LLANDINAM REPOWERING AND EXTENSION

STATEMENT OF COMMON GROUND BETWEEN POWYS COUNTY COUNCIL AND CELTPOWER LTD

NOISE

1. Introduction

1.1 This is a statement of common ground arrived at for the Mid-Wales Wind Farm Inquiry between Celt Power Ltd and Powys County Council.

1.2 This statement refers to information presented in Chapter 11 of the ES and subsequent 2011 and 2013 SEI for the Llandinam wind farm following proposed repowering.

Baseline Background Noise Levels

1.3 Background noise levels were measured by Hoare Lea Acoustics at six locations described in Table 11-2 of the ES, with limited periods of shut-down of the existing wind turbines. However background noise levels were not used to derive ETSU-R-97 noise limits. Criteria based on the fixed absolute limit values of 40 dB(A) specified in ETSU-R-97 for day-time were used.

1.4 For the properties of Pabyllwyd and South of Pabyllwyd, the noise limits derived in the ES for the Llaithddu scheme and set out in Table 11-8 of the 2011 SEI for the Development are used.

Prediction of Noise during Operational Phase

1.5 The candidate turbine used for the ES is the Siemens 2.3 MW VS82m machine. The 'at source' noise emission levels for the candidate turbine (the "Sound Power Levels") used as input to the noise predictions, and presented in Table 11-1 in section 11.6.2 of the 2011 SEI are based on manufacturer's data which include a margin to account for measurement uncertainties.

1.6 Turbine noise immission levels (shown in Table 11-5 of the 2013 SEI) have been predicted at representative dwellings (receptors) using the method of ISO 9613-2, assuming 'mixed' ground conditions, consistent with the recommendations of the IOA good practice guide to the application of ETSU-R-97. The predictions shown in the 2013 SEI represent realistic estimates of the levels of the worst case noise likely to be experienced when receptor locations are downwind of the proposed turbines.

Assessment of Noise Impact at Receptors

1.7 The assessment of noise impact has been performed in accordance with the guidance in ETSU-R-97.

1.8 The assessments shown in the ES and SEI compared predicted noise immission levels with the noise limits derived for each location. These comparisons show that compliance with the derived noise levels can be achieved at all locations based on the data used.

1.9 Section 11.8 of the 2013 SEI presents the Cumulative Noise Impact Assessment of the following wind farm schemes which have/are being considered by either DECC or Powys CC:

- Llanbadarn Fynnydd,

- Garreg Llwyd Hill,

- Bryn Titli,

- Waun Garno,

- Llaithddu,

- Neuadd Goch,

- Hirddywel

1.10 This cumulative impact assessment shows that compliance with the guidance in ETSU-R-97 remains when considering predictions of cumulative noise from all of these proposals.

2. Noise limits

2.1 Noise limits have been specified by the developer in the table attached to the draft noise conditions set out in the Appendix.

2.2 The noise limits specified in the tables attached to the draft noise conditions represent an adequate and appropriate way of controlling operational noise levels from the final turbine model to be installed at the site, on the assumption that the scheme proceeds in isolation or with the other windfarms referred to above.

3. Tonal Noise

3.1 ETSU-R-97 specifies a penalty to be applied for the presence of tonal components in the noise emitted by the turbines. The potential for this characteristic to be emitted is best controlled by way of a penalty applied to overall noise levels and incorporated into the methodology for

demonstrating compliance with the noise limits contained within the draft conditions.

4. **Low Frequency Noise, Infrasound and Ground-borne vibration**

4.1 Low Frequency Noise, Infrasound and Ground-borne vibration were dealt with in the ES.

4.2 There is no evidence to suggest that these adverse factors would be present onsite.

5. **Amplitude/Aerodynamic Modulation (AM)**

5.1 The IOA good practice guide to the application of ETSU-R-97 summarises the current position with regards to AM and is reiterated in 1.17 below.

5.2 The evidence in relation to "Excess" or "Other" Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM.

6. **Construction and Decommissioning Noise**

6.1 Noise during decommissioning of the existing turbines, construction and decommissioning of the Project is not likely to cause significant impacts. In addition to existing powers under the Control of Pollution Act 1974, this is most appropriately dealt with by way of planning conditions restricting the hours when noisy activities may take place, as in the draft conditions set out in the Appendix. .

Signed on behalf of Powys County Council . . . . . .

Signed on behalf of Celt Power Limited . . . . . Robert Seaton solicitor for Celtpower

Dated 6/8/2013

APPENDIX

Noise Conditions

1. Construction work shall only take place between the hours of 07:30 – 19:30 hours on Monday to Friday inclusive and 07:30 – 13:00 hours on Saturdays, with no construction work on a Sunday or public holiday. Outwith these hours, works at the site shall be limited to emergency works, erection of turbines, dust suppression, and the testing/maintenance of plant and equipment, or construction work that is not audible from any noise sensitive property outwith the Site, unless otherwise approved in writing by the Local Planning Authority. The Local Planning Authority shall be informed in writing of emergency works within three working days of occurrence.

2. The rating level of noise immissions from the combined effects of the wind turbines (including the application of any tonal penalty) when determined in accordance with the attached Guidance Notes (to this condition), shall not exceed the values for the relevant integer wind speed set out in, or derived from, the table attached to this condition at any dwelling which is lawfully existing or has planning permission at the date of this permission and:

a) 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 Local Planning Authority on its request, within 14 days of receipt in writing of such a request.

b) No electricity shall be exported until The Company has submitted to the Local 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 Local Planning Authority.

c) Within 21 days from receipt of a written request from the Local 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 a

consultant approved by the Local 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 Local 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.

d) The assessment of the rating level of noise immissions shall be undertaken in accordance with an assessment protocol that shall previously have been submitted to and approved in writing by the Local Planning Authority. The protocol shall include the proposed measurement location identified in accordance with the Guidance Notes where measurements for compliance checking purposes shall be undertaken, whether noise giving rise to the complaint contains or is likely to contain a tonal component, and also the range of meteorological and operational conditions (which shall include the range of wind speeds, wind directions, power generation and times of day) to determine the assessment of rating level of noise immissions. 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 written request of the Local Planning Authority under paragraph (c), and such others as the independent consultant considers likely to result in a breach of the noise limits.

e) Where a dwelling to which a complaint is related is not listed in the tables attached to these conditions, The Company shall submit to the Local Planning Authority for written approval proposed noise limits selected from those listed in the Tables to be adopted at the complainant's dwelling for compliance checking purposes. The proposed noise limits are to be those limits selected from Table 1, having regard to Table 2, and specified for a listed location which the independent consultant considers as being likely to experience the most similar background noise environment to that experienced at the complainant's dwelling. 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 Local Planning Authority for the complainant's dwelling.

f) The Company shall provide to the Local 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 Local Planning Authority for compliance measurements to be made under paragraph (c), unless the time limit is extended in writing by the Local Planning 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 Planning Authority with the independent consultant's assessment of the rating level of noise immissions.

g) Where a further assessment of the rating level of noise immissions from the wind farm is required pursuant to Guidance Note 4(c), The Company shall submit a copy of the further assessment within 21 days of submission of the independent consultant's assessment pursuant to paragraph (d) above unless the time limit has been extended in writing by the Local Planning Authority.

Table 1 - Noise limits expressed in dB $L_{A90,10\ minute}$ as a function of the standardised wind speed (m/s) at 10 metre height as determined within the site averaged over 10 minute periods.

Location	Standardised wind speed at 10 meter height (m/s) within the site averaged over 10-minute periods											
	1	2	3	4	5	6	7	8	9	10	11	12
Cwm Diffwys	35.0	35.0	35.0	35.0	36.5	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Pantydwr	35.0	35.0	35.0	35.0	36.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Cwm Feinon	35.0	35.0	35.0	35.0	37.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Waen Cwm Yr Ynys	35.0	35.0	35.0	35.0	38.0	39.5	39.5	39.5	39.5	39.5	39.5	39.5
Waenllwydion	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Wainhir	35.0	35.0	35.0	35.0	36.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Bryn Llyndwr	35.0	35.0	35.0	35.0	36.0	36.5	37.0	37.5	37.5	37.5	37.5	37.5
Paby Llwyd 1	35.0	35.0	35.0	35.0	37.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Paby Llwyd 2	35.0	35.0	35.0	35.0	37.0	38.0	39.0	39.0	39.0	39.0	39.0	39.0
Paby Llwyd 3	35.0	35.0	35.0	35.0	36.0	36.0	37.0	39.0	39.0	39.0	39.0	39.0
Paby Llwyd 4	35.0	35.0	35.0	35.0	35.0	35.0	36.0	37.0	37.0	37.0	37.0	37.0

Table 2: Coordinate locations of the properties listed in Table 1 .

Property	Easting	Northing	Applicable limit (Table 1)
Cwm Diffwys	301115	281407	Cwm Diffwys
Community centre	300083	281670	Pantydwr
Pen-y-lan	300194	282226	Pantydwr
Pantydwr	300388	282065	Pantydwr
Pen-y-banc	300720	282740	Pantydwr
Craig	300771	282459	Pantydwr
Cwm farm	300958	282570	Pantydwr
Ty'n-y-pwll	300787	283285	Pantydwr
Rhiwysgyfarnog	301162	283099	Pantydwr
Glyn Ferrion	301467	283746	Pantydwr
Gwern-y-gigfran	301259	284336	Pantydwr
Bryn Coch	301063	283695	Pantydwr
Foel Fawr	301830	284360	Cwm Feinon
Foel Fach	301541	284471	Pantydwr
Cwm Feinon	301986	284682	Cwm Feinon
Glyn Fach	301501	284752	Pantydwr
Waen Cwm Yr Ynys	302505	285224	Waen Cwm Yr Ynys
Coed-y-Gaer	300965	285007	Waenllwydion
Cwmffrwd	304159	287611	Waenllwydion
Waenllwydion	303775	287263	Waenllwydion
Wainhir	305296	286650	Wainhir
Ty'n-y-celyn	305271	286985	Wainhir
Pentre	306484	286038	Wainhir
Dugwm Farm	305619	285068	Waen Cwm Yr Ynys
Gwrhyd	306481	285167	Bryn Llyndwr
Bryn Picca	306766	284176	Wainhir
Bryn Llyndwr	305950	283300	Bryn Llyndwr
Paby Llwyd 1	305324	282553	Paby Llwyd 1
Paby Llwyd 2	305039	282383	Paby Llwyd 2
Paby Llwyd 3	304807	281859	Paby Llwyd 3
Paby Llwyd 4	304774	281328	Paby Llwyd 4

Note to Table 2: The geographical coordinate references are provided for the purpose of identifying the general location of dwellings to which a given set of noise limits applies.

Note:

For the purposes of this condition, a "dwelling" is a building within Use Class C3 & C4 of the Town and Country Planning (Use Classes) Order 1987 which lawfully exists or had planning permission at the date of this consent.

Reason: **To protect the amenity of the area.**

Guidance Notes for Noise Conditions

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 $L_{A90,10\ minute}$ 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 BS 4142: 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 Local 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 Local 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 $L_{A90,10\ minute}$ 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 at hub height 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, this hub height wind speed, averaged across all operating wind turbines, shall be used as the basis for the analysis. All 10 minute arithmetic average mean wind speed data measured at 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 Guidance Note 2, such correlation to be undertaken in the manner described in Guidance Note 2. All 10-minute periods shall commence on the hour and in 10-minute increments thereafter.

(e) Data provided to the Local 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 shall be made so as to provide not less than 20 valid data points as defined in Guidance Note 2 (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.

(c) For those data points considered valid in accordance with Guidance Note 2(b), values of the $L_{A90,10\ minute}$ 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 procedure specified in Guidance Note 1(d), 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 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.

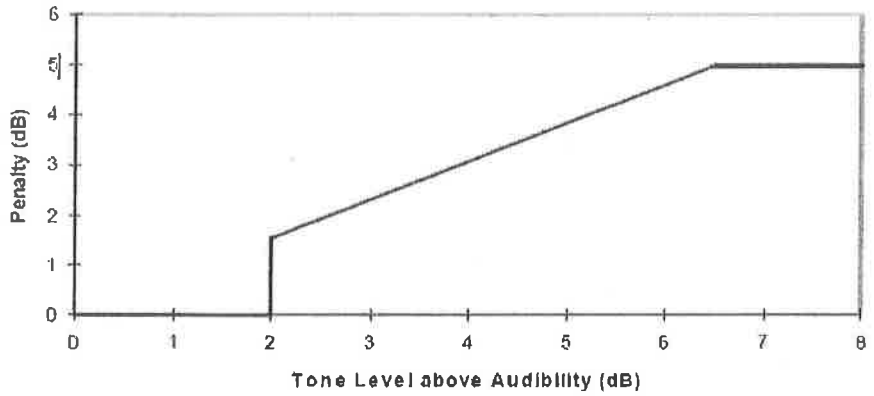
(b) For each 10 minute interval for which $L_{A90,10\ minute}$ data have been determined as valid in accordance with Guidance Note 2 a tonal assessment shall be performed on noise immissions during 2 minutes of each 10 minute period. The 2 minute periods should be spaced at 10 minute intervals provided 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 104109 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 Local 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:

(e). Repeating the steps in Guidance Note 2, with the wind farm switched off, and determining the background noise (L3) at each integer wind speed within the range