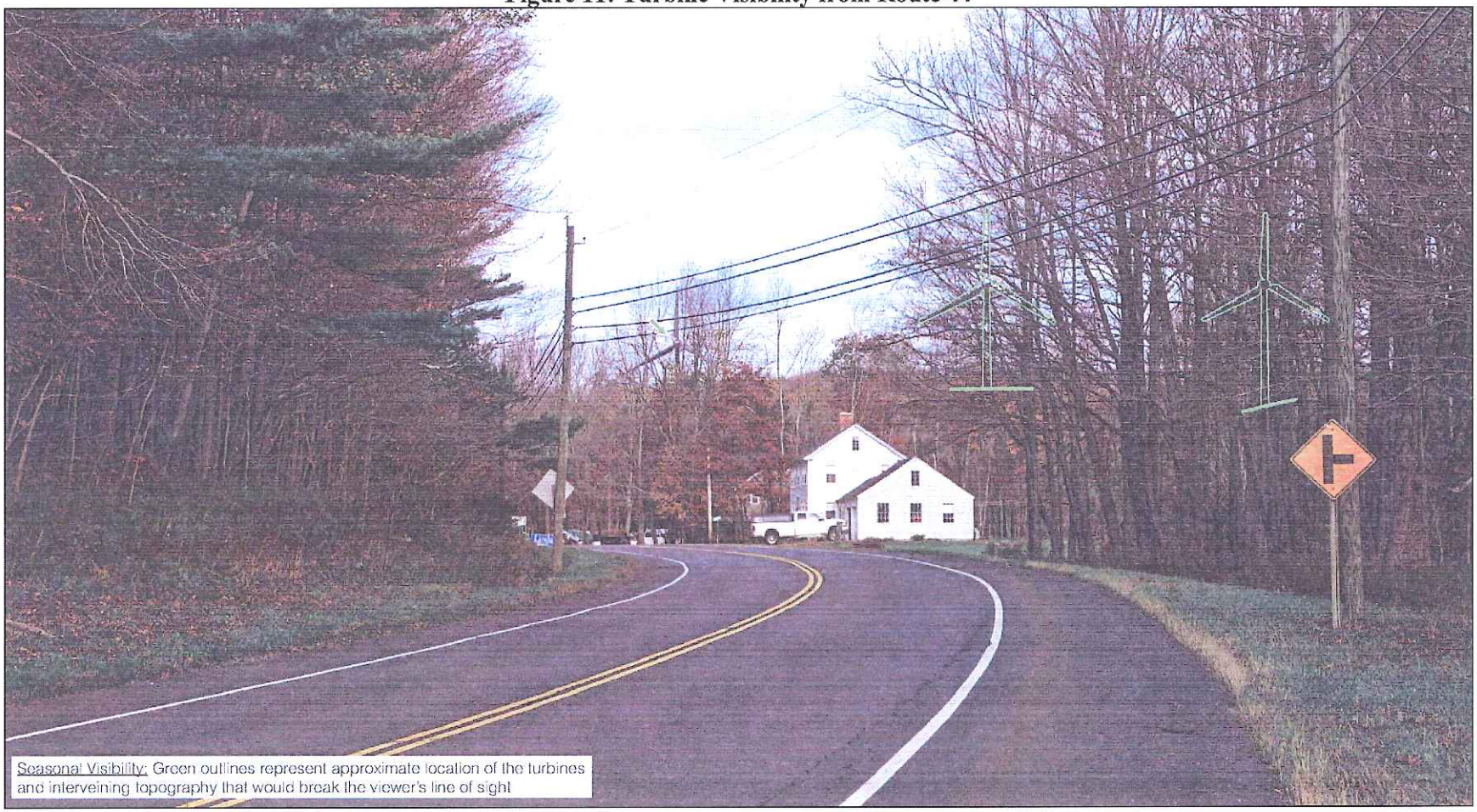


(BNE 8 [Libertine], Exhibit 2 – Supplemental Visual Resource Evaluation, Figure 4)

Figure 10: Turbine Visibility from Route 44

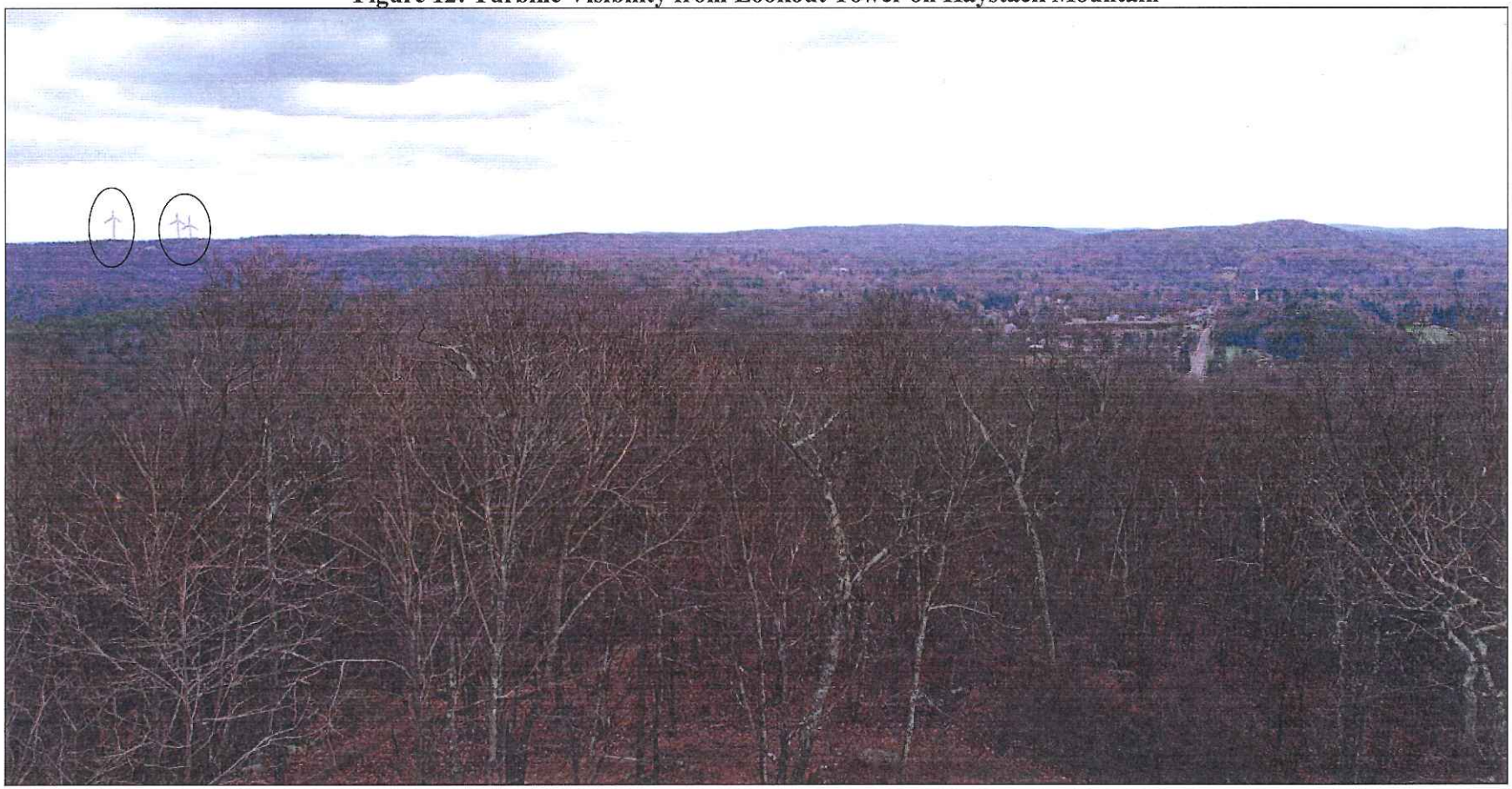
(BNE 8 [Libertine], Exhibit 2: Supplemental Visual Resource Evaluation, View 1)

Figure 11: Turbine Visibility from Route 44



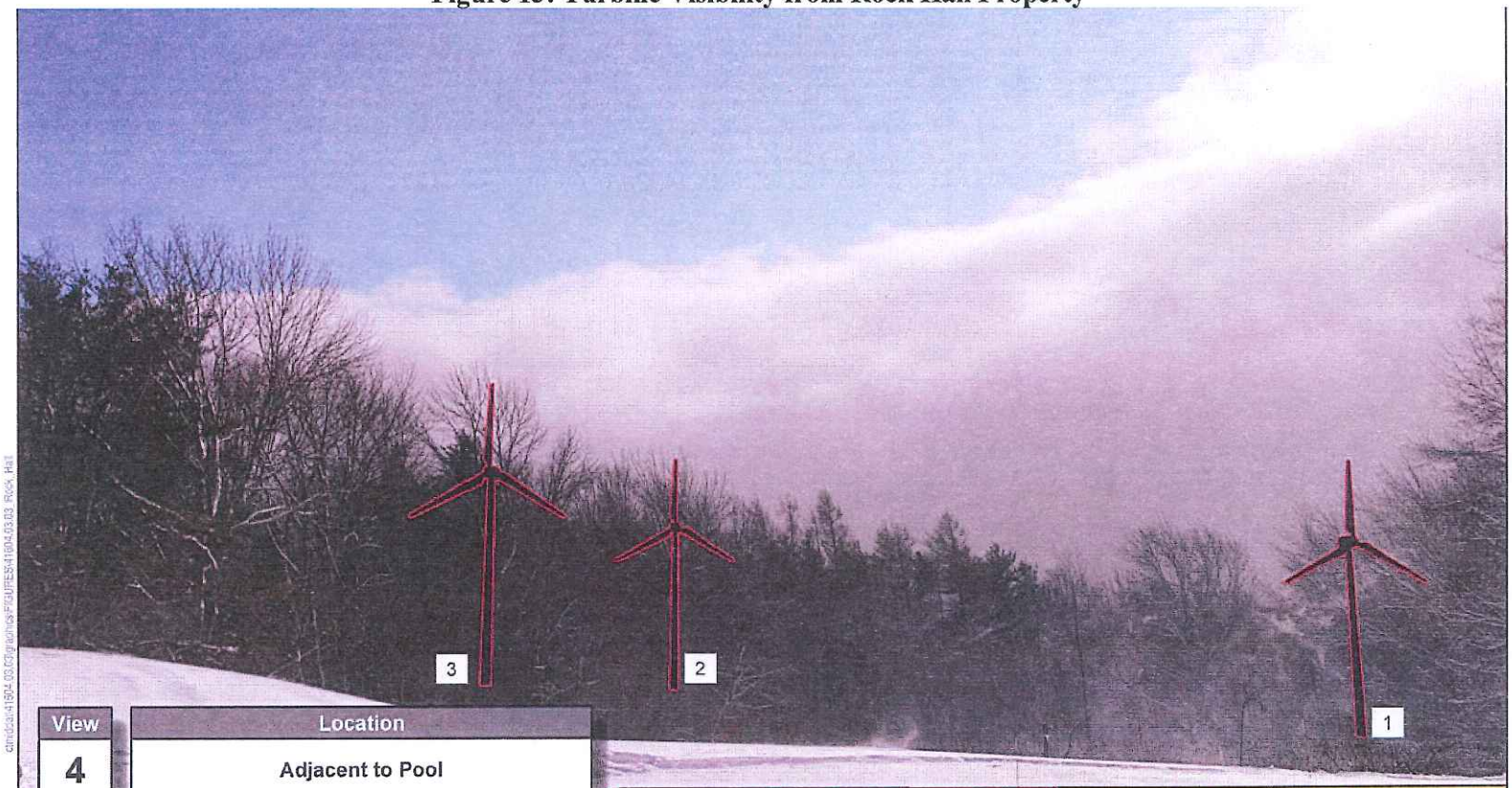
(BNE 8 [Libertine], Exhibit 2: Supplemental Visual Resource Evaluation, View 2)

Figure 12: Turbine Visibility from Lookout Tower on Haystack Mountain



(BNE 8 [Libertine], Exhibit 2: Supplemental Visual Resource Evaluation, View 5)

Figure 13: Turbine Visibility from Rock Hall Property

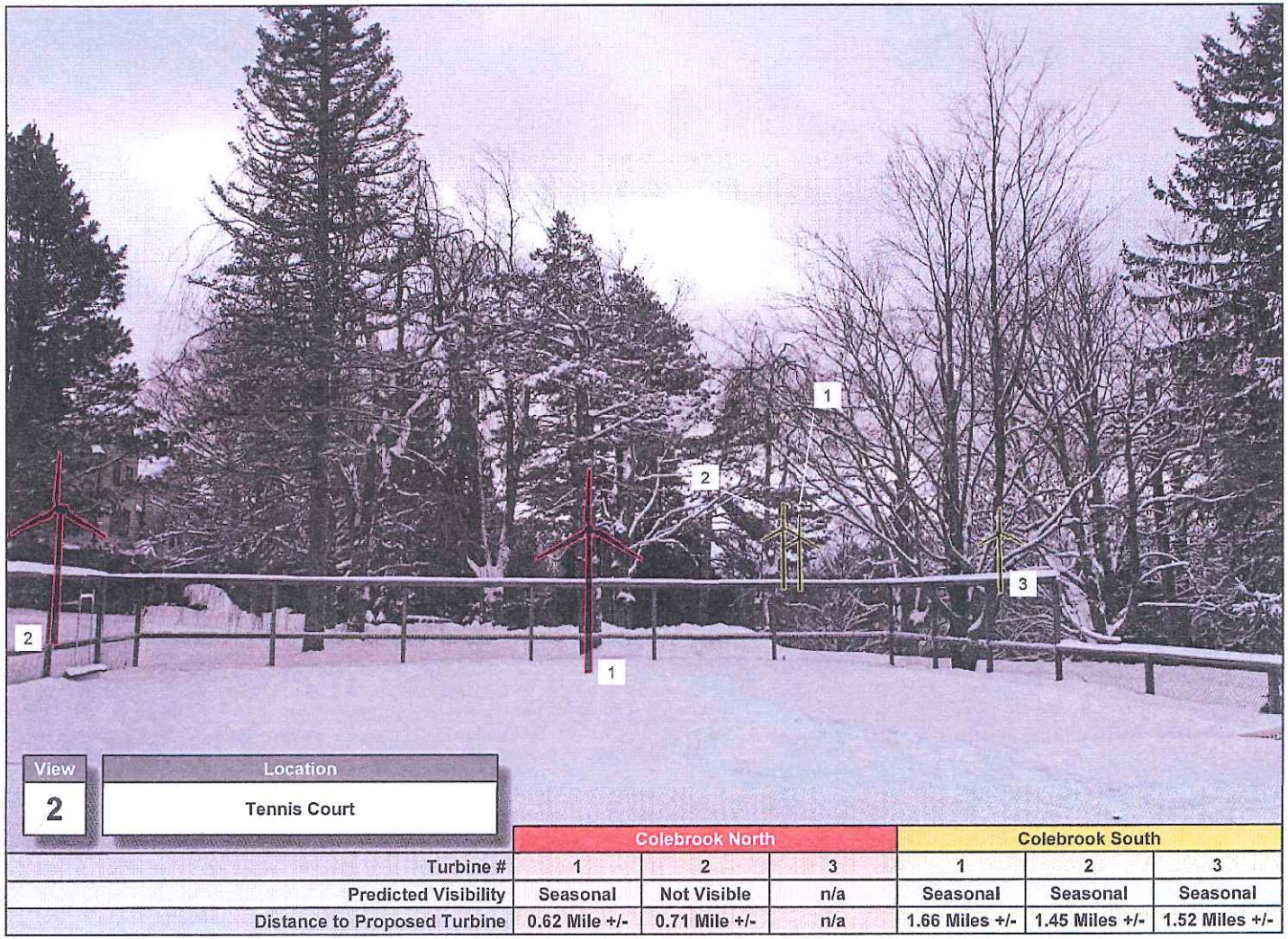


View	Location
4	Adjacent to Pool

	Colebrook North			Colebrook South		
Turbine #	1	2	3	1	2	3
Predicted Visibility	Year Round	Year Round	Year Round	n/a	n/a	n/a
Distance to Proposed Turbine	0.57 Mile +/-	0.65 Mile +/-	0.49 Mile +/-	n/a	n/a	n/a

(BNE 8 [Libertine], Exhibit 4: SHPO Submission, View 4)

Figure 14: Turbine Visibility from Rock Hall Property



View	Location
2	Tennis Court

	Colebrook North			Colebrook South		
Turbine #	1	2	3	1	2	3
Predicted Visibility	Seasonal	Not Visible	n/a	Seasonal	Seasonal	Seasonal
Distance to Proposed Turbine	0.62 Mile +/-	0.71 Mile +/-	n/a	1.66 Miles +/-	1.45 Miles +/-	1.52 Miles +/-

(BNE 8 [Libertine], Exhibit 4: SHPO Submission, View 2)