

Table B19 - Octave band sound power spectrum (dB L_{Aeq}) for reference wind speed conditions (v₁₀ = 8 m/s) – M74 West Renewable Energy Park

Turbine make / model	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	A
Seimens Gamesa SG 6.6-155	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
Derived from: Siemens Gamesa product specification document ‘Standard Acoustic Emissions, Rev. 0, Mode AM 0, IEC Ed3, document number D2311677/003, spectrum at 8 m/s hub height wind speeds, adjusted to 107.0 dB L _{WA} .									

Annex C – Noise Monitoring Information Sheets

Table C1 - Information on the measurement location, equipment and noise data at Snar Farm.

Measurement Location Name		Snar Farm				
Measurement Location Description		Noise monitoring equipment was placed within 10 m of the residential property façade, but more than 3.5 m away, as per ETSU-R-97 requirements. This was secured to fence post towards the middle of the property area. Water stream was noted at approximately 30 m from noise monitoring location but was not readily audible at the monitoring location. Trees surround the property area in all directions, with the nearest tree at least 15 m or more from the monitoring location. Ambient noise consisted mainly of bird song, trees rustling in the wind, livestock (sheep), and water stream noise heard toward the perimeter of property. Monitoring location was chosen to minimise water and tree noise, as far as possible. Monitoring position included rain gauge recording at 10-minute intervals. SLM Location: (X, Y: 286298,620052)				
Equipment		Type		Serial Number		Last Calibrated (UKAS)
Sound Level Meter		Class 1		00832245		15/08/2023
Pre-amplifier		NH-25		44552		15/08/2023
Microphone		UC-59		05472		15/08/2023
Calibrator		NC-75		34745899		24/07/2024
SLM Range		20 – 120 dB(A)		-		-
File	Time Start (GMT)	Time End (GMT)	Cal Start	Cal End	Drift	Notes
Auto_0101	29/05/2025 – 12:00	18/06/2025 – 13:00	94.0 dB(A)	93.9 dB(A)	0.1 dB	No significant drift
Auto_0102	18/06/2025 – 13:30	01/07/2025 – 12:30	94.0 dB(A)	94.1 dB(A)	0.1 dB	No significant drift
Data Exclusions						
Measured noise data was synchronised with 10-minute interval LIDAR wind data recorded on-site throughout the survey duration, as well as rain gauge measured data. Intervals of rainfall were excluded from analysis, as well as dawn chorus time between 04:00-07:00 local time.						

Figure C1 - View of the monitoring location a: Snar Farm looking north.



Figure C2 - View of the monitoring location a: Snar Farm looking east.



Figure C3 - View of the monitoring location at Snar Farm looking south.



Figure C4 - View of the monitoring location at Snar Farm looking west.



Derivation of Generic Background Noise Levels

C.1 A review of the environmental impact assessments (EIAs) for neighbouring schemes shows that background noise levels have been measured at a number of locations in the area (see Figure B1). The neighbouring schemes and the noise survey results taken from that noise assessments considered are detailed in Table C2.

Table C2 - Neighbouring wind farms and background noise survey information referenced in the noise assessments for each scheme (grid coordinates of the survey locations are provided as OSGB Grid eastings and northings, and are those stated in each of the respective noise assessments).

Wind Farm	Background noise survey information
Harryburn Windfarm ⁶²	The background noise monitoring survey was undertaken over seven weeks from May 2016 to July 2016 by Hoare Lea. The equations of the best-fit lines were taken from the charts in the Harryburn Windfarm EIAR and are presented below. The best-fit line equations were used to derive background noise levels for each wind speed, both with and without wind shear corrections, as shown on the charts in Annex E. Tabular values of background levels relative to each wind speed are presented in Table C3 (without shear correction) and Table C4 (with shear correction). Historical data used from background surveys undertaken at locations: - Douglas Lodge, Crawford (295585/620699): - Day: $y=0.56085x+35.467$ - Night: $y=0.37611x+33.844$ 76 Dumfries Road, Elvanfoot (295239/617110): - Day: $y=0.28541x+37.882$ - Night: $y=0.37586x+36.544$ - Glencaple Cottage (292006/621445): - Day: $y=0.008151x^3-0.02636x^2-0.00829+35.335$ - Night: $y=0.16067x+33.662$ - South Shortcleugh (292848/616703): - Day: $y=0.00336x^3-0.0021x^2+0.86222x+27.036$ - Night: $y=0.3869x+30.357$ 3 Symington Street, Leadhills (288654/615274): - Day: $y=-0.00289x^4+0.064861x^3-0.28611x^2+0.12593x+30.229$ - Night: $y=0.81073+20.344$ - Waterhead Toll Cottage (288879/618153): - Day: $y=0.32618x+32.575$ - Night: $y=0.20302x+32.832$
North Lowther Energy Initiative ⁶³	The background noise monitoring survey was undertaken over six weeks from March 2016 to May 2016 by TNEI, with background charts presented in Technical Appendix 11.2: Operational Noise Assessment. The best-fit line equations from those charts are shown below. These were used to derive background noise levels relative to each wind speed bin with and without wind shear, as shown in the charts in Annex E below. Tabular values of background levels relative to each wind speed are presented in Table C3 (without shear correction) and Table C4 (with shear correction). Historical data used from background survey undertaken at location: - Meadowfoot - Day: $y=0.012x^3-0.152x^2+1.196x+25.522$ - Night: $y=0.023x^3-0.433x^2+2.499x+24.07$

62 ECU00005277 - Harryburn Wind Farm Environmental Statement – Chapter 15: Noise – Appendix 15.1: Noise & Vibration – 24/04/2017

63 ECU00000426 - Noth Lowther Energy Initiative Environmental Statement – Chapter 11: Noise – Technical Appendix 11.2: Operational Noise Assessment – May 2017

C.2 Table C1 indicates the seven previous background noise survey locations which are considered most relevant to this assessment, and which are closest to the noise sensitive receptors near to the Proposed Development. These background noise levels were related to standardised ten metre wind speeds derived from hub height wind speeds at a hub height relevant to each wind farm. Table C3 presents the background levels for each historical survey locations relative to standardised 10 m wind speeds.

Table C3 - Background noise levels at the eight survey locations relevant to assessment of the proposed development for both day-time and night-time periods.

Survey Locations	Standardised 10 m Wind Speed (m/s)									
	3	4	5	6	7	8	9	10	11	12
Day-time Periods										
Glencaple Cottage	35.3	35.4	35.7	36.1	36.8	37.8	39.1	40.8	42.9	45.5
Waterhead Toll Cottage	33.6	33.9	34.2	34.5	34.9	35.2	35.5	35.8	36.2	36.5
Douglas Lodge	37.1	37.7	38.3	38.8	39.4	40.0	40.5	41.1	41.6	42.2
76 Dumfries Road	38.7	39.0	39.3	39.6	39.9	40.2	40.5	40.7	41.0	41.3
South Shortcleugh	29.7	30.7	31.7	32.9	34.1	35.5	37.1	38.8	40.7	42.9
3 Symington Street	29.5	29.6	30.0	31.0	32.4	34.3	36.5	38.9	41.1	42.8
Meadowfoot	28.1	28.6	29.2	29.8	30.6	31.5	32.7	34.3	36.3	38.7
Night-time Periods										
Glencaple Cottage	34.1	34.3	34.5	34.6	34.8	34.9	35.1	35.3	35.4	35.6
Waterhead Toll Cottage	33.4	33.6	33.8	34.1	34.3	34.5	34.7	34.9	35.1	35.3
Douglas Lodge	35.0	35.3	35.7	36.1	36.5	36.9	37.2	37.6	38.0	38.4
76 Dumfries Road	37.7	38.0	38.4	38.8	39.2	39.6	39.9	40.3	40.7	41.1
South Shortcleugh	31.5	31.9	32.3	32.7	33.1	33.5	33.8	34.2	34.6	35.0
3 Symington Street	22.8	23.6	24.4	25.2	26.0	26.8	27.6	28.5	29.3	30.1
Meadowfoot	28.3	28.6	28.6	28.4	28.2	28.1	28.3	28.8	29.8	31.5
* Background levels derived from best-fit equations as shown in Table C2.										

C.3 Given the large number of baseline surveys completed in the area, in combination with a number of wind farms being operational and potentially influencing background noise levels, it was not considered necessary or potentially practical to undertake further extensive baseline surveys. A baseline survey was therefore undertaken at a single additional location (Snar Farm) to the west of the Proposed Development area to gather comprehensive baseline surrounding the Site. A combination of the measured baseline data and existing data have been used to provide the required representative baseline background noise levels for the purposes of an ETSU-R-97 assessment. The IOA GPG suggests that baseline results measured for other wind farms can be referenced in this way, but that they should be based on standardised ten metre wind speeds related to those at the hub height of the candidate wind turbine on the proposed development. Where these wind speed references differ, corrections may need to be applied to account for wind shear effects.

C.4 In utilising the historical baseline data, these were corrected for the lower hub heights that were used in the previous surveys. Following guidance in the IOA GPG Supplementary Guidance Note 4 (“Wind Shear”), it was estimated that the likely effects of the height difference in question would be less than 1 m/s, even accounting for relatively high shear periods for the type of terrain present in the area. . Therefore, a correction of 1 m/s was applied by increasing the wind speed references, which had the effect of shifting the background curves “to the right”, i.e. the value obtained at 7 m/s was applied at 8 m/s etc. Table C4 presents the background levels with the wind shift applied.

Table C4 - Wind shear corrected background noise levels at the four survey locations relevant to assessment of the proposed development are shown for both day-time and night-time periods. These values have been corrected for wind shear to account for the difference in the wind speed reference height used for those background noise survey and the hub height of the proposed development.

Survey Locations	Standardised 10 m Wind Speed (m/s)									
	3	4	5	6	7	8	9	10	11	12
Day-time Periods										
Glencaple Cottage	35.3	35.3	35.4	35.7	36.1	36.8	37.8	39.1	40.8	42.9
Waterhead Toll Cottage	33.2	33.6	33.9	34.2	34.5	34.9	35.2	35.5	35.8	36.2
Douglas Lodge	36.6	37.1	37.7	38.3	38.8	39.4	40.0	40.5	41.1	41.6
76 Dumfries Road	38.5	38.7	39.0	39.3	39.6	39.9	40.2	40.5	40.7	41.0
South Shortcleugh	28.8	29.7	30.7	31.7	32.9	34.1	35.5	37.1	38.8	40.7
3 Symington Street	29.8	29.5	29.6	30.0	31.0	32.4	34.3	36.5	38.9	41.1
Meadowfoot	27.4	28.1	28.6	29.2	29.8	30.6	31.5	32.7	34.3	36.3
Night-time Periods										
Glencaple Cottage	34.0	34.1	34.3	34.5	34.6	34.8	34.9	35.1	35.3	35.4
Waterhead Toll Cottage	33.2	33.4	33.6	33.8	34.1	34.3	34.5	34.7	34.9	35.1
Douglas Lodge	34.6	35.0	35.3	35.7	36.1	36.5	36.9	37.2	37.6	38.0
76 Dumfries Road	37.3	37.7	38.0	38.4	38.8	39.2	39.6	39.9	40.3	40.7
South Shortcleugh	31.1	31.5	31.9	32.3	32.7	33.1	33.5	33.8	34.2	34.6
3 Symington Street	22.0	22.8	23.6	24.4	25.2	26.0	26.8	27.6	28.5	29.3
Meadowfoot	27.5	28.3	28.6	28.6	28.4	28.2	28.1	28.3	28.8	29.8
* Background levels from Table C3 shifted 'to right' by 1 m/s to account for wind shear on a conservative basis.										

Annex D – Wind Speeds and Directions

Figure D1 - Wind speed and direction range during all quiet day-time periods (Property (Snar Farm) data shown; rain and other data exclusions shown).

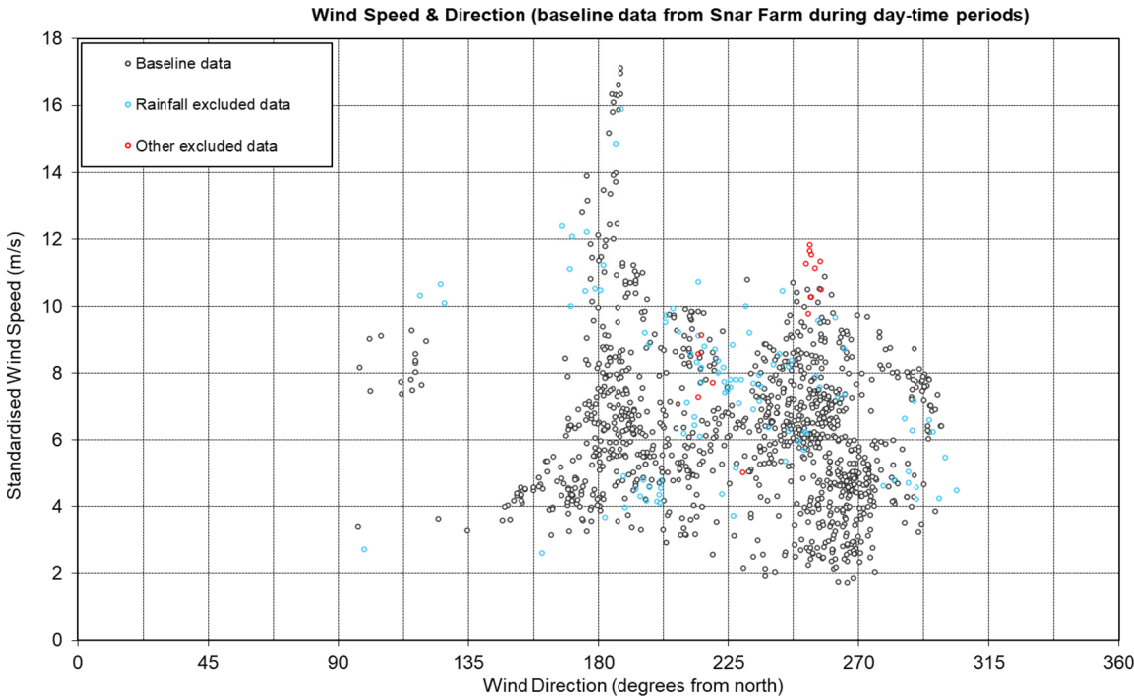


Figure D2 - Wind speed and direction range during all night-time periods (Property (Snar Farm) data shown; rain and other data exclusions shown).

