STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 3.2 MW Wind Renewable Generating Project on New Haven Road in Prospect, Connecticut	Docket/Petition No. 980 March 8 , 2011

Supplemental Pre-filed Testimony of Michael S. Klein

10. Did you review BNE's Memorandum to the Connecticut Water Company dated February 3, 2011 and revised plan sheets C-202, C-203, C-303, C-315, and C-500?

Yes.

11. In your professional opinion, do you have any concerns with BNE's Memorandum and revised plan sheets? If so, please explain your concerns.

Yes. The revised plans still do not include adequate measures to protect the downstream wetlands and water supply reservoir. During construction two of the four discharge points will have no controls and after construction there are no controls at any of the discharge points, yet the petition states that there will be no change from pre-construction conditions and therefore no downstream impacts. Page 4 of Exhibit K shows catchments used for the stormwater detention and water quality models. Typically, the catchments correspond to drainage basins (*i.e.* the area that drains to the detention basin or stormwater treatment facility in question). In the pre-development condition, they would be based on the existing contours of the land and usually specify a point(s) of analysis(ses) - where the flow leaves the property, at the detent basin outfall, a nearby culvert, etc. For post development conditions, one would typically use the land contours as graded, and the same point(s) of analysis(ses). In this case, BNE disregarded the contours and established arbitrary catchments and then calculated the discharge from these

arbitrary catchments. In my opinion, this has no relationship to how the land will actually drain and does not provide a meaningful analysis.

Exhibit H (Erosion and Sediment Control Plan) Appendix C of Volume 2 includes the calculations for the sizing of the temporary sediment traps or TSTs (they originally were labeled SB or sediment basin). Although portions of it are illegible, I found some things interesting:

- At page C-2: "The installation of a sediment basin is not practical given the site conditions." This statement needs to be clarified and the basis for the conclusion provided. If a sediment trap is required to meet the Erosion Control and Stormwater Manuals and it cannot be provided, then BNE's analysis demonstrates that the proposed development cannot be accommodated at the site without adverse impacts on downstream wetlands and water quality from sedimentation and water quality degradation.

- According to the E&S Manual p. 5-11-5, a temporary **sediment basin** is required for drainage areas of 5-100 acres in size. Temporary **sediment traps** ("TST") are only allowed for drainage areas of < 5 acres. Because of the way BNE did the drainage study that I noted previously, the drainage areas for the two sediment traps that are proposed are unclear, but it appears to me that they exceed the five acre maximum.. Appendix C further states that the sediment trap will be sized per sediment loading criteria from SB-1. SB-1 is a table in the E&S Manual that gives values that can be used for the erosion rate, which is used to size sediment basins, not temporary sediment traps.

- The CT E&S Manual sizing criteria for temporary sediment traps is 134 c.y (3726 c. ft) per acre of total drainage area. The sediment structures BNE provided are about 60 x 30 x avg depth 4' or about 7200 cu.ft. Therefore, BNE has storage for 7200/3726 or 1.9 acres of drainage area, which is clearly much less than the drainage area contributing to either of the basins. BNE's design computations under the SB-1 criteria uses a drainage area of 67 acres. While this clearly exceeds the maximum allowed for a sediment trap, using that as the design basis would require a total storage of 249,642 cu. ft. Even assuming that we split the drainage into the two traps (which appear to be about the same size), the quoted drainage area would require approximately 125,000 cu. ft per trap; instead it has 7200 cu. ft. **The traps are undersized by a factor of about 17.4 per the TST design criteria.**

Basically, it appears that the design is based on a mix of those required for either sediment basins and/or sediment traps. The calculations provided also understated the size of the construction

area by over 50% (5 acres vs. actual which is over 8). The sediment delivery rate that BNE used for the undisturbed portion of the drainage area is for wooded areas, while in actuality, a good portion of the drainage basin is actually hayfield/pasture/grassy area which has 5 times the sediment delivery rate of woods.

Moreover, BNE used the lowest sediment density (50) of the published range in manual for a soil that is equal parts silt/sand/clay (which would be a clay loam soil). The soils at the site actually have very few clay-sized particles. The surface soils are fine sandy loam, which has less than 20% clay, and between 50 & 100% sand. The underlying soils are often coarser. The density used should have been taken from the upper portion of the sand/silt mix range which is 75-95. This also understates the total sediment yield. The combined effect of these elements is to understate the sediment yield substantially (as much as 50-66%).

The E&S Manual tells us that a sediment basin requires detailed hydraulic design, must have a spillway designed to pass a specific storm, must have a certain amount of freeboard for the design storm, etc. None of these features are provided in the design shown on the plans. It is also possible that the actual design requirements would have resulted in a basin embankment that would have required a DEP dam permit.

Of course, none of this applies to a TST which is sized very simply based on the drainage area, but BNE didn't use the design criteria for a TST (which they cannot meet).

There are also two discharge points for which BNE provides no sediment control. These are located at Stations 7 + 65 and 18 + 00 on the access road, and have drainage areas of about 2 and 4 acres, respectively. Temporary sediment traps are required at these locations to meet the E&S and Stormwater Manuals and the requirements of the CT General Permit. The grading shown Station 7 + 65 on Sheets C-201 and C-301 extends to the property line without a temporary

sediment trap **and** it also assumes that the several upslope areas can be graded at 1:1. The required sediment/pollution control facility cannot be provided at this location without encroaching on the abutter's property.

The discharge at Station 18 + 00 is allowed to spill over the cul-de-sac and across the blade assembly area without any treatment. The flow cannot be diverted to the temporary sediment trap shown south of the revised tower assembly area, because it is already undersized and does not meet the requirements for embankment width or side slopes. A sediment basin is required at this location. BNE has indicated that sediment basins are not practical. If this is true, then the required sediment/pollution control facility cannot be provided at this location, either.

In conclusion, none of the discharges from the Site will be treated in accordance with the DEP's Erosion and Sediment Control Manual or the Stormwater Manual. As a result, they do not meet the CT Water Quality Standards and are reasonably likely to result in pollution, impairment and destruction of the land, water (including wetlands and drinking water supply reservoirs) and other natural resources of the state.

12. Did you review BNE's responses to SPC's second set of interrogatories?

Yes. The responses are dated February 16, 2011. I also reviewed BNE's amended response to interrogatory number 59 dated March 2, 2011.

13. In your professional opinion, do you have any concerns with BNE's responses?

Yes.

14. Please identify the interrogatory responses that you are concerned about. Please comment on each response identified.

The responses are as follows:

Q46. Please provide a more detailed map of the project site located at 178 New Haven Road (the "Site") showing the breeding bird survey points relative to the Site boundary and proposed activities on-site, and indicate why these point locations were chosen.

A46. See map attached hereto as Exhibit 1. Breeding bird survey point count locations were chosen along a roughly linear transect bisecting the Site, with the exception of a few points. Point locations were chosen in order to ensure good spatial coverage of the Site, ensure proposed turbine locations were sampled and ensure that representative land cover types present at the Site were sampled. Major bird habitat types (e.g. grasslands and woodlands) were targeted. The linear transect and 5-minute survey design was selected based on West's experience completing similar surveys, state and federal guidelines and present knowledge of field survey designs.

Comment: A grid distribution pattern would have been more effective at sampling the areas surrounding the turbine locations. Points P9 and P3 appear to be located roughly at the two turbine locations. However, no survey points were located east and west of P9 or north and south of P3

Q47. Were the breeding bird survey points located in the vicinity of the proposed turbines in a manner that would adequately collect data to analyze breeding bird use within 500 meters of each proposed turbine location?

A47. Yes. One BBS point was located at each proposed turbine location and other BBS points were established approximately 100 m (328 ft) apart along the Transect; therefore, at least 4 points were located within 500-m of each proposed turbine location.

Comment: BNE's literature citations indicate that the area of influence of the facility can extend 500 meters in all directions. The sampling program did not cover the area located east and west of P9 or north and south of P3.

Q.48. Why was breeding bird survey data collected at 12 points?

A48. The number of points to sample (12) was selected based on the minimum number of survey points West determined should be included in the BBS survey, and the maximum number which could be completed in a single morning (from sunrise to no later than 10:00 AM). Due to difficulty walking through the underbrush of the largely forested Site, it was determined during point setup that no more than 12 5-minute points could be surveyed in a single morning between sunrise and 10:00 AM.

Comment: BNE's answer is directly contradicted by their Exhibit 3, which shows that the field surveys ended at 8:00, 8:13 and 8:40 a.m.. Furthermore, based on my observations during the field walk, the site conditions do not indicate dense underbrush. In fact, BNE's Exhibit 1 and my field observations show a woods road that generally corresponds to BNE's survey points. Moreover, additional data points could have been included simply by increasing the number of survey days.

Q49. Please provide documentation demonstrating that the protocol used for the breeding bird survey provides a statistically relevant sample size.

A49. The aim of the breeding bird study is to record information about the relative abundance and species composition of breeding songbirds throughout representative habitats in the study area. The sampling design was considered to have an adequate number of points and survey rounds to meet this aim, though a priori statistical tests to determine survey effort (i.e. a power analysis) were not conducted. Rather, as stated above, the maximum number of points which could be logistically sampled in a single morning per survey round within as many representative habitats as possible within the Site were selected. This survey approach is consistent with federal draft recommendations and state (e.g. Maine and New York) guidelines for completing pre-construction BBS surveys. The ratio of survey points (12) to the number of proposed turbines (2) is actually higher than what is typically surveyed for larger wind-energy projects in the region and the nation.

Comment: The ratio of survey points to the number of turbines for larger projects is irrelevant for two reasons: First, this is not a larger project. Second, as the number of turbines increases, the ratio is expected to decrease. Finally, virtually all of the guidelines/recommendations call for a minimum of one full year of sampling, to include spring migration, summer breeding, fall migration, over-wintering and nocturnal surveys.

Q50. Why were the late June through mid-July breeding bird survey dates chosen?

A.50. The dates were selected to maximize survey coverage of the peak breeding bird season (i.e., surveys were designed to occur when the most number and greatest species richness of breeding birds would be expected to occur).

Comment: The peak breeding bird activity period in Connecticut begins in late May and ends in mid to late June, with the height of activity occurring within the first two weeks of June. This is noted in the Connecticut DEP's Forest Interior Breeding Bird Survey protocol, which requires that surveys be conducted 3 times: once between May 20 and June 2, once between June 3 and June 16 and once between June 17 and June 30. These first two survey periods were not sampled as this Site. By late June many birds are nesting and males have stopped or significantly reduced the frequency of territorial singing, which is the primary method of identification in forested habitat.

Q51. Why were no spring or summer nighttime call-back surveys conducted to inventory nocturnal species (e.g., owls and nightjars)?

A51. Nocturnal surveys were not included in the survey design due to: 1) the vast majority of pre-construction wind energy breeding bird surveys do not include nocturnal bird surveys, and 2) impacts to nocturnally active resident birds have generally been low in the eastern US (e.g. see data from post-construction studies completed in New York, New Hampshire and Pennsylvania).

Comment: In my opinion, the answer number 1 is irrelevant and untrue. Many of the survey protocols include nocturnal surveys.

Answer number 2 is only relevant if before and after surveys were done at those sites.

Q52. Why were no early spring surveys conducted to observe species such as American Woodcock (*Scolopax minor*)?

A52. The objective was to sample during the season when the majority of breeding birds would be present. Some species (e.g. Scolopax minor) may breed earlier in the season, however, the majority of woodland passerines and other species with the potential to breed within available habitats at the site are likely to occur during the survey period – June to mid-July.

Comment: The American Woodcock is a declining species that utilizes wooded swamps, edge habitats and fields similar to those found at this Site. Site surveys were in progress during their early spring breeding period. In addition to migratory data, this omission affects the reliability of the impact assessment.

Q53. Were multi-season surveys conducted at the Site or was this 2010 data compared to other breeding bird survey sites with respect to species richness and diversity on this Site? If so, where is this comparative analysis?

A53. No.

Comment: The Breeding Bird Surveys prepared for BNE Energy states that "[t]he results . . . were characteristic of deciduous forest and open grassland areas of central Connecticut." (Exhibit M, p. 12). If no multi-season surveys were conducted, this conclusion has no basis in fact.

Q54. Why were no data collected on spring and fall migratory bird use?

A54. 1. Based on existing information derived from several sources, the Site does not appear to be located in an area which would concentrate migratory birds, and impacts to migrating birds are not anticipated to be high relative to other wind energy projects.

a. The majority of waterfowl and waterbirds migrating through Connecticut are concentrated along coastal portions of the state. While ponds and other waterbodies in the area may occasionally be used by migrating individuals or small groups, the town of Prospect does not appear to provide significant stopover habitat for migratory waterfowl or other waterbirds. The area is several miles from the nearest major river system, does not contain extensive agricultural lands (which have been known to attract hungry migrant geese), and is roughly 12 to 15 miles inland from the Connecticut coast. No likely stopover habitat in the forms of large wetlands or open agricultural fields are located within the Site. The Prospect area is not included in the CTDEP Migratory Waterfowl GIS data layer that depicts areas with high concentrations of migratory waterfowl, and is not identified as a Waterfowl or Waterbird Focus Area by the Atlantic Coast Joint Venture (ACJV). The ACJV is a partnership of 18 state and federal agencies, regional conservation groups, and others coordinating to protect habitat for native birds in the Atlantic Flyway. The nearest Focus Area identified by the ACJV is approximately nine miles to the southeast, along the marshes of the Quinnipiac River and New Haven Harbor (Atlantic Coast Join Venture 2010). Waterfowl and waterbirds migrating to and from the Quinnipiac River/New Haven Harbor Focus Area or the Connecticut coast may pass over Prospect and the Project site in flight, however, most migrating waterbirds fly at night (and to a lesser extent during daytime) at altitudes of 500 to 1,000 feet or more (Bellrose, 1976). This phenomenon has been confirmed with radar at many locations for ducks, geese, loons, and other birds (Kerlinger 1982, Kerlinger and Moore 1989). Impacts to waterfowl and waterbirds observed at numerous operating commercial wind energy facilities throughout the United States, including at large sites with high migration activity (e.g. Top of Iowa, Iowa), revealed that waterfowl are not particularly susceptible to collision with wind turbines (Koford et al. 2005). No waterfowl or waterbird fatalities have been documented at the closest operational wind facility (Lempster Wind, Lempster New Hampshire; Tidhar et al 2010).

b. Most songbirds migrate at night, when air conditions and temperatures are more favorable (Kerlinger 1995). In the midwestern and eastern United States, night migrating songbirds have accounted for a majority of the fatalities at wind turbines. In general, the documented level of fatalities has not been large

in comparison with the source populations of these species, nor have the fatalities been suggestive of biologically significant impacts to species. Nocturnally migrating songbirds documented at the closest operational wind facility (Lempster Wind, Lempster New Hampshire) have been within the range observed within the region and the nation, and impacts are estimated as resulting in the loss of individuals per annum (Tidhar et al 2010). The observed level of mortality is also minor when compared to other potential sources of avian mortality (Erickson et al., 2001). The results of preconstruction surveys of nocturnal migration using radar, which include characterizations of passage rate and flight altitude, do not correlate with observed mortality of birds at operational wind energy sites (Tidhar et al 2010).

c. The Northeast Hawk Watch Association (NEHWA) and the Hawk Migration Association of North America (HMANA) monitor the numbers and types of hawks migrating annually over specific mountains or hilltops where regular raptor passage occurs. The majority of hawk watch sites in Connecticut are located along the hills of southern Litchfield County and western Fairfield County, with numerous count sites in Woodbury, Southbury, and Newtown,
approximately 15 miles or more to the west of the Project site. The Site is not located in an area with physiographic features likely to concentrate raptor migration during fall or spring. While broad front raptor migration may occur over the Site, this is likely to be primarily comprised of broad-winged hawks, which have not been highly susceptible to wind energy induced mortality. Raptor mortality from collision with turbines has also been low at most operating wind power projects outside of California (NWCC 2010). In instances where concentrated hawk migration does occur around wind energy sites, evidence to date shows that risk to migrating raptors is not great and not likely to be biologically significant (NWCC 2010, Erickson et al 2003). The Site does not contain a high prey base for migrating or resident raptors, an important factor in contributing to mortality at operating facilities (Smallwood 2008 and NWCC 2010). No raptor fatalities have been documented at the closest operational wind facility (Lempster Wind, Lempster New Hampshire; Tidhar et al 2010).

d. While few shorebirds may pass over the Site during migration periods, the Site lacks suitable stopover habitat and existing research has demonstrated that very few shorebirds collide with wind turbines or other tall structures (Erickson et al. 2001). No shorebird fatalities have been documented at the closest operational wind facility (Lempster Wind, Lempster New Hampshire; Tidhar et al 2010).

Comment: BNE's answer is largely irrelevant with respect to the birds that WEST identified at the site, songbirds (aka, passerines). BNE's answer focused almost entirely on waterfowl and shorebirds. Shorebird migration is not an issue here. Raptors and passerines are the most potentially significant migratory groups.

The answer under "c" states that the site does not have a high prey base that would attract hawks without providing the factual basis for this conclusion.

The answer under "d" refers to no shorebird fatalities at the Lempster, NH wind energy facility, which is six times (approximately 90 miles) further from the shore than Prospect.

Q55. Please provide an analysis of the potential impacts of the proposed activities on forest-interior bird habitat and populations. This impact analysis should extend beyond the

footprint of the turbine to include the 500 meter area of avoidance described by Pearce-Higgins et al. (2009).

A55. BNE objects to this interrogatory because it is overly broad and unduly burdensome.

Comment: In my opinion, the question is straightforward and relevant. This Site is adjacent to and/or part of a large block of unfragmented forest capable of supporting area-sensitive forest interior birds. Forest interior birds are susceptible to adverse impacts resulting from forest fragmentation: (1) direct habitat loss through forest clearing at the turbine locations, (2) indirect habitat loss resulting from encroachment of edge habitat extending from the turbine clearings (*i.e.*, edge avoidance), and (3) habitat loss resulting from avoidance of forest located in proximity to the turbine (as cited in Pearce-Higgins *et. al*, 2009). Furthermore, it appears that BNE has not quantified these potential impacts.

Q56. Please describe the impact of the high representation of "unidentified passerine" on reported species richness and species diversity.

A56. The number of unknown passerine observations made was due to dense understory and forest canopy which limited the potential for the surveyor to visually identify birds. The dense vegetation also masked call "signatures", which were often distant and infrequent – which again limited the potential for auditory identifications. Many auditory observations were also chirps and not easily identifiable to species, as would be the case with songs. As a result, species richness and bird diversity estimates were affected, however, the degree to which these results were affected is uncertain as species diversity was relatively low while survey effort was average to good for a pre-construction survey effort.

Comment: The understory and canopy vegetation would not have been as dense if the surveys began in late May as recommended by the Connecticut DEP. It is my opinion that the high number of unidentified birds was due primarily to the late timing of the survey when singing by territorial males decreases significantly. While the degree to which it would have affected richness and diversity is uncertain, the high proportion of unidentified passerine observations severely limits the conclusions that can be drawn from the results, particularly any assessment of the species diversity or richness at the site as "low". Furthermore, one of the

reasons why diversity was low in relationship to survey effort is likely that there were so many "unidentified passerine" observations, which were all considered the same species in the analysis. Passerines are the primary group that WEST would find, if it did the work at the right time of year. The hot, dry late spring and early summer last year amplifies the effect of the late survey, as the 2010 breeding season in Connecticut began in late May for most forest-dwelling passerines.

Q57. Did the analysis of bird use and impacts account for the differential in visual detection and identification between the two habitat types surveyed?

A57. The analysis did not account for differences in visual detection and identification between habitat types. Survey methodology was selected with a range of detection (100-m) which was considered adequate for visual or auditory detection of birds within the sampled area. Mean use per survey point analysis was included in the BBS report for all birds and different bird types.

Comment: Since the analysis did not account for the difference in sampling efficiency between the two habitat types, I reiterate that the statement in the executive summary - "Bird abundance and species richness at survey points proximate to proposed turbine locations was low to moderate relative to the open meadow and forest edge points" - is misleading. (Exhibit M, p. i). It suggests that the forested areas surveyed are of lower value as a result of the reduced species richness and abundance, when in actual fact it may be due to differences in the ability to detect and identify birds between the two habitat types..

Q58. Did you compare the results from the forested data points to breeding bird survey results in similar forested habitats within the same eco-region?

A58. Results of the pre-construction breeding bird surveys completed at the Site were compared with other available sources of information and indicate that the Site is not located in an area with high bird species diversity, regionally important breeding bird habitat or high breeding bird use. While 119 bird species were identified as confirmed breeders in either the Mount Carmel quadrangle or the eight surrounding quadrangles of the CT Breeding Bird Atlas, only 35 unique bird species were identified during site surveys. Cumulatively, three species (8.6% of all species) comprised 29.9% of the individual observations: unidentified passerine (58 observations), eastern towhee (56 observations), and American robin (43 observations). All other species composed less than ten percent of the observations individually.

A comparison was made with data collected as part of the US Geological Surveys Breeding Bird Survey program. There are three breeding bird survey routes that at least partly occur within 15 miles of the Project site and likely include similar habitats to those found in Prospect, including woodland and small areas of open field. These routes, named North Woodbury (Route No. 18008), Southington (Route No. 18015), and Westbrook (Route No. 18006) after the town nearest the start of the survey route, are located northwest, northeast, and southeast of the Project site, respectively. Data collection periods vary by survey route. The number of species observed during the 10-year period from 2000 to 2009 ranged from a low of 40 on the Southington BBS to a high of 72 on the North Woodbury route. In May 2008 CTDEP initiated a long-term (5-10 year) bird banding program just a few miles from the Project site, in the west block of the Naugatuck State Forest. In 2008 CTDEP captured 26 species of breeding birds over a period of seven sessions at the Naugatuck State Forest banding station. The majority of the species captured at the State Forest banding station also could potentially breed at the Project site, although several species are unlikely to occur due to habitat deficiencies. The understory of the Project site is a virtual monoculture of Japanese barberry, and the overall lack of variation in the shrub layer may make the site less attractive for species such as hooded warbler and black-throated blue warbler which prefer a dense, but diverse understory, while species like ovenbird tend to prefer more open understory than exists at the Project site. While barberry does produce fruit, it is considered of minor food value to terrestrial birds.

Comment: Again, BNE is comparing the species diversity results from the BBS study with species diversity results from other studies in the region. However, this cannot be done with any degree of confidence due various factors. First, a large proportion of WEST's observations consisted of "unidentified passerine". The inability to identify 58 birds observed would directly affect species diversity and species richness. "Unidentified passerine" is not a species, it is a group for which no species can be assigned. The chances that these 58 birds all belonged to the same species is roughly the same that they are all different species - **nil**. Second, BNE is comparing the results of their BBS to two study types with very different methodologies. The USGS North American Breeding Bird Survey program consisted of 3 minute roadside point-count surveys conducted at a regional scale. The other study cited is a local banding study where birds are captured via mist-netting. Total species diversity and richness would be expected to vary depending upon the survey technique and the scale of the survey. No comparison is provided to data collected within the region using the same methodology. Therefore, there is no

basis for the claim that "the Site is not located in an area with high bird species diversity, regionally important breeding bird habitat or high breeding bird use."

Q59. Please describe the impact of the proposed wind turbines on the 12 bird species (both in terms of breeding and migratory use) that are listed as species of conservation concern by national conservation organizations and the CT Department of Environmental Protection due to declining populations.

A59. No sensitive or protected species were recorded during scheduled breeding bird surveys. A review of all publically [sic] available fatality monitoring data from the United States was completed to assess the level of impacts to all state listed threatened, endangered and sensitive species, in addition to the twelve species of conservation concern requested in the interrogatory. These twelve species are not listed by the state of Connecticut as threatened, endangered or species of concern. Fatality monitoring studies included in the meta-analysis were generally completed during spring and fall migration seasons in addition to the breeding bird season. A total of 76 studies were analyzed, of which 21 studies were completed in the Northeaster region. The number of fatalities of each species included in the analysis observed at operating projects have been low and are described in the table below.[1] Impacts to the 12 species of conservation concern have ranged from zero (Baltimore oriole) to 13 (Eastern kingbird) fatalities recorded from all 76 studies included in the analysis. The majority of fatalities were observed outside of the Northeaster United States and occurred at projects considerably larger than that of Wind Prospect. For example, horned lark fatalities were reported at 34 facilities located primarily in the western US (in states with non-listed) populations), with only one eastern facility reporting casualties. The vast majority of formal post-construction mortality studies completed in the Unites [sic] States have been completed at facilities with substantially larger numbers of turbines and MW capacity. For example, the mean project size for studies below is 53.8 turbines (range: 3-195).

Comment: In my opinion, the answer is completely unresponsive to the question asked.

Q72. What is the source and level of accuracy of the topography shown on the plans that comprise Exhibit F to the petition?

A72. The source of the topography shown on the plans is from the State of Connecticut, Department of Environmental Protection. All 2004 Statewide Aerial Survey imagery and data products are defined under State of Connecticut contract award number RFP-990-A-14-0518-C (dated Feb 22, 2000). The Connecticut 14 Statewide LiDAR dataset consists of x, y, and z point-data from an interpolated surface model ("bare-earth") derived from an Airborne LiDAR Topographic Mapping System (ALTMS). This data underwent automated processes to interpolate and create 2 foot elevation contours from the 20-foot posting LiDAR 2000 point data. The horizontal positional accuracy of the 20-foot posting LiDAR 2000 point data is approximately 3 feet on the ground.

[1] Table not reproduced for this testimony.

Comment: BNE did not provide vertical accuracy, which is of more significance with respect to topography. Specifically, BNE's response regarding the accuracy of the topographic mapping is at best only partially responsive to the questions asked. Therefore, I conducted additional research. The Connecticut DEP (the editor and publisher of the LIDAR data) indicates the following regarding the accuracy of the LIDAR 2' contour data:

"**Horizontal accuracy report:** The horizontal positional accuracy of this data is not known. This data underwent automated processes to interpolate and create 2 foot elevation contours from the 20-foot posting LiDAR 2000 point data. The horizontal positional accuracy of the 20-foot posting LiDAR 2000 point data is approximately 3 feet on the ground. The data is not consistently accurate statewide."

"**Vertical accuracy report:** The data is not consistently accurate statewide. In some areas there are anomalies with the contour line information areas due to data gaps in the underlying LiDAR data used to generate the contour lines. This is a known limitation of the LiDAR data collected for Connecticut in 2000." (source: http://www.cteco.uconn.edu/metadata/dep/document/LIDAR_2000_CONTOUR_2FT_FGDC_Plus.htm).

Moreover, I discussed this with the CT DEP's point of contact (Howard Sternberg) and Professor Tom Meyers at UCONN who was responsible for analyzing the performance of the contractor. They confirmed that the accuracy is not known and that the information was not intended for use in engineering, without extensive "ground truthing" to confirm horizontal and vertical accuracy. I would also note that with conventional photogrammetry, 20' contour elevation data would be considered accurate to within 10' (1/2 the contour interval). That accuracy does not improve when the 20' contour data is interpolated to 2' data.

Q73. How were the wetland flags placed in the field by VHB located and transferred to the plans? What is the level of accuracy?

A73. Wetland boundary flag locations have been located in the field using a GPS receiver utilizing available real-time Satellite-Based Augmentation System (WAAS) corrections. Resulting positions have been post-processed against a nearest Continuously Operating Reference Station (CORS) tied to the National Spatial Reference System (NSRS). Resulting positions have been post-processed using generally accepted survey adjustment methods with an ultimate expected horizontal accuracy of less than one meter.

Comment: If the work was done according to generally accepted survey methods, a surveyor should have certified the wetland flag locations. Wetland flag locations that are accurate to within 3' (less than 1 meter) lie within a 6' circle. This is an unacceptable level of accuracy given the very limited separating distances proposed between the limits of the work and the wetlands at some locations.

Q83. Please explain the conflict with Erosion Control Note 9 C-201 and grading for Tower assembly area on same sheet, which it shows as a 1:1 slope.

A83. Realizing the minimum requirements in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, in an effort to reduce the construction footprint as much as possible, we have designed many slopes as 1:1 vice 1:2. This will require more attention to slope stabilization during construction through the use of temporary seeding and erosion control blankets and other erosion control measures. This method will only be utilized after geotechnical evaluations including soil analyses indicate it can be done with no increased risk, otherwise we will redesign at 1:2. Again, this will be finalized in the anticipated development and management phase of this proceeding. This is typical procedure for any contested proceeding with the Council.

Comment: As noted in the E&S Manual, temporary seeding with or without erosion control blankets is not an acceptable methods for stabilizing 1:1 slopes.

Q84. How will the discharge from the temporary diversion ditch be conveyed down the slope at Station 1+75 of the access road, to the roadside ditch?

A84. Water on the north side of the Access Road flows west to a rip rap collection point at approximate station 2+25 where it is conveyed to the south side of the Access Road by a concrete pipe to a rip rap apron. Again, this will be finalized in the anticipated development and management phase of this proceeding. This is typical procedure for any contested proceeding with the Council.

Comment: I don't believe BNE answered the question.. The question is about how water is conveyed from temporary diversion trench to the ditch without eroding the slope in between. The question was **not** about how water from the ditch is conveyed under the road.

Q88. Please provide site plans (including grading, erosion control, access, utilities, sanitary facilities) for the proposed support building. How much Site disturbance be required to make this facility operational? Was this included in the area of disturbance calculations?

A88. Site plans for the proposed support building have not been fully developed. The site disturbance for the proposed building area, however, was included in the disturbance calculations. Detailed site plans for the support building will be finalized and included in the anticipated development and management phase of this proceeding. This is typical procedure for any contested proceeding with the Council.

Comment: BNE's plans show a building but they do not show any parking, driveway, grading around the building, utilities or the septic system. School buses require significant space to maneuver. The soils at the site all present severe limitations for installation of roads, small commercial buildings and septic systems, which means that not all potential locations may be acceptable for the proposed support facilities. Select fill or groundwater controls may be required to accommodate the septic system. There are mandatory minimum separating distances between drainage measures, cut slopes, wells and septic systems. Therefore, they cannot know the amount of land disturbance that will be required to build the support building, provide access, utilities, parking or waste disposal.

Q89. Why don't the temporary sediment basins conform to the requirements of the Erosion Control Manual with respect to height, width and slope of the containment berm? Where is the outlet?

A89. This project uses temporary sediment traps as per drawing C-503. References to basins on other sheets are typographical errors and will be corrected.

Comment: The temporary sediment traps shown on the plans do not confirm to the requirements of the detail shown on BN E'splans with respect to side slopes or berm width, nor do they show an outlet weir or any stabilization at the downslope side of the trap.

Q90. How do the plans prevent stormwater from reconcentrating and causing erosion and sedimentation into wetlands downgradient of the two sediment basins?

A90. The temporary sediment trap apron acts as a level spreader to prevent concentration that would cause erosion and sedimentation into wetlands down gradient of the two temporary sediment traps.

Comment: On sloping sites, level spreaders are often ineffective. For example, at the Oxford High School site there is a discharge from a poured concrete level spreader (which is much more likely to be constructed to actually be level than an apron of a temporary sediment basin) onto a similar slope. The flow from the level spreader at that site has reconcentrated in a very short distance and caused significant erosion. CT DEP issued a violation and advanced soil stabilization techniques were unable to remediate the problem. The contractor was eventually required to rip-rap the entire slope last year. With the snow cover it is not possible to determine if this was effective in stopping the problem. You just cannot get effective sheet flow on these kind of slopes.

Q92. Please explain the discrepancy between the proposed grading for the West facing slope of blade assembly area for turbine, the Erosion control plan notes, which do not permit slopes steeper than 2:1 without a plan designed and sealed by a geotechnical engineer, and the CT Sediment and Erosion Control Manual.

A92. Realizing the minimum requirements in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, in an effort to reduce the construction footprint as much as possible, we have designed many slopes as 1:1 vice 1:2. This will require more attention to slope stabilization during construction through the use of temporary seeding and erosion control blankets and other erosion control measures. This method will only be utilized after geotechnical evaluations including soil analyses indicate it can be done with no increased risk, otherwise we will redesign at 1:2. Again, this will be finalized in the anticipated development and management phase of this proceeding. This is typical procedure for any contested proceeding with the Council.

Comment: Temporary seeding with or without erosion control blankets is not acceptable on 1:1 slopes. Since BNE recognizes the possibility of using 2:1 slopes, it should provide an analysis of the grading limits required under that scenario.

Q93. How will the side slopes and bottom of the temporary roadside ditches be stabilized? What runoff velocities will occur for the 10 year through 100 year storms and how will the ditch bottom and sides be stabilized? Please provide calculations showing that the ditches will be stable and have adequate capacity to pass the design storm.

A93. Plan sheets show stabilization with temporary seeding in accordance with Connecticut Guidelines for Soil Erosion and Sediment Control section 5-3-2. Hydrographs have been provided for 2, 10, 25, and 100 year storm events. Calculations will be provided in the

anticipated development and management phase of this proceeding. This is typical procedure for any contested proceeding with the Council.

Comment: The answer is noresponsive. The hydrographs provided do not show either peak flow or velocities in the ditches. Without knowing the velocities of flow in the ditches, it is unclear if the ditches can can convey the required volume or velocity without causing significant erosion, which will cause degradation of the wetlands and watercourses. The interior slopes and bottom of the ditches **cannot** be stabilized with vegetation. Once installed they will be subject to continuous flow from groundwater seepage and irregular but frequent flow from runoff events. Effective vegetative cover cannot be obtained under such conditions.

Q94. What measures are included in the design to control seepage and stabilize cut slopes in areas with a hardpan, or where seasonal high groundwater is likely to be encountered?

A94. The plans in Exhibit F are schematic drawings for review by the Connecticut Siting Council and not for construction. The anticipated development and management phase of this proceeding will include filing of construction drawings and will include geotechnical analyses to provide design for seepage and seasonal high groundwater issues.

Comment: The plans submitted in Exhibit F are far beyond schematics. They include road plans and profiles, grading at 2' contours, etc. Control of seepage and high groundwater are major factors in designing roads and extensive earthwork on the side slopes of drumlins. Furthermore, schematic design is not sufficient to demonstrate compliance with the Connecticut E&S or Stormwater Manuals. Finally, the soils at this site have severe limitations for grading and for roads, including limitations due to the need to control seepage and high groundwater. These limitations may require extensive engineering measures to overcome. Such measures should be developed and analyzed to insure that they can be accommodated without affecting the overall feasibility of the design.

Q98. How will the stormwater on the downslope side of the permanent access road be handled? Will it be allowed to sheet flow over the embankment? If so, how will the embankment be stabilized while the sheet flow is occurring?

A98. Disturbed areas on post construction plan sheets get re-vegetated with permanent vegetation as shown on drawings C-312 and C-313 as upland meadow in accordance with Connecticut Guidelines for Soil Erosion and Sediment Control Section 5-3-5.

Comment: In my opinion, this answer is non-responsive. The question asked how the embankment would be stabilized in the face of flows that will sheet over the re-graded embankment once it is seeded.

Q99. How will the success of the proposed restoration and enhancement areas be monitored and what plans are in effect to address any remedial measures that may be required?

A99. Monitoring of the Upland Meadow Creation and Restoration Areas will be conducted by a qualified third party inspector for several growing seasons following Project construction to ensure that the Restoration Areas are reestablished, that no invasive species colonize in those areas, and that the adjacent slopes are properly stabilized. BNE will institute remedial measures to the extent necessary.

Comment: There is no documentation on the plans or in the Petition that addresses monitoring, nor is the answer sufficiently detailed to consider it acceptable. Success standards, financial assurances and detailed reporting requirements must be addressed and examined for completeness. Finally, there should be an enforceable assignment of responsibility for stewardship of any of the lands designated for restoration.

Q105. Please provide the weather conditions during each bird survey (temperature, cloud cover, precipitation) as well as the start and end time and the specific field personnel.

A105. See table attached hereto as Exhibit 3.

Comment: Exhibit 3 shows that many of the bird surveys were conducted under poor or fair visibility. This likely contributed to the high number of unidentifiable species reported and is yet another indication that BNE's bird survey methodology and implementation was severely flawed. Table 3 also shows that BNE's response to Q. 43 was inaccurate.