

# Cairnhill Wind Farm

APP/2014/0508

S42 Application – supporting statement

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**Client:** Cairnhill Windfarm Ltd

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**Report Prepared for:**

Marcus Price Hafslund on behalf of Cairnhill Windfarm Ltd

**Author:**

Green Cat Renewables Ltd

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# 1 Introduction

## 1.1 Preamble

The purpose of the two S42 applications that the following information is submitted in support of, is to facilitate an equitable re-allocation of the operating headroom at the site between existing projects. No additional wind turbines are planned or proposed at the site. The following information details where the historical allocation of headroom differs from best practice.

In March 2023, the information contained in this supporting statement was provided to Aberdeenshire Environmental Health to initiate a consultation on the subject of making amendments to the noise conditions given in APP/2014/0508 and PPA-110-2264, via S42 application. Although some initial brief comments were received in response to this query, from an Environmental Health Officer (EHO), the consultation process ended when we were notified that the EHO had gone on long term leave and her manager had left her role within Environmental Health. As a result, no formal response was received.

Ownership of both the wind developments listed above has recently changed. The original three turbine project at Cairnhill is now operated as a separate financial entity to the extension turbine (now known as Cairnhill 2). The new owners therefore seek to amend the noise conditions given in PPA-110-2264 such that they refer to immission levels for Cairnhill 2 alone.

The following review of noise conditions applicable at the site, necessitated by the legal separation of PPA-110-2264 noise constraints from APP/2014/0508, provided the opportunity to review whether the mitigation requirement stated in both APP/2014/0508 and PPA-110-2264 is an operational necessity when considering the provisions given in the IoA GPG, provisions that were novel at the time of approval and which have subsequently become more fully understood by all stakeholders.

## 1.2 Project History

The three-turbine wind energy project at Cairnhill (Planning reference F/App/2007/2299) was approved in July 2008. Condition 15 of approval gives operational noise limits for the project:

*At wind speeds not exceeding 10m/s, as measured or calculated at a height of 10m above ground level at the site, the wind turbine noise level at any noise sensitive property shall not exceed 35dB LA90 (10 minutes).*

*The condition shall only apply to dwellings, vacant or occupied, existing at the date of this planning permission.*

A three turbine project at Castle of Auchry was later approved on 10/08/2012; ref: APP/2010/0067. This project is located south of the Cairnhill turbines but contributes to the cumulative immission levels in the area. Condition 3 of this approval was amended on 19/12/2012 to allow for an increase the tip height from 74m to 80m; ref: APP/2012/2824. All other conditions were carried forward without amendment. Condition 15 of approval states the following:

*At wind speeds not exceeding 12 metres per second, as measured or calculated at a height of 10 metres above ground level, at the site, the wind turbine noise level at any dwelling shall not exceed:*

*(a) During night hours 38 dB LA90 (10 minutes) or the night hours LA90 (10 minutes) background noise level plus 5 dBA, whichever is the greater, and;*

*(b) During daytime hours 35 dB LA90 (10 minutes) or the daytime hours LA90 (10 minutes) background noise level plus 5 dBA, whichever is the greater;*

*(c) Notwithstanding the above and providing the present and future occupants of Cairnhill Croft have a financial interest in the windfarm development the noise at Cairnhill Croft shall not exceed 45dB LA90 (10 minutes).*

A two turbine extension to the existing Cairnhill project was proposed in 2012. This proposal was reduced to a single turbine extension, but the resulting application (ref: APP/2012/0272) was refused by the LPA on 22 January 2015. Cumulative noise was cited among the reasons for refusal.

Application APP/2014/0508 was then lodged to amend Condition 15 of the original Cairnhill approval (F/App/2007/2299) quoted above from a simplified 35dB(A) noise condition to the tabulated limit values given in the Table 1-1:

**Table 1-1 Approved immission limits for Cairnhill only**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	24	28	31	34	33	36	36	36	36
Cotburn	377065 853239	25	28	32	35	36	37	37	37	37
Craigbank	377137 852566	26	30	33	36	37	38	38	38	38
Easter Badentyre	377348 852114	25	28	32	35	34	37	37	37	37

Note: for all properties not specified above the predicted noise from the turbine will be calculated using the propagation model in ISO 9613-Part 2 incorporating the recommendations contained in the Institute of Acoustics Good Practice Guide dated May 2013.

The amended noise conditions included a requirement to mitigate the three Cairnhill turbines from 800kW mode (full power) to 600kW mode for a narrow sector of wind directions between 52 degrees and 123 degrees when the 10m wind speeds were between 7.5m/s and 8.5m/s. This is reflected in lower limit values, ascribed to Cairnhill Croft and Easter Badentyre for 8m/s, than those for adjacent wind speeds.

Application APP/2012/0272 for a single turbine extension to Cairnhill (Cairnhill 2) was subsequently approved at appeal (ref: PPA-110-2264) on 22 June 2015. The noise limits for that approval are given at Condition 15:

**Table 1-2 Approved immission limits for Cairnhill 2**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	28	28	32	35	34	37	37	37	37
Cotburn*	377065 853239	31	31	35	38	39	40	40	40	40
Craigbank*	377137 852566	31	31	34	37	39	39	39	39	39
Easter Badentyre	377348 852114	29	29	32	35	35	37	37	37	37

\*These properties will have a financial interest in the development

Condition 15 is ambiguous as to the turbine(s) that the limit values are associated with, but given they are equal to or show a marginal increase over, those shown in Table 1-1, and because the additional turbine was proposed as an extension of Cairnhill Wind farm, it is reasonable to assume that the constraint applies to all four Cairnhill turbines.

The single Enercon E48 turbine installed under PPA-110-2264 (Cairnhill 2) was the 500kW variant, rather than the 800kW version, (that formed the basis of approval) whose maximum sound emission levels are 2.5dB lower than the 800kW turbine. The 800kW variant is installed at both Cairnhill and Castle of Auchry.

## 2 Reassessment of applicable noise limits

### 2.1 Consistency with previous submissions

The following analysis relies on the same baseline data that has been referenced in previous planning submissions (NIAs) and which formed the basis for both Cairnhill (APP/2014/0508) and Cairnhill 2 (PPA-110-2264) approvals, including:

1. Cumulative ETSU noise limits derived from measured background levels (appendix 1);
2. Enercon E48 turbine sound power data (both 500kW & 800kW variants);
3. Receptor locations, and;
4. Turbine locations.

### 2.2 Historical deviations from current best practice

The following points are considerations that have been included in the reappraisal of applicable noise limit criteria.

1. Full ETSU noise limits were approved for Castle of Auchry (ref: APP/2010/0067), despite the presence of the operational Cairnhill Wind Farm, when apportioned limits would have been more appropriate. This led to issues when Environmental Health required that Castle of Auchry be represented as operating at the limit of its condition in subsequent cumulative assessments, thereby ascribing more operational headroom to that project than should have been approved or it could reasonably use in practice.
2. ETSU is applicable to wind developments of 50kW and greater. However, app reference: F/APP/2010/3297 (Upper Cotburn) was nevertheless included in the cumulative noise assessment for all assessment locations. This project consists of three 20m tall turbines of 15kW each, that have little potential for contribution to cumulative immission levels at locations other than Cotburn. These three turbines are located to the north-west of Cotburn which is opposite in direction to the four Cairnhill turbines lying to the south-east. Therefore, even if it is considered that the project has potential for cumulative noise at Cotburn, it would not receive any contribution during conditions when Cotburn lies downwind of Cairnhill & Cairnhill 2.
3. Despite the developer of Cairnhill 2 securing Financial Involvement arrangements with two of the nearby residents, the resulting limit criteria (PPA-110-2264) did not reflect these arrangements, particularly at the lower wind speeds where a lower fixed limit of 40dB (Aberdeenshire PA - Wind Turbine Development: Submission Guidance Note – 2015) or 45dB should be applied.
4. The requirement for mitigation of Cairnhill was the inevitable result of the cumulative effect of the previous three issues. Once these issues are addressed in line with current best practice, it becomes clear that there is sufficient operational headroom in the local noise environment for each of the three developments to operate concurrently and without recourse to any power curtailment.

### 2.3 Cumulative Assessment Principals

The following calculations are based on the following principals:

- a) That a 40dB limit may be applied for resident who has a financial involvement in a project where there is contributing cumulative immission from other nearby projects as per point 3 above.
- b) Apportioned limits can be calculated from predicted immission levels by rounding those levels to the nearest integer dB and then adding 1dB. This has been common practice for projects in Aberdeenshire and beyond since the introduction of the IoA GPG.

- c) Under section 5.4 of the IoA (Derivation of the Relative Noise Limits), the sections relevant to this S42 application begin at 5.4.6 (Existing wind farm/s, consented to the total ETSU-R-97 limits, currently operating).
- a. Castle of Auchry is consented with total ETSU-R-97 limits.
  - b. The project is currently operating.
  - c. The sum of the noise limits for all the [cumulative] sites exceed the requirements of ETSU-R-97 (Point 1 above).
  - d. The existing wind farm is not utilising the total ETSU-R-97 limits and therefore significant headroom is present.
  - e. The operator of Cairnhill & Cairnhill 2 does not have consent to make measurements at Castle of Auchry.
  - f. There needs to be confidence that the unused headroom currently available will continue to be available. Castle of Auchry has been operating for almost 10 years without any known noise compliance or complaint issues. Empirically, an increase in sound power of more than 2dB for any of the turbines would suggest a significant short term maintenance issue. Having measured dozens of Enercon turbines through their life cycle, GCR's experience is that the turbines operate within their stated  $\pm 1$ dB sound power warranty. There is therefore no evidence to suggest that sound power of these turbines or the background levels, on which the total ETSU noise limits are based, would change significantly over time. It is therefore reasonable to be confident that the currently available headroom will persist.
  - g. Cumulative conditioning of noise applies for Cairnhill 2 but this is no longer sustainable.
  - h. Negotiation is possible but only between the projects at Cairnhill and Carinhill 2.
- d) With the above criteria met, then clause 5.4.11 applies:

*'In cases where there is significant headroom (e.g. 5 to 10 dB) between the predicted noise levels from the existing wind farm and the total ETSU-R-97 limits, where there would be no realistic prospect of the existing wind farm producing noise levels up to the total ETSU-R-97 limits, agreement could be sought with the LPA as to a suitable predicted noise level (including an appropriate margin to cover factors such as potential increases in noise) from the existing wind farm to be used to inform the available headroom for the cumulative assessment without the need for negotiation or cumulative conditioning. This may be the case particularly at low wind speeds.'*

Greater than 5dB headroom exists between predicted levels from Castle of Auchry and its consented limits.

An appropriate margin above predicted levels may be agreed with the LPA. GCR propose this margin be 2dB for the reasons given above.

Amendment of the noise limits provided for Castle of Auchry (ref: APP/2010/0067), namely Condition 15, is not required.

## 2.4 Cumulative Noise Assessment

Table 2-1 shows predicted levels for Castle of Auchry with an additional +2dB margin as per clause 5.4.11.

**Table 2-1 Castle of Auchry**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	26.3	30.7	34.9	36.5	37.1	37.1	37.1	37.1	37.1
Cotburn	377065 853239	12.8	17.2	21.4	23.0	23.6	23.6	23.6	23.6	23.6
Craigbank	377137 852566	16.8	21.2	25.4	27.0	27.6	27.6	27.6	27.6	27.6
Easter Badentyre	377348 852114	21.4	25.8	30.0	31.6	32.2	32.2	32.2	32.2	32.2

Table 2-2 shows predicted levels from Cairnhill rounded up to the nearest integer +1dB headroom. No curtailment of sound emission would be required to meet these limits. It is proposed these be the new apportioned limits for Cairnhill.

**Table 2-2 Proposed limits for Cairnhill**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	25	29	32	35	37	37	37	37	37
Cotburn	377065 853239	26	29	33	36	37	38	38	38	38
Craigbank	377137 852566	27	31	34	37	39	39	39	39	39
Easter Badentyre	377348 852114	26	29	33	36	37	38	38	38	38

Table 2-3 shows Cairnhill 2 levels rounded up to the nearest integer +1dB headroom. As previously, no curtailment of sound emission would be required to meet these limits. It is proposed these be the new apportioned limits for Cairnhill 2.

**Table 2-3 Proposed limits for Cairnhill 2**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	15	19	23	25	25	25	25	25	25
Cotburn	377065 853239	25	30	34	35	36	36	36	36	36
Craigbank	377137 852566	21	25	29	31	31	31	31	31	31
Easter Badentyre	377348 852114	16	21	25	26	27	27	27	27	27

Table 2-4 shows cumulative levels from all three preceding tables.



**Table 2-4 Cumulative levels**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	28.9	33.1	36.9	39.0	40.2	40.2	40.2	40.2	40.2
Cotburn	377065 853239	28.7	32.7	36.7	38.7	39.6	40.2	40.2	40.2	40.2
Craigbank	377137 852566	28.3	32.3	35.6	38.3	39.9	39.9	39.9	39.9	39.9
Easter Badentyre	377348 852114	27.6	31.2	35.2	37.7	38.6	39.3	39.3	39.3	39.3

Table 2-5 shows applicable cumulative immission limits.

**Table 2-5 Applicable immission limits**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Cotburn	377065 853239	40.0	40.0	40.0	43.6	48.8	53.6	57.6	60.6	62.1
Craigbank	377137 852566	40.0	40.0	40.0	40.0	45.0	51.0	56.8	61.2	62.5
Easter Badentyre	377348 852114	35.0	35.0	35.0	39.2	43.6	47.6	50.8	52.8	53.1

Exceedance of applicable limits is shown in Table 2-6.

**Table 2-6 Exceedance of applicable limits**

Location		Standardised Wind Speed at 10m height in m/s averaged over 10-minute periods, Sound Pressure Levels in dB, LA 10min								
		4	5	6	7	8	9	10	11	12
Cairnhill Croft	377737 851954	-16.1	-11.9	-8.1	-6.0	-4.8	-4.8	-4.8	-4.8	-4.8
Cotburn	377065 853239	-11.3	-7.3	-3.3	-4.9	-9.2	-13.4	-17.4	-20.4	-21.9
Craigbank	377137 852566	-11.7	-7.7	-4.4	-1.7	-5.1	-11.1	-16.9	-21.3	-22.6
Easter Badentyre	377348 852114	-7.4	-3.8	0.2	-1.5	-5.0	-8.3	-11.5	-13.5	-13.8

In this example, compliance with total ETSU limits is shown by a safe margin in all scenarios but one; Easter Badentyre at 6m/s where a marginal exceedance of 0.2dB is shown. Given that the calculations conservatively assume simultaneous downwind propagation from all turbines, this marginal exceedance is not viewed as significant.

### 3 Summary

It is ambiguous as to which turbines the limits approved for Cairnhill 2 apply to. Separate noise limits for Cairnhill 2 are now required such that it may operate as a separate legal entity.

For the reasons discussed, the approved noise limits for the three sites were not arrived at following current best practice.

The IoA guidance allows for a more equitable distribution of operational headroom across neighbouring developments provided that certain criteria are met. The preceding discussion illustrates that these criteria are met.

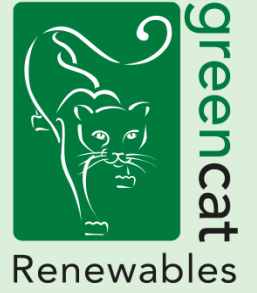
An example is given that demonstrates that existing operational headroom is available and how separate apportioned limits for both Cairnhill and Carnhill 2 could be accommodated.

The proposed changes do not constrain Castle of Auchry whose approved conditions need not be amended.

No further development of wind energy is proposed for the site at Cairnhill.

The preceding information provides the basis for the two S42 applications, but further detail can be provided as required by the planning officer.

The supplied information includes proposed noise limits for both Cairnhill and Cairnhill 2.



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**Registered Office**

Green Cat Renewables  
Stobo House  
Roslin  
Midlothian  
EH25 9RE

+44 (0) 131 541 0060

[info@greencatrenewables.co.uk](mailto:info@greencatrenewables.co.uk)  
[www.greencatrenewables.co.uk](http://www.greencatrenewables.co.uk)