Acoustic Associates Sussex Ltd

Assessment of Proposed Wind Turbine at Lancing Business Park

Site: Lancing Business Park, Lancing, West Sussex
Client: Graham Wood Structural Ltd

Report by: Mike Wood AMIOA
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Management Summary

Acoustic Associates Sussex Ltd has been commissioned by Graham Wood Structural Ltd. to provide noise prediction and assessment of a proposed new wind turbine at Lancing Business Park. Using the manufacturers data for the turbine, noise at local residences was predicted and assessed according to the ETSU document "The Assessment and Rating of Noise from Windfarms" (1). Computer modelling of the site in question was used to predict noise levels at local residences during day and night-time periods. Results were then compared to limits set out in ETSU-R-97 and levels due to the turbine were found to be lower than 35 dB L_{A90} and therefore the installation of the turbine has been judged to be unlikely to cause noise disturbance to local residents.

Introduction

Lancing Business Park is a small industrial development on the South Coast in West Sussex. The business park is surrounded by residential housing and therefore proposals to build a new wind turbine on the site will need to consider the effect on local residents. Figure 1 shows the location of Lancing Business Park in relation to local housing along with the location of the proposed wind turbine.



Figure 1: Location of mast relative to housing

The proposed turbine is understood to be a Bergey Model BWC Excel 10 kW Class Wind Turbine (Height = 30 m). The nearest residential housing is shown in Figure 1 and is 255 m to the North of the proposed mast location. Computer modelling will use acoustic test data from the turbine to calculate predicted levels at the nearest residential location with a further two reception points to the South and West of the site (Figure 1).

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Assessment

Computer modelling software was used to predict the noise levels at nearby housing (2). Modelling considered both the noise generated by the mast and factors affecting noise propagation (e.g. height of the mast, intervening buildings and any topographical features).

Test Data

Acoustic test data regarding the proposed mast was supplied by the mast manufacturers, (Bergey Windpower Company) and is based on work carried out by the Conservation and Production Research Laboratory, United States Department for Agriculture (Bushlands, Texas, USA). A summary of the results is detailed in Table 1 below

Table 1: Wind turbine test measurements for Bergey Excel 10kW Turbine (Based on results taken on 6th July 2010)

Wind Speed	Distance (meters)	Recorded Sound Pressure Level (L_{Aeq} dBA)	Equivalent Background Noise Corrected Sound Power Level of Turbine (L_{WA} dBA)[1]
6	45.5	42.2	80.4
6.5	45.5	43.3	81.4
7	45.5	44.5	82.6
7.5	45.5	45.6	83.7
8	45.5	46.8	84.9
8.5	45.5	48.3	86.4
9	45.5	49.8	88.0
9.5	45.5	51.2	89.4
10	45.5	52.9	91.0
10.5	45.5	54.7	92.8
11	45.5	56.6	94.8
11.5	45.5	58.8	97.0
12	45.5	60.7	98.8
12.5	45.5	62.4	100.5
13	45.5	63.7	101.9

[1] Calculated from equation (9) of BS EN 61400-11:2003 "Wind Turbine Generator Systems"

Computer Model

A computer model of Lancing Business Park and surrounding areas was constructed (Figure 2).

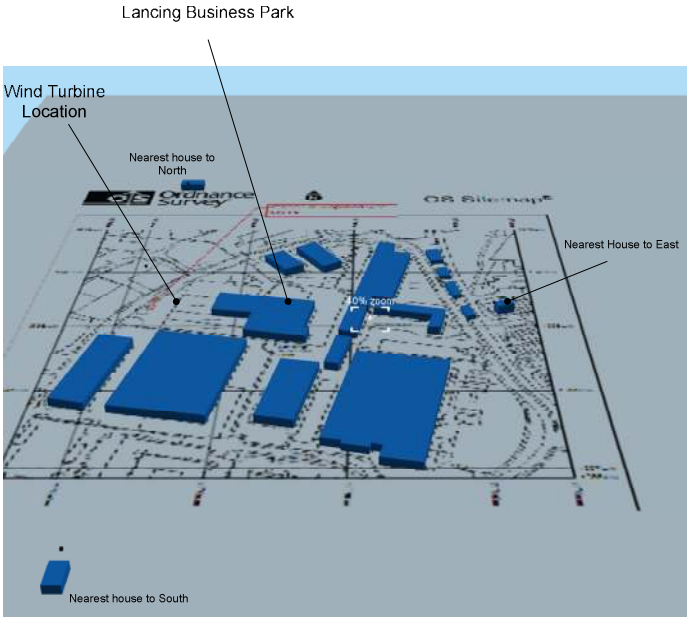

Figure 2: Computer model of Lancing Business Park

ETSU set limits of wind turbine noise relative to levels of background noise in surrounding residential areas. It is important to note that wind speeds affect both the level of background noise and noise from the turbine itself.

Regarding limits set for day and night-time periods, ETSU defines daytime as the period from 7 am to 11 pm and night-time as the period from 11 pm to 7 am. Due to the large distance between the wind turbine and the nearest noise sensitive properties, ETSU suggests a simplified noise assessment method. ETSU states:

> ***"If the noise is limited to an $L_{A90,10min}$ of 35 dB(A) up to wind speeds of 10 m/s at 10 m height, then this condition alone would offer sufficient protection of amenity and background noise surveys would be unnecessary… …even in sheltered areas when the wind speed exceeds 10 m/s on the wind farm site, some additional background noise will be generated which will increase background levels at the property."***

Since the noise of the turbine increases with wind speed, then if noise does not exceed 35 dB L_{Aeq} near local housing with wind speeds of 10 m/s, it can be assumed that above limit of 35 dB(A) $\boldsymbol{L_{A90,min}}$ will not be breached and sufficient protection of amenity would be achieved.

Results of the Computer Model

The table below shows predicted day and night levels 10 m above ground level at the nearest residential locations.

Table 2: Predicted level at 10 m above ground at residential locations

Location	Distance	Predicted L_{Aeq} from turbine (day)	Predicted L_{Aeq} from turbine (night)	Limit of contribution to background noise ($L_{A90,10min}$)
House to East	280 m	31.0 dB	31.0 dB	35 dB
House to South	330 m	29.7 dB	29.7 dB	35 dB
House to North	255 m	33.1 dB	33.1 dB	35 dB

It is clear from the table above that the limits are below those required for the ETSU simplified assessment condition to be met.

Conclusion

Given the above assessment of the modelling results, the simplified ETSU assessment can be applied. In this circumstance ETSU states that "**this condition alone would offer sufficient protection of amenity"** and is therefore suggested that the installation of the proposed turbine at Lancing Business park is unlikely to cause noise disturbance to local residents.

References

1. *The Assessment and Rating of Noise from Windfarms.* s.l. : ETSU for Department of Trade and Industry, 1996. ETSU-R-97.

2. *IMMI Noise Modelling Software.* s.l. : Wolfel , Version 2009 [313].

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