



Balmeanach Wind Farm Limited

Balmeanach Wind Farm

**Technical Appendix 13.2
Noise Limits for Cumulative Wind Farms**

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Contents

1	INTRODUCTION.....	2
2	BEN AKETIL WIND FARM.....	2
3	BEN SCA WIND FARM	8
4	GLEN ULLINISH WIND FARM	14
5	EDINBANE WIND FARM.....	16

1 Introduction

- 1.1.1 This Technical Appendix provides a brief summary of the relevant noise limits included in the planning consents for nearby wind farms to the Proposed Development.

2 Ben Aketil Wind Farm

- 2.1.1 Consent was granted on 15 February 2023 for the extension of life of the Ben Aketil Wind Farm and Extension. Condition 14 of planning consent reference 20/04369/S42 is relevant to the permitted noise from the wind farm and is reproduced below.

- 2.1.2 The values presented in Table 1 for 9 Balmeanach (5th entry) and Allt Ruairidh (6th entry) have been used as the immission levels from Ben Aketil Wind Farm and extension at NSR1 and NSR2 respectively. No entry for NSR3, 23 Upper Edinbane, was available so a value equal to the predicted immission plus a 2 dB uplift was used for that location. It is noted that the Table 1 noise limit values for NSR1 and NSR2 are also equal to the predicted immission plus a 2 dB uplift.

14. The rating level of noise immissions from the combined effects of the operational wind turbines at Ben Aketil (Planning Application Ref: 02/00275/FULCA) and Ben Aketil Extension (Planning Application Ref: 09/00115/FULSL) (including the application of any tonal penalty), when determined in accordance with the attached Guidance Notes, shall not exceed the values for the relevant integer wind speeds set out in or derived from Table 1 attached to these conditions. Furthermore

- (A) Where there is more than one dwelling at a location specified in Table 1 attached to

this condition, the noise limits set for that location shall apply to all dwellings at that location. In the event of a noise complaint relating to a dwelling which is not identified by name or location in the Table attached to these conditions, the applicant shall submit to the Planning Authority, for written approval, proposed noise limits to be adopted at the complainant's dwelling for compliance checking purposes. The submission of the proposed noise limits to the Planning Authority shall include a written justification of the choice of limits. The rating level of noise immissions resulting from the combined effects of the wind turbines when determined in accordance with the attached Guidance Notes shall not exceed the noise limits approved in writing by the planning authority for the complainant's dwelling.

- (B) No electricity shall be exported on a commercial basis to the grid until the Company has submitted to the Planning Authority for written approval a list of proposed independent consultants who may undertake compliance measurements in accordance with this condition. Amendments to the list of approved consultants shall be made only with the prior written approval of the Planning Authority.

- (C) There shall be no Commencement of Development until a Noise Measurement and Mitigation Scheme has been submitted to, and approved in writing by, the planning authority. The scheme shall include:

- A framework for the measurement and calculation of the rating level of noise immissions from the wind farm (including the identification of any tonal component) to be undertaken in the event of a complaint in accordance with ETSU-R-97 and its associated Good Practice Guide and Supplementary Guidance Notes.
- A framework for implementing any required curtailment measures, where necessary to ensure the values in Table 1 are met and not exceeded.

- (D) Within 21 days from receipt of a written request of the planning authority, following a complaint to it from an occupant of a dwelling alleging noise disturbance at that dwelling, the Company shall, at its expense, employ an independent consultant approved by the planning authority to assess the rating level of noise immissions from the wind farm at the complainant's property in accordance with the approved Noise Measurement and Mitigation Scheme. The written request from the planning authority shall set out at least the date, time and location that the complaint relates to and any identified atmospheric conditions, including wind direction, and include a statement as to whether, in the opinion of the Local Planning Authority, the noise giving rise to the complaint contains or is likely to contain a tonal component.
- Within 14 days of receipt of a written request from the planning authority, the Company shall provide the planning authority with the information relevant to the complaint logged in accordance with paragraph (G) of this condition.

The independent consultant's assessment must be undertaken in accordance with the approved Noise Measurement and Mitigation Scheme and must relate to the range of conditions which prevailed during times when the complainant alleges there was disturbance due to noise, having regard to the information provided in the written request from the planning authority and such other conditions as the independent consultant considers necessary to fully assess the noise at the complainant's property.

- (E) The Company shall provide to the planning authority the independent consultant's assessment of the rating level of noise immissions within 2 months of the date of the written request of the Planning Authority, unless the time limit is extended in writing by the Planning Authority. All data collected for the purposes of undertaking the compliance measurements shall be made available to the Planning Authority on the request of the Planning Authority. The instrumentation used to undertake the measurements shall be calibrated in accordance with Guidance Note 1(a) and certificates of calibration shall be submitted to the Planning Authority with the independent consultant's assessment of the rating level of noise immissions.
- (F) Where a further assessment of the rating level of noise immissions from the wind farm is required to assess the complaint, the Company shall submit a copy of the further assessment within 21 days of submission of the independent consultant's assessment to the Planning Authority unless the time limit for the submission of the further assessment has been extended in writing by the planning authority.
- (G) Within one week of the planning authority receiving an assessment which identifies that the wind farm noise levels are exceeding any of the limits in Table 1 attached to this condition, the Company will implement mitigation measures in accordance with the approved Noise Measurement and Mitigation Scheme.
- (H) The Company shall continuously log power production, wind speed and wind direction, all in accordance with Guidance Note 1(d). These data shall be retained for a period of not less than 24 months. The Company shall provide this information in the format set out in Guidance Note 1(e) to the planning authority on its request, within 14 days of receipt in writing of such a request.

Note: For the purposes of this condition, a "dwelling" is a building within Use Class 9 of the Use Classes Order which lawfully exists or had planning permission at the date of this consent.

SECTION 42 PERMISSION

Reference No: 20/04369/S42

Table 1 - Noise Limits in dB LA90

Location (easting, northing grid coordinates)	Standardised wind speed at 10 metres height (m/s) within the site averaged over 10-minute periods											
	1	2	3	4	5	6	7	8	9	10	11	12
LA90 Decibel Levels												
Upperglen (131978, 851178)				18	21	26	29	31	32	32	32	32
Coishletter Woodland (133696, 851068)				15	18	23	25	27	29	29	29	29
Blackhill (134519, 850404)				15	17	23	25	27	28	28	28	28
Glen Vic Askill (135979, 844311)				10	13	18	21	23	24	24	24	24
9 Balmeanach (133132, 843734)				13	16	21	24	26	27	27	27	27
Allt Ruairidh (132485, 843549)				14	17	22	24	26	28	28	28	28
2 Balmeanach (131318, 843153)				13	15	21	23	25	26	26	26	26
North of 1 Balmeanach (130944, 843272)				13	15	21	21	25	26	26	26	26
1 Caroy Struan (130338, 843921)				13	16	21	24	26	27	27	27	27
12 Feorlig (129987, 845192)				20	23	28	31	33	34	34	34	34
Upper Feorlig (129940, 845118)				20	23	28	31	34	34	34	34	34
11 Upper Feorlig (129895, 844969)				20	23	28	31	34	34	34	34	34
1 Roskhill (128254, 845221)				13	15	21	23	25	26	26	26	26
Roskhill Cottage (127638, 845505)				12	15	20	22	24	26	26	26	26
Horneval (127534, 848009)				14	16	22	24	26	27	27	27	27

Note to Table 1: The wind speed standardised to 10 metres height within the Site refers to wind speed at 10 metres height derived in accordance with the method given in the attached Guidance Notes.

Dated: 15th February 2023

Dafydd Jones

Area Planning Manager

Guidance Notes for Noise Condition

These notes are to be read with and form part of the noise condition. They further explain the condition and specify the methods to be employed in the assessment of complaints about noise immissions from the wind farm. The rating level at each integer wind speed is the arithmetic sum of the wind farm noise level as determined from the best-fit curve described in Guidance Note 2 of these Guidance Notes and any tonal penalty applied in accordance with Guidance Note 3. Reference to ETSU-R-97 refers to the publication entitled "The Assessment and Rating of Noise from Wind Farms" (1997) published by the Energy Technology Support Unit (ETSU) for the Department of Trade and Industry (DTI).

Guidance Note 1

- (a) Values of the $L_{A90,10\text{-minute}}$ noise statistic should be measured at the complainant's property, using a sound level meter of EN 60651/BS EN 60804 Type 1, or BS EN 61672 Class 1 quality (or the equivalent UK adopted standard in force at the time of the measurements) set to measure using the fast time weighted response as specified in BS EN 60651/BS EN 60804 or BS EN 61672-1 (or the equivalent UK adopted standard in force at the time of the measurements). This should be calibrated in accordance with the procedure specified in BS4142: 1997 (or the equivalent UK adopted standard in force at the time of the measurements). Measurements shall be undertaken in such a manner to enable a tonal penalty to be applied in accordance with Guidance Note 3.
- (b) The microphone should be mounted at 1.2 - 1.5 metres above ground level, fitted with a two-layer windshield or suitable equivalent approved in writing by the Planning Authority, and placed outside the complainant's dwelling. Measurements should be made in "free field" conditions. To achieve this, the microphone should be placed at least 3.5 metres away from the building facade or any reflecting surface except the ground at the approved measurement location. In the event that the consent of the complainant for access to his or her property to undertake compliance measurements is withheld, the Company shall submit for the written approval of the planning authority details of the proposed alternative representative measurement location prior to the commencement of measurements and the measurements shall be undertaken at the approved alternative representative measurement location.
- (c) The $L_{A90,10\text{-minute}}$ measurements should be synchronised with measurements of the 10-minute arithmetic mean wind and operational data logged in accordance with Guidance Note 1(d), including the power generation data from the turbine control systems of the wind farm.
- (d) To enable compliance with the conditions to be evaluated, the Company shall continuously log arithmetic mean wind speed in metres per second and wind direction in degrees from north for each turbine and arithmetic mean power generated by each turbine, all in successive 10-minute periods. Unless an alternative procedure is previously agreed in writing with the planning authority, such as direct measurement at a height of 10 metres, this wind speed, averaged across all operating wind turbines, and corrected to be representative of wind speeds measured at a height of 10m, shall be used as the basis for the analysis. It is this 10 metre height wind speed data, which is correlated with the noise measurements determined as valid in accordance with Guidance Note 2. All 10-minute periods shall commence on the hour and in 10- minute increments thereafter.
- (e) Data provided to the planning authority in accordance with the noise condition shall be provided in comma separated values in electronic format.

- (f) A data logging rain gauge shall be installed in the course of the assessment of the levels of noise immissions. The gauge shall record over successive 10-minute periods synchronised with the periods of data recorded in accordance with Note 1(d).

Guidance Note 2

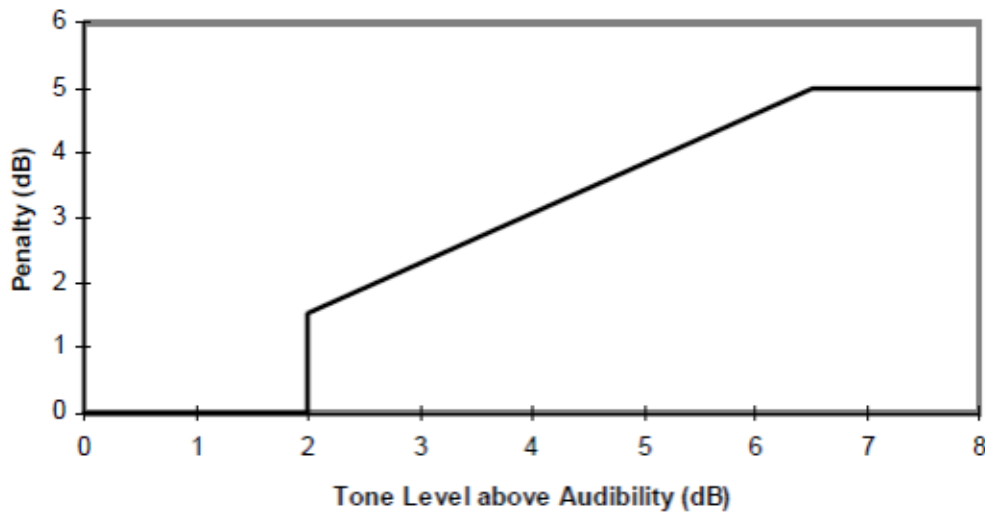
- a) The noise measurements should be made so as to provide not less than 20 valid data points as defined in Note 2 paragraph (b).
- b) Valid data points are those measured in the conditions specified in the agreed written protocol under paragraph (d) of the noise condition but excluding any periods of rainfall measured in the vicinity of the sound level meter. Rainfall shall be assessed by use of a rain gauge that shall log the occurrence of rainfall in each 10 minute period concurrent with the measurement periods set out in Guidance Note 1. In specifying such conditions the planning authority shall have regard to those conditions which prevailed during times when the complainant alleges there was disturbance due to noise or which are considered likely to result in a breach of the limits.
- c) For those data points considered valid in accordance with Guidance Note 2(b), values of the $L_{A90,10\text{-minute}}$ noise measurements and corresponding values of the 10-minute 10-metre height wind speed averaged across all operating wind turbines using the procedure specified in Guidance Note 1(d), shall be plotted on an XY chart with noise level on the Y-axis and the 10- metre height mean wind speed on the X-axis. A least squares, "best fit" curve of an order deemed appropriate by the independent consultant (but which may not be higher than a fourth order) should be fitted to the data points and define the wind farm noise level at each integer speed.

Guidance Note 3

- a) Where, in accordance with the approved assessment protocol under paragraph (d) of the noise condition, noise immissions at the location or locations where compliance measurements are being undertaken contain or are likely to contain a tonal component, a tonal penalty is to be calculated and applied using the following rating procedure.
- b) For each 10-minute interval for which $L_{A90,10\text{-minute}}$ data have been determined as valid in accordance with Guidance Note 2, a tonal assessment shall be performed on noise immissions during 2-minutes of each 10-minute period. The 2-minute periods should be spaced at 10 minute intervals provided that uninterrupted uncorrupted data are available ("the standard procedure"). Where uncorrupted data are not available, the first available uninterrupted clean 2-minute period out of the affected overall 10-minute period shall be selected. Any such deviations from the standard procedure, as described in Section 2.1 on pages 104-109 of ETSU-R-97, shall be reported.
- c) For each of the 2-minute samples the tone level above or below audibility shall be calculated by comparison with the audibility criterion given in Section 2.1 on pages 104-109 of ETSU-R-97.
- d) The tone level above audibility shall be plotted against wind speed for each of the 2-minute samples. Samples for which the tones were below the audibility criterion or no tone was identified, a value of zero audibility shall be used.
- e) A least squares "best fit" linear regression line shall then be performed to establish the average tone level above audibility for each integer wind speed derived from the value of the "best fit" line at each integer wind speed. If there is no apparent trend with wind speed then a simple arithmetic mean shall be used. This process shall be repeated for

each integer wind speed for which there is an assessment of overall levels in Guidance Note 2.

- f) The tonal penalty is derived from the margin above audibility of the tone according to the figure below.



Guidance Note 4

- a) If a tonal penalty is to be applied in accordance with Guidance Note 3 the rating level of the turbine noise at each wind speed is the arithmetic sum of the measured noise level as determined from the best fit curve described in Guidance Note 2 and the penalty for tonal noise as derived in accordance with Guidance Note 3 at each integer wind speed within the range specified by the planning authority in its written protocol under paragraph (d) of the noise condition.
- b) If no tonal penalty is to be applied then the rating level of the turbine noise at each wind speed is equal to the measured noise level as determined from the best fit curve described in Guidance Note 2.
- c) In the event that the rating level is above the limit(s) set out in the Tables attached to the noise conditions or the noise limits for a complainant's dwelling approved in accordance with paragraph (e) of the noise condition, the independent consultant shall undertake a further assessment of the rating level to correct for background noise so that the rating level relates to wind turbine noise immission only.
- d) The Company shall ensure that all the wind turbines in the development are turned off for such period as the independent consultant requires to undertake the further assessment. The further assessment shall be undertaken in accordance with the following steps:
- i. Repeating the steps in Guidance Note 2, with the wind farm switched off, and determining the background noise (L_3) at each integer wind speed within the range requested by the planning authority in its written request under paragraph (c) and the approved protocol under paragraph (d) of the noise condition.
 - ii. The wind farm noise (L_1) at this speed shall then be calculated as follows where L_2 is the measured level with turbines running but without the addition of any tonal penalty:

$$L_1 = 10 \log \left[10^{L_2/10} - 10^{L_3/10} \right]$$

- iii. The rating level shall be re-calculated by adding the tonal penalty (if any is applied in accordance with Note 3) to the derived wind farm noise L_1 at that integer wind speed.
- iv. If the rating level after adjustment for background noise contribution and adjustment for tonal penalty (if required in accordance with note (iii) above) at any integer wind speed lies at or below the values set out in the Tables attached to the conditions or at or below the noise limits approved by the Planning Authority for a complainant's dwelling in accordance with paragraph

(e) of the noise condition then no further action is necessary. If the rating level at any integer wind speed exceeds the values set out in the Table attached to the conditions or the noise limits approved by the Planning Authority for a complainant's dwelling in accordance with paragraph (e) of the noise condition then the development fails to comply with the conditions.

Reason: In the interest of amenity.

3 Ben Sca Wind Farm

- 3.1.1 Consent was granted on 07 April 2022 for Ben Sca Wind Farm Extension. Condition 25 of planning consent reference 21/05767/FUL is relevant to the permitted noise from the wind farm and is reproduced below.
 - 3.1.2 The consent sets the limit to 2 dB above predicted noise immission levels presented in Table 6.3 of the Ben Sca Wind Farm Extension EIAR. None of these receptors directly align with those used in the assessment of the Proposed Development, so the predicted levels from Ben Sca Wind Farm and Ben Sca Wind Farm Extension plus a 2 dB uplift at the NSRs for the Proposed Development have been used.
25. The rating level of noise immissions from the combined effects of the wind turbines hereby permitted (including the application of any tonal penalty), when determined in accordance with the attached Guidance Notes, shall not exceed more than 2dB above the predicted levels contained within EIAR VOL 4 Technical Appendix E - Noise Assessment Report, Table 6-3.

Table 6-3: ETSU-R-97 Daytime Compliance – Proposed Development Only

NSR		Noise, dB $L_{A90, 10 \text{ min}}$ at standardised 10 m wind speed, ms^{-1}									
		4	5	6	7	8	9	10	11	12	
NSR01 Upperglen	① Noise limit (Table 6-1)	35.0	35.0	35.0	37.4	40.0	42.1	43.8	45.1	46.2	
	② WTN: Proposed development	18.0	22.9	26.9	29.0	29.6	30.3	30.3	30.3	30.3	
	③ WTN: Proposed development + Ben Sca Wind Farm	20.6	25.5	29.5	31.6	32.2	32.9	32.9	32.9	32.9	
	④ Exceedance: Proposed development (② – ①)	-17.0	-12.1	-8.1	-8.4	-10.4	-11.8	-13.5	-14.8	-15.9	
	⑤ Exceedance: Proposed development + Ben Sca (③ – ①)	-14.4	-9.5	-5.5	-5.8	-7.8	-9.2	-10.9	-12.2	-13.3	

NSR		Noise, dB $L_{A90, 10 \text{ min}}$ at standardised 10 m wind speed, ms^{-1}								
		4	5	6	7	8	9	10	11	12
NSR02 Coishletter Woodlands	① Noise limit (Table 6-1)	35.0	35.0	35.0	37.4	40.0	42.1	43.8	45.1	46.2
	② WTN: Proposed development	13.8	18.7	22.7	24.8	25.4	26.1	26.1	26.1	26.1
	③ WTN: Proposed development + Ben Sca Wind Farm	18.8	23.7	27.7	29.8	30.4	31.1	31.1	31.1	31.1
	④ Exceedance: Proposed development (② – ①)	-21.2	-16.3	-12.3	-12.6	-14.6	-16.0	-17.7	-19.0	-20.1
	⑤ Exceedance: Proposed development + Ben Sca (③ – ①)	-16.2	-11.3	-7.3	-7.6	-9.6	-11.0	-12.7	-14.0	-15.1
NSR03 Blackhill	① Noise limit (Table 6-1)	35.0	35.0	35.0	37.4	40.0	42.1	43.8	45.1	46.2
	② WTN: Proposed development	10.5	15.4	19.4	21.5	22.1	22.8	22.8	22.8	22.8
	③ WTN: Proposed development + Ben Sca Wind Farm	18.5	23.4	27.4	29.5	30.1	30.8	30.8	30.8	30.8
	④ Exceedance: Proposed development (② – ①)	-24.5	-19.6	-15.6	-15.9	-17.9	-19.3	-21.0	-22.3	-23.4
	⑤ Exceedance: Proposed Development + Ben Sca (③ – ①)	-16.5	-11.6	-7.6	-7.9	-9.9	-11.3	-13.0	-14.3	-15.4

- A) Prior to the First Export Date, the wind farm operator shall submit to the Local Authority for written approval a list of proposed independent consultants who may undertake compliance measurements in accordance with this condition. Amendments to the list of approved consultants shall be made only with the prior written approval of the Local Authority.
- B) Within 21 days from receipt of a written request of the Local Authority, following a complaint to it alleging noise disturbance at a dwelling, the wind farm operator shall, at its expense, employ an independent consultant approved by the Local Authority to assess the level of noise imissions from the wind farm at the complainant's property (or a suitable alternative location agreed in writing with the Local Authority) in accordance with the procedures described in the attached Guidance Notes.

The written request from the Local Authority shall set out at least the date, time and location that the complaint relates to. Within 14 days of receipt of the written request of the Local Authority made under this paragraph (B), the wind farm operator shall provide the information relevant to the complaint to the Local Authority in the format set out in Guidance Note 1(e).

- C) Prior to the commencement of any measurements by the independent consultant to be undertaken in accordance with these conditions, the wind farm operator shall submit to the Local Authority for written approval the proposed measurement location identified in accordance with the Guidance Notes where measurements for compliance checking purposes shall be undertaken.

Where the proposed measurement location is close to the wind turbines, rather than at the complainants property (to improve the signal to noise ratio), then the operators submission shall include a method to calculate the noise level from the wind turbines at the complainants property based on the noise levels measured at the agreed location (the alternative method). Details of the alternative method together with any associated guidance notes deemed necessary, shall be submitted to and agreed in writing by the Local Authority prior to the commencement of any measurements.

Measurements to assess compliance with the noise limits of this condition shall be undertaken at the measurement location approved in writing by the Local Authority

- D) Prior to the commencement of any measurements by the independent consultant to be undertaken in accordance with these conditions, the wind farm operator shall submit to the Local Authority for written approval a proposed assessment protocol setting out the following:
- i) the range of meteorological and operational conditions (the range of wind speeds, wind directions, power generation and times of day) to determine the assessment of rating level of noise imissions.
 - ii) a reasoned assessment as to whether the noise giving rise to the complaint contains or is likely to contain a tonal component.

The proposed range of conditions shall be those which prevailed during times when the complainant alleges there was disturbance due to noise, having regard to the information provided in the written request of the Local Authority under paragraph (B), and such others as the independent consultant considers necessary to fully assess the noise at the complainant's property. The assessment of the rating level of noise imissions shall be undertaken in accordance with the assessment protocol approved in writing by the Local Authority and the attached Guidance Notes.

- E) The wind farm operator shall provide to the Local Authority the independent consultant's assessment of the rating level of noise imissions undertaken in accordance with the Guidance Notes within 2 months of the date of the written request of the Local Authority made under paragraph (B) of this condition unless the time limit is extended in writing by the Local Authority. The assessment shall include all data collected for the purposes of undertaking the compliance measurements, such data to be provided in the format set out in Guidance Note 1(e) of the Guidance Notes. The instrumentation used to undertake the measurements shall be calibrated in accordance with Guidance Note 1(a) and certificates of calibration shall be submitted to the Local Authority with the independent consultant's assessment of the rating level of noise emissions.
- F) Where a further assessment of the rating level of noise imissions from the wind farm is required pursuant to Guidance Note 4(c) of the attached Guidance Notes, the wind farm operator shall submit a copy of the further assessment within 21 days of submission of the independent consultant's assessment pursuant to paragraph (E) above unless the time limit for the submission of the further assessment has been extended in writing by the Local Authority.
- G) The wind farm operator shall continuously log power production, wind speed and wind direction, all in accordance with Guidance Note 1(d) of the attached Guidance Notes. The data from each wind turbine shall be retained for a period of not less than 24 months. The wind farm operator shall provide this information in the format set out in Guidance Note 1(e) of the attached Guidance Notes to the Local Authority on its request within 14 days of receipt in writing of such a request.

- H) Where it is proposed to operate any turbine in a reduced running mode in order to meet the limits, no turbine shall be erected until a curtailment plan for the turbines has been submitted and approved in writing by the local planning authority. The curtailment plan shall demonstrate how the limits will be complied with and shall include the following:
- i. Definition of each noise reduced running mode including sound power data;
 - ii. The wind conditions (speed & direction) at which any noise reduced running mode will be implemented;
 - iii. Details of the manner in which the running modes will be defined in the SCADA data or how the implementation of the curtailment plan can be otherwise monitored and evidenced.

The Curtailment Plan shall be implemented in accordance with the approved details

- I) Prior to the First Export Date, the wind farm operator shall submit to the Local Authority for written approval, a scheme of mitigation to be implemented in the event that the rating level, after adjustment for background noise contribution and any tonal penalty, is found to exceed the conditioned limits. The scheme shall define any reduced noise running modes to be used in the mitigation together with sound power levels in these modes and the manner in which the running modes will be defined in the SCADA data.
- J) The scheme referred to in paragraph I above should include a framework of immediate and long term mitigation measures. The immediate mitigation measures must ensure the rating level will comply with the conditioned limits and must be implemented within seven days of the further assessment described in paragraph F being received by the Local Authority. These measures must remain in place, except during field trials to optimise mitigation, until a long term mitigation strategy is ready to be implemented.

Guidance Notes for Noise Condition

These notes are to be read with and form part of the noise condition. They further explain the condition and specify the methods to be employed in the assessment of complaints about noise imissions from the wind farm. The rating level at each integer wind speed is the arithmetic sum of the wind farm noise level as determined from the best-fit curve described in Note 2 of these Guidance Notes and any tonal penalty applied in accordance with Note 3 with any necessary correction for residual background noise levels in accordance with Note 4. Reference to ETSU-R-97 refers to the publication entitled "The Assessment and Rating of Noise from Wind Farms" (1997) published by the Energy Technology Support unit (ETSU) for the Department of Trade and Industry (DTI).

Note 1

- (a) Values of the $L_{A90,10\text{-minute}}$ noise statistic should be measured at the complainant's property (or an approved alternative representative location as detailed in Note 1(b)), using a sound level meter of EN 60651/BS EN 60804 Type 1, or BS EN 61672 Class 1 quality (or the equivalent UK adopted standard in force at the time of the measurements) set to measure using the fast time weighted response as specified in BS EN 60651/BS EN 60804 or BS EN 61672-1 (or the equivalent UK adopted standard in force at the time of the measurements). This should be calibrated before and after each set of measurements, using a calibrator meeting BS EN 60945:2003 "Electroacoustics - sound calibrators" Class 1 with PTB Type Approval (or the equivalent UK adopted standard in force at the time of the measurements) and the results shall be recorded. Measurements shall be undertaken in such a manner to enable a tonal penalty to be calculated and applied in accordance with Guidance Note 3.

- (b) The microphone shall be mounted at 1.2 - 1.5 metres above ground level, fitted with a two-layer windshield or suitable equivalent approved in writing by the Local Authority, and placed outside the complainant's dwelling. Measurements should be made in "free field" conditions. To achieve this, the microphone shall be placed at least 3.5 metres away from the building facade or any reflecting surface except the ground at the approved measurement location. In the event that the consent of the complainant for access to his or her property to undertake compliance measurements is withheld, the wind farm operator shall submit for the written approval of the Local Authority details of the proposed alternative representative measurement location prior to the commencement of measurements and the measurements shall be undertaken at the approved alternative representative measurement location.
- (c) The $L_{A90,10\text{-minute}}$ measurements should be synchronised with measurements of the 10-minute arithmetic mean wind speed and wind direction data and with operational data logged in accordance with Guidance Note 1(d) and rain data logged in accordance with Note 1(f).
- (d) To enable compliance with the conditions to be evaluated, the wind farm operator shall continuously log arithmetic mean wind speed in metres per second and wind direction in degrees from north at hub height for each turbine, arithmetic mean power generated by each turbine and any data necessary to define the running mode as set out in the Curtailment Plan, all in successive 10-minute periods. Unless an alternative procedure is previously agreed in writing with the Planning Authority, this hub height wind speed, averaged across all operating wind turbines, shall be used as the basis for the analysis. Each 10 minute arithmetic average mean wind speed data as measured at turbine hub height shall be 'standardised' to a reference height of 10 metres as described in ETSU-R-97 at page 120 using a reference roughness length of 0.05 metres. It is this standardised 10 metre height wind speed data which is correlated with the noise measurements determined as valid in accordance with Note 2(b), such correlation to be undertaken in the manner described in Note 2(c). All 10 minute periods shall commence on the hour and in 10 minute increments thereafter synchronised with Greenwich Mean Time and adjusted to British Summer Time where necessary.
- (e) Data provided to the Local Authority shall be provided in comma separated values in electronic format with the exception of data collected to assess tonal noise (if required) which shall be provided in a format to be agreed in writing with the Local Authority.
- (f) A data logging rain gauge shall be installed in the course of the independent consultant undertaking an assessment of the level of noise imissions. The gauge shall record over successive 10 minute periods synchronised with the periods of data recorded in accordance with Note 1(d). The wind farm operator shall submit details of the proposed location of the data logging rain gauge to the Local Authority prior to the commencement of measurements.

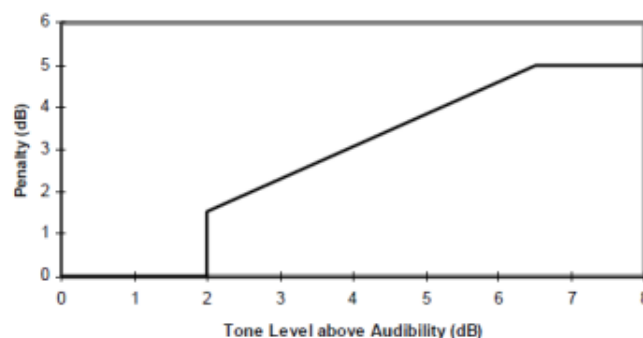
Note 2

- (a) The noise measurements should be made so as to provide not less than 20 valid data points as defined in Note 2 paragraph (b).
- (b) Valid data points are those measured during the conditions set out in the assessment protocol approved by the Local Authority but excluding any periods of rainfall measured in accordance with Note 1(f).
- (c) Values of the $L_{A90,10\text{-minute}}$ noise measurements and corresponding values of the 10-minute standardised ten metre height wind speed for those data points considered valid in accordance with Note 2(b) shall be plotted on an XY chart with noise level on the Y-axis

and wind speed on the X-axis. A least squares, "best fit" curve of an order deemed appropriate by the independent consultant (but which may not be higher than a fourth order) shall be fitted to the data points to define the wind farm noise level at each integer speed.

Note 3

- (a) Where, in accordance with the approved assessment protocol noise imissions at the location or locations where compliance measurements are being undertaken contain or are likely to contain a tonal component, a tonal penalty shall be calculated and applied using the following rating procedure.
- (b) For each 10-minute interval for which $L_{A90,10\text{-minute}}$ data have been determined as valid in accordance with Note 2, a tonal assessment shall be performed on noise imissions during 2 minutes of each 10-minute period. The 2-minute periods should be spaced at 10-minute intervals provided that uninterrupted uncorrupted data are available ("the standard procedure"). Where uncorrupted data are not available, the first available uninterrupted clean 2-minute period out of the affected overall 10-minute period shall be selected. Any such deviations from the standard procedure shall be reported.
- (c) For each of the 2-minute samples the tone level above audibility shall be calculated by comparison with the audibility criterion given in Section 2.1 on pages 104 -109 of ETSU-R-97.
- (d) The tone level above audibility shall be plotted against wind speed for each of the 2-minute samples. Samples for which the tones were below the audibility criterion or no tone was identified, a value of zero audibility shall be substituted.
- (e) A least squares "best fit" linear regression shall then be performed to establish the average tone level above audibility for each integer wind speed derived from the value of the "best fit" line fitted to values within $\pm 0.5\text{m/s}$ of each integer wind speed. If there is no apparent trend with wind speed then a simple arithmetic mean shall be used. This process shall be repeated for each integer wind speed for which there is an assessment of overall levels in Note 2.
- (f) The tonal penalty is derived from the margin above audibility of the tone according to the figure below derived from the average tone level above audibility for each integer wind speed.



Note 4

- (a) If a tonal penalty is to be applied in accordance with Note 3 the rating level of the turbine noise at each wind speed is the arithmetic sum of the measured noise level as determined from the best fit curve described in Note 2 and the penalty for tonal noise as derived in accordance with Note 3 at each integer wind speed within the range set out in the approved assessment protocol.

- (b) If no tonal penalty is to be applied then the rating level of the turbine noise at each wind speed is equal to the measured noise level as determined from the best fit curve described in Note 2.
- (c) If the rating level lies at or below the noise limits approved by the Local Authority then no further action is necessary. In the event that the rating level is above the noise limits, the independent consultant shall undertake a further assessment of the rating level to correct for background noise so that the rating level relates to wind turbine noise imission only.
- (d) The wind farm operator shall ensure that all the wind turbines in the development are turned off for such period as the independent consultant requires to undertake the further assessment. The further assessment shall be undertaken in accordance with the following steps:
- Repeating the steps in Note 2, with the wind farm switched off, and determining the background noise (L3) at each integer wind speed within the range set out in the approved noise assessment protocol.
 - The wind farm noise (L1) at this speed shall then be calculated as follows where L2 is the measured level with turbines running but without the addition of any tonal penalty:

$$L_1 = 10 \log \left[10^{L_2/10} - 10^{L_3/10} \right]$$

- The rating level shall be re-calculated by adding the tonal penalty (if any is applied in accordance with Note 3) to the derived wind farm noise L1 at that integer wind speed.
- If the rating level after adjustment for background noise contribution and adjustment for tonal penalty lies at or below the noise limits approved by the Local Authority then no further action is necessary. If the rating level at any integer wind speed exceeds the noise limits approved by the Local Authority then the development fails to comply with the conditions.

Reason: In the interest of amenity.

4 Glen Ullinish Wind Farm

- 4.1.1 Consent was granted on 21 December 2021 for Glen Ullinish Wind Farm variation. Condition 21 of planning consent reference 20/01129/S42 is relevant to the permitted noise from the wind farm and is reproduced below.
- 4.1.2 The consent sets a fixed limit of 35 dB LA90 for all wind speeds up to 10 m/s at all properties except Glen Vic Askill. Noise imission levels from Glen Ullinish Wind Farm have been calculated as part of this assessment to be equal to 35 dB LA90 at NSR1, 9 Balmeanach, for wind speeds of 7 m/s and greater. It will not be possible for Glen Ullinish Wind Farm to produce a greater noise level without breaching the consented noise limit. Therefore, the predicted imission levels without any uplift has been used.
21. The rating level of noise imissions from the combined effects of the wind turbines hereby granted (including the application of any tonal penalty), when determined in accordance with the attached Guidance Notes, shall not exceed 35 dBLA90, 10-min at any wind speed up to 10m/s at any noise sensitive property existing or with the benefit if planning permission at the time of this permission. The exception to this is the property at Glen Vic Askill where the rating level of noise imissions shall not exceed 45 dBLA90, 10-min at any wind speed up to 10m/s and:

- (A) Prior to the First Export Date, the wind farm operator shall submit to the Planning Authority for written approval a list of proposed independent consultants who may undertake compliance measurements in accordance with this condition. Amendments to the list of approved consultants shall be made only with the prior written approval of the Planning Authority.
- (B) Within 21 days from receipt of a written request of the Planning Authority, following a complaint to it alleging noise disturbance at a dwelling, the wind farm operator shall, at its expense, employ an independent consultant approved by the Planning Authority to assess the level of noise immissions from the wind farm at the complainant's property in accordance with the procedures described in the attached Guidance Notes. The written request from the Planning Authority shall set out at least the date, time and location to which the complaint relates. Within 14 days of receipt of a written request from the Planning Authority made under this paragraph (B), the wind farm operator shall provide the information relevant to the complaint logged in accordance with paragraph (H) to the Planning Authority in the format set out in Guidance Note 1(e).
- (C) Prior to the commencement of any measurements by the independent consultant to be undertaken in accordance with these conditions, the wind farm operator shall submit to the Planning Authority for written approval the proposed measurement location identified in accordance with the Guidance Notes where measurements for compliance checking purposes shall be undertaken. Measurements to assess compliance with the noise limits or approved by the Planning Authority pursuant to paragraph (B) of this condition shall be undertaken at the measurement location approved in writing by the Planning Authority.
- (D) Prior to the submission of the independent consultant's assessment of the rating level of noise immissions pursuant to paragraph (E) of this condition, the wind farm operator shall submit to the Planning Authority for written approval a proposed assessment protocol setting out the following:
 - (i) The range of meteorological and operational conditions (the range of wind speeds, wind directions, power generation and times of day) to determine the assessment of rating level of noise immissions.
 - (ii) A reasoned assessment as to whether the noise giving rise to the complaint contains or is likely to contain a tonal component.

The proposed range of conditions shall be those which prevailed during times when the complainant alleges there was disturbance due to noise, having regard to the information provided in the written request from the Planning Authority under paragraph (B), and such others as the independent consultant considers necessary to fully assess the noise at the complainant's property. The assessment of the rating level of noise immissions shall be undertaken in accordance with the assessment protocol approved in writing by the Planning Authority and the attached Guidance Notes.

- (E) The wind farm operator shall provide to the Planning Authority the independent consultant's assessment of the rating level of noise immissions undertaken in accordance with the Guidance Notes within 2 months of the date of the written request of the Planning Authority made under paragraph (B) of this condition unless the time limit is extended in writing by the Planning Authority. All data collected for the purposes of undertaking the compliance measurements shall be made available to the Planning Authority on the request of the Planning Authority. The instrumentation used to undertake the measurements shall be calibrated in accordance with Guidance Note 1(a) and certificates of calibration shall be submitted to the Planning Authority with the independent consultant's assessment of the rating level of noise immissions.

- (F) Where a further assessment of the rating level of noise immissions from the wind farm is required pursuant to Guidance Note 4(c) of the attached Guidance Notes, the wind farm operator shall submit a copy of the further assessment within 21 days of submission of the independent consultant's assessment pursuant to paragraph (E) above unless the time limit for the submission of the further assessment has been extended in writing by the Planning Authority.
- (G) The wind farm operator shall continuously log power production, wind speed and wind direction, all in accordance with Guidance Note 1(d). These data shall be retained for a period of not less than 24 months. The wind farm operator shall provide this information in the format set out in Guidance Note 1(e) to the Planning Authority on its request, within 14 days of receipt in writing of such a request.

Note: For the purposes of this condition, a "dwelling" is a building within Use Class 9 of the Use Classes Order which lawfully exists or had planning permission at the date of this permission.

Reason: To ensure that the noise impact of the as built turbines does not exceed the predicted noise levels in the interest of amenity, that the noise immissions will be monitored over time and that there is sufficient scrutiny and assessment in the event that a complaint is received.

5 Edinbane Wind Farm

- 5.1.1 Consent was granted on 16 May 2007 for Edinbane Wind Farm. This predates the electronic planning portal and it has not been possible to obtain a copy of the planning consent or any noise limits that apply to this wind farm.
- 5.1.2 In the absence of consented noise limits, calculated noise immission levels from Edinbane Wind Farm plus a 2 dB uplift at the NSRs for the Proposed Development have been used.