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Via: Priority Mail

December 4, 2006

Town of Warren Town Board
642 Kingdom Road
Mohawk, NY 13407
Attn: Richard Jacks

Subject: Jordanville, NY – SEIS Review

Dear Mr. Jacks,

Pressly & Associates, Inc (Pressly) was retained by Advocates for Stark and Otsego 2000, Inc. to conduct a review of sections 3.1 and 3.2 of the Jordanville Supplemental EIS. This review was focused on assessment of the potential impacts to local water resources as well as the Upper Susquehanna River and Mohawk River Watersheds.

BACKGROUND

Subsurface Turbine Construction Details

The foundations for the turbines are proposed to be a raft type concrete structure with a diameter of up to 60 feet and a depth of up to 9 feet. In some cases a concrete caisson type foundation may be constructed with a diameter of 22 feet and a depth of 30 feet. The total area of land clearing and construction around each turbine location was a circular area estimated to be approximately 200 feet in diameter.

A total of 21 miles of access roads shall be constructed. The roads are reported to require an initial 75- foot wide clearing with a finished gravel surface of up to 20 feet in width.

A total of 41 miles of buried electrical lines will require an area of disturbance of up to 25 feet wide for the movement of machinery. The trenches are proposed to be 3 feet wide and 3 feet deep.

Topography

The project area is part of a larger hilltop or plateau averaging about 1500 feet mean sea level (msl) elevation. The slopes on the perimeter range from 0 to 20 percent with the steepest slopes towards the northeast and southeast. The area contains numerous wetlands and the origin of both protected and unprotected streams that flow towards Mohawk River to the north and form part of the headwaters for the Susquehanna River to the south.

The slope of the ground surface will give a rough approximation of the surface and ground water flow direction within the project area. The northeast portion of the project area decreases in elevation towards the northeast and eventually the Mohawk River. The southeast portion of the project area slopes towards the southeast and the Otsquago Creek. Otsquago Creek flows northeast towards the Mohawk River. The northwestern portion of the project area also slopes to the north. The southwestern portion of the project area is relatively flat and contains the largest wetland areas. Surface water appears to flow south from this area towards Canadarago Lake and the Susquehanna River.

Geology

An exploration program consisting of 5 borings, was conducted by GZA, GeoEnvironmental of NY as part of the the Draft EIS. Bedrock was encountered at two of the boring locations TB-3 and TB-5 at depths of 4 feet and 7.5 feet below grade, respectively. Bedrock cores were obtained and described by a geologist. The bedrock encountered at TB-3 was identified as the Coeymans Limestone. The bedrock at TB-5 was described as the Onondaga Limestone. Bedrock core holes did not retain water suggesting a high drainage rate through the underlying fractures.

Based on the boring results and Figure 2 of the original GZA report in the DEIS, it was inferred that approximately 40 percent of the project area will contain shallow bedrock that will require blasting, hydraulic fracturing, or pneumatic jackhammering regardless of whether a raft or a caisson foundation is installed.

Iberdola, the parent company of Community Energy, Inc. conducted an additional 32 borings as part of the Supplemental EIS. The results were summarized in Appendix D – Groundwater Analysis, prepared by GZA. The boring results indicated that 12 of the 32 borings have the potential for foundation construction in limestone bedrock. No data regarding rock cores or the type of bedrock was provided in the report. The reported depth to bedrock data was within the range of earlier estimates (based on the DEIS) by Pressly regarding the percentage of turbines to be constructed within bedrock.

Wetlands and Streams

Numerous NYS DEC, NWWI, and EDR delineated wetlands were identified within the project area. Virtually all of the protected streams flow towards the northeast and southeast towards the Mohawk River. A north-south groundwater divide appears to exist just north of the Holy Trinity Monastery located to the west of the project area. The streams located to the southwest were unprotected and interconnect the area's largest wetlands (NYS DEC JV-6 and JV-9), which are located to the southwest of the project area. These streams emanate from the hilltops which were proposed to contain turbines 28, 89, 13, 87, 14, 15, 18, and 22A.

Groundwater

Overburden and bedrock groundwater aquifers provide drinking water via domestic wells, including artesian springs for residences and municipal buildings (such as the Van Hornesville Post Office) surrounding the project area. A groundwater study, including but not limited to a comprehensive well survey, were not conducted as part of the original DEIS or the supplemental EIS.

A limited database search of existing groundwater wells (only 18 wells were identified) was provided within the supplemental EIS and indicated the presence of groundwater within the limestone aquifer. The elevation of groundwater was measured to be anywhere from 22 feet above to 42 feet below the overburden soil/bedrock interface. In addition, an interview with Hanson Aggregates indicated that groundwater rose above the ground surface (bedrock) during the wet season and has to be pumped out.

Groundwater flow through limestone occurs within fractures, cavities, and caverns that can have very relatively high hydraulic conductivities. This was evidenced in the initial GZA report included in the original DEIS, page 7:

> "Water was used during the rock core drilling at TB3 and TB5. The water was pumped down the test boring to cool the rock core drillbit. Water level measurements following rock core drilling did not note the presence of standing water, which indicates the water pumped into the test boring drained out through existing rock fractures."

Groundwater flows relatively fast and is less filtered through this medium as opposed to a sandstone, shale, or unconsolidated overburden aquifers. Thus, pollutant attenuation will be minimal. Permeability within limestone aquifers of this type can be high to very high, ranging from 100 to 100,000 ft/day (Groundwater Manual, U.S. Department of the Interior, 1981).

A natural limestone artesian well supplies groundwater to the NYS DEC Fish Hatchery located less than 1 mile to the southeast of the project off Chyle Road. Note that a similar artesian spring supplies municipal and residential buildings in Van Hornesville. Based on the bedrock map (Figure 2) provided by GZA, the limestone supplying the hatchery's groundwater is part of the Coeymans Limestone, although it is bordered nearby with the Cobleskill and the Onondaga Limestone formations. Discussions with hatchery personnel indicated that water was flowing from the well in excess of 400 gallons per minute, suggesting cavernous limestone aquifer characteristics. Further evidence of this formation's cavernous characteristics can be observed at Howe Caverns, which were formed within the Coeymans Limestone.

COMMENTS

The following comments were prepared by Pressly regarding the DEIS and supplemental EIS:

1. EDR states on page 18 of the supplemental EIS, "Any methods to further assess the karst features are premature at this time and may not be warranted.". This conclusion was probably based on the GZAs conclusion on page 14 of the their report which read as follows,

> "GZA did not conduct dye testing as part of our assessment because there is no indication that karst conditions are present at the proposed wind turbine locations nor will be impacted by the Jordanville Wind Project."

It should be noted that no empirical data to identify karst features (sinkholes, etc) in the form of rock cores, or other surveys were included in the supplemental EIS report.

2. NYS DEC recommendations detailed in the September 8, 2006 letter to Bernard C. Melewski, Esq were not completed as part of the supplemental EIS. The recommendations were focused on protecting the fish hatchery and included groundwater studies consisting of a "comprehensive karst survey" and "dye tests". To further complicate this study, EDR removed the fish hatchery from the study area maps.

3. On page nine (9) of the GZA report, it was stated that karst features were not identified. However, there was no evidence of rock core drilling in the report. Therefore, it was not possible for EDR to make any conclusions regarding the presence/absence of karst features based on the data contained in the report.

4. The construction areas for each turbine were not accurately depicted to-scale on the Delineated Wetland Maps and other figures included in the report. The DEIS report indicated that the area for construction clearing will be approximately 200 feet in diameter. However, photos of similar construction projects show construction areas ranging from 350 to 400 feet in diameter (Attachment 1).

5. In general, it appears that "avoidable" impacts to wetlands were not avoided at some locations. These included but may not be limited to turbines 86, 87, and 96.

6. As stated in earlier comments to the DEIS by Pressly, 21 miles of new access roads will be constructed in the project area. It was estimated that the current road mileage abutting or within the participating parcels was approximately 25 miles. Therefore, the number of roads within the project area will be nearly doubled. Consequently, runoff within the project area will be nearly doubled, despite the statement on page 45 of the original DEIS report, "Construction of access roads will result in minor increase in storm water runoff that would otherwise have infiltrated into the ground at road locations".

The nearly 100 percent increase of road runoff within the project area increases potential contaminant migration into surface water and wetlands resulting from:

- turbidity (due to land clearing, excavation),
- pH changes due to concrete spills and infiltration into groundwater
- road deicing,
- herbicide use, and
- dust suppression chemical use.

7. The hatchery water supply as well as other water wells located near the project area may be potential receptors of contamination resulting from infiltration of contaminants into bedrock fractures at recharge locations with the highest elevation. According to Ms. Janice Whipple, PhD, identified groundwater seeps, springs, and water wells were located as close as 500 feet from turbine locations. Based on the minimum 200-foot diameter construction area, these features are likely to be even closer to proposed areas of disturbance. Water resources would be potential receptors of the contaminants listed above.

Note that the impacts of dust suppression chemical runoff were documented at the Tug Hill Wind Farm Project in Lowville, NY, where all fish at the local fish hatchery were killed.

8. Figure 5 of the DEIS depicts the headwaters of unnamed protected streams, which flows towards the fish hatchery and are directly adjacent to turbines 57, 58, 59, 85, and 86. Directly north and also located within the same Coeymans limestone are up to 15 turbine areas which, according to Figure 2 of the GZA report will contain bedrock at depths of 1-3 meters from the ground surface and, therefore, blasting, hydraulic fracturing, or pneumatic jackhammering will be required. This will pose a risk to potential receptors by:

- Exposing large bedrock surface areas causing enhanced infiltration of strong basic water (from concrete work) and turbidity into the bedrock aquifer.
- Diversion of groundwater flow due to rock excavation activities, which will cause flow channels within the limestone seal off or open up in unpredictable ways.
- Diversion of groundwater flow and recharge due to presence of impermeable structures at the highest points of recharge where orientation of groundwater divides may be altered.

The following comments pertain specifically to the GZA report entitled, Report on Potential Impacts to Groundwater and Karst Topography During Construction of the Jordanville Wind Farm.

Page 2 – Paragraph 2 –2nd To Last Sentence

The GZA report quotes the report "Bedrock Geology of the Central Mohawk Valley" and notes that construction sites in the project area," must be explored for sinks or cavities in rock. It should be understood that this note was for structural purposes, however, for the proposed project, the issues pertaining to karst groundwater flow conditions are of even greater importance to the environment.

Page 2 – Paragraph 3 – Second Sentence

The report states, "…groundwater at the proposed turbine locations is expected to be relatively deep within bedrock…". This statement was contradicted by both the Hanson Aggregates interview and the limited well survey, which showed groundwater surface elevations ranging from above to below the bedrock surface (see Groundwater above)

Page 3 – Paragraph 1

".. A few karst like features are present within the central portion of the project area…". However, no data regarding karst surveys were included in the supplemental EIS. In addition, Pressly has obtained evidence of several other sinkholes in the project area showing enhanced drainage and erosion features. This evidence was included as Attachment 2.

Page 4 – Paragraph 1

"..groundwater velocity ranges between 1 – 15 feet per day…".

These values were obtained from a non-cited and unsubstantiated report from Hanson Aggregates. They probably represent hydraulic permeability, rather than velocity. According to the US Dept of Interior handbook, these values are typical of fine sand or clean sandstone media. The drainage of water into boreholes TB3 and TB5 showed direct empirical evidence of higher permeability fractured rock media. Also note that karst features provide more rapid groundwater pathways compared with the surrounding fractured rock matrix.

Page 4 – Collection of Water Well Logs

Only a small fraction (18) of the total number of existing domestic water supply wells were identified in the project area by GZA through database searches. Therefore the majority of wells both within an adjacent to the project area were not identified. An accurate well survey to identify potential receptors of groundwater contamination, including both artesian and drilled wells, would have required a door to door survey, which could have been completed in a few days.

Page 6 – Second Paragraph - Last 2 Sentences

Mr. LeClerc indicates that groundwater rises above the ground surface (probably limestone bedrock) during the spring (see Groundwater above). This information contradicts assumptions in the supplemental EIS which minimize potential groundwater impacts because groundwater is too deep.

Page 8 – 3rd Paragraph

In summary, Mr. Palmer, PhD stated that the construction activities would be the only activity that might impact groundwater at the Study Area. It is not clear how EDR and GZA are able to conclude otherwise before collecting any empirical groundwater data or identifying all potential receptors proximate to the study area.

On page 12, Mr. Palmer further indicates a regional deepwater source for the hatchery would have a minimum contribution from surface features. The proposed project is likely large enough to be considered a "regional project" and that subsurface groundwater (originating from construction areas on bedrock), in addition to surface features (runoff) would be an additional source contributing to the fish hatchery water supply, or any other domestic water well in the area. Many, of which, are located closer to the turbine locations and at shallow depths.

Page 13 – Last Paragraph- First Sentence

> "The water from the springs that feeds the fish hatchery will more likely be impacted by farming, cattle, and other large scale regional activities including inadequately maintained and or failing near by septic systems which are less regulated than the proposed Jordanville Wind….".

This conclusion by GZA, referring to other "regional activities", directly contradicts the argument throughout the report that sources near the surface will not contaminate the fish hatchery.

CONCLUSIONS

Based on the number of construction sites and the double-fold increase in runoff due to access roads, surface water impacts including wetland impacts are likely to occur within the project area.

- The supplemental EIS interviewed local individuals regarding potential impacts to water resources. It appears that some of the individuals provided further evidence towards potential groundwater impacts. In addition, some of those interviewed were either publicly supportive of the project or may gain financially from the project, calling in to question the objectivity of the interview.

- Bedrock aquifers will likely be impacted by the excavation of turbine foundations within shallow limestone bedrock present at 30 to 40 percent of the turbine locations.

- The direction of groundwater flow and a comprehensive potential receptor survey is crucial for the protection of public, commercial, and independent domestic water supplies as well as the surface waters that are hydraulically connected to the groundwater.

RECOMMENDATIONS

In order to ensure the protection of surface and groundwater resources within and surrounding the project area, the following was recommended:

- Conduct a groundwater investigation to evaluate vertical and groundwater flow across the project area and specifically between the project area, nearby wells, and the fish hatchery. The study should include both bedrock and overburden wells that can provide future monitoring points relative to any identified potential receptors of groundwater contamination.

- Conduct a well survey to identify public, commercial, and domestic water supplies within ½ mile of the project area.

- Conduct a fate and transport analysis of identified contaminants relative to the identified wells/springs and the fish hatchery.

- Revise the wetland impacts analysis to include an accurate measure of acreage impacts based on a reasonable setback and to-scale construction clearing areas.

- Avoid placement of turbines immediately adjacent to wetland areas and streams.

It was a pleasure to assist you with your environmental needs. If you have any questions, please do not hesitate to call me at 607-264-9521.

Sincerely,

Nicholas Pressly
Environmental Projects Manager

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ATTACHMENT 1

ATTACHMENT 2