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 ("Wind Prospect")	**Petition No. 980** **February 16, 2011**

PRE-FILED TESTIMONY OF WILLIAM F. CARBONI

1. Please describe your involvement in this project.

I was retained by Reid and Riege, PC on behalf of FairwindCT, Inc. to assess the plans and reports submitted by 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.

2. What degrees do you have?

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

3. What professional licenses do you hold?

I am a licensed professional engineer in Connecticut and California.

4. Please describe your experience as a civil engineer.

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.

5. What is the purpose of your testimony?

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

6. Please summarize your findings.

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, the 2004 Connecticut Stormwater Quality Manual, the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, 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.

7. What is your most significant finding?

My most significant finding concerns slope stability. Zapata 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, 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 basically results in the entire project falling apart. Grading would extend into wetlands. The road cross section areas would need to be significantly expanded, and associated grading would extend into one of the blade assembly areas, requiring its relocation. Generally, the amount of disturbance and earthwork would significantly increase, likely requiring relocation of many of the proposed facilities. The additional disturbance and earthwork also has serious implications for the rate and volume of runoff and erosion into wetlands on the property and onto neighboring properties, including the New Naugatuck Reservoir.

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

As I stated above, good engineering practice is to use slopes of 2:1 or shallower. That practice is included in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, 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.

The Guidelines were adopted by the Council on Soil and Water Conservation in accordance with the Connecticut Soil and Erosion Sediment Control Act, Connecticut General Statutes § 22a-325–22a-329.

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 severe limitation to the construction of local roads and streets.

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

> 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 . . .

These plans include areas with slopes more than 20 feet high. In one area, there is an 8-foot vertical rise at a slope of 2 foot horizontal to 1 foot vertical (2:1) transitioning to another 8-foot vertical rise at a 1:1 slope. No cross slope bench or engineered structural design features are provided. These conditions do not comply with the Guidelines.

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. For example, the gravel road section at Station 2+00 will be expanded from the 60-foot width shown on the plans to about 110 feet. At gravel road Station 8+00, the grading would extend 35 feet either side of the centerline. This would put the toe of slope of the westerly site of the road onto the adjoining property. On the easterly side, the grading would extend into the blade assembly area, which could not be constructed and meet the requirement of a maximum 0.5 deviation from level (see further discussion below). The blade assembly area would need to be relocated, which would expand the area of disturbance.

Using 1:1 slopes also greatly understates the amount of disturbance and earthwork necessary to construct the facilities as shown. The amount of disturbed area would increase, which in turn would require relocation of many of the proposed facilities because the slopes would intercept each other. The expansion of disturbance area would increase removal of the native vegetation. In the two locations noted above, the disturbance would increase by 83 percent at Station 2+00 and 48 percent at Station 8+00. 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, including the nearby New Naugatuck Reservoir.

BNE's plans fail to conform to good engineering practice and to Chapter 5, Section 2 (Preserve and Conserve Soils, Land Grading) of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, which were adopted pursuant to Sections 22a-325–22a-329 of the Connecticut General Statutes.

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

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, temporary sediment basin, water quality swale, hydrology, outlet protection, water quality and stormwater quantity.

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

The petition states that the rotor blades are 40.3 meters (132 feet) in length. BNE is requesting that the rotor be approved up to 50 meters (164 feet). The blade assembly areas shown on the plans have a length from the centroid of the triangle to the furthest end of the leg of approximately 130 feet or 39.4 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 layout 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 the north tower, the grading around the blade assembly area may extend into the wetlands area.

On Sheet C-102 of the BNE plans, Note 2 states "Blade assembly area shall not have flatness deviation of more than six inches over the length of blades." In the north tower area, two legs of the blade assembly area are level at elevation 640.0. However, the third leg (northerly leg) has a 1:1 slope near the center. The leg drops from elevation 640.00 to 620 in a distance of 10 feet. It continues to drop to elevation 615 at the end of the leg area. Therefore, the ground at the tip of the blade will be 25 feet below the rotor of the blade. A significant amount of fill will be necessary to make the blade assembly area meet the flatness standard. This fill would need to be expanded about 50 feet. This fill will significantly impact the wetlands, which are located about 10 feet away from the blade assembly area as shown on Sheet C-303.

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

Sheet C-504 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 have a roadside ditch as show in the details. The section uses 1:1 side slope on 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 detail on sheet C-504 appears to show a different design.) The velocity in the channels with a slope of 9 percent will be approaching 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 "Drainage Manual" 2000.

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 conform to A. Section M.02.03 of CT DOT's Form 816, 2004 Standard Specifications for Roads, Bridges and Incidental Construction and A. Section 7.6-3 of CT DOT's 2000 Drainage Manual.

12. What engineering errors did you find with regard to the temporary sediment basin?

Sheet C–503 shows detail for a temporary sediment basin. This detail is taken from the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. The detail shows that the minimum top width of the berm is 3 feet and the slopes both inside and outside of the basin are a minimum of 2 feet horizontally to 1 foot vertically. Sheet C–303 shows a temporary sediment basin on the east side of the road. The berm forming the basin is 4 feet deep on the inside of the basin. On the outside of the basin, the berm depth is 8 feet. Based on the criteria are shown in the detail, the width of the berm would be 23 feet. The basin grading shown on Sheet C–303 has a bottom width of approximately 10 feet. This does not conform to either the detail in the plans or the 2002 Guidelines. A berm that conforms to the 2002 Guidelines would cause the grading for the basin to extend closer to and perhaps into the surrounding wetlands, which has obvious implications for BNE's statements regarding the wetlands impact of its proposed project. Moreover, the steeper, narrower berm contained in these plans would be less stable and more prone to erosion and eventual failure, also resulting in an adverse impact on the wetlands.

BNE's plans fail to conform to Chapter 5, Section 11 (Sediment Impoundments, Barriers and Filters, Figure TST-2) of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

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

Section 2.3.1 of BNE's Stormwater Management Plan states "The 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. 980, 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 9 percent. The post-construction grading plans do not show any channel protection or any check dams. The area is shown as part of the restoration area that calls for grass seeding.

The 2004 Connecticut Stormwater Quality 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 Connecticut Stormwater Quality Manual.

BNE's plans fail to conform to Section 11-P5 (Water Quality Swales) of the 2004 Connecticut Stormwater Quality Manual, which is compiled by the CT Department of Environmental Protection. Compliance with the Manual ensures compliance with a whole host of state statutes and associated regulations regarding water quality.

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

Section 2.3.1 of BNE's Stormwater Management Plan makes the following statement:

> Construction within the project area in 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 two towers, the site will be returned to pre-construction conditions.

(Petition No. 980, 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. The project proposes the use of a roadside ditch in order to convey the water into the temporary sediment basin, which will have the same effect as a pipe except that the ditch is subject to erosion. The ditch will greatly decrease the Time of Concentration of the runoff, which will increase the peak rate of runoff. Further, Sheets C-308, C-309 and C310 show culverts as part of the post-construction plan.

Furthermore, BNE does not propose to return the site to pre-construction conditions. Sheets C-312, -313, -314 and -315 show that post-construction, the site will be seeded with a conservation/wildlife seed mix. The restoration/creation plan calls for 3 maple trees and 30 shrubs to be planted in the 8.36 acres of disturbed area. That plan would not come close to recreating pre-construction conditions. The site would have a higher peak rate of runoff.

BNE's plans fail to conform to Section 7.6 (Peak Flow Control) of the 2004 Connecticut Stormwater Quality Manual.

15. What engineering errors did you find with regard to outlet protection?

Outlet protection refers to 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 four discharge points. They are located on the downhill side of the road at Stations 7+65, 12+00, 17+37, 18+00. There are no outlet protection facilities at Stations 7+65 or 18+00. There are temporary sediment basins at Stations 12+00 and 17+37. However, there do not appear to be any outlet protection facilities. There are no calculations provided in the reports showing compliance with 2002 Connecticut Guidelines for Soil Erosion and Sediment Control Outlet Protection (OP).

The area uphill of the access road from the beginning of the access road to station 12+00 has a relativity uniform slope. Prior to construction, rainfall on this area will sheet flow to the downhill wetlands area. However, after construction of the access road, the runoff will be channeled into discrete points of discharge. Each of these points will require outlet protection to prevent erosion and subsequent sedimentation, which would have an adverse effect on the wetlands and the reservoir. As currently proposed, erosion will occur during construction, resulting in deposits of sediment into the wetlands.

After the final construction and restoration plan is implemented, there will be three permanent discharge points at Stations 7+65, 12+00 and 16+50. There is no protection at the end of the water quality swale at Station 7+65. There are level spreaders located at the other two discharge points. These level spreaders are located 30 to 100 feet downhill of the end of the culverts, which may be too far downhill from the discharge points. There are no design calculations for these facilities to show compliance with 2002 Connecticut Guidelines for Soil Erosion and Sediment Control design criteria for level spreaders.

Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities ("General Permit") 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 this requirement.

BNE's plans fail to conform to Section 6 (b) (6) C (iii) 2) of the General Permit, which is issued under the authority of Section 22a-430b of the Connecticut General Statutes and Chapter 5, Section 10 (Outlet Protection, Level Spreader) of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, which were adopted pursuant to Sections 22a-325–22a-329 of the Connecticut General Statutes.

16. What engineering errors did you find with regard to water quality?

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." The area draining to the downhill limits of the disturbed area is about 30 acres. Therefore, the required water storage is 4,000 cubic yards. The erosion control plans show two sediment structures for the entire site with a combined capacity of approximately 160 cubic yards. The storage volume of the traps is therefore inadequate, will not protect downslope wetlands or watercourses and fails to conform to the General Permit. The sediment traps are intended to capture pollutants during the construction phase of the project. Since they are not adequately sized, they will not function properly to prevent pollution.

The General Permit also 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 Quality Manual should be followed, but that criteria has not been implemented by BNE.

The 2004 Connecticut Stormwater Quality 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. 980, Ex. G, pages K-1–K-2.) However, there is no implementation of these criteria on the plans or other places in BNE's submission.

BNE's plans fail to conform to Section 6 (b) (6) C (i) 2) and 6 (b) (6) C (iii) 1) of the General Permit and Sections 7.4.1 and 7.5.1 of the 2004 Connecticut Stormwater Quality Manual.

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

The Flood Control and Peak Runoff Attenuation Management Practices study contained in the 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. It is also impossible to determine compliance with the General Permit.

The first discharge point appears to be at Station 7+40 of the gravel access road. The area uphill of the road to station 5+80 in the entire road will discharge at Station 7+40. The discharge at this point will flow directly onto the adjoining property of the Naugatuck Water Company. There is no outlet protection at this discharge point. Therefore, erosion will occur, resulting in the transport of sediments and nutrients into the Reservoir. The closest drainage area analyzed in the Stormwater Management Plan is Drainage Area 2. According to the study, this area contains 7.0 acres. Below are BNE's reported existing and proposed peak runoff rates.

Table 1. Peak Flow (in cfs), as reported in Petition No. 980, Ex. G, pages 2-2–2-4

	Design Storm			
	2-yr	10-year	25-year	100-year
Area 2				
Pre-construction		9.24	13.05	20.31
Post-construction		12.19	15.31	23.63
Area 4				
Pre-construction		50.33	71.00	110.63
Post-construction		58.54	74.53	117.62

Table 2. Peak Flow (in cfs), as reported in Petition No. 980, Ex. G, App'x K (Pre-Development Drainage Area Hydrographs)

	Design Storm			
	2-yr	10-year	25-year	100-year
Area 2				
Pre-construction	3.48	10.63	13.55	21.39
Post-construction	4.39	12.19	15.31	23.63
Area 4				
Pre-construction	19.30	57.88	73.69	116.53
Post-construction	19.50	58.54	74.53	117.62

According to the 2004 Connecticut Stormwater Quality 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.

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.

Ignoring for the moment that the values shown in the report differ from those shown in the appendix, Drainage Area 2 is reported to have a 26 percent increase in the peak rate of runoff during a 2-year storm. This does not meet the standards of the 2004 Connecticut Stormwater Quality Manual, which requires that the peak rates of runoff during a 2-year storm decrease.

The drainage analysis uses a runoff Coefficient Number (CN) of 65 for the existing condition. That CN is to be applied to a wood/grass combination on Hydrologic Soils Group B soils in fair conditions. However, "wood/grass combination" is not an accurate description of the entire site, which is predominantly wooded with a small portion of pasture located in the southeast corner. The pasture area appears to be about 9.5 acres. The remaining 58.0 acres are woods in good condition. About 1.5 acres of pasture is contained in Drainage Area 4.

Despite these facts, Zapata uses a wood/grass combination value to represent the entire site. That use is disingenuous. Using the actual values for woods and pasture on HSG B soils results in a weighted average CN of 55, rather than the 65 used in the report. The runoff in a 2-year storm under existing conditions using the CN value of 65 is 4.95 cfs. The drainage analysis value is 19.30 cfs. Using an inappropriate CN value for the site overstates the existing condition, thereby reducing the percent increase in the proposed condition. Using the appropriate CN number would show that the actual increase in the peak rate of runoff is much higher and the potential for adverse impacts is much greater.

Section 2.2 of the Stormwater Management Plan states that the area to be disturbed is 8.36 acres. (Petition No. 980, Ex. G, page 2-1.) However, in Appendix K the input data for the drainage analysis shows the area disturbed as only 7.10 acres. (Petition No. 980, Ex. G, App'x K (Pre-Development Drainage Area Hydrographs).) The difference of 1.26 acres is unaccounted for. These areas may be the areas that are to be restored. However, the restored meadow would have a CN value of 58, which is higher than 65 for woods and would contribute to an increase in the rate of runoff. All of these factors result in a significant underestimation of the peak flows from these areas.

The Soil Survey lists the soils on this site as Hydrologic Soils Group C soils, not the B soils used in the analysis. In Appendix K of the Stormwater Management Plan, the correct HSG C soil classification is used.

For Drainage Area 2, the report uses a Time of Concentration (Tc) of 11.5 minutes, which is based on using what is known as a lag/CN methodology. Using that same methodology results in a Tc of 10.4 minutes for the proposed condition — a relatively small change. Using this methodology is misleading because it does not take into account the change in land use in critical portions of the drainage area. 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 uses uphill of the access road changed entirely.

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 vastly different result. Using this methodology based on sheet flow and shallow concentrated flow through a wooded area, the Tc is 31 minutes for the existing condition. To get the Tc for the proposed condition, this methodology uses sheet flow across a dense grass for the first 300 feet, shallow concentrated flow across grass for the next 160 feet and then channel flow for the next 200 feet. The Tc for the proposed condition is reduced to 18 minutes. This methodology better represents the flow conditions that will occur according to BNE's submitted plans. The peak rate of flow in a 2-year storm will increase by 74 percent, not the 26 percent increase from Zapata's report. 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.

BNE's plans fail to conform to Section 7.4 and 7.6 of the 2004 Connecticut Stormwater Quality Manual.

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

Yes, I found technical errors and I found some omissions.

19. What technical errors did you find in BNE's submission?

I found two technical errors in my review of BNE's petition. First, Sheets C-100, C-200, C-300 and C-308 state that they use a graphic scale of 1" = 100'. The actual scale is 1" = 200'.

Second, the scale and finished grade of the road are in error on Sheet C-306. For example, the road equation computes the proposed 710 contour at Station 11+26. The proposed road 710 contour is graphically shown on the profile portion of the sheet at about station 10+80. In the plan portion of the same Sheet, the 710 contour is a station 11+27. It would appear that the proposed road surface is graphically shown 5 feet lower than the road profile equation. Therefore, the road section shown at Station 10+00 depicts an 8.75 ft. fill. This fill is most likely closer to 14 feet. Using a slope of 2 feet horizontally to 1 foot vertically (2:1), the base width of the fill section will be 20 feet wider than shown on the plans. This will significantly increase the amount of disturbance, increase the rate of runoff and further tax the undersized erosion control measures.

20. What information and data was omitted from BNE's submission?

I found several omissions in my review of BNE's petition.

First, on page 8 of the petition, BNE states that the ancillary building will be used for office space and for education and tours. The building will have restroom facilities and the wastewater will need to be disposed in an on-site septic system designed in accordance with applicable standards. However, there is no information regarding the design flows for the intended uses. Therefore, I do not know if the standards referred to are the Connecticut Public Health Code Section 19-13-B103 or Section 19-13-B104. That omission violates the Public Health Code and authorizing statutes.

BNE does not provide any deep test information, percolation data or permeability data for the area in which the septic system will likely be installed. The "Soil Survey of New Haven County, Connecticut" by USDA, SCS ("Soil Survey") lists the soils on this site as having a severe limitation to the proper functioning of septic tank absorption fields. Therefore, it is impossible to know if the receiving soils are available to safely dispose of the wastes without polluting the waters of the State of Connecticut.

The ancillary building is shown north of the existing cell tower with no means of access, either temporary or permanent. The north side of the access road from station 0+50 to 1+50 has a slope of 2 feet horizontally to 1 foot vertically (2:1). This area is south of the ancillary building. The roadside grade would make it impossible to use the area south of the building as an access road. The area to the west and north of the ancillary building is shown on Sheet C-313 as an Upland Meadow when the Creation and Restoration Plan is implemented. Therefore, BNE presumably does not intend to access the ancillary building from the west or north. The result is that there is no access to the building.

Finally, there is no parking area for either the employees who will use the ancillary building or the buses bringing people for education and tours. Nor is there grading showing how the area will be able to accommodate the ancillary building or the associated parking facilities. A level pad for the building and a parking lot with a 3 percent cross slope may cause the grading to intercept the grading shown for the crane assembly area. Without information on the grading and location of the access road, it is impossible to determine if the site can accommodate these facilities. Moreover, without knowing the extent of the grading, I cannot evaluate the extent of land clearing and the accompanying effect on erosion control measures.

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

BNE's plans fail to conform with Connecticut water quality standards. 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 have significant impacts on the rate of flow 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.

Feb 16, 2011
Date

William F Carboni
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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

<u>**CERTIFICATION**</u>

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 16th day of February, 2011:

Carrie L. Larson
Paul Corey
Jeffrey J. Tinley
Hon. Robert J. Chatfield
Thomas J. Donohue, Jr.
John R. Morissette
Christopher R. Bernard
Joaquina Borges King

Emily Gianquinto