

July 3rd 2009

TV 61036

The Barbados Light & Power Co. Ltd.
P.O. Box 142
Garrison Hill
St. Michael

Attention: Mr. Roger Blackman

Dear Mr. Blackman:

**Re: Application No. 3262/11/04C
Construction of a Wind Driven Electrical Station at Lamberts, East,
Lamberts Plantation, St. Lucy**

Thank you for forwarding comments requesting additional clarification on our environmental assessment report for the above site. I have repeated the comments and provide responses in italicised fonts below.

1. Methodology of noise monitoring:

- Noise dosimeters are ideal for measuring personal exposure to occupational noise but are not appropriate for the purposes of a field noise survey. An Integrating Sound Level Meter is recommended as a more accurate method of determining the Leq and is particularly useful if the noise is highly variable.
- Detailed descriptions of the monitoring sites and noise generating activities that were occurring at the time of monitoring should be provided.

Response:

- *We agree that an Integrating Sound Level Meter is the most appropriate instrument for any noise survey where one is measuring the environmental impact from designated noise sources. On this occasion, the sound measurements were performed using a Quest Technologies M-27 noise logging dosimeter which while most often used for personal exposure, also has a logging capability. Measurements of the sound pressure level were taken at 1-minute intervals over a 24-hour period and this data set was then evaluated in terms of the hourly equivalent sound level (Leq). While this data is representative of the background, the noise assessment of the windfarm used the International Finance Corporation¹ (World Bank) guideline of 45dBA as a reference for acceptable overnight noise levels at the closest residences.*

¹ International Finance Corporation (IFC) Environmental Health and Safety Guidelines, April 2007

- *The locations were selected to represent the closest residences to the windfarm around the perimeter of the site. Measurements were taken at a height of approximately 1.5 metres above the ground and the location was chosen both to be representative of conditions at the measurement location and to avoid any reflective impacts associated with structures on the measurement site. Information on meteorological conditions was presented in our letter of October 09, 2008.*
- *In our letter of October 09, 2008 it was also noted that the only location where noise levels would be influenced by construction would be L2 at Date Tree where construction of a house was occurring and could have influenced the daytime noise levels. However, when determining the existing ambient noise levels it is the night-time levels that are the lowest levels which need to be considered. At that location the lowest noise level (L_{EQ}) attained at night was in the 55dBA range which is higher than the predicted noise levels from the wind farm at that location.*

2. Methodology/rationale for the 350m separation distance.

- The industry guideline used to calculate the 350m setback should be referenced. The EPD remains concerned that 350m from the base of the tower to the nearest resident is not adequate to reduce potential impacts.
- It is also not clear if the land within the 350m is to be acquired by the developer or if the owner may wish to develop it at a later date.

Response:

- *The 350 metres separation distance from the closest residence was only one of the guidelines used during the feasibility study to pre-screen generally acceptable sites. This is an industry guideline based on seven rotor diameters (50m rotor), which is normally adequate to mitigate noise effects and reduce shadow flicker. The primary standard was the World Bank 45 dBA impact criterion for wind speeds of 8 m/s or less².*
- *The guideline was used in the report by Renewable Energy Systems: “Feasibility Study for a Wind Farm on Barbados – March 2004”*

3. Hours of construction

- Use of heavy equipment should be limited to daytime.

Response:

We agree to limit the use of heavy equipment to daytime hours.

² Ibid.

4. Section 7.2.4 Specifications of Turbines

- Since the type of turbine to be used has not been finalised, a range of noise data from different types of turbines being considered should have been provided to represent alternatives available.
- Little information has been provided as to what levels of low frequency noise are considered “problematic” and/or “significant” as well as no indication given as to established accepted thresholds for such noise.

Response:

- *As noted, the specific turbines to be used have not been purchased as selection will follow a competitive tendering process once the project has been approved. The Environmental Impact Assessment report was based on the installation of Vestas V52-850kW turbines as being typical of the size and type of wind turbine that will be installed in terms of power, hub-height and potential noise level. The noise assessment was based on all 11 turbines operating simultaneously.*
- *When the final turbine design parameters and geotechnical data are available, the layout will be re-optimised using the Windfarm program. At that time the potential noise impact at each receptor will be re-evaluated using Windfarm or some other ISO9613-compliant noise assessment software and a report submitted.*
- *There has been considerable debate in recent years over the potential impact from low-frequency sound from wind turbines and there is no consensus as to a specific limit criterion for low frequency or infrasound. Typically if there is a tonal quality present in the turbine mechanical or aerodynamic noise spectrum then a 5-10 dB penalty is added to the calculated receptor noise level.*
- *It is generally agreed that low frequency impact was worse with older model turbines where the blades passed through the tower shadow (downwind rotors or large vertical axis machines). Modern machines are much less susceptible to low frequency infrasound³. There has frequently been confusion over low frequency modulation of sound and the presence of infrasound and while there is a great deal of discussion about infrasound in connection with wind turbines in the media, there is no verifiable evidence for infrasound production by modern wind turbines⁴.*
- *The post-commissioning noise monitoring plan will however quantify any production of low frequency and infrasound from wind turbines on the site.*

5. Dust Control Measures

- Although dust control measures are covered in Section 7.1.3 of the Environmental Impact report and in more detail in the Environmental Management Plan for Construction, neither one makes specific mention of releases of particulates e.g. dust from vehicles entering or leaving the site. Examples of controls not mentioned may include wheel washing and enforceable speed limits.

³ HGC Engineering *Wind Turbines and Sound: Review and Best Practice Guidelines*. Report to Canadian Wind Energy Association, February 2007

⁴ Ibid.

Response:

- The temporary nature of construction differentiates it from other fugitive dust sources as to estimation and control of emissions. Construction consists of a series of different operations, each with its own duration and potential for dust generation. In other words, emissions from any single construction site can be expected (1) to have a definable beginning and an end and (2) to vary substantially over different phases of the construction process⁵.
- Best Management Practices for dust control will be used during construction as detailed in the report. In particular vehicles traveling on unpaved areas of the site will be limited to 15 kph. Since dust emissions from paved road surfaces are up to 90% less than for unpaved surfaces, project efforts were aimed at reduction of particulate emission at source.
- However track-out of silt especially post wet suppression remains a potential concern. Dust levels at the site will be monitored regularly using a hand held dust monitor. The area of paved road within 50m of the site exit will be inspected regularly for silt track-out and will be cleaned as necessary. This is felt to be a more effective process than wheel washing.

6. Section 7.2.4 Post Commissioning Noise Monitoring.

- The appended Environmental Management Plan indicated post commissioning noise monitoring at one location only. There should be a more comprehensive monitoring plan with multiple locations along with a schedule indicating the times and frequency of the monitoring.

Response:

Wind turbine noise typically includes both mechanical and aerodynamic effects. To ensure that all effects are measured, the proposed monitoring plan will include:

- *Measurements of A-weighted sound pressure level (dBA) taken at a minimum of five locations around the wind farm. These locations will be chosen once the final farm design has been approved and will be representative of the nearest residential receptor as well as offsite receptors in the cardinal directions as well as both upwind and down wind locations. Approximate locations could include:*
 - *Josey Hill*
 - *Cave Hill / Graveyard*
 - *Lamberts plantation (closest receptor)*
 - *Alexandra*
 - *Collins / the Risk*
- *Measurements will be taken over a minimum period of 48 hours using Type I or Type II integrating sound level meters at a height of 1.5 metres above the ground using wind shielded microphones and which will be site calibrated daily before and after each set of measurements. Monitors will be no closer than 3m from any reflecting surface (wall) and specific high noise events (onsite or offsite) will be logged.*

⁵ EPA AP42 Chapter 13 section 2-3

- *Measurements will include both hourly sound pressure level (Leq) as well as 1/3 octave band data to assess the tonal quality of any noise impact. This will be compared to the applicable criteria as well as to the results of the noise modelling.*
- *Measurements will be taken over three (3) 24-hour periods with the wind farm fully operational to allow for collection of noise data over a range of wind speed and wind direction conditions.*
- *The monitoring program will be repeated at the time of each plant expansion.*

I trust that this responds to the information request. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,
AMEC Earth & Environmental,
a division of AMEC Americas Limited



Peter Rostern, P.Eng.
Principal Environmental Engineer



Steve Lamming Ph.D., CCEP
Sr. Associate Air Quality/Noise