STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 4.8 MW Wind Renewable Generating Project on Winsted-Norfolk Road in Colebrook, Connecticut ("Wind Colebrook North")	**Petition No. 984**
	March 15, 2011

PRE-FILED TESTIMONY OF WILLIAM F. CARBONI

Q1. Please state your name for the record.

A1. My name is William Carboni. I work at Spath-Bjorklund Associates.

Q2. Please describe your involvement in this project.

A2. I was retained by Reid and Riege, PC on behalf of FairwindCT, Inc., Susan Wagner and Michael and Stella Somers to assess the plans and reports submitted by BNE Energy Inc. ("BNE") regarding stormwater discharge, erosion and sediment control and provide testimony on those subjects. The plans and reports were prepared for BNE by Zapata Inc. ("Zapata"). I began by conducting an initial review of the plans to determine whether they complied with Connecticut State Guidelines with regards to erosion and sedimentation, the Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, site engineering with regards to drainage and grading, and Standards of Good Practice for this type of site development. That review led to my submission of this testimony.

Q3. What degrees do you have?

A3. I earned a B.S. in civil engineering from Worcester Polytechnic Institute in 1967.

Q4. What professional licenses do you hold?

A4. I am a licensed professional engineer in Connecticut and California.

Q5. Please describe your experience as a civil engineer.

A5. I have worked as a civil engineer with several firms and state agencies since 1967. My career began in California, where I worked for the California Department of Water Resources and later the California Division of Highways. In those positions, I completed assignments ranging from evaluating local surface and imported water projects, geologic and hydrologic water resources, ground water utilization, analysis of agricultural and urban unit water use, preparation of freeway designs, evaluation of socio-economic impacts of alternate freeway locations and incorporating freeways into city plans. In 1972, I moved into the private sector. I worked for three different corporations over the next dozen years and worked on projects including transportation systems, engineering and environmental evaluations of potential effects of industrial parks, planned residential developments and the conversion of agricultural land, expansion of a sewer plant, preparation of master water supply and waste water disposal plans and studies of noise pollution from transportation sources.

In 1984, I moved to Connecticut and started working at Spath-Bjorklund Associates, where I am still employed today. At Spath-Bjorklund, I supervise the engineering section. In that role, I have been responsible for preparing grading, street, utility and sewage disposal plans for residential and commercial projects. My work on projects has included hydrologic and hydraulic computations, designing stormwater treatment and detention and drainage calculations. I have designed, evaluated and consulted on all manner of drainage system and erosion control analysis and design. A copy of my current CV is attached to this testimony.

Q6. Have you testified in front of the Siting Council before?

A6. Yes, I submitted pre-filed testimony regarding Petition No. 980, in which BNE is

seeking approval to site a similar project in Prospect, Connecticut.

Q7. What is the purpose of your testimony?

A7. This testimony details my findings regarding BNE's submission to the Siting Council.

Q8. Please summarize your findings.

A8. Generally, I found that BNE's submission contains technical and engineering errors, omits necessary information and data and does not conform with the Connecticut Public Health Code, the Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, (CGP), the 2004 Connecticut Stormwater Quality Manual (2004 Manual), the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (2002 Guidelines), the 2004 Connecticut Department of Transportation's ("CT DOT") Standard Specifications for Roads, Bridges and Incidental Construction (Form 816) or the CT DOT 2000 Drainage Manual.

The proposed project, its plans and reports therefore do not comply with the requirements of the State of Connecticut. BNE's submission also contains statements and calculations that do not represent the site accurately and minimize the impact that this project will have on the site.

Q9. What is your most significant finding?

A9. My most significant finding concerns the lack of sedimentation facilities and outlet protection facilities. There are multiple discharge points from the proposed road and from the blade assembly areas. However, there is only one temporary sedimentation trap and there are no temporary sedimentation basins or level spreaders. The absence of these facilities violate the water quality standards of the state and will result in erosion and deposits of sediment into wetlands.

Section 5-11 of the 2002 Guidelines provides the criteria for sediment impoundments and barriers. For drainage areas less than 1 acre, geotextile silt fences or hay bale barriers are

required below the disturbed area. For drainage areas of 1 to 5 acres, temporary sediment traps are required. For drainage areas larger than 5 acres, temporary sediment basins are required.

BNE's plans propose six point discharges from the roads and five area discharges from the tower areas. The following table shows the area tributary to each of the discharges and the type of sedimentation impoundment required. Under the 2002 Guidelines, these plans should provide for the installation of six temporary sediment traps, two temporary sediment basins and three geotextile silt fences or hay bale barriers. Instead, Zapata proposes using only one temporary sediment trap and silt fences at each discharge point. Those facilities violate the 2002 Guidelines and will not control erosion on the site.

Table 1. Facilities required by CT water quality standards versus facilities provided by BNE.

Discharge Point	Tributary Area (acres)	Disturbed Area (acres)	Facility Required by 2002 Guidelines	Facility Provided
Access road Station 0+00 rt.	0.28	N/A	Silt Fence	Silt Fence
Access road Station 0+00 lt.	0.44	N/A	Silt Fence	Silt Fence
Access road Station 7+80 rt.	0.25	N/A	Silt Fence	Silt Fence
Access road Station 7+80 lt.	1.89	N/A	Sediment Trap	Silt Fence
Access road Station 8+90 lt.	11.89	2.77	Sediment Basin	Silt Fence
Access road Station 12+30 rt.	4.40	N/A	Sediment Trap	Silt Fence
Tower 1 above loop south end	3.59	N/A	Sediment Trap	Silt Fence
Tower 1 south end blade assembly	4.28	N/A	Sediment Trap	Silt Fence
Tower 1 below assembly area	1.20	N/A	Sediment Trap	Silt Fence
Tower 2 south end blade assembly	2.02	N/A	Sediment Trap	Silt Fence
Tower 2 tributary to proposed sediment trap	5.51	1.52	Sediment Basin	Sediment Trap

N/A = Not applicable. The 2002 Erosion Control Guidelines criteria is based on total tributary area only.

In the Stormwater Management Plan submitted as Exhibit H to BNE's petition, Appendix K contains calculations for water quality volume, water quality flow and water quality sediment loading. However, there are no calculations for sizing the sediment trap that is provided in the plans, nor are there calculations for the traps or basins required by the 2002 Guidelines. In providing the calculations, Zapata acknowledges the requirement for sediment controls. However, this requirement is not fully implemented in the plans.

The one temporary sediment trap proposed by BNE is located down hill of the access road to Tower 2. The trap as proposed has a volume of 407 cubic yards. Based on the 2002 Guidelines, this sediment trap should be a sediment basin and should have a volume of 738 cubic yards. The one facility that is proposed is undersized.

Q10. Are some of these discharge areas more troublesome than others?

A10. Yes. One of the discharge areas is more significant than the others.

The wetlands crossing located on the crane road is the most important discharge point in the proposed plans. Here, four road side ditches discharge directly into the wetlands. The 2002 Guidelines require that one discharge point have a sediment basin and that two of the other three points should have temporary sediment traps. BNE has proposed no sedimentation facilities proposed at the wetland crossing.

Section 5-11 of the 2002 Guidelines states that the minimum storage volume for impoundments is 134 cubic yards per acre of drainage area. For drainage areas larger than 5 acres, the volume is adjusted based on engineering studies. Using the design methodology in the 2002 Guidelines, the basin that should have been located on the crane road at the wetlands should contain 1394 cubic yards.

Using a 4-foot depth, this basin would have an average surface area measuring of 97 feet by 97 feet. The construction of a basin that large will be difficult at this location. The cuts on the

uphill end of the basin will be more than 20 feet deep. Using 2:1 slopes and a reverse bench as required by the 2002 Guidelines, the slope area will be about 50 feet wide. The area required to be cleared for this basin alone will be about a half acre. Other temporary sediment traps and basins that are required to be on the site but are not provided for in the plans may also not be able to be constructed due to slope and other constraints, but this area is the most troublesome. The additional land clearing associated with making this and other discharge areas comply with the 2002 Guidelines will result in an increased rate of runoff and additional erosion and sedimentation.

Q11. Are there other problems with the proposed discharge points?

A11. Yes. In addition to providing sedimentation facilities in inadequate numbers and sizes, the plans have no energy dissipators. Energy dissipators are structures placed at the end of culverts, swales, ditches or other conveyance facilities to reduce the velocity of the water and to dissipate energy for the purpose of preventing erosion of the soil downstream of the discharge points. During the construction phase of this project, there will be eleven point discharges. The plans show no energy dissipators at any of these point discharges. There are no calculations provided in the reports showing compliance with 2002 Guidelines.

The area north of the central wetlands has a relativity uniform slope. Prior to construction, rainfall on this area will sheet flow to the wetlands. However, after construction of the access roads and blade laydown area, the runoff will be channeled into discrete points of discharge. Each of these points will require outlet protection to prevent erosion of the wetlands.

Moreover, the points where each of the four ditches along the side of the access road discharge into the wetlands also require outlet protection. These points should be protected with level spreaders. There are no design calculations for these facilities to show compliance with 2002 Guidelines design criteria for level spreaders.

As currently proposed, erosion will occur during construction, resulting in deposits of sediment into the wetlands.

Q12. Do you have other concerns about the proposed wetlands crossing?

A12. Yes. First, BNE has omitted dewatering facilities from its plans. According to the Petition, the wetlands crossing will be constructed from June 1 to September 30. (Petition No. 984, Section VII. J.) This time period is not necessarily a dry period. Therefore, dewatering of the wetlands will be required in order to install the crossing and the box culverts.

Section 5-13 of the 2002 Guidelines provides the required facilities necessary for the pump intakes, the pump settling basin and the discharge outlet protection. General Permit Section 6 (b) (6) C (ii), Dewatering Wastewater, also provides criteria for the proper discharge of dewatering wastewater. Because the BNE plans do not propose any dewatering facilities, they do not comply with the 20202 Guidelines or the General Permit.

Q13. Do you have another concern about the proposed wetlands crossing?

A13. Yes. According to the Petition, the box culverts will be in accordance with the DEP Inland Fisheries Division Stream Crossing Guidelines. (Petition No. 984, Section VII. J.) These guidelines call for an Openness Ratio ≥ 0.25. The report provides no calculations of the Openness Ratio, which is a function of width, height and length. Based on the information shown on Sheet C-503, I calculate that the height of the east and west box culverts would be more than 6.9 feet and 12.2 feet, respectively. The road profile does not allow for facilities of that size.

BNE does not provide information regarding the bankfull widths of the existing streams or the flow in the two streams leading to the wetlands crossing. This information is necessary to determine if the culverts have sufficient hydraulic capacity. This information is also necessary to analyze whether the proposed box culverts are properly sized in compliance with the DEP Crossing Guidelines, which state that the width of the culvert should be 1.2 times the width of

the stream. The petition is therefore incomplete. Due to lack of information provided in the report, it cannot be determined if the plans comply with the DEP Crossing Guidelines or good engineering practice. BNE should be required to submit evidence that its proposed culverts comply with the Crossing Guidelines and good engineering practice.

Q14. What about the post-construction plans to control erosion on the site?

The erosion and sediment control measures I discussed above pertain to the construction period. The General Permit Section 6 (b) (6) C (iii) 1) has "[a] goal of 80 percent removal of total sentiment load from the stormwater discharge shall be used in designing and installing stormwater management measures." This goal is applicable to post-construction stormwater management. In order to meet this goal, the criteria of the 2004 Manual should be followed, but that criteria have not been implemented by BNE.

The 2004 Manual Section 7.4.1 provides that "the water quality volume (WQV) is the amount of stormwater runoff from a given storm that should be captured and treated in order to remove the majority of stormwater pollutants on average annual basis." This criterion is applicable to "[a]ny development resulting in disturbance of greater than or equal to one acre of land." According to Section 7.5.1, "[t]he groundwater recharge criterion is intended to maintain pre-development annual groundwater recharge volumes by capturing and infiltrating stormwater runoff." This section provides an equation for the calculation of the Groundwater Recharge Volume (GRV). In Appendix K to BNE's Stormwater Management Plan, the WQV and the GRV are calculated. (See Petition No. 984, Ex. G, pages K-1 to K-4.) However, there is no implementation of these criteria on the plans or other places in BNE's submission.

The plans also violate several provisions of the General Permit. Section 6 (b) (6) C (I) 2), Structural Practices, provides that "All sediment traps or basins shall provide a minimum of 134 cubic yards of water storage per acre drained and shall be maintained until final stabilization of

the contributing area." Section 6 (b) (6) C (iii) 2) provides that "Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow . . ." The plans do not comply with these requirements.

Q15. What is your overall control about the lack of sediment facilities and outlet protection facilities?

Overall, the lack of such facilities violates the 2002 Guidelines, the General Permit and the 2004 Manual. As currently proposed, erosion will occur during construction, resulting in deposits of sediment into the wetlands, despite BNE's unsupported claim that "Wind Colebrook North will . . . have minimal impacts that comply with DEP's water quality standards . . ." (Petition No. 984, pages 1-2.)

Q16. Do you have other concerns regarding the plans?

A14. Yes. Slope stability is another major concern. The Zapata plans used 1 foot horizontal to 1 foot vertical, or 1:1, slopes extensively throughout the plans for the proposed project. I have never seen 1:1 slopes used this extensively in any proposed development without being accompanied by slope protection, such as riprap, geotextile materials, retaining walls, or gabion walls to provide the required slope stability. Good engineering practice is to use slopes of 2:1 or shallower. Applying 2:1 slopes to the proposed project would significantly expand the amount of land that would be disturbed and possibly extend the grading into wetlands or adjoining property. The additional disturbance and earthwork also have serious implications for the rate and volume of runoff and erosion into wetlands on the property and onto neighboring properties.

Q17. Please describe in greater detail your findings regarding slope stability.

A15. As I stated above, good engineering practice is to use slopes of 2:1 or shallower. That practice is included in the 2002 Guidelines, which states:

> Where a slope is to be vegetated and mowed, the slope shall not be steeper than 3:1; flatter slopes are preferred because of safety factors related to the operation of equipment.
>
> Where a slope is to be vegetated but not mowed, the slope shall not be steeper than 2:1.

Instead of complying with the Guidelines, these plans make extensive use of slopes of 1:1, for both cut and fill situations. These slopes are used on the side of the road, for the graded areas for blade assembly and tower assembly and they are used for the side slopes of the roadside ditches. None of the slopes show any slope protection such as riprap or geotextile materials. The slopes will not be stable and do not conform to good engineering practice. The Soil Survey lists the soils on this site as having a moderate to very severe erosion hazard.

The Guidelines also require "engineered structural design features" to be incorporated in the design.

> For slopes steeper than 2:1, or when slopes are steeper than 3:1 and the change in elevation exceeds 15 feet without a cross slope bench . . .

Using the good engineering practice of 2:1 slopes would have many ramifications here. If the good engineering practice of using 2:1 or shallower slopes was followed by BNE, the width of the area required for the road cross-section would be significantly expanded. Of more importance, however, is the impact of using 2:1 slopes on the grading of the blade laydown and the crane assembly areas. The area north of Tower 1, although unlabeled, is assumed to be a crane assembly area. The grading at 1:1 slope at this location already extends into the wetlands. When a 2:1 slope is used, there will be more direct wetland impact.

Similarly, at Tower 3, the grading of the north leg of the blade assembly extends to within 7 feet of the property line. The use of the proper slope grading will extend the bottom of the slope onto the adjoining property. BNE acknowledges that the grading may not fit within the site. A note on Sheet C-200 states: "Approval of this plan is not an authorization to grade

adjacent properties. When field conditions warrant off-site grading, permission must be obtained."

The expansion of disturbance area would increase removal of the native vegetation. The peak rate of runoff would also increase because there would be a greater conversion of woods to meadows, so the rates and volume of runoff discharged onto the adjoining properties would increase. Also, there would be increased erosion due to the increased rates of runoff. This eroded sediment would be deposited in wetlands and watercourses. BNE's plans fail to conform to good engineering practice and to the 2002 Guidelines.

Q18. What is good engineering practice with regard to slope stability?

A16. In order to show compliance with Connecticut water quality standards and requirements, the normal engineering procedure is to grade the roads and other features to a stable condition. The 2002 Guidelines mandate that procedure, and further state:

> Exceptions: Slope limitations may be increased providing detailed soil mechanics analysis calculations are performed which confirm an acceptable safety factors for the finished slope.

(Chapter 5-2, Land Grading (emphasis added).) Therefore, under good engineering practices and under the requirements of the 2002 Guidelines, using steeper slopes should be considered as an alternative option only if subsequent in situ geotechnical testing shows that steeper slopes are possible. Unless and until in situ testing proves that steeper slopes are possible, the plans presented by BNE should be an alternative, not the proposed design.

On Sheet C-200 of the plans is a note stating "Maximum graded slopes are 2:1. When steeper slopes must be used plans must be sealed by a geotechnical engineer for slope stability and final surface stability." Zapata acknowledges that 2:1 slopes are the accepted engineering standard. However, they have not followed their own criteria, have not the provided additional testing nor have the plans been appropriately sealed.

If BNE has conducted any such detailed geotechnical analysis, it has not reported the results. Therefore, the only soil data available is the Soil Survey, which reports that soils in the area of the Site have a moderate to very severe erosion hazard. Stabilizing all of the 1:1 slopes proposed by BNE will require more than temporary seeding and erosion control blankets; stabilization will most likely require riprap slopes, retaining walls, gabions or any of the measures suggested in the 2002 Guidelines stabilization structures matrix. Without conducting a detailed geotechnical analysis and including stabilization structures in its plans now, BNE cannot prove that its plans meet the state's water quality standards.

Q19. What other engineering errors did you find in BNE's submission?

A17. The other engineering errors I found in my review of BNE's petition and associated reports and plans can be grouped into several categories: structural fabrication, road section, water quality swale, hydrology, water quality and stormwater quantity.

Q20. What engineering errors did you find with regard to structural fabrication?

A18. The petition states that the rotor blades are 40.3 meters (132 feet) in length. (Section III.B.1.) BNE is requesting that the rotor be approved up to 50 meters (164 feet). The blade assembly areas shown on the plans (Sheets C-101, 102 and 103) have a length from the centroid of the triangle to the furthest end of the leg of approximately 132 feet or 40.3 meters. It appears that the layout area shown on the plans is not large enough to accommodate the 40.3 meter blades and allow room for equipment to maneuver. The laydown area will not allow the assembly of the 50 meter blades. It would need to be extended 34 feet in all directions just to accommodate the blades. Presumably, another 10 feet would be necessary for equipment. The extension of 44 feet in all directions would significantly increase the disturbed areas. In the case of Tower 1, the blade laydown area already extends into the wetlands. The extension of the laydown area will increase the direct wetland impact. Similarly, at Tower 3, the grading of the

north leg of the blade assembly extends to within 7 feet of the property line. The extended laydown area will require the relocation of the entire Tower 3 facilities or an easement will be needed from the adjoining property owner.

I question the design of the blade laydown areas. At all the laydown areas, the far end of the one of the legs is significantly lower than the centroid of the triangle. The difference in elevation ranges from 17 to 24 feet. A significant amount of fill will be necessary to make the blade assembly area level in order to lay down the blade.

Q21. What engineering errors did you find with regard to the road section?

A19. Sheet C-503 shows the road cross section. There is only one road section. The section does not describe what happens with the roadside ditches when the road is in a fill section. The grading on the Plan and Profile sheets does not uniformly have a roadside ditch as show in the details. The section uses 1:1 side slopes on both cut and fill slopes. This is not stable, as discussed above, and will lead to erosion and potential slope failure.

The roadside ditch is shown on the plans has having 1:1 slopes. The velocity in the channels with a slope of 12 percent will be more than 7 feet per second. An analysis has not been performed to show that the shear forces on the bottom and sides of the ditch are within the acceptable limits of stability. These analyses must be in compliance with the CT DOT 2000 Drainage Manual.

The road section calls for a wearing surface of "24 inches of compacted #57 stone." The road surface does not conform to CT DOT, Form 816, "Standard Specifications for Roads, Bridges and Incidental Construction," 2004, Section M.02.03. Form 816 call for the use of Rolled Bank Gravel or Traffic Bound Gravel for travel surfaces.

BNE's plans fail to comply with the requirements of CT DOT's Form 816 and CT DOT's 2000 Drainage Manual.

Q22. What engineering errors did you find with regard to the water quality swale?

A20. Section 2.3.1 of BNE's Stormwater Management Plan states "The diversion swale constructed as part of the Erosion and Sediment Control Plan will remain in place and will be converted to a water quality swale." (Petition No. 984, Ex. G, page 2-1.) The water quality swales are shown on the plans paralleling the road. The swales shown are actually triangular-shaped ditches with side slopes of 1:1 on one side and 8:1 on the other side. The longitudinal slope of the swales is the same as the road, ranging up to 12.25 percent. The post-construction grading plans do not show any channel protection or any check dams. The gravel along some of the channel bottoms and the stone check dams shown on the erosion control plans have been removed. The area is shown as part of the restoration area that calls for grass seeding.

The 2004 Manual has the following design criteria for dry water quality swales:

1) Trapezoidal shape with a bottom width of 4 foot minimum recommended for maintenance, an 8-foot maximum, widths up to 16 feet are allowable if a dividing berm or structure is used
2) The side slopes are a 3(h):1(v) maximum; 4:1 or flatter recommended for maintenance
3) The longitudinal slope is 1% to 2% without check dams, up to 5% with check dams
4) The size of the swale shall have the length, width, depth, and slope needed to provide surface storage for the WQV
5) The underlying soil bed shall be 30 inches deep with gravel/pipe underdrain system
6) The swale will safely convey the 2-year storm with non-erosive velocity

The proposed roadside ditch converted to a water quality swale meets none of these criteria. It will not function as a water quality swale providing the water quality benefits required by the 2004 Manual.

BNE's plans fail to conform to the CT DEP's 2004 Manual. Compliance with the Manual ensures compliance with a whole host of state statutes and associated regulations regarding water quality.

Q23. What engineering errors did you find with regard to hydrology?

A21. Section 2.3.2 of BNE's Stormwater Management Plan makes the following statement:

> Construction within the project area is such that flooding caused by an increase in impervious area or the reconfiguration of stormwater conveyance through the drainage area is not a primary concern. The total increase in impervious area is approximately one percent. Permanent stormwater conveyance structures such as storm drains, catch basin, and the like are not planned for this development. Upon completion of the construction of the three towers, the site will be returned to pre-construction conditions.

(Petition No. 984, Ex. G, page 2-2.) These statements are not true. Impervious area is not the only cause for increase in the rate and volume of runoff. The conversion of the land from a wooded site to gravel roads and meadow will increase the runoff coefficient of the land.

As stated in the Section 1.7.3 of BNE's Stormwater Management Plan, ". . . runoff migrates, typically via overland sheet flow . . ." The project proposes the use of roadside ditches in order to convey the water to discharge points, which will have the same effect as a pipe, except that the ditch is subject to erosion. The ditch will concentrate the flow and greatly decrease the Time of Concentration of the runoff, which will increase the peak rate of runoff.

Furthermore, BNE does not propose to return the site to pre construction conditions. Sheets C-312 through C-315 show the Upland Meadow and Wetland Restoration Plan. The plan calls for the site to be seeded with a conservation/wildlife seed mix. The Petition states "A Wildlife/Conservation seed mix containing native grasses and forbs will be used to stabilize expose areas post-construction." (Petition No. 984, Section VII. J.) The restoration/creation plan does not call for any trees or shrubs to be planted in the disturbed area. This plan will not

recreate the existing second growth and upland hardwood forests described in the Petition. This will result in the site having a higher peak rate of runoff.

BNE's plans fail to conform to the 2004 Manual.

Q24. What engineering errors did you find with regard to stormwater quantity?

A22. The Flood Control and Peak Runoff Attenuation Management Practices study contained in BNE's Stormwater Management Plan does not accurately represent the site. The configuration of the drainage areas does not conform to the drainage patterns of the site nor do they allow the analysis of the discharge points. Due to these inadequacies, it is impossible to determine the increase in peak runoff reaching the wetlands or neighboring properties. The Plan is therefore incomplete.

There are deficiencies in the preparation of the study regarding the calculation of the Time of Concentration (Tc) and the calculation of the land use in the post-development drainage areas.

Zapata uses the lag/CN methodology to calculate Tc. Using this methodology results in a Tc for Drainage Area 2 of 26.4 minutes for both the existing condition and proposed condition. The report shows no change in the Tc. That result is simply not possible. The report does not take into consideration that the access road and other grading will intercept the sheet flow and channelize the runoff. The methodology takes advantage of the fact that a large portion of the site is not being modified. However, in Drainage Area 2, the land use in the area where the Tc is calculated is being changed.

An alternate methodology is to use sheet flow-shallow concentrated flow values. This methodology is more appropriate for the circumstances of this site and it yields a different result. Using the methodology based on sheet flow and shallow concentrated flow through a wooded area, the Tc is 39.5 minutes for the existing condition. For the Tc in the proposed condition, this

methodology uses sheet flow across woods for the first 300 feet, shallow concentrated flow across through woodland area then shallow concentrated flow for the next 420 feet where the flow is intercepted by the gravel road and then shallow concentrated flow through woodland for the remaining 120 feet. The Tc for the proposed condition is reduced to 36.2 minutes. This methodology better represents the flow conditions that will occur according to BNE's submitted plans. Although the time of concentration is relatively small, the peak rate of flow will increase by 5 percent. Zapata's report shows no increase in the peak runoff rate. The higher peak rate of runoff should be used to design the soil erosion control facilities. Using the underestimated amount will result in undersized facilities, which will in turn result in erosion and subsequent sedimentation in the wetlands and watercourses.

Another deficiency in the plans is the drainage analysis, which divided the site into nine drainage areas. The petition states "The project would result in approximately 9.45 acres of temporary disturbance related to tree clearing and would permanently convert approximately 1.75 acres of forestland to gravel access road." (Petition No. 984, Section VII. G.) This is a total of 11.2 acres that would be converted from woods to grasslands. However, Appendix K of the Stormwater Management Plan shows that only 1.26 acres of disturbed area was used to compute the post-development runoff. The other areas in the post-development condition have the same CN values as the pre-development. Apparently, only the proposed roads and gravel areas were considered in the calculation. By Zapata's estimate, there another 9.94 acres of land that are presently wooded and will be grass areas. As stated above, I believe this estimate is low because the disturbed area will increase when the proper 2:1 slopes are used. The CN value for woods is 60. The CN value for grassland or range in fair condition is 69. (As a point of reference, gravel roads have a CN value of 85.)

For Drainage Area 2, accounting for the conversion of woods to grass land and the reduction in the time of concentration results in a 15 percent increase in the peak rate of flow during a 2-year storm. Similarly, Drainage Area 4 will have areas of woods removed and replaced with grass. The report does not account for the conversion to grass and does not show any increase in the peak rate of runoff. Although the report does not account for the conversion to grass in Drainage Area 1, it does show an increase in the peak rate of runoff.

The petition states that ". . . BNE will employ a storm water management plan that will result in no net increase in runoff to any surrounding properties." (Petition No. 984, Section VII.K.) However, the plans do not show any facilities that would reduce the peak rate or volume of runoff leaving the site.

According to the 2004 Manual:

> The stream channel protection criterion is intended to protect stream channels from erosion and associative sedimentation and downstream receiving orders and wetlands as a result of urbanization within a watershed. By restricting peak flows from storm events that result in bankfull flow conditions (typically the two-year storm, which controls the form of the stream channel), damaging effects to channel from increased runoff due to urbanization can be reduced.

(Section 7.4.) The stream channel protection criterion is:

> Control the 2-year, 24-hour post-development peak flow rate to 50 percent of the two-year, 24-hour predevelopment level or
>
> Control the 2-year, 24-hour post-development peak rate of flow to the 1-year, 24-hour predevelopment level.

(Section 7.6.) BNE's plans fail to conform to 2004 Manual.

Q25. Did you find other errors in BNE's submission?

A23. Yes, I found another error. The Zapata plans make extensive use of a drainage ditch paralleling the roads. From the grading plans and erosion control plans, these ditches are approximately 1 foot deep with 1:1 side slopes. The erosion control plans show pipe culverts

under the road to carry runoff from one side of the road to the other. The runoff is picked up on the other side of the road by another ditch or it becomes a discharge point. These pipe culverts are not shown on the road plan and profile sheets nor on the post-construction grading plans. I do not know if these pipes are temporary facilities for construction or if they are part of the final stabilization plan. Without these cross culverts, the roadside ditches will overflow and there will be numerous new discharge points without outlet protection.

The pipes will need to have at least 2 feet of cover in order to carry the large cranes that will be necessary to erect the towers and blade assemblies. The culverts may be 15-inch pipes (standard minimum road drainage pipes). The bottoms of the pipes will need to be 3 and a half feet below the road. This will not work with a 1 foot ditch. A ditch 3 and a half feet deep with 2:1 side slopes and a 2-foot bottom width will have a top width of about 16 feet. The plans call for a top width of 4 feet. Properly sized roadside ditches will increase the amount of land disturbance. This in turn will increase the rate of runoff and erosion.

Similarly, the box culverts in the wetlands crossing will have to have two feet of cover. According to the Plan/Profile Sheet C-304, the finished grade of the road is only 1.5 above the existing ground. The structure requirement, Openness Ratio (see above) and hydraulic requirements make the proposed road design impossible. The road elevation would have to be raised 4 to 6 feet. This would increase the width of the road section through the wetlands by 24 feet. This will increase the disturbance and subsequently the erosion and sedimentation caused by the project.

Q26. What are your conclusions regarding BNE's proposed project?

A24. BNE's plans fail to conform with Connecticut water quality standards. The plans do not contain sufficient sediment impoundments. As a minimum, the 2002 Guideline requires the installation of six temporary sediment traps, two temporary sediment basins. The plans

propose one sediment trap and it is undersized. Zapata's calculations and plans do not follow good engineering practice, which may result in unstable slopes, excessive erosion and inadequate sediment control. The methodologies seem to inaccurately minimize the impact that BNE's project will have on the site. BNE's project will dramatically change the character of the site and those changes will increase the rate and volume of runoff from the site, which in turn has significant implications for the likely rate of erosion on the site. As currently designed, this project will, within a reasonable degree of engineering certainty, lead to pollution of the waters of the state. This stormwater management plan does not meet Connecticut's water quality standards, as reflected in the 2004 Stormwater Quality Manual, the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, the General Permit, CT DOT's Form 816, CT DOT's 2000 Drainage Manual and the Public Health Code.

The statements above are true and accurate to the best of my knowledge.

March 15, 2011
Date

William F. Carboni
William F. Carboni, P.E., No. 22722

ATTACHMENT

Exhibit 1 CV of William F. Carboni

EXHIBIT 1

WILLIAM F. CARBONI, P.E.

1984 - Present: Spath-Bjorklund Associates; Monroe, CT

Mr. Carboni supervises the engineering section and has been responsible for the preparation of grading, street, utility and sewage disposal plans for single family, condominium, commercial and office projects. Sewage disposal systems have included municipal sewer extensions and septic systems meeting both local and State D.E.P. regulations. Many of the systems have required the design of sewage pump stations. He has prepared engineering reports detailing hydrologic and hydraulic computations, design of storm water treatment and detention, drainage system calculations and other engineering aspects of land development. Other assignments include soils testing, ground water monitoring and utilization of computer aided design for predicting groundwater flow patterns.

1980 - 1984: Consulting Engineering; Sacramento, CA

As a consulting engineer, prepared evaluations of a variety of engineering projects. Projects have included the cost evaluation of improvements to a regional transportation system, the engineering and environmental evaluations of the potential effects of industrial parks, planned residential developments, and the conversion of agricultural land. The studies were coordinated with State and local agencies to insure compliance with all engineering and environmental regulations.

1977 - 1980: The Spink Corporation; Sacramento, CA

As an Associate with the Spink Corporation, prepared the overall water system design for two major residential developments (population exceeding 10,000 persons), designed an expansion of a sewage treatment plant. He headed a design section and supervised the preparation of engineering plans. The plans included all engineering facilities required for the construction of residential, commercial and industrial developments. As head of the Environmental Section of the firm, was responsible for the preparation of environmental studies and their representation at public hearings.

1972 - 1977: Albert A. Webb Associates; Riverside, CA

Assignments included the preparation of master water supply and waste water disposal plans; estimations of existing and projected future populations, land use and agricultural activities and estimated their resultant water demand and/or waste water generation; assisted in the formulation of alternative means of improving water supply and its quality; and prepared economic analyses of these plans.

As head of the environmental analysis group of the company, assignments included preparation of environmental studies for private and public projects, preparation of specialized environmental investigations and preparation of studies of noise pollution resulting from various transportation sources.

1970 - 1972: California Division of Highways (Caltrans); Los Angeles, Ca

Assignments included the preparation of preliminary freeway designs; evaluation of the socio-economic impacts of alternate freeway locations; assessment of housing relocation needs and employment displacement; incorporation of freeways into city plans; meetings with citizens'

advisory committees.

1967 - 1970: California Department of Water Resources; Los Angeles, CA

Assignments included the evaluation of local surface and imported water projects, geologic and hydrologic ground water resources, waste water reclamation, ground water utilization, potential surface water projects, desalinization of sea water, and weather modification. Assignments also included projection of population and agricultural land use, analysis of agricultural and urban unit water use, design of system for conjunctive use of surface water reservoirs, ground water and imported water and present worth analysis of cost of projects.

1966 Summer: Boston Redevelopment Authority; Boston, MA

As a student intern, conducted traffic surveys and compiled data for a traffic flow map of the city; and conducted a pedestrian survey and origin-destination studies.

Academic Background

Earned a Bachelor of Science Degree in Civil Engineering at Worcester Polytechnic Institute; Worcester, MA, in June 1967.

Professional Registration
Professional Engineer - Connecticut No. 22722, 2001
Professional Engineer - California No. 26890, 1976

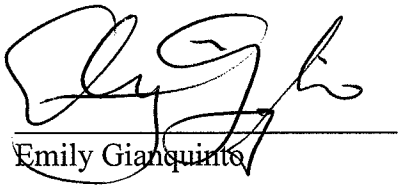
CERTIFICATION

I hereby certify that a copy of the foregoing document was delivered by first-class mail and e-mail to the following service list on the 15th day of March, 2011:

Carrie L. Larson
Paul Corey
Jeffery and Mary Stauffer
Thomas D. McKeon
David M. Cusick
Richard T. Roznoy
David R. Lawrence and Jeannie Lemelin
Walter Zima and Brandy L. Grant
Eva Villanova

and sent via e-mail only to:

John R. Morissette
Christopher R. Bernard
Joaquina Borges King



Emily Gianquinto