

**Environmental Health Minimum Information Requirements for
Wind Turbine Planning Applications
February 2015 (version 23)**

The applicant will need to provide the following information in their full application.

The checklist (Appendix 1) provides assurance that the submitted noise report contains the necessary information. Failure to submit a completed and signed checklist is likely to mean that your application takes longer to be assessed and may result in delays in the processing of your application if required information is missing.

Environmental Health may object to the application due to insufficient information being provided to adequately assess the impact of noise. In turn this may also lead to the planning application being recommended for refusal on grounds of insufficient noise information to satisfy the local planning authority that the proposal would not adversely affect the living conditions of residents in the area.

The key objective of Cornwall Council will be to ensure that turbine noise levels at noise sensitive receptors are limited to a maximum of:-

- 35dB L_{Aeq} - small turbine/s
- 35dB L_{A90} - large turbine/s
- 45dB L_{A90} – large turbine/s at financially involved premises
- For ETSU-derived limits, a minimum fixed daytime limit 35dB L_{A90}

The above noise limits must take account of all wind turbines in the vicinity. Therefore in order to preserve the integrity of any cumulative noise predictions and to provide noise “headroom” for future wind turbine development, Environmental Health recommend that noise limits based upon the predicted sound levels are contained in any planning consent. This is likely to result in a noise limit for an individual turbine of less than 35dB L_{A90} .

A new wind turbine will still be expected to meet the appropriate noise limit at third party properties that have a 45dB L_{A90} limit for their own wind turbine.

Where ETSU-derived limits are applied, a post-commissioning monitoring condition will be attached to the planning consent. Other applications may also have post commissioning monitoring conditions applied.

It should be noted that Environmental Health will make a consultation response based upon the information provided. However, certain site specific definitions of noise sensitive receptors, curtilage, financially-involved premises etc. will ultimately be determined by the Planning Officer/Committee.

In order to fully capture all information pertaining to this application, all documentation and general queries should be directed to the relevant Planning Case Officer.

Definitions:-

Small and Large Turbines

A small turbine is one that meets the Renewable UK (formally known as BWEA) definition, as stated in British Wind Energy Association Small Wind Turbine Performance and Safety Standard 29 Feb 2008 available through the following link <https://www.renewableuk.com/default.aspx>

A wind turbine having a rotor swept area 200m² or less. In a horizontal axis wind turbine this equates to a rotor diameter of 16m.

A large turbine is any turbine that falls outside the scope of this definition

Curtilage

For the purposes of this advisory note the word 'curtilage' is used to describe an existing domestic garden area boundary. It is not used to describe the entire extent of a land parcel.

Desktop Site Specific Noise Assessment

As an absolute minimum a desktop site specific noise assessment will be required for all wind turbine applications. Please refer to the attached Environmental Health checklist for full details of what is required to be contained in a noise assessment.

We require the guidance in the Institute of Acoustics "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise" [May 2013] to be followed. Hereafter referred to as "The IOA Guidance".

<https://www.ioa.org.uk/publications/good-practice-guide>

A Desktop Site Specific Noise Assessment must provide predicted noise levels at the curtilage of identified noise sensitive premises and, where appropriate, financially involved properties in the vicinity of the proposed location of the turbine.

Printouts from computer models used to make predictions or produce noise contour maps are insufficient by themselves and must be accompanied by a site specific assessment.

The cumulative noise impact of all turbines; existing, consented and in the planning process must be included. Please refer to section 5 of the IOA Guidance for further information. Where a cumulative assessment includes noise from a small wind turbine the sound power level must be standardised at 10 ms⁻¹ to 10m height, using Equation 29 in IEC 61400-11 (Nov 2012) or the guidance on p120 of ETSU-R97.

In order to minimize the risk to the operator we require predictions to be based on the apparent sound power level plus uncertainty (see the IOA Guidance on the application of uncertainty), and to include penalties for any identified tonality in accordance with ETSU-R-97. The appropriate prediction methodology should be applied as follows:

- Small turbines – please refer to Equation A.2 in the British Wind Energy Association Small Wind Turbine Performance and Safety Standard 29 [Feb 2008] (i.e. basic hemispherical sound propagation). The equation should be based upon the declared apparent sound power level at 8 m/s at hub height
- Large turbines - predictions will be accepted using ISO 9613 – 2 following the IOA guidance on input parameters.

The noise assessment must be undertaken by a qualified and competent acoustician, and all the data inputs, justification for use of these values, assumptions made, and margins of error must also be included in the assessment.

NB: Due to the increasing number of wind turbines in Cornwall, please note that site specific noise limit/s will be set, that are based on predicted turbine noise levels rather than the single turbine or the ETSU derived limits.

Detailed Site Specific Noise Assessment

Please refer to the attached Environmental Health checklist for full details of what is required to be contained in a noise assessment.

A detailed site specific noise report will be required where ETSU-derived limits are sought. The report must include all of the requirements detailed above for the desktop study, full details of the background measurements and a table showing the following noise data for wind speeds between the cut in wind speed to 10 metres per second at 10 metres height:

- Predicted turbine noise levels at noise sensitive properties
- Measured background noise levels at agreed representative locations undertaken in accordance with ETSU-R-97.
- ETSU-R-97 derived noise levels
- The difference between the predicted noise level and the ETSU-R-97 noise levels

NB: Due to the increasing number of wind turbines in Cornwall, please note that site specific noise limit/s will be set, that are based on predicted turbine noise levels rather than the single turbine or the ETSU derived limits.

KEY POINTS:-

Candidate Turbines

In the event that an alternative turbine to that contained in the submitted noise assessment is chosen for installation, then a new desktop site specific noise assessment of the proposed turbine will be required to be submitted to and approved in writing by the Local Planning Authority.

Noise Sensitive Receptors

Please note that caravan and camp sites and holiday lets in separate ownership are classed as noise sensitive receptors and any noise assessment must provide predicted turbine noise levels at these locations.

Financially Involved Properties

The financially-involved properties should be clearly identified and a statement must be included to the effect that they meet the following definition of financially-involved:

- Occupiers of properties who own the land on which a wind turbine/farm is proposed;
- Persons who have invested money in the wind turbine/farm and seek to gain a financial reward from it.

It is advisable to ensure any issues regarding financial involvement are resolved prior to undertaking the noise assessment, to prevent unnecessary additional work in re-doing noise prediction calculations.

Background Noise Monitoring

For applications that require background noise monitoring, the monitoring locations must be agreed in writing with Environmental Health in advance. Two weeks notice must be given of the intended start date to provide the opportunity for an Officer from Environmental Health to attend, where appropriate, during the installation of the equipment. The noise assessment should state the name of the Officer with whom the locations were agreed.

Care should be taken to choose appropriate monitoring locations for background noise monitoring, and avoid taking measurements during unrepresentative noisy periods such as local events, peak holiday times near main roads, or following unusually heavy rainfall events near streams etc. Refer to the IOA Guidance for further information.

Cumulative Noise Impact Assessments

If the proposed turbine produces noise levels within 10dB of any turbines (existing/consented/turbines or currently the subject of an application) at the same receptor locations, then a cumulative noise impact assessment will be required. Any screening for cumulative effect will need to be undertaken by a competent and qualified acoustician. It is recommended that the area is first screened for turbines within a 2km radius of the proposed turbine, and that a cumulative assessment is undertaken of those identified turbines that fall within a 1km radius of any noise sensitive premises.

Maps showing locations of these turbines can be found at:-
cornwall.gov.uk/environment-and-planning/planning/minerals-waste-and-renewable-energy/renewable-energy/

Please note these maps may not contain the very latest information and you are advised to contact the Planning Officer for further advice.

In a cumulative noise impact assessment, the predicted sound levels of **consented** turbines should be based on the **consented** sound limits. The relevant section of the planning consent should be produced in support of the noise assessment. NB historic consents are likely to be for the full 35 dB(A) allowance; more recent consents are likely to be for the predicted level.

Where noise sensitive properties are not named and allocated a consented limit within the relevant Decision Notice, the method for determining the sound level of a consented wind turbine at properties being considered in respect of the proposed wind turbine as follows:

1. Determine the consented sound limit at the nearest noise sensitive property (**controlling property**) from the planning consent document.
2. Using the prediction methodology and model inputs outlined in this document, predict the sound level from the *consented* wind turbine at the **controlling property**.
3. The cumulative assessment should be undertaken at the point on the curtilage at which the noise from the proposed turbine is being assessed.
4. Please note that a consented sound limit based on the predicted sound level at the controlling property may include a valley penalty. Due to the potential for differing topography, it may not be appropriate to apply the same valley penalty to predictions of the consented turbine at the noise sensitive properties being assessed in respect of the proposed turbine.
5. Compare the predicted sound level with the consented sound limit and determine the relevant correction factor in accordance with the following table.
6. Apply this correction factor to the *predicted* sound level of the consented wind turbine at the noise sensitive properties being considered in respect of the proposed wind turbine.

NB Where cumulative sound is being considered at a named property at which a consented limit already applies, the consented level should be used in the cumulative assessment and it will not be necessary to apply a correction factor.

Table: Correction factor to be applied in a cumulative noise assessment to predicted sound levels of consented turbines

Controlling property	Correction factor
Predicted sound level is more than the consented sound level ^a	The <i>consented</i> sound level should be used in the cumulative sound assessment
Predicted sound level is equal to consented sound level	0.0 dB(A)
Predicted sound level is less than the consented sound level by:	The correction factor is the difference between the predicted and the consented.
1 dB(A) ^b	1 dB(A)
2 dB(A) ^b	2 dB(A)
3 dB(A) ^b	3 dB(A)
Predicted sound level is less than the consented sound level by 4 dB(A) ^b or more ^c .	4 dB(A)

Notes

- a any difference are likely to be due to a new turbine sound power data, or changes in recommended prediction methodology, such as inclusion of valley penalty or use of uncertainty.
- b the usual rounding convention applies, e.g. a difference of 4.4 dB(A) would be rounded to 4dB(A), and a difference of 4.5dB(A) would be rounded to 5dB(A)
- c the correction factor is limited to a maximum of 4dB(A) eg where the difference is 7 dB(A), the correction factor will still be 4 dB(A)

The derivation of the sound level of the proposed wind turbine and each of the consented wind turbines should be clearly presented in table, an example of which is shown below.

	Octave band centre frequencies						
	Hz dB(A)						
	63	125	250	500	1K	2K	4K
Sound power level							
Distance attenuation							
Atmospheric attenuation							
Ground absorption							
Uncertainty							
Tonal penalty							
Consented SPL correction factor							
Valley penalty							
Predicted SPL LAeq							

Cumulative and small wind turbines

A conflict may occur where a cumulative assessment has to consider small and large turbines. The following principles therefore apply

Example – application for one small turbine has to consider three large turbines in a cumulative assessment.

1. The proposed wind turbine must meet the small turbine limit at noise sensitive properties of LAeq 35dB at 8 m/s at hub height
2. Cumulatively sound from the proposed small wind turbine and the 3 consented large wind turbines must meet the LA90 35dB at 10 m/s at 10m height.
3. For the cumulative assessment, the sound power level for the small wind turbine therefore must be at 10m/s *and* adjusted to 10m height.
4. If one of the consented turbines was a small turbine, then the sound power level should also be adjusted for the cumulative assessment, as in 3 above.

Directivity

It is accepted that directivity (source and propagation) might be a relevant consideration when assessing cumulative noise impacts. This is because predictions using ISO 9613-2 relate to 'worse case' conditions and therefore consider downwind propagation from source to receiver. It follows that when considering multiple wind turbines and receiver(s) downwind propagation might not be quite so relevant in the case of all turbine/receptor combinations.

However, it remains the preference of Environmental Health that an absolute worst case approach is maintained when considering predicted cumulative impacts (i.e. an attenuation factor is not included to account for potential reductions in noise levels from crosswind though to upwind source/receptor locations). This preference is due to several factors including (not exhaustive):

- To ensure a worst case approach is maintained given the reliance upon predictions (as opposed to monitoring);
- different methodologies currently exist for calculating directivity attenuation (for example, comparing four different approaches to directivity in one case study has shown that the calculated attenuation factor at 90 degrees ranges from -2.0dB to -5.9dB);
- The need for further research on factors such as whether total wind turbine noise is reduced according to direction, whether the horizontal directivity pattern is of a dipole character due to the fact that the emitted sound from the dominant sound source is decreased in the crosswind direction, the effect of different wind speeds etc.
- Depending upon the methodology for assessing directivity, the need for reliable and localised wind speed data (which is often lacking or not available for a sufficient length of time);

- The presumption that is sometimes made (in association with directivity propagation) that a wind turbine can be limited/restricted at specified wind direction/speeds to avoid exceeding a noise limit due to cumulative considerations (without evidence that this is technically achievable, cut-in and off timescales, wind-down periods, impact upon wind turbine maintenance etc.).

However, where a competent acoustician considers there is a case for directivity attenuation factors to be applied as part of a cumulative noise assessment, there may be instances where this can be accepted. In such circumstances, a discussion with the Environmental Health case officer should take place to discuss the proposed methodology. This will be considered on a case-by-case basis. The guidance in section 4.4 of the IOA guidance should be followed but with further detail provided to account for how this is to be applied in practice.

This document provides guidance on the preferred methodologies which align with ETSU-R-97 and the Institute of Acoustics' publication "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise" and the associated supplementary guidance notes. We believe that our document concisely summarises the important principles of the Good Practice Guidance and also 'fills gaps' where there is a lack of detailed guidance.

Nevertheless, we are open to discussion with qualified acousticians on alternative methodologies, especially in areas where there is a lack of detailed guidance in the Good Practice Guide, and where our "consistent approach" principle would not be compromised.

EXAMPLE CONDITIONS

Small wind turbine condition

- a) The noise emission from the wind turbine when operating in isolation shall not exceed the predicted integer sound pressure level $L_{Aeq,T}$ when calculated in accordance with Equation A.2 in the British Wind Energy Association Small Wind Turbine Performance and Safety Standard 29 [Feb 2008] (i.e. basic hemispherical sound propagation) using the noise label sound power level $L_{Wd,8m/s}$, at the curtilage of any noise-sensitive premises lawfully existing at the time of this consent at wind speeds up to and including 8 ms^{-1} at rotor centre height. Sound limits at noise sensitive properties include those stated in Table 1 below:

Table 1: sound limits $L_{Aeq,T}$ at wind speeds up to and including 8 ms^{-1} at rotor centre height at the curtilage of residential receptors		
Property name	National Grid Ref	Sound limit
Eg Barn Farm*	Eg(227450,379150)	26 dB(A)
Eg Barn Cottage	Eg(227450,379150)	22 dB(A)
		?? dB(A)
		?? dB(A)
* denotes financially involved property		

- b) For the purpose of this condition, curtilage is defined as “the boundary of a lawfully existing domestic garden area”.
- c) At the request of the Local Planning Authority (LPA), the wind turbine operator shall, at their own expense, employ a suitably competent and qualified person to measure and assess, by a method to be approved in writing by the LPA, whether noise from the turbine meets the specified level. The assessment shall be commenced within 21 days of the notification, or such longer time as approved by the LPA.
- d) The method described in paragraph (c) above shall include an assessment of tonality $\Delta L_{a,k}$ as described in IEC 61400-11 (small/large turbines) and ISO 1996-2:2007 (small turbines). Where a tone is identified a penalty shall be added to the measured sound levels in accordance with ETSU-R-97 (large turbines) or the British Wind Energy Association Small Wind Turbine Performance and Safety Standard 29 [Feb 2008] (small turbines).
- e) A copy of the assessment, together with all recorded data and audio files obtained as part of the assessment, shall be provided to the LPA (in electronic form) within 60 days of the notification.
- f) If the assessment requested by the LPA demonstrates that the specified level is being exceeded, the operator of the turbine shall take immediate steps to ensure that the noise emissions from the turbine are reduced to, or below, the specified noise limit. The operator shall provide written confirmation of that reduction to the LPA within a time period to be agreed with the LPA. In the event that it is not possible to achieve the specified noise limit with mitigation within a reasonable time period, then the operation of the turbine shall cease.

The measurement time period shall be based on BWEA blade length calculation (para 3.4(1) $t=4*D$ seconds)

Where t = measurement time period in seconds (subject to a minimum period of 10 seconds)
 D = rotor diameter in metres

- g) In the event that an alternative turbine to that contained in the submitted noise assessment (reference) is chosen for installation, then development shall not take place until a new desktop site specific noise assessment of the proposed turbine has been submitted to and approved in writing by the Local Planning Authority.
- h) Where micro-siting of the turbine has been approved, the applicant shall provide a 12-figure national grid reference to the Local Planning Authority within 4 weeks of commissioning of the turbine.

Large wind turbine condition

- a) The rating level of noise imissions from the wind turbine/s (*including the application of any penalties for tonal and/or amplitude modulation components*), when determined in accordance with the attached Guidance Notes (*to this condition*), when operating in isolation shall not exceed the values for relevant integer wind speeds set out in, or derived from Table 1 below, using an effective sound power level of [**please insert sound power level plus uncertainty e.g. $99.8 + (0.7 \times 1.645) = 101$ dB(A)**], at the curtilage of any noise-sensitive premises lawfully existing or which has planning permission at the date of this consent at wind speeds up to and including 10 ms^{-1} at 10m height. Sound limits at noise sensitive properties include those stated in Table 1 below:

Table 1: sound limits LA90 10 mins at wind speeds up to and including 10 ms^{-1} at the curtilage of residential receptors		
Property name	National Grid Ref	Sound limit
Eg Barn Farm*	Eg(227450,379150)	26 dB(A)
Eg Barn Cottage	Eg(227450,379150)	22 dB(A)
		?? dB(A)
		?? dB(A)
* denotes financially involved property		

- b) For the purpose of this condition, curtilage is defined as “the boundary of a lawfully existing domestic garden area”.
- c) At the request of the Local Planning Authority (LPA), the wind turbine operator shall, at their own expense, employ a suitably competent and qualified person to measure and assess, by a method to be approved in writing by the LPA, whether noise from the turbine/s meets the specified level. The assessment shall be commenced within 21 days of the notification, or such longer time as approved by the LPA.
- d) The method described in paragraph (c) above shall include an assessment of tonality $\Delta L_{a,k}$ as described in IEC 61400-11 (small/large turbines) and ISO 1996-2:2007 (small turbines). Where a tone is identified a penalty shall be added to the measured sound levels in accordance with ETSU-R-97 and guidance note 2 attached to this condition.
- e) A copy of the assessment, together with all recorded data and audio files obtained as part of the assessment, shall be provided to the LPA (in electronic form) within 60 days of the notification.
- f) If the assessment requested by the LPA demonstrates that the specified level is being exceeded, the operator of the turbine/s shall take immediate steps to ensure that the noise emissions from the turbine/s are reduced to, or below, the specified noise limit. The operator shall provide written confirmation of that reduction to the LPA within a time period to be agreed with the LPA. In the event that it is not possible to achieve the specified noise limit with mitigation within a reasonable time period, then the operation of the turbine/s shall cease.
- g) In the event that an alternative turbine/s to that contained in the submitted noise assessment (**Insert reference**) is chosen for installation, then development shall not take place until a new desktop site specific

noise assessment of the proposed turbine has been submitted to and approved in writing by the Local Planning Authority.

- h) Where micro-siting of the turbine/s has been approved, the applicant shall provide the 12-figure national grid reference of the installed turbine/s to the Local Planning Authority within 4 weeks of commissioning of the turbine.
- i) Within 28 days from receipt of a written request from the Planning Authority, following an excessive amplitude modulation (EAM) complaint to it from the occupant of a noise sensitive receptor, the wind turbine operator shall submit a scheme for the assessment and regulation of EAM to the Planning Authority for its written approval. The scheme shall be in general accordance with:
- Any guidance endorsed in National or English Planning Policy or Guidance at that time, or in the absence of endorsed guidance,
 - Suitable published methodology endorsed as good practice by the Institute of Acoustics; or in the absence of such published methodology,
 - The methodology published by Renewable UK on the 16th December 2013, or any other methodology agreed in writing by the Local Planning Authority;

The approved scheme shall be implemented within 3 months of the written approval by the Planning Authority and shall thereafter be retained. In the event that the EAM cannot be eliminated or reduced below the level specified in the agreed methodology, then the operation of the turbine/s shall permanently cease.

Guidance Note 1 – Excess Amplitude Modulation

Excess Amplitude Modulation (“Excess AM”) is the modulation of aerodynamic noise produced at the frequency at which a blade passes a fixed point and occurring in ways not anticipated by ETSU-R-97, The Assessment and Rating of Noise from Wind Farms, on page 68.

Guidance Note 2

(a) If a tonal penalty is required in accordance with section d of the condition 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 (b) below and the penalties for tonal noise as derived in accordance with section d of the condition at each integer wind speed.

(b) For those data points considered valid, values of the LA90,10 minute noise measurements and corresponding values of the 10- minute wind speed, as derived from the standardised ten metre height wind speed averaged across all operating wind turbines using the approved methodology from part (c) of the condition, shall be plotted on an XY chart with noise level on the Y-axis and the standardised 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 turbine/s noise level at each integer speed.

Appendix 1

Site Specific Noise Assessment Environmental Health Check List

The noise assessment must include the following information. Please refer to the Institute of Acoustics "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise" May 2013 for more detailed information. Hereafter referred to as "The IOA Guidance".

[http:// www .ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf](http://www.ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf)

1.0 General requirements

- | | | | | | |
|------|---|--------------------------|-----|--------------------------|-----|
| 1.1 | The turbine model, hub height and rotor diameter | <input type="checkbox"/> | yes | | |
| 1.2 | The BWEA test report or IEC 61400-11 report to include full octave data, information on tones and uncertainty. Where data is warranted, we will still expect to see the full test report on which the warrantee is based | <input type="checkbox"/> | yes | | |
| 1.3 | A 12-figure national grid reference for the precise location of the proposed turbine | <input type="checkbox"/> | yes | | |
| 1.4 | A map showing the separation distance to the curtilage of non-involved noise-sensitive premises (usually a residential premises but may be a camp or caravan site) | <input type="checkbox"/> | yes | | |
| 1.5 | Where micro-siting is sought, there must be a clear statement to this effect within the noise report. Noise predictions must be made from the closest point on the perimeter of the micro-siting area to the curtilage of noise-sensitive premises. | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |
| 1.6 | A 12-figure national grid reference for the precise location of the assessment position at the receptor | <input type="checkbox"/> | yes | | |
| 1.7 | The same information in (1.1) – (1.6) above for each turbine considered in any cumulative noise assessment | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |
| 1.8 | Identification of all financially involved properties | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |
| 1.9 | A statement to demonstrate how any identified financially involved properties meet the Council's definition | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |
| 1.10 | A statement regarding the nature of any let or tenanted properties owned by the applicant | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |
| 1.11 | A statement regarding whether or not the turbine is a candidate model | <input type="checkbox"/> | yes | <input type="checkbox"/> | n/a |

2.0 Noise predictions

- 2.1 For small wind turbines – hemispherical methodology based upon the declared apparent sound power level. If YES please go to section 2.7. yes n/a
- For large wind turbines ISO 9613 based on the apparent sound power level and octave band data from the test report yes n/a
- 2.2 Where octave data in the test report is not provided for the relevant wind speed, please provide full details of scaling/normalisation methodology yes n/a
- 2.3 The following model input parameters must be used
- Receptor height = 4m yes
- G = 0.5 for soft ground (G=1 should never be used) yes no
- G = 0 to be used where the majority of propagation is over paved ground or over large bodies of water, and/or no spectral data available (see section 4.3.3 of the IOA guidance) yes no
- Atmospheric conditions of 10°C and 70% humidity (please refer to ISO 9613-2 for co-efficients) yes
- 2.4 Where octave band data is not provided in the turbine test report, the calculation may be undertaken using the broadband sound power level, with attenuation at 250 Hz and the use of G=0 yes n/a
- 2.5 The sound power level must be adjusted, where necessary, for a higher hub height than that stated for the test data, in accordance with IEC 61400-14. Full details of calculations must be provided yes n/a
- 2.6 Where G=0.5 the ISO 9613-2 prediction must include an allowance for uncertainty as specified in section 4.3.6 of the IOA Guidance
- Test report uncertainty multiplied by a factor of 1.645 unless the warranted sound power level is higher. In this event the warranted sound power level should be used. yes n/a
- Where no data on uncertainty is provided in the test report, then +2dB should be applied to the predictions yes n/a
- 2.7 Any tones identified in the test report should be applied to the prediction in accordance with ETSU-R-97 yes n/a
- 2.8 The valley/steep slope test should be undertaken in accordance with section 4.3.9 of the IOA guidance and the relevant correction factor applied to the prediction where necessary. yes n/a

- 2.9 Topographic screening effects should be limited to a reduction of no more than 2dB and then only if there is no direct line of sight between the highest point on the turbine rotor and the receiver location yes n/a

3.0 Cumulative noise assessment & Directivity

- 3.1 A cumulative noise impact assessment must be undertaken where noise from the proposed turbine/s produces noise levels within 10 dB of any existing turbines at the same receptor location.
- 3.2 Full details of any screening for the potential for cumulative must be provided. yes
- 3.3 Where screening identifies that a cumulative assessment is not required, a statement must be provided in the noise report, supported by details of the screening. yes n/a
- 3.4 The cumulative noise assessment must be based upon consented turbine levels in accordance with the methodology outlined in this document(unless otherwise agreed in writing with the Environmental Protection Officer) yes n/a
- 3.5 Where the cumulative assessment includes small turbine/s the sound power level at wind speeds of 10 m/s must be standardised to 10m height (See IEC 61400-11) or page 120 of ETSU R-97 yes n/a
- 3.6 Relevant noise conditions of consented turbines included in the cumulative assessment must be included in the report yes n/a
- 3.7 A directivity allowance is discouraged (please refer to explanatory information in this document), but where a directivity assessment has been undertaken an explanation of the methodology and the calculations used must be included. yes n/a

4.0 Background Noise Monitoring & Assessment

- 4.1 Details and description of baseline measurement locations, including a map illustrating the locations and a description of the noise environment at the location yes
- 4.2 Evidence that locations were agreed in writing with Local Authority, and that two weeks notification of intended start date of survey given. To include name of Environmental Protection Officer with whom agreed. yes
- 4.3 Details of survey period, which must be of sufficient length to gather required data, subject to a minimum period of 1 week yes

- 4.4 Full details of equipment used, including microphone shield specification and calibration information. yes
Class 1 precision standards (IEC 61672) or Type 1 precision standards (BS EN 60651) used
Large diameter, double layer microphone windscreen used (not the standard small 90mm, single layer), or system with comparable protection against wind generated noise at the microphone
- 4.5 Calibration drift less than 0.5 yes
Calibration drift 0.5 – 1.5 – evidence provided that demonstrates ok to use
Calibration over 1.5 – measurements discarded
- 4.6 Noise, wind and rainfall measurements synchronised. yes
- 4.7 Photographs of monitoring equipment in situ yes
- 4.8 Monitoring equipment sited on façade most exposed to turbine noise yes
- 4.9 Evidence that microphone is 1.2-1.5m above ground yes
- 4.10 Evidence that microphone is between 3.5m and 20m from a dwelling yes
- 4.11 Evidence that microphone is at least 3.5m from any reflecting surfaces except the ground yes
- 4.12 Evidence that microphone is located sufficiently separated from trees and running water yes
- 4.13 Predominant noise sources during set up and pick up identified yes
- 4.14 Details of type of rain gauge used and location yes
- 4.15 Rainfall measurements yes
- 4.16 Full details of data exclusions e.g. for rainfall/dawn chorus/other turbines, regarding periods which have been excluded. Excluded data to be illustrated in time history or scatter plots. yes
- 4.17 Details of method of wind speed measurement (e.g. met mast with one or two anemometers, including height of anemometers, LIDAR, SODAR) yes
- 4.18 Wind shear corrections, when using met mast with anemometer at 10m height, with details of method. Please refer to section 4.5 and Annex A of the IOA Guidance yes n/a
- 4.19 Directional analysis of wind data if required. Please refer to section 3.1.22-24 of the IOA Guidance yes n/a

- 4.20 The data must be presented in a table containing background noise levels, predicted turbine noise levels, cumulative predicted noise levels(if applicable), ETSu limits and difference between predicted turbine noise levels and derived limits. yes
- 4.21 The above data must also be presented graphically with the type, order & coefficient of the regression line clearly marked. yes
- 4.22 The raw data must be available and provided on request yes

I confirm that the minimum information requirements in respect of the assessment of noise have been met.

Applicants/Agents Name _____

Position _____

Date _____