

## Annex 2 – Extract of Noise Conditions for Other Schemes

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## ANNEX C: DECISION LETTER AND CONDITIONS

Energy and Climate Change Directorate  
Electricity Division



Jon Soal  
SSE Renewables  
Inveralmond House  
200 Dunkeld Road  
Perth  
PH1 3AQ

6 June 2014

Dear Mr Soal,

**CONSENT UNDER S36 OF THE ELECTRICITY ACT 1989 AND DEEMED PLANNING PERMISSION UNDER S57(2) OF THE TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997 FOR THE STRONELAIRG WIND POWERED ELECTRICITY GENERATING STATION IN THE COUNCIL AREA OF THE HIGHLANDS.**

### **Application**

I refer to the Application made by SSE Renewables, ("the Company") dated 2 July 2012 for consent under section 36 of the Electricity Act 1989 ("the Electricity Act") for construction and operation of Stronelairg Wind Powered electricity generating station, with a generation capacity of around 300MW. This letter contains the Scottish Ministers' decision on the Application.

### ***Planning Permission***

In terms of section 57 (2) of the Town and Country Planning (Scotland) Act 1997 ("the planning act") Scottish Ministers may on granting consent under section 36 of the Electricity Act direct that planning permission be deemed to be granted in respect of that generating station and any ancillary Developments (as described in part 1 of Annex 1). This letter contains the Scottish Ministers' decision on such a direction.

### **Consultation**



(3) The approved Outdoor Access Management Plan, and any associated works, shall be implemented in full, prior to the Commencement of the Development or as otherwise may be agreed within the approved Plan.

**Reason:** To safeguard and maximise the opportunities for continued public access to the countryside during the construction and operation of this wind farm.

**27. (1)** No development shall commence until a TV and Radio Reception Mitigation Plan has been submitted to, and approved in writing by, the Planning Authority.

(2) The TV and Radio Reception Mitigation Plan shall provide for a baseline TV reception survey to be carried out prior to the commencement of turbine installation, the results of which shall be submitted to the Planning Authority.

(3) Within 12 months of the Final Commissioning of the Development, any claim by any individual person regarding TV picture loss or interference at their house, business premises or other building, shall be investigated by a qualified engineer appointed by the developer and the results shall be submitted to the Planning Authority. Should any impairment to the TV signal be attributable to the Development, the developer shall remedy such impairment so that the standard of reception at the affected property is equivalent to the baseline TV reception.

**Reason:** To ensure local TV and Radio Services are sustained during the construction and operation of this development.

**28.** The Wind Turbine Noise Level, including the application of any tonal penalty specified in ETSU-R-97 at pages 99-109, shall not exceed 35 dB LA90, 10min at any Noise-Sensitive Premises. This condition shall only apply at wind speeds up to 10m/s measured or calculated using the methods described in "Prediction and Assessment of Wind Turbine Noise" (published in IOA Bulletin March/April 2009).

**Reason:** To ensure that the noise impact of the built turbines does not exceed the predicted noise levels set out within the supporting Environmental Statement.

**29. (1)** The Wind Farm Operator shall, beginning with the first day upon which the Wind Farm becomes operational, log wind speed and wind direction data continually and shall retain the data for a period of at least 12 months from the date that it was logged. The data shall include the average wind speed, measured in metres per second, over 10 minute measuring periods. These measuring periods shall be set to commence on the hour and at 10 minute consecutive increments thereafter. Measurements shall be calculated at 10m above ground level using the methods described in "Prediction and Assessment of Wind Turbine Noise" (published in IOA Bulletin March/April 2009).

(2) All wind speed data shall be made available to the Planning Authority on request in Microsoft Excel compatible electronic spreadsheet format.



**Reason:** To ensure that the noise impact of the built turbines can be assessed, if necessary following a complaint, in order to demonstrate that they do/do not exceed the predicted noise levels set out within the supporting Environmental Statement.

30. (1) At the reasonable request of the Planning Authority, the Wind Farm Operator shall assess, at its own expense and using a suitably qualified consultant(s) not involved in the original noise assessment, the level of noise emissions from the Wind Turbines.

(2) Assessment shall be carried out in accordance with the Noise Measurement and Mitigation Scheme approved under this planning permission and a report of assessment shall be submitted to the Planning Authority within two months of a request under this condition, unless an alternative timescale is otherwise agreed in writing by the Planning Authority.

(3) If noise emissions are found to exceed limits prescribed under this planning permission, then the Wind Farm Operator shall implement mitigation measures in full accordance with the approved Noise Measurement and Mitigation Scheme, or alternative equal or better mitigation measures as may first be approved in writing by the Planning Authority, in order to reduce noise levels to comply with prescribed limits. The time period for implementing mitigation measures shall be as outlined in the approved Noise Measurement and Mitigation Scheme or as otherwise may be specified in writing by the Planning Authority.

**Reason:** To ensure that, following a complaint, noise levels can be measured to assess whether or not the predicted noise levels set out within the supporting Environmental Statement have been breached, and where excessive noise is recorded, suitable mitigation measures are undertaken.

31. (1) No development shall commence until a Noise Measurement and Mitigation Scheme has been submitted to, and approved in writing by, the Planning Authority.

(2) The Noise Measurement and Mitigation Scheme shall include:

(a) a framework for the measurement and calculation of noise levels to be undertaken in accordance with "The Assessment & Rating of Noise from Wind Farms", September 1996, ESTU report number ETSU-R-97 having regard to paragraphs 1-3 and 5-11 inclusive, of The Schedule, pages 95 to 97; and Supplementary Guidance Notes to the Planning Obligation, pages 99 to 109. Wind speeds shall be determined using the methods in "Prediction and Assessment of Wind Turbine Noise" (published in IOA Bulletin March/April 2009); and

(b) mitigation measures to be enacted, along with a timetable(s) for implementation, should noise emissions exceed the limits prescribed under this planning permission.

(3) The Noise Measurement and Mitigation Scheme shall be implemented as approved.

**Reason:** To ensure that the noise impact of the built turbines can be assessed, if necessary following a complaint, in order to demonstrate that they do/do not exceed

the predicted noise levels set out within the supporting Environmental Statement, and where excessive noise is recorded, suitable mitigation measures can be undertaken.

**32. (1)** No development shall commence until a Deer Management Plan, developed in consultation with SNH, has been submitted to, and approved in writing to, the Planning Authority.

(2) The Deer Management Plan shall draw upon Wild Deer Best Practice standards and Chapter 4 of the code of Practice on Deer Management, and ensure that appropriate monitoring and deer control measures are carried out to mitigate any deer-related impacts on the Monadhliath SAC and SSSI.

(3) Thereafter, the Deer Management Plan shall be implemented as approved.

**Reason:** To ensure that any impacts on the adjacent SAC and SSSI from deer affected or displaced by the development are suitably mitigated.

**33.** Unless otherwise agreed in writing by the Planning Authority, all concrete batching shall be undertaken within the Site and shall, as far as is possible, utilise site-won sand and aggregates.

**Reason:** In order to reduce the volume of HGV movements on the public road network, in the interests of the safety and free-flow of road users and pedestrians.





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Decision by Claire Milne, a Reporter appointed by the Scottish Ministers

- Planning appeal reference: PPA-270-2183
- Site address: Dell Wind Farm, Land at Dell Estate, Whitebridge, Inverness IV2
- Appeal by Dell Wind Farm Ltd against the decision by The Highland Council
- Application for planning permission 14/02879/FUL dated 29 July 2014 refused by notice dated 12 October 2017
- The development proposed: erection of 14 turbine wind farm (approx. 42 MW installed capacity) and associated infrastructure
- Application drawings: listed in the Schedule
- Date of hearing sessions: 22 May 2019
- Date of site visit by Reporter: 19 March 2018, 23 and 24 May 2019

Date of appeal decision: 22 August 2019

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## Decision

I allow the appeal and grant planning permission subject to the 29 conditions listed at the end of the decision notice. Attention is drawn to the three advisory notes at the end of the notice.

## Preliminary matter

On 16 May 2017, the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 came into force. The 2017 regulations revoked the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 with certain exceptions. The 2011 Regulations continue to have effect for an application (and any subsequent appeal) for planning permission where the applicant submitted an environmental statement in connection with the application before 16 May 2017. That was done in this case. I have therefore determined this appeal in accordance with the 2011 regulations as they applied before 16 May 2017.

In carrying out my assessment of the proposal, I have taken account of the environmental information and other material submitted, in particular the Environmental Statement (ES) July 2014, Additional Landscape Visualisations, November 2014, Further Environmental Information, March 2016 and the Additional Information, November 2018, along with my observations at the accompanied and unaccompanied visits to the site and within the surrounding area.



### 23. Private Water Supply

Prior to commencement of development a scheme for protecting private water supplies from damage or disruption that may be caused by the development shall be submitted for the approval of the Planning Authority.

*Reason: To ensure that all construction operations are carried out in a manner that minimises their impact on amenity and the environment.*

### 24. Flooding and Related Matters

Prior to commencement of development the finalised design of the bridge crossing and access track from the B862 to Killiechoilum shall be agreed with the planning authority in consultation with SEPA and be demonstrated to follow the design recommendations of the Flood Risk Assessment forming part of the FEI.

The existing bridge crossing at Killiechoilum shall be demolished prior to the construction of the new bridge forming part of the development.

Prior to commencement of development a proposed design of river crossing bridge proposal including a river bank restoration scheme, together with an updated Flood Risk Assessment, shall be submitted to and approved by the Planning Authority, in consultation with SEPA.

Only watercourse-related infrastructure should be allowed within a 50m buffer zone of any watercourse. The 50m buffer zone shall be marked on site before Development commences.

*Reason: to protect the water environment and minimise flood risk.*

### 25. Noise

Noise immissions from the combined effect of the turbines received at any dwelling lawfully existing or with planning permission as at the date of this permission, when measured in accordance with the methods specified in paragraphs 98 — 104 of "The Assessment and Rating of Noise from Wind Farms ("ETSU 1997) shall not exceed 35dB(A) L90 10 mins at wind speeds measured on site of up to 10ms measured at 10m above ground level.

*Reason: to protect nearby residents from undue d and disturbance.*

### 26. Eagle Conservation

No work shall start on the site in implementation of this permission until details of a scheme for the mitigation of the potential effect of the proposal on the Golden Eagle population has been submitted to and approved by the planning authority. The scheme is to include an annual contribution to the Great Glen Regional Golden Eagle Conservation Management Plan for the duration of the life of the wind farm, from the commencement of construction to the completion of decommissioning and site restoration. The mitigation scheme with a focus upon education and

**From:**Robin Fraser  
**Sent:**Fri, 18 Jan 2019 14:48:08 +0000  
**To:**Ken McCorquodale  
**Subject:**RE: Chasing Consultation response for 18/04733/S36 Glenshero Wind farm

I have no objection to the application subject to a standard noise condition being attached which limits noise levels to no more than 3dB above the levels predicted in Table 9.10 of the Noise Section 9 of the Environmental Impact Assessment Report.

Regards,

Robin Fraser

Environmental Health Officer

Highland Council, Community Services, 38 Harbour Road, Inverness, IV1 1UF

[REDACTED]

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<https://www.surveymonkey.com/s/highlandeh>

**From:** Ken McCorquodale  
**Sent:** 18 January 2019 12:10  
**To:** Robin Fraser  
**Subject:** Chasing Consultation response for 18/04733/S36 Glenshero Wind farm

Hi Robin,

Quietly chasing for an EHO response to the above.



Cheers

Ken

Ken McCorquodale

Principal Planner (Development Management)

Development & Infrastructure Service, Town House, High Street, Inverness IV1 1JJ

[REDACTED]

[REDACTED]

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This advice is given without prejudice to the future consideration of and decision on any application received by The Highland Council

**Follow up documentation for existing planning applications** should no longer be submitted directly to Planning Officers or to Area Planning Offices. If you would like to submit revised plans or any other follow up/additional documentation in relation to an existing application, please do so by using the Post Submission Additional Document online form available on the [ePlanning.scot](http://ePlanning.scot) Portal. Further guidance on how to do this can be found here on our Planning Web Pages. Please remember to quote the correct application reference number on the online form before submitting. Thank you for your co-operation.

## Annex 3 – Summary of Wind Turbine Noise Source Data

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Noise data for the GE and Enercon turbines has not been included due to data confidentiality. Detailed noise data would be available upon request following the signing of the appropriate Non Disclosure Agreement

A copy of the noise data modelled for the proposed Glenshero wind Farm has been provided below.

**Table 9.7: Location of Residential Properties and Distances to Nearest Proposed Turbine**

| House Name | House ID | Co-ordinates |        | Distance (m) | Nearest Turbine |
|------------|----------|--------------|--------|--------------|-----------------|
|            |          | X (m)        | Y (m)  |              |                 |
| MELGARVE   | H43      | 246300       | 796074 | 3,562        | T40             |
| SHESGNAN   | H44      | 243988       | 795242 | 5,650        | T40             |

9.4.25 Although not finalised, the candidate turbine type for the noise assessment is the Vestas V117 4.2 MW turbine. This report uses the acoustic data from the manufacturer's performance specification for all analysis<sup>18</sup>. The manufacturer has identified these values as warranted although no independent test reports are available to indicate whether any margin has been incorporated; therefore, 2 dB has been added to the warranted levels as a conservative measure as recommended by the IoA GPG. Details used in this analysis are as follows:

- a hub height of 76.5 m;
- a rotor diameter of 117 m;
- sound power levels,  $L_{WA}$ , for standardised 10 m height wind speeds ( $v_{10}$ ) as shown in Table 9.8;
- octave band sound power level data, at the wind speeds where it is available, as shown in Table 9.9;
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

**Table 9.8 – A-Weighted Sound Power Levels (dB(A) re 1 pW) for the Vestas V117 4.2 MW Wind Turbine**

| Standardised 10 m Height Wind Speed, $v_{10}$ (ms <sup>-1</sup> ) | Warranted | Plus Uncertainty |
|---|-----------|------------------|
| 1   | 92.5      | 94.5             |
| 2   | 92.5      | 94.5             |
| 3   | 92.5      | 94.5             |
| 4   | 95.8      | 97.8             |
| 5   | 100.0     | 102.0            |
| 6   | 103.8     | 105.8            |
| 7   | 105.7     | 107.7            |
| 8   | 106.0     | 108.0            |
| 9   | 106.0     | 108.0            |
| 10  | 106.0     | 108.0            |
| 11  | 106.0     | 108.0            |
| 12  | 106.0     | 108.0            |

<sup>18</sup> 'Performance Specification V117 - 4.0/4.2 MW, Vestas Document ID: 0067 7063 V03, 2017-11-29



**Table 9.9 - Octave Band A-Weighted Sound Power Levels (dB(A) re 1 pW) at 8 ms<sup>-1</sup> for the Wind Turbine**

| Octave Band (Hz) | Sound Power Level, dB(A) |
|------------------|--------------------------|
| 63               | 88.4                     |
| 125              | 95.5                     |
| 250              | 100.2                    |
| 500              | 102.5                    |
| 1000             | 102.4                    |
| 2000             | 99.8                     |
| 4000             | 94.8                     |
| 8000             | 87.3                     |
| OVERALL          | 108.0                    |

*Predictions of Noise Levels at Residential Properties*

9.4.26 Table 9.10 shows the predicted noise immission levels at the nearest residential properties at each wind speed considered, calculated from the operation of the proposed development. The property with the highest predicted noise immission level of 28.8 dB(A) is Garvabeg (H41).

9.4.27 EIAR Volume 3: Figure 9.1 shows an isobel (i.e. noise contour) plot for the site at a 10 m height wind speed of 8 ms<sup>-1</sup>. Such plots are useful for evaluating the noise 'footprint' of a given development.

**Table 9.10: Predicted Noise Levels at nearby Residential Properties, dB(A)**

| House ID | Reference Wind Speed, Standardised v <sub>10</sub> (ms <sup>-1</sup> ) |     |     |      |      |      |      |      |      |      |      |      |
|----------|--|-----|-----|------|------|------|------|------|------|------|------|------|
|          | 1  | 2   | 3   | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| H1       | 6.3  | 6.3 | 6.3 | 9.7  | 13.8 | 17.6 | 19.6 | 19.8 | 19.8 | 19.8 | 19.8 | 19.8 |
| H2       | 6.3  | 6.3 | 6.3 | 9.7  | 13.8 | 17.6 | 19.6 | 19.8 | 19.8 | 19.8 | 19.8 | 19.8 |
| H3       | 6.3  | 6.3 | 6.3 | 9.7  | 13.8 | 17.6 | 19.6 | 19.8 | 19.8 | 19.8 | 19.8 | 19.8 |
| H4       | 6.4  | 6.4 | 6.4 | 9.7  | 13.9 | 17.6 | 19.6 | 19.9 | 19.9 | 19.9 | 19.9 | 19.9 |
| H5       | 6.4  | 6.4 | 6.4 | 9.8  | 13.9 | 17.7 | 19.7 | 19.9 | 19.9 | 19.9 | 19.9 | 19.9 |
| H6       | 6.7  | 6.7 | 6.7 | 10.1 | 14.2 | 18.0 | 19.9 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 |
| H7       | 6.6  | 6.6 | 6.6 | 9.9  | 14.1 | 17.8 | 19.8 | 20.1 | 20.1 | 20.1 | 20.1 | 20.1 |
| H8       | 6.7  | 6.7 | 6.7 | 10.0 | 14.2 | 17.9 | 19.9 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 |
| H9       | 6.9  | 6.9 | 6.9 | 10.2 | 14.4 | 18.2 | 20.1 | 20.4 | 20.4 | 20.4 | 20.4 | 20.4 |
| H10      | 6.8  | 6.8 | 6.8 | 10.2 | 14.3 | 18.1 | 20.1 | 20.3 | 20.3 | 20.3 | 20.3 | 20.3 |
| H11      | 6.8  | 6.8 | 6.8 | 10.2 | 14.3 | 18.1 | 20.0 | 20.3 | 20.3 | 20.3 | 20.3 | 20.3 |
| H12      | 6.8  | 6.8 | 6.8 | 10.2 | 14.3 | 18.1 | 20.0 | 20.3 | 20.3 | 20.3 | 20.3 | 20.3 |
| H13      | 6.9  | 6.9 | 6.9 | 10.2 | 14.4 | 18.2 | 20.1 | 20.4 | 20.4 | 20.4 | 20.4 | 20.4 |
| H14      | 6.9  | 6.9 | 6.9 | 10.2 | 14.4 | 18.2 | 20.1 | 20.4 | 20.4 | 20.4 | 20.4 | 20.4 |
| H15      | 7.4  | 7.4 | 7.4 | 10.8 | 14.9 | 18.7 | 20.6 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 |

## Annex 4 – Topographical Corrections and Wind Turbine Summary

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## Topographical (concave ground/ barrier) Noise Prediction Adjustment Table

### Notes/Comments

Requirement to include a concave ground profile correction of +3dB has been calculated in accordance with section 4.3.9 of the IOA GPG (July 2011)

A barrier correction of -2dB is included where the landform completely obscures a turbine at the noise assessment location

Where analysis indicates that both are required the barrier correction take precedence and a correction of -2dB is applied

|               | Noise Assessment Locations |      |    |    |    |    |
|---------------|----------------------------|------|----|----|----|----|
| Wind Farm     | Hub                        | T ID | 1  | 2  | 3  | 4  |
| Stronelaig 1  | 69                         | 1    | -2 | -2 | 0  | -2 |
| Stronelaig 2  | 76                         | 2    | -2 | -2 | 0  | -2 |
| Stronelaig 3  | 76                         | 3    | -2 | -2 | 0  | -2 |
| Stronelaig 4  | 76                         | 4    | -2 | -2 | 0  | 0  |
| Stronelaig 5  | 76                         | 5    | -2 | -2 | 0  | 0  |
| Stronelaig 6  | 76                         | 6    | -2 | -2 | 0  | 0  |
| Stronelaig 7  | 76                         | 7    | -2 | -2 | 0  | 0  |
| Stronelaig 8  | 76                         | 8    | -2 | -2 | 0  | 0  |
| Stronelaig 9  | 69                         | 9    | -2 | -2 | 0  | 0  |
| Stronelaig 10 | 69                         | 10   | -2 | -2 | 0  | 0  |
| Stronelaig 11 | 76                         | 11   | -2 | -2 | 0  | -2 |
| Stronelaig 12 | 76                         | 12   | -2 | -2 | 0  | 0  |
| Stronelaig 13 | 76                         | 13   | -2 | -2 | 0  | -2 |
| Stronelaig 14 | 76                         | 14   | -2 | -2 | 0  | -2 |
| Stronelaig 15 | 76                         | 15   | -2 | -2 | 0  | 0  |
| Stronelaig 16 | 76                         | 16   | -2 | -2 | 0  | 0  |
| Stronelaig 17 | 76                         | 17   | -2 | -2 | 0  | -2 |
| Stronelaig 18 | 76                         | 18   | -2 | -2 | 0  | -2 |
| Stronelaig 19 | 76                         | 19   | -2 | -2 | 0  | -2 |
| Stronelaig 20 | 76                         | 20   | -2 | -2 | 0  | -2 |
| Stronelaig 21 | 76                         | 21   | -2 | -2 | 0  | -2 |
| Stronelaig 22 | 76                         | 22   | -2 | -2 | 0  | -2 |
| Stronelaig 23 | 76                         | 23   | -2 | -2 | 0  | -2 |
| Stronelaig 24 | 76                         | 24   | -2 | -2 | 0  | -2 |
| Stronelaig 25 | 76                         | 25   | -2 | -2 | 0  | -2 |
| Stronelaig 26 | 76                         | 26   | -2 | -2 | 0  | -2 |
| Stronelaig 27 | 76                         | 27   | -2 | -2 | 0  | -2 |
| Stronelaig 28 | 76                         | 28   | -2 | 0  | 0  | -2 |
| Stronelaig 29 | 76                         | 29   | -2 | 0  | 0  | -2 |
| Stronelaig 30 | 69                         | 30   | -2 | 0  | 0  | -2 |
| Stronelaig 31 | 76                         | 31   | -2 | 0  | 0  | -2 |
| Stronelaig 32 | 76                         | 32   | -2 | -2 | 0  | -2 |
| Stronelaig 33 | 76                         | 33   | -2 | -2 | 0  | -2 |
| Stronelaig 34 | 76                         | 34   | -2 | -2 | 0  | -2 |
| Stronelaig 35 | 69                         | 35   | -2 | -2 | 0  | -2 |
| Stronelaig 36 | 76                         | 36   | -2 | -2 | 0  | -2 |
| Stronelaig 37 | 76                         | 37   | -2 | -2 | 0  | -2 |
| Stronelaig 38 | 76                         | 38   | 3  | -2 | 0  | -2 |
| Stronelaig 39 | 76                         | 39   | -2 | -2 | 0  | -2 |
| Stronelaig 40 | 76                         | 40   | -2 | -2 | 0  | -2 |
| Stronelaig 41 | 76                         | 41   | -2 | -2 | 0  | -2 |
| Stronelaig 42 | 69                         | 42   | -2 | -2 | 0  | -2 |
| Stronelaig 43 | 76                         | 43   | -2 | -2 | 0  | -2 |
| Stronelaig 44 | 76                         | 44   | -2 | -2 | 0  | -2 |
| Stronelaig 45 | 69                         | 45   | -2 | -2 | -2 | -2 |
| Stronelaig 46 | 69                         | 46   | -2 | -2 | 0  | -2 |
| Stronelaig 47 | 76                         | 47   | 3  | -2 | -2 | -2 |
| Stronelaig 48 | 76                         | 48   | 3  | -2 | 0  | -2 |
| Stronelaig 49 | 76                         | 49   | -2 | -2 | -2 | -2 |



|                |      |     |    |    |    |    |
|----------------|------|-----|----|----|----|----|
| Stronelaig 50  | 76   | 50  | -2 | -2 | -2 | -2 |
| Stronelaig 51  | 76   | 51  | -2 | -2 | -2 | -2 |
| Stronelaig 52  | 76   | 52  | -2 | -2 | -2 | -2 |
| Stronelaig 53  | 76   | 53  | -2 | -2 | -2 | -2 |
| Stronelaig 54  | 76   | 54  | -2 | -2 | -2 | -2 |
| Stronelaig 55  | 76   | 55  | 0  | -2 | -2 | -2 |
| Stronelaig 56  | 69   | 56  | -2 | -2 | -2 | -2 |
| Stronelaig 57  | 76   | 57  | 3  | -2 | -2 | -2 |
| Stronelaig 58  | 69   | 58  | 3  | -2 | 0  | -2 |
| Stronelaig 59  | 69   | 59  | 3  | -2 | 0  | 0  |
| Stronelaig 60  | 69   | 60  | -2 | -2 | -2 | -2 |
| Stronelaig 61  | 69   | 61  | 0  | -2 | -2 | -2 |
| Stronelaig 62  | 76   | 62  | -2 | -2 | 0  | 0  |
| Stronelaig 63  | 76   | 63  | -2 | -2 | -2 | -2 |
| Stronelaig 64  | 76   | 64  | -2 | -2 | -2 | -2 |
| Stronelaig 65  | 76   | 65  | -2 | -2 | -2 | -2 |
| Stronelaig 66  | 76   | 66  | -2 | -2 | -2 | -2 |
| Corriegarth 1  | 78.3 | 67  | -2 | -2 | 0  | 0  |
| Corriegarth 2  | 78.3 | 68  | -2 | -2 | 0  | 0  |
| Corriegarth 3  | 78.3 | 69  | -2 | -2 | 0  | 0  |
| Corriegarth 4  | 78.3 | 70  | -2 | -2 | 0  | 0  |
| Corriegarth 5  | 78.3 | 71  | -2 | -2 | 0  | 0  |
| Corriegarth 6  | 78.3 | 72  | -2 | -2 | 0  | 0  |
| Corriegarth 7  | 78.3 | 73  | -2 | -2 | 0  | 0  |
| Corriegarth 8  | 78.3 | 74  | -2 | -2 | 0  | 0  |
| Corriegarth 9  | 78.3 | 75  | -2 | -2 | 0  | 0  |
| Corriegarth 10 | 78.3 | 76  | -2 | -2 | 0  | 0  |
| Corriegarth 11 | 78.3 | 77  | -2 | -2 | 0  | 0  |
| Corriegarth 12 | 78.3 | 78  | -2 | -2 | 0  | 0  |
| Corriegarth 13 | 78.3 | 79  | -2 | -2 | 0  | 0  |
| Corriegarth 14 | 78.3 | 80  | -2 | -2 | 0  | 0  |
| Corriegarth 15 | 78.3 | 81  | -2 | -2 | 0  | 0  |
| Corriegarth 16 | 78.3 | 82  | -2 | -2 | 0  | 0  |
| Corriegarth 17 | 78.3 | 83  | -2 | -2 | 0  | 0  |
| Corriegarth 18 | 78.3 | 84  | -2 | -2 | 0  | 0  |
| Corriegarth 19 | 78.3 | 85  | -2 | -2 | 0  | 0  |
| Corriegarth 20 | 78.3 | 86  | -2 | -2 | 0  | 0  |
| Corriegarth 21 | 78.3 | 87  | -2 | -2 | 0  | 0  |
| Corriegarth 22 | 78.3 | 88  | -2 | -2 | 0  | 0  |
| Corriegarth 23 | 78.3 | 89  | -2 | -2 | 0  | 0  |
| Dell 1         | 80   | 90  | -2 | -2 | 0  | 0  |
| Dell 2         | 80   | 91  | -2 | -2 | 0  | 0  |
| Dell 3         | 80   | 92  | -2 | -2 | 0  | 0  |
| Dell 4         | 80   | 93  | -2 | -2 | 0  | 0  |
| Dell 5         | 80   | 94  | -2 | -2 | 0  | 0  |
| Dell 6         | 80   | 95  | -2 | -2 | 0  | 0  |
| Dell 7         | 80   | 96  | -2 | -2 | 0  | 0  |
| Dell 8         | 65   | 97  | -2 | -2 | 0  | 0  |
| Dell 9         | 65   | 98  | -2 | -2 | 0  | 0  |
| Dell 10        | 65   | 99  | -2 | -2 | 0  | 0  |
| Dell 11        | 65   | 100 | -2 | -2 | 0  | 0  |
| Dell 12        | 80   | 101 | -2 | -2 | 0  | 0  |
| Dell 13        | 80   | 102 | -2 | -2 | 0  | 0  |
| Dell 14        | 80   | 103 | -2 | -2 | 0  | 0  |
| Glenshero 1    | 76.5 | 104 | 0  | -2 | 0  | 0  |
| Glenshero 2    | 76.5 | 105 | -2 | -2 | 0  | 0  |
| Glenshero 3    | 76.5 | 106 | 0  | -2 | 0  | 0  |
| Glenshero 5    | 76.5 | 107 | 0  | -2 | 0  | 0  |
| Glenshero 6    | 76.5 | 108 | 0  | -2 | 0  | 0  |

|              |      |     |    |    |    |    |
|--------------|------|-----|----|----|----|----|
| Glenshero 7  | 76.5 | 109 | 0  | -2 | 0  | 3  |
| Glenshero 8  | 76.5 | 110 | -2 | -2 | 0  | 0  |
| Glenshero 9  | 76.5 | 111 | -2 | -2 | 0  | 3  |
| Glenshero 10 | 76.5 | 112 | -2 | -2 | 0  | 3  |
| Glenshero 11 | 76.5 | 113 | -2 | -2 | -2 | 3  |
| Glenshero 12 | 76.5 | 114 | -2 | -2 | 0  | 3  |
| Glenshero 13 | 76.5 | 115 | -2 | -2 | -2 | 3  |
| Glenshero 14 | 76.5 | 116 | -2 | -2 | 0  | -2 |
| Glenshero 15 | 76.5 | 117 | -2 | -2 | -2 | -2 |
| Glenshero 16 | 76.5 | 118 | -2 | -2 | -2 | -2 |
| Glenshero 17 | 76.5 | 119 | -2 | -2 | -2 | -2 |
| Glenshero 18 | 76.5 | 120 | 0  | -2 | -2 | 0  |
| Glenshero 19 | 76.5 | 121 | -2 | -2 | -2 | -2 |
| Glenshero 20 | 76.5 | 122 | 0  | -2 | -2 | 0  |
| Glenshero 21 | 76.5 | 123 | 0  | -2 | -2 | -2 |
| Glenshero 22 | 76.5 | 124 | -2 | -2 | -2 | -2 |
| Glenshero 23 | 76.5 | 125 | -2 | -2 | -2 | -2 |
| Glenshero 24 | 76.5 | 126 | -2 | -2 | -2 | -2 |
| Glenshero 25 | 76.5 | 127 | -2 | -2 | -2 | -2 |
| Glenshero 26 | 76.5 | 128 | -2 | -2 | -2 | -2 |
| Glenshero 27 | 76.5 | 129 | -2 | -2 | -2 | -2 |
| Glenshero 28 | 76.5 | 130 | -2 | -2 | -2 | -2 |
| Glenshero 29 | 76.5 | 131 | -2 | -2 | -2 | -2 |
| Glenshero 30 | 76.5 | 132 | -2 | -2 | -2 | -2 |
| Glenshero 31 | 76.5 | 133 | -2 | -2 | -2 | -2 |
| Glenshero 32 | 76.5 | 134 | -2 | -2 | -2 | -2 |
| Glenshero 33 | 76.5 | 135 | -2 | -2 | -2 | -2 |
| Glenshero 34 | 76.5 | 136 | -2 | -2 | -2 | -2 |
| Glenshero 35 | 76.5 | 137 | -2 | -2 | -2 | -2 |
| Glenshero 36 | 76.5 | 138 | -2 | -2 | -2 | -2 |
| Glenshero 37 | 76.5 | 139 | -2 | -2 | -2 | -2 |
| Glenshero 38 | 76.5 | 140 | 0  | -2 | -2 | -2 |
| Glenshero 39 | 76.5 | 141 | 0  | -2 | -2 | 3  |
| Glenshero 40 | 76.5 | 142 | 0  | -2 | 0  | -2 |
| Cloiche 1    | 78   | 143 | -2 | -2 | 0  | 0  |
| Cloiche 2    | 78   | 144 | -2 | -2 | 0  | 0  |
| Cloiche 3    | 78   | 145 | -2 | -2 | 0  | -2 |
| Cloiche 4    | 78   | 146 | -2 | -2 | 0  | -2 |
| Cloiche 5    | 78   | 147 | -2 | -2 | 0  | 0  |
| Cloiche 6    | 78   | 148 | -2 | -2 | 0  | 0  |
| Cloiche 7    | 78   | 149 | -2 | -2 | 0  | 0  |
| Cloiche 8    | 78   | 150 | -2 | -2 | 0  | 0  |
| Cloiche 9    | 78   | 151 | -2 | -2 | 0  | -2 |
| Cloiche 10   | 78   | 152 | -2 | -2 | 0  | -2 |
| Cloiche 11   | 78   | 153 | -2 | -2 | 0  | -2 |
| Cloiche 12   | 78   | 154 | -2 | -2 | 0  | -2 |
| Cloiche 13   | 78   | 155 | -2 | -2 | 0  | -2 |
| Cloiche 14   | 78   | 156 | -2 | -2 | 0  | 0  |
| Cloiche 15   | 78   | 157 | -2 | -2 | 0  | 0  |
| Cloiche 16   | 78   | 158 | -2 | -2 | 0  | -2 |
| Cloiche 17   | 78   | 159 | -2 | -2 | 0  | -2 |
| Cloiche 18   | 78   | 160 | 0  | -2 | 0  | -2 |
| Cloiche 19   | 78   | 161 | -2 | -2 | 0  | -2 |
| Cloiche 20   | 78   | 162 | -2 | -2 | 0  | -2 |
| Cloiche 21   | 78   | 163 | -2 | -2 | 0  | -2 |
| Cloiche 22   | 78   | 164 | -2 | -2 | 0  | 0  |
| Cloiche 23   | 78   | 165 | -2 | -2 | 0  | -2 |
| Cloiche 24   | 78   | 166 | -2 | -2 | 0  | -2 |
| Cloiche 25   | 78   | 167 | -2 | -2 | 0  | -2 |

|            |    |     |    |    |    |    |
|------------|----|-----|----|----|----|----|
| Cloiche 26 | 78 | 168 | -2 | -2 | 0  | -2 |
| Cloiche 27 | 78 | 169 | -2 | -2 | 0  | 0  |
| Cloiche 28 | 78 | 170 | -2 | -2 | 0  | 3  |
| Cloiche 29 | 78 | 171 | -2 | -2 | -2 | -2 |
| Cloiche 30 | 78 | 172 | -2 | -2 | -2 | -2 |
| Cloiche 31 | 78 | 173 | -2 | -2 | -2 | -2 |
| Cloiche 32 | 78 | 174 | -2 | -2 | -2 | -2 |
| Cloiche 33 | 78 | 175 | -2 | -2 | -2 | -2 |
| Cloiche 34 | 78 | 176 | -2 | -2 | -2 | -2 |
| Cloiche 35 | 78 | 177 | -2 | -2 | -2 | 0  |
| Cloiche 36 | 78 | 178 | -2 | -2 | -2 | 0  |

\* the 78m hub used for Cloiche is the lowest within the range of turbines considered therefore provides a worst case for these calculations



| <b>Turbine Number</b> | <b>Type</b>         | <b>Easting</b> | <b>Northing</b> | <b>Height</b> | <b>Turbine height AGL</b> |
|-----------------------|---------------------|----------------|-----------------|---------------|---------------------------|
| Stronelaig 1          | VESTAS-V112 3.45MW- | 248481         | 803156          | 694           | 69                        |
| Stronelaig 2          | VESTAS-V117 3.45MW- | 248256         | 803699          | 638           | 76                        |
| Stronelaig 3          | VESTAS-V117 3.45MW- | 248819         | 803970          | 640           | 76                        |
| Stronelaig 4          | VESTAS-V117 3.45MW- | 248289         | 804250          | 642           | 76                        |
| Stronelaig 5          | VESTAS-V117 3.45MW- | 248728         | 804612          | 659           | 76                        |
| Stronelaig 6          | VESTAS-V117 3.45MW- | 249148         | 805007          | 671           | 76                        |
| Stronelaig 7          | VESTAS-V117 3.45MW- | 249660         | 805330          | 677           | 76                        |
| Stronelaig 8          | VESTAS-V117 3.45MW- | 250194         | 805579          | 677           | 76                        |
| Stronelaig 9          | VESTAS-V112 3.45MW- | 250633         | 805194          | 685           | 69                        |
| Stronelaig 10         | VESTAS-V112 3.45MW- | 250097         | 804873          | 704           | 69                        |
| Stronelaig 11         | VESTAS-V117 3.45MW- | 250729         | 804576          | 645           | 76                        |
| Stronelaig 12         | VESTAS-V117 3.45MW- | 249584         | 804556          | 664           | 76                        |
| Stronelaig 13         | VESTAS-V117 3.45MW- | 250106         | 804284          | 636           | 76                        |
| Stronelaig 14         | VESTAS-V117 3.45MW- | 251267         | 804435          | 604           | 76                        |
| Stronelaig 15         | VESTAS-V117 3.45MW- | 251208         | 804961          | 615           | 76                        |
| Stronelaig 16         | VESTAS-V117 3.45MW- | 251149         | 805522          | 646           | 76                        |
| Stronelaig 17         | VESTAS-V117 3.45MW- | 249115         | 803206          | 678           | 76                        |
| Stronelaig 18         | VESTAS-V117 3.45MW- | 249349         | 802626          | 685           | 76                        |
| Stronelaig 19         | VESTAS-V117 3.45MW- | 249723         | 803178          | 663           | 76                        |
| Stronelaig 20         | VESTAS-V117 3.45MW- | 249929         | 802622          | 664           | 76                        |
| Stronelaig 21         | VESTAS-V117 3.45MW- | 249675         | 802098          | 693           | 76                        |
| Stronelaig 22         | VESTAS-V117 3.45MW- | 250129         | 801983          | 657           | 76                        |
| Stronelaig 23         | VESTAS-V117 3.45MW- | 249444         | 803741          | 647           | 76                        |
| Stronelaig 24         | VESTAS-V117 3.45MW- | 250282         | 803385          | 654           | 76                        |
| Stronelaig 25         | VESTAS-V117 3.45MW- | 250900         | 803990          | 613           | 76                        |
| Stronelaig 26         | VESTAS-V117 3.45MW- | 250865         | 803361          | 654           | 76                        |
| Stronelaig 27         | VESTAS-V117 3.45MW- | 251357         | 803708          | 642           | 76                        |
| Stronelaig 28         | VESTAS-V117 3.45MW- | 251814         | 804074          | 634           | 76                        |
| Stronelaig 29         | VESTAS-V117 3.45MW- | 252254         | 804397          | 656           | 76                        |
| Stronelaig 30         | VESTAS-V112 3.45MW- | 252865         | 804235          | 653           | 69                        |
| Stronelaig 31         | VESTAS-V117 3.45MW- | 253479         | 804310          | 689           | 76                        |
| Stronelaig 32         | VESTAS-V117 3.45MW- | 251800         | 803380          | 652           | 76                        |
| Stronelaig 33         | VESTAS-V117 3.45MW- | 252385         | 803820          | 661           | 76                        |
| Stronelaig 34         | VESTAS-V117 3.45MW- | 252517         | 803291          | 668           | 76                        |
| Stronelaig 35         | VESTAS-V112 3.45MW- | 252974         | 803638          | 683           | 69                        |
| Stronelaig 36         | VESTAS-V117 3.45MW- | 253529         | 803673          | 684           | 76                        |
| Stronelaig 37         | VESTAS-V117 3.45MW- | 254202         | 803779          | 645           | 76                        |
| Stronelaig 38         | VESTAS-V117 3.45MW- | 254208         | 804302          | 651           | 76                        |
| Stronelaig 39         | VESTAS-V117 3.45MW- | 250572         | 802828          | 654           | 76                        |
| Stronelaig 40         | VESTAS-V117 3.45MW- | 250676         | 802293          | 657           | 76                        |
| Stronelaig 41         | VESTAS-V117 3.45MW- | 251215         | 802400          | 679           | 76                        |
| Stronelaig 42         | VESTAS-V112 3.45MW- | 250972         | 801947          | 692           | 69                        |
| Stronelaig 43         | VESTAS-V117 3.45MW- | 251716         | 802751          | 671           | 76                        |
| Stronelaig 44         | VESTAS-V117 3.45MW- | 252488         | 802622          | 695           | 76                        |
| Stronelaig 45         | VESTAS-V112 3.45MW- | 253084         | 802485          | 686           | 69                        |

|                |                     |        |        |     |      |
|----------------|---------------------|--------|--------|-----|------|
| Stronelairg 46 | VESTAS-V112 3.45MW- | 253107 | 803083 | 687 | 69   |
| Stronelairg 47 | VESTAS-V117 3.45MW- | 254838 | 803700 | 655 | 76   |
| Stronelairg 48 | VESTAS-V117 3.45MW- | 254807 | 804262 | 635 | 76   |
| Stronelairg 49 | VESTAS-V117 3.45MW- | 254902 | 803063 | 655 | 76   |
| Stronelairg 50 | VESTAS-V117 3.45MW- | 254572 | 802686 | 688 | 76   |
| Stronelairg 51 | VESTAS-V117 3.45MW- | 254938 | 801714 | 705 | 76   |
| Stronelairg 52 | VESTAS-V117 3.45MW- | 254948 | 802201 | 715 | 76   |
| Stronelairg 53 | VESTAS-V117 3.45MW- | 255478 | 801987 | 710 | 76   |
| Stronelairg 54 | VESTAS-V117 3.45MW- | 255351 | 802598 | 698 | 76   |
| Stronelairg 55 | VESTAS-V117 3.45MW- | 255773 | 802996 | 678 | 76   |
| Stronelairg 56 | VESTAS-V112 3.45MW- | 256289 | 802663 | 696 | 69   |
| Stronelairg 57 | VESTAS-V117 3.45MW- | 255589 | 803594 | 668 | 76   |
| Stronelairg 58 | VESTAS-V112 3.45MW- | 255500 | 804172 | 656 | 69   |
| Stronelairg 59 | VESTAS-V112 3.45MW- | 255433 | 804778 | 676 | 69   |
| Stronelairg 60 | VESTAS-V112 3.45MW- | 256311 | 803569 | 706 | 69   |
| Stronelairg 61 | VESTAS-V112 3.45MW- | 256133 | 804082 | 716 | 69   |
| Stronelairg 62 | VESTAS-V117 3.45MW- | 256102 | 804575 | 708 | 76   |
| Stronelairg 63 | VESTAS-V117 3.45MW- | 254111 | 803221 | 662 | 76   |
| Stronelairg 64 | VESTAS-V117 3.45MW- | 253804 | 802694 | 678 | 76   |
| Stronelairg 65 | VESTAS-V117 3.45MW- | 253420 | 801935 | 726 | 76   |
| Stronelairg 66 | VESTAS-V117 3.45MW- | 253847 | 802232 | 729 | 76   |
| Corriegarth 1  | Enercon-E82 3MW     | 256230 | 813455 | 589 | 78.3 |
| Corriegarth 2  | Enercon-E82 3MW     | 256569 | 813377 | 600 | 78.3 |
| Corriegarth 3  | Enercon-E82 3MW     | 256765 | 813769 | 611 | 78.3 |
| Corriegarth 4  | Enercon-E82 3MW     | 256142 | 812730 | 616 | 78.3 |
| Corriegarth 5  | Enercon-E82 3MW     | 256565 | 812847 | 638 | 78.3 |
| Corriegarth 6  | Enercon-E82 3MW     | 256976 | 813111 | 636 | 78.3 |
| Corriegarth 7  | Enercon-E82 3MW     | 256957 | 813556 | 630 | 78.3 |
| Corriegarth 8  | Enercon-E82 3MW     | 257533 | 813890 | 642 | 78.3 |
| Corriegarth 9  | Enercon-E82 3MW     | 257895 | 813904 | 660 | 78.3 |
| Corriegarth 10 | Enercon-E82 3MW     | 256734 | 812630 | 630 | 78.3 |
| Corriegarth 11 | Enercon-E82 3MW     | 257138 | 812869 | 668 | 78.3 |
| Corriegarth 12 | Enercon-E82 3MW     | 257333 | 813304 | 648 | 78.3 |
| Corriegarth 13 | Enercon-E82 3MW     | 257873 | 813470 | 664 | 78.3 |
| Corriegarth 14 | Enercon-E82 3MW     | 258297 | 813902 | 686 | 78.3 |
| Corriegarth 15 | Enercon-E82 3MW     | 257245 | 812584 | 652 | 78.3 |
| Corriegarth 16 | Enercon-E82 3MW     | 257572 | 813115 | 675 | 78.3 |
| Corriegarth 17 | Enercon-E82 3MW     | 257916 | 813155 | 694 | 78.3 |
| Corriegarth 18 | Enercon-E82 3MW     | 258260 | 813499 | 679 | 78.3 |
| Corriegarth 19 | Enercon-E82 3MW     | 257654 | 812699 | 669 | 78.3 |
| Corriegarth 20 | Enercon-E82 3MW     | 258047 | 812809 | 683 | 78.3 |
| Corriegarth 21 | Enercon-E82 3MW     | 258460 | 813100 | 689 | 78.3 |
| Corriegarth 22 | Enercon-E82 3MW     | 258829 | 813451 | 700 | 78.3 |
| Corriegarth 23 | Enercon-E82 3MW     | 258750 | 813810 | 703 | 78.3 |
| Dell 1         | VESTAS-V90 3MW      | 248918 | 805347 | 679 | 80   |
| Dell 2         | VESTAS-V90 3MW      | 249714 | 805770 | 674 | 80   |
| Dell 3         | VESTAS-V90 3MW      | 250139 | 805945 | 673 | 80   |

|              |                   |        |        |     |      |
|--------------|-------------------|--------|--------|-----|------|
| Dell 4       | VESTAS-V90 3MW    | 250554 | 805862 | 659 | 80   |
| Dell 5       | VESTAS-V90 3MW    | 248767 | 805785 | 691 | 80   |
| Dell 6       | VESTAS-V90 3MW    | 249307 | 805665 | 678 | 80   |
| Dell 7       | VESTAS-V90 3MW    | 249746 | 806178 | 710 | 80   |
| Dell 8       | VESTAS-V90 3MW    | 250543 | 806253 | 672 | 65   |
| Dell 9       | VESTAS-V90 3MW    | 250691 | 806764 | 669 | 65   |
| Dell 10      | VESTAS-V90 3MW    | 249193 | 806000 | 704 | 65   |
| Dell 11      | VESTAS-V90 3MW    | 250235 | 806436 | 712 | 65   |
| Dell 12      | VESTAS-V90 3MW    | 250450 | 806939 | 673 | 80   |
| Dell 13      | VESTAS-V90 3MW    | 249947 | 806684 | 700 | 80   |
| Dell 14      | VESTAS-V90 3MW    | 250819 | 807202 | 653 | 80   |
| Glenshero 1  | VESTAS-V117-4.2MW | 248013 | 800118 | 735 | 76.5 |
| Glenshero 2  | VESTAS-V117-4.2MW | 248493 | 800028 | 721 | 76.5 |
| Glenshero 3  | VESTAS-V117-4.2MW | 248342 | 799607 | 704 | 76.5 |
| Glenshero 5  | VESTAS-V117-4.2MW | 248760 | 798869 | 669 | 76.5 |
| Glenshero 6  | VESTAS-V117-4.2MW | 248494 | 799139 | 693 | 76.5 |
| Glenshero 7  | VESTAS-V117-4.2MW | 249008 | 799343 | 712 | 76.5 |
| Glenshero 8  | VESTAS-V117-4.2MW | 248901 | 799815 | 713 | 76.5 |
| Glenshero 9  | VESTAS-V117-4.2MW | 249362 | 799666 | 732 | 76.5 |
| Glenshero 10 | VESTAS-V117-4.2MW | 249617 | 799994 | 734 | 76.5 |
| Glenshero 11 | VESTAS-V117-4.2MW | 250027 | 799747 | 710 | 76.5 |
| Glenshero 12 | VESTAS-V117-4.2MW | 249968 | 800345 | 716 | 76.5 |
| Glenshero 13 | VESTAS-V117-4.2MW | 250623 | 800053 | 723 | 76.5 |
| Glenshero 14 | VESTAS-V117-4.2MW | 250179 | 800806 | 708 | 76.5 |
| Glenshero 15 | VESTAS-V117-4.2MW | 250567 | 800502 | 715 | 76.5 |
| Glenshero 16 | VESTAS-V117-4.2MW | 253542 | 799869 | 714 | 76.5 |
| Glenshero 17 | VESTAS-V117-4.2MW | 253074 | 799659 | 694 | 76.5 |
| Glenshero 18 | VESTAS-V117-4.2MW | 253198 | 798901 | 686 | 76.5 |
| Glenshero 19 | VESTAS-V117-4.2MW | 253527 | 799465 | 656 | 76.5 |
| Glenshero 20 | VESTAS-V117-4.2MW | 253481 | 798676 | 621 | 76.5 |
| Glenshero 21 | VESTAS-V117-4.2MW | 253617 | 798336 | 595 | 76.5 |
| Glenshero 22 | VESTAS-V117-4.2MW | 253973 | 799327 | 657 | 76.5 |
| Glenshero 23 | VESTAS-V117-4.2MW | 254042 | 799767 | 695 | 76.5 |
| Glenshero 24 | VESTAS-V117-4.2MW | 254526 | 799690 | 619 | 76.5 |
| Glenshero 25 | VESTAS-V117-4.2MW | 253740 | 800472 | 752 | 76.5 |
| Glenshero 26 | VESTAS-V117-4.2MW | 254469 | 800164 | 667 | 76.5 |
| Glenshero 27 | VESTAS-V117-4.2MW | 254195 | 800487 | 697 | 76.5 |
| Glenshero 28 | VESTAS-V117-4.2MW | 255106 | 800465 | 702 | 76.5 |
| Glenshero 29 | VESTAS-V117-4.2MW | 254461 | 801148 | 686 | 76.5 |
| Glenshero 30 | VESTAS-V117-4.2MW | 254869 | 800893 | 683 | 76.5 |
| Glenshero 31 | VESTAS-V117-4.2MW | 255186 | 801365 | 724 | 76.5 |
| Glenshero 32 | VESTAS-V117-4.2MW | 255463 | 800933 | 746 | 76.5 |
| Glenshero 33 | VESTAS-V117-4.2MW | 255576 | 800262 | 724 | 76.5 |
| Glenshero 34 | VESTAS-V117-4.2MW | 255810 | 800702 | 725 | 76.5 |
| Glenshero 35 | VESTAS-V117-4.2MW | 256098 | 800357 | 739 | 76.5 |
| Glenshero 36 | VESTAS-V117-4.2MW | 255052 | 800017 | 684 | 76.5 |
| Glenshero 37 | VESTAS-V117-4.2MW | 253160 | 800367 | 752 | 76.5 |

|              |                   |        |        |     |      |
|--------------|-------------------|--------|--------|-----|------|
| Glenshero 38 | VESTAS-V117-4.2MW | 253818 | 798956 | 613 | 76.5 |
| Glenshero 39 | VESTAS-V117-4.2MW | 249702 | 799389 | 687 | 76.5 |
| Glenshero 40 | VESTAS-V117-4.2MW | 248034 | 799186 | 693 | 76.5 |
| Cloiche 1    | GE 130 3.8MW      | 246783 | 804218 | 639 | 84.9 |
| Cloiche 2    | GE 130 3.8MW      | 247321 | 804180 | 642 | 84.9 |
| Cloiche 3    | GE 130 3.8MW      | 247972 | 803060 | 666 | 84.9 |
| Cloiche 4    | GE 130 3.8MW      | 247289 | 802902 | 679 | 84.9 |
| Cloiche 5    | GE 130 3.8MW      | 247084 | 803411 | 633 | 84.9 |
| Cloiche 6    | GE 130 3.8MW      | 247759 | 804458 | 649 | 84.9 |
| Cloiche 7    | GE 130 3.8MW      | 248149 | 804689 | 652 | 84.9 |
| Cloiche 8    | GE 130 3.8MW      | 248433 | 805039 | 664 | 84.9 |
| Cloiche 9    | GE 130 3.8MW      | 248141 | 802548 | 720 | 84.9 |
| Cloiche 10   | GE 130 3.8MW      | 247133 | 802313 | 693 | 84.9 |
| Cloiche 11   | GE 130 3.8MW      | 246917 | 801717 | 695 | 84.9 |
| Cloiche 12   | GE 130 3.8MW      | 247584 | 801964 | 702 | 84.9 |
| Cloiche 13   | GE 130 3.8MW      | 246624 | 801159 | 701 | 84.9 |
| Cloiche 14   | GE 130 3.8MW      | 246598 | 803094 | 638 | 84.9 |
| Cloiche 15   | GE 130 3.8MW      | 246328 | 802556 | 683 | 84.9 |
| Cloiche 16   | GE 130 3.8MW      | 246665 | 802253 | 683 | 84.9 |
| Cloiche 17   | GE 130 3.8MW      | 246200 | 802005 | 694 | 84.9 |
| Cloiche 18   | GE 130 3.8MW      | 246029 | 801215 | 703 | 84.9 |
| Cloiche 19   | GE 130 3.8MW      | 247940 | 801628 | 703 | 84.9 |
| Cloiche 20   | GE 130 3.8MW      | 247944 | 800942 | 732 | 84.9 |
| Cloiche 21   | GE 130 3.8MW      | 248380 | 800690 | 721 | 84.9 |
| Cloiche 22   | GE 130 3.8MW      | 248999 | 800802 | 700 | 84.9 |
| Cloiche 23   | GE 130 3.8MW      | 248496 | 801189 | 714 | 84.9 |
| Cloiche 24   | GE 130 3.8MW      | 248479 | 802007 | 719 | 84.9 |
| Cloiche 25   | GE 130 3.8MW      | 249090 | 802015 | 723 | 84.9 |
| Cloiche 26   | GE 130 3.8MW      | 249193 | 801495 | 682 | 84.9 |
| Cloiche 27   | GE 130 3.8MW      | 249798 | 800871 | 716 | 84.9 |
| Cloiche 28   | GE 130 3.8MW      | 249475 | 800443 | 727 | 84.9 |
| Cloiche 29   | GE 130 3.8MW      | 255605 | 801455 | 749 | 84.9 |
| Cloiche 30   | GE 130 3.8MW      | 256001 | 801903 | 710 | 84.9 |
| Cloiche 31   | GE 130 3.8MW      | 256641 | 802276 | 737 | 84.9 |
| Cloiche 32   | GE 130 3.8MW      | 257165 | 802794 | 743 | 84.9 |
| Cloiche 33   | GE 130 3.8MW      | 256751 | 803157 | 714 | 84.9 |
| Cloiche 34   | GE 130 3.8MW      | 257337 | 803339 | 752 | 84.9 |
| Cloiche 35   | GE 130 3.8MW      | 257234 | 803946 | 741 | 84.9 |
| Cloiche 36   | GE 130 3.8MW      | 256658 | 804129 | 739 | 84.9 |

#### **Turbine Coordinate Source**

|             |  |
|-------------|--|
| Stronelaig  | As Built Coordinates provided by SSE   |
| Dell        | Coordinates taken from ES, Table 4.2 and candidate from ES                                 |
| Corriegarth | As Built Coordinates taken from document CORRr046 Rev D - Corriegarth Coordinates 15-07-15 |
| Glenshero   | Coordinates taken from ES, Vol 2 Chapter 2 Table 2.1 and candidate from ES                 |

## Annex 5 – Suggested Noise Conditions

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## Noise

- 1) 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 the values for the relevant integer wind speeds set out in or derived from Table 1 attached to these conditions and:
  - A) Prior to the operation of the wind farm, 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 immissions 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 logged in accordance with paragraph (H) to the Local Authority in the format set out in Guidance Note 1(e).
  - C) Where there is more than one property 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. Where a dwelling to which a complaint is related is not identified by name or location in the Table attached to these conditions, the wind farm operator shall submit to the Local Authority for written approval proposed noise limits to be adopted at the complainant's dwelling for compliance checking purposes. The proposed noise limits are to be those limits selected from the Table 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 submission of the proposed noise limits to the Local Authority shall include a written justification of the choice of the representative background noise environment provided by the independent consultant. 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 Authority for the complainant's dwelling.
  - 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 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 complainant's property (to improve the signal to noise ratio), then the operator's submission shall include a method to calculate the noise level from the wind



turbines at the complainant's 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 set out in the Table attached to these conditions or approved by the Local Authority pursuant to paragraph (C) of this condition shall be undertaken at the measurement location approved in writing by the Local Authority.

- E) Prior to the submission of the independent consultant's assessment of the rating level of noise immissions pursuant to paragraph (F) of this condition, 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 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 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 immissions shall be undertaken in accordance with the assessment protocol approved in writing by the Local Authority and the attached Guidance Notes.

- F) The wind farm operator shall provide to the Local 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 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 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) of the attached Guidance Notes, the wind farm operator shall submit a copy of the further assessment within 21 working days of submission of the independent consultant's assessment pursuant to paragraph (F) above unless the time limit for the submission of the further assessment has been extended in writing by the Local Authority.
- H) 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 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.

**Note:** For the purposes of this condition, a “dwelling” is a building within Use Classes 7, 8 and 9 of the Town and Country Planning (Use Classes) (Scotland) Order 1997 which lawfully exists or had planning permission at the date of this permission.

**Table 1 – All times of the Day - Noise level dB L<sub>A90</sub>**

| Location (easting, northing grid coordinates) | Standardised wind speed at 10 metres height (m/s) averaged over 10-minute periods |      |      |      |      |      |      |      |      |      |      |      |
|---|---|------|------|------|------|------|------|------|------|------|------|------|
|   | 1   | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| L <sub>A90</sub> Decibel Levels               |   |      |      |      |      |      |      |      |      |      |      |      |
| Killin Lodge (252673, 808997)                 | 35.0  | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 33.5 | 32.7 | 32.7 | 32.7 | 32.7 | 32.7 |
| Crathie (258349, 794404)                      | 35.0  | 35.0 | 35.0 | 35.0 | 35.0 | 34.4 | 33.9 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 |
| Garvabeg (252766, 794886)                     | 33.8  | 33.8 | 33.8 | 33.8 | 33.8 | 32.9 | 31.0 | 30.5 | 30.5 | 30.5 | 30.5 | 30.5 |
| Melgarve (246328, 796097)                     | 34.1  | 34.1 | 34.1 | 34.1 | 34.1 | 33.4 | 32.2 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |

Note 1 to Table 1: The geographical coordinates references set out in the table are provided for the purpose of identifying the general location of dwellings to which a given set of noise limits applies. The standardised wind speed at 10 metres height refers to wind speed at 10 metres height derived from those at hub height, calculated in accordance with the method given in the Guidance Notes.

## 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 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 (m/s) and arithmetic mean wind direction in degrees from north in each successive 10-minutes period in a manner to be agreed in writing with the planning authority. Each 10 minute arithmetic average mean wind speed data as measured or calculated 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 in accordance with paragraphs (E) (F) (G) and (H) of the noise condition 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.

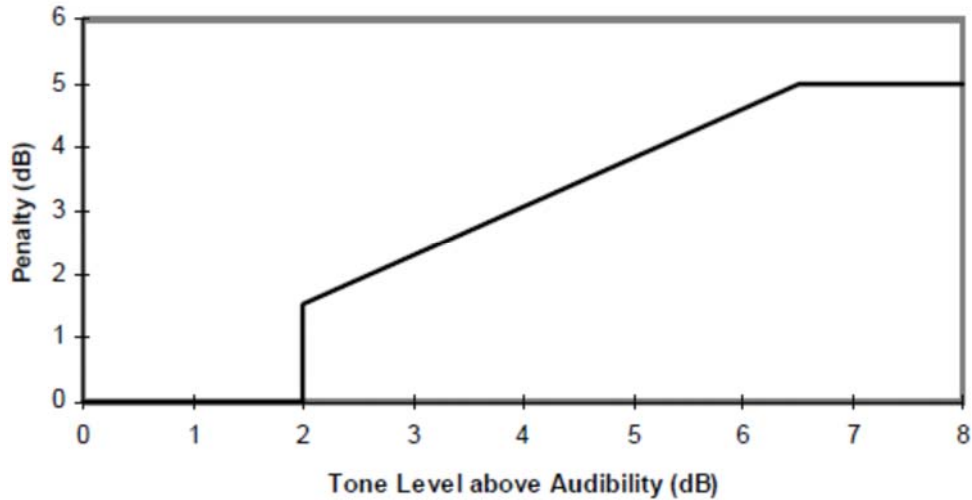
- (f) A data logging rain gauge shall be installed in the course of the independent consultant undertaking an assessment of the level of noise immissions. The gauge shall record over successive 10-minute periods synchronised with the periods of data recorded in accordance with Note 1(d).

**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 under paragraph (E) of the noise condition 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 under paragraph (E) 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 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 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 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 under paragraph (E) 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 Note 2.
- (c) If the rating level at any integer wind speed lies at or below the values set out in the Table attached to the conditions or at or below the noise limits approved by the Local Authority for a complainant's dwelling in accordance with paragraph (C) of the noise condition then no further action is necessary. In the event that the rating level is above the limit(s) set out in the Table attached to the noise conditions or the noise limits for a complainant's dwelling approved in accordance with paragraph (C) 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 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:
  - i. Repeating the steps in Note 2, with the wind farm switched off or prior to the operation of the wind farm, and determining the background noise ( $L_3$ ) at each integer wind speed within the range set out in the approved noise assessment protocol under paragraph (E) of this 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 Table attached to the conditions or at or below the noise limits approved by the Local Authority for a complainant's dwelling in accordance with paragraph (C) 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 Local Authority for a complainant's dwelling in accordance with paragraph (C) of the noise condition then the development fails to comply with the conditions.