

Appendix 7A

Cumulative Wind Farm Noise Assessment

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Introduction

Within the 10km study area, other wind farm developments, including those that are consented but not built, or at planning stage, have been considered as part of the assessment of effects. **Table 7A.1** below outlines the identified wind farms for inclusion within the cumulative noise assessment.

Table 7A.1 Sources of turbine information

Site	Turbine type	Source
Eredine	Siemens Gamesa SG155-6.6	Craigimoddie II Environmental Impact Assessment Report ¹
An Suidhe Part 1	Enercon E44/900	Sound Power Level E-44 ²
An Suidhe Part 2	Enercon E48/800	Sound Power Level E-48 ³
A' Chruach Part ¹	Senvion MM92/2050*	Power Curve & Sound Power Level MM 92 [2050kW/50&60Hz] ⁴
A' Chruach extension Part ¹	Senvion MM100	Power Curve & Sound Power Level MM 100 [50Hz/2000kW] ⁵
Blarghour ²	Vestas V117	Blarghour Environmental Statement – Technical Appendix 2.6 (Noise Impact Assessment) ⁶
An Càrr Dubh	Siemens Gamesa SG155-6.6	An Carr Dubh Wind Farm Volume 1 – Chapter 11 – Noise ⁷
Glasvaar	Vestas V136	Glasvaar Wind Farm EIA Report – Chapter 11 - Noise ⁸

¹ Energiekontor UK Ltd (2020). *Craigimoddie Wind Farm Environmental Impact Assessment Report – Chapter 10: Noise*. [online] Available at:

<https://www.energiekontor.co.uk/component/rsfiles/preview?path=Craigimoddie%252FEIAR%2B-%2BVolume%2B%252FCh10-15%252FChapter%2B10%2B-%2BNoise.pdf> [Accessed 14 December 2023].

² Enercon (2012). *SIAS-04-SPL E44 OM | Rev2_1-eng-eng.doc*, Sound Power Level E-44. Enercon, Germany

³ Enercon (2012). *SIAS-04-SPL E48 OM | Rev3_1-eng-eng.doc*, Sound Power Level E-48. Enercon, Germany

⁴ Senvion (2014). *SD-2.9-WT.PC.03-B-G-EN*, Power Curve & Sound Power Level MM 92 [2050kW/50&60Hz]. Senvion, Germany.

⁵ Senvion (2014). *SD-2.21-WT.PC.01-A-D-EN*, Power Curve & Sound Power Level MM 100 [50Hz/2000kW]. Senvion, Germany.

⁶ Ramboll (2018). *Blarghour Wind Farm Environmental Statement – Technical Appendix 2.6 (Noise Impact Assessment)*. [online] Available at: [https://coriolisv3.opendebate.co.uk/files/blarghour/Environmental Statement/Vol4 TechnicalAppendix 2.6 Noise 2.p df](https://coriolisv3.opendebate.co.uk/files/blarghour/Environmental%20Statement/Vol4%20TechnicalAppendix%202.6%20Noise%202.pdf) [Accessed 14 December 2023].

⁷ Statkraft (2023). *An Carr Dubh Wind Farm Volume 1 – Chapter 11 – Noise*. [online] Available at: [volume-1---chapter-11---noise.pdf \(statkraft.co.uk\)](https://www.statkraft.co.uk/volume-1---chapter-11---noise.pdf) [Accessed 14 December 2023].

⁸ Glasvaar Ltd (2022) *Glasvaar Wind Farm EIA Report – Chapter 11 – Noise*. [online] Available at: <https://portal360.argyll-bute.gov.uk/civica/Resource/Civica/Handler.ashx/Doc/pagestream?cd=inline&pdf=true&docno=22822324> [Accessed 9 February 2024]

Site	Turbine type	Source
¹ A' Chruach Wind Farm is to utilise both Servion MM100 and MM92 turbine models. As the placement of the exact turbines is unknown, all turbines have been assumed to be MM100 as a worst-case scenario. ² In 2021, consent was granted for a 17 turbine wind farm development (application reference WIN-130-4). Since then a planning application to vary the Section 36 consent has been submitted but is yet to be determined. The variation proposed to reduce the number of turbines from 17 to 14. The inclusion of the consented development is therefore considered to be a worst-case scenario.		

The Proposed Development

The Proposed Development comprises 22 wind turbines with a hub height of 122.5m. The location of the turbines are presented in **Table 7A.2** and illustrated within Figure 4.1 within **Chapter 4 - Description of the Proposed Development** of the Environmental Impact Assessment (EIA) Report.

Table 7A.2 Turbine details for Proposed Development

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	201508	706114	122.5
T2	201129	707055	122.5
T3	200888	705148	122.5
T4	200779	706459	122.5
T5	200222	704727	122.5
T6	200175	705910	122.5
T7	199614	704277	122.5
T8	199236	705150	122.5
T9	199178	707191	122.5
T10	199172	705898	122.5
T11	199000	703779	122.5
T12	198805	704370	122.5
T13	198850	706418	122.5
T14	198423	706930	122.5
T15	198350	705077	122.5
T16	198155	703498	122.5
T17	198092	705579	122.5
T18	198064	706123	122.5
T19	197887	702987	122.5

T20	197534	702434	122.5
T21	197030	704927	122.5
T22	196547	704575	122.5

The candidate turbine used for the purposes of this assessment is the Siemens Gamesa SG155-6.6, modelled on full power. **Table 7A.3** provides the candidate turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.4** shows the octave band sound power levels.

Table 7A.3 Sound power levels used for Proposed Development turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Siemens Gamesa SG 155-6.6	100.4	105.2	107.0	107.0	107.0	107.0	107.0	107.0	107.0

Table 7A.4 Octave band sound power levels used for Proposed Development turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	80.0	87.4	92.0	94.3	94.1	94.4	87.8	72.8
5	84.8	92.2	96.8	99.1	98.9	99.2	92.6	77.6
6	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
7	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
8	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
9	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
10	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
11	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
12	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4

An Suidhe Part 1

The location of the turbines are presented in **Table 7A.5**.

Table 7A.5 Turbine details for An Suidhe Part 1

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	200835	708046	50
T2	201109	707994	50
T3	201322	708122	50
T4	201540	708272	50
T5	201760	708442	50
T6	200992	708273	50
T7	201169	708381	50
T8	201379	708521	50
T9	201529	708739	50

Table 7A.6 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.7** shows the octave band sound power levels.

Table 7A.6 Sound power levels used for An Suidhe Part 1 turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Enercon E44/900	101.9	101.9	101.9	101.9	103.5	104.1	104.1	104.1	104.1

Table 7A.7 Octave band sound power levels used for An Suidhe Part 1 turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	82.7	89.5	94.5	95.5	96.8	94	87.3	82.6
5	82.7	89.5	94.5	95.5	96.8	94	87.3	82.6
6	82.7	89.5	94.5	95.5	96.8	94	87.3	82.6
7	82.7	89.5	94.5	95.5	96.8	94	87.3	82.6
8	85.7	91.2	94.8	96.9	98.9	96.2	88.9	82.8
9	86.4	92.9	95.1	98	99.5	96	88.7	82.4
10	86.2	91.9	95.3	98.3	99.4	96.1	88.8	81.9
11	86.2	91.9	95.3	98.3	99.4	96.1	88.8	81.9
12	86.2	91.9	95.3	98.3	99.4	96.1	88.8	81.9

An Suidhe Part 2

The location of the turbines are presented in **Table 7A.8**.

Table 7A.8 Turbine details for An Suidhe Part 2

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	199724	706463	56
T2	199906	707150	56
T3	200156	707351	56
T4	200268	707530	56
T5	200573	707582	56
T6	200392	707754	56
T7	200249	707984	56
T8	199966	707964	56
T9	200092	708241	56
T10	200352	708243	56
T11	200519	708404	56
T12	200757	708496	56

Turbine Location Reference	Easting	Northing	Hub Height (m)
T13	201045	708768	56
T14	201272	708981	56

Table 7A.9 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.10** shows the octave band sound power levels.

Table 7A.9 Sound power levels used for An Suidhe Part 2 turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Enercon E48/800	91.2	95.7	99.9	102.7	103.7	104.5	104.5	104.5	104.5

Table 7A.10 Octave band sound power levels used for An Suidhe Part 2 turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	73.0	78.7	85.7	86.4	84.0	80.2	76.4	72.7
5	77.5	83.2	90.2	90.9	88.5	84.7	80.9	77.2
6	81.6	85.7	92.6	94.9	94.7	89.5	85.7	82.3
7	84.0	88.7	96.2	98.1	96.5	91.4	88.5	86.0
8	81.9	88.3	97.4	99.4	97.8	91.4	88.1	85.9
9	82.3	89.8	98.6	100.0	97.6	92.5	91.3	89.6
10	80.9	86.7	96.2	99.1	100.2	95.0	89.9	86.9
11	80.9	86.7	96.2	99.1	100.2	95.0	89.9	86.9
12	80.9	86.7	96.2	99.1	100.2	95.0	89.9	86.9

A' Chruach extension Part 1

The location of the turbines are presented in **Table 7A.11**.

Table 7A.11 Turbine details for A' Chruach extension Part 1

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	193420	699571	80
T2	193061	699613	80
T3	192876	699380	80
T4	193089	699257	80
T5	192609	699123	80
T6	192380	698947	80
T7	192075	698966	80
T8	192593	698622	80
T9	191978	698554	80
T10	191740	698992	80
T11	191661	698726	80
T12	191369	698502	80
T13	191462	698173	80
T14	191703	698430	80
T15	193527	697326	80
T16	193883	697179	80
T17	193292	697115	80
T18	193654	696948	80
T19	193342	696834	80
T20	193039	696888	80
T21	192960	696568	80

Table 7A.12 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.13** shows the octave band sound power levels.

Table 7A.12 Sound power levels used for A' Chruach extension Part 1 turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Senvion MM100*	98.1	103.4	105	105.7	105.8	105.8	105.8	105.8	105.8

* A' Chruach Wind Farm is to utilise both Senvion MM100 and MM92 turbine models. As the placement of the exact turbines is unknown, all turbines have been assumed to be MM100 as a worst-case scenario.

Table 7A.13 Octave band sound power levels used for A' Chruach extension Part 1 turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	71.3	80.8	86.2	91.8	93.1	92.3	87.5	80.1
5	75.6	85	91.3	96.4	98.6	97.8	92.9	86.9
6	77.2	86.7	93.2	98	100.3	99.3	94.5	88.7
7	77.9	87.6	93.9	98.6	100.8	100	95.4	90.6
8	78.2	88.3	94.1	98	100.6	100.4	96.2	91.6
9	78	87.6	93.8	98.1	100.6	100.5	96.3	92.1
10	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3
11	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3
12	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3

A' Chruach extension Part 1

The location of the turbines are presented in **Table 7A.14**.

Table 7A.14 Turbine details for A' Chruach extension Part 2

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	193836	697396	80
T2	194235	697241	80

Table 7A.15 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.16** shows the octave band sound power levels.

Table 7A.15 Sound power levels used for A' Chruach extension Part 2 turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Senvion MM100	98.1	103.4	105	105.7	105.8	105.8	105.8	105.8	105.8

Table 7A.16 Octave band sound power levels used for A' Chruach extension Part 2 turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	71.3	80.8	86.2	91.8	93.1	92.3	87.5	80.1
5	75.6	85	91.3	96.4	98.6	97.8	92.9	86.9
6	77.2	86.7	93.2	98	100.3	99.3	94.5	88.7
7	77.9	87.6	93.9	98.6	100.8	100	95.4	90.6
8	78.2	88.3	94.1	98	100.6	100.4	96.2	91.6
9	78	87.6	93.8	98.1	100.6	100.5	96.3	92.1
10	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3
11	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3
12	78.7	88.6	94.1	97.5	100.2	100.5	97	93.3

Blarghour

The location of the turbines are presented in **Table 7A.17**.

Table 7A.17 Turbine details for Blarghour

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	203341	715526	78
T2	203833	715461	78
T3	204299	715248	78
T4	202745	715060	78
T5	203424	715106	78
T6	203965	714983	78
T7	202861	714688	78
T8	203547	714675	78
T9	203997	714582	78
T10	203329	714350	78
T11	203821	714178	78
T12	203130	713965	78
T13	203601	713788	78
T14	202888	713677	78
T15	203288	713464	78
T16	202573	713313	78
T17	202940	713092	78

Table 7A.18 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.19** shows the octave band sound power levels.

Table 7A.18 Sound power levels used for Blarghour turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Vestas V117	97.7	102.2	106.2	108.6	108.8	108.8	108.8	108.8	108.8

Table 7A.19 Octave band sound power levels used for Blarghour turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	78.1	85.2	89.9	92.2	92.1	89.5	84.5	77.0
5	82.6	89.7	94.4	96.7	96.6	94.0	89.0	81.5
6	86.6	93.7	98.4	100.7	100.6	98.0	93.0	85.5
7	89.0	96.1	100.8	103.1	103.0	100.4	95.4	87.9
8	89.2	96.3	101.0	103.3	103.2	100.6	95.6	88.1
9	89.2	96.3	101.0	103.3	103.2	100.6	95.6	88.1
10	89.2	96.3	101.0	103.3	103.2	100.6	95.6	88.1
11	89.2	96.3	101.0	103.3	103.2	100.6	95.6	88.1

Broad band sound power data for Vestas V117 4.2MW was unavailable, so the closest match V117 3.4MW has been used.

An Carr Dubh

The location of the turbines are presented in **Table 7A.20**.

Table 7A.20 Turbine details for An Càrr Dubh

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	204480	711431	122.5
T2	204460	711855	122.5
T3	203485	711094	122.5
T4	203215	711665	122.5
T5	202838	711959	122.5
T6	203065	712565	122.5
T7	203863	712604	122.5
T8	203567	712148	122.5
T9	201875	712156	122.5
T10	202196	712675	122.5
T11	201800	711645	122.5
T12	201540	711260	122.5
T13	201270	710920	122.5

Table 7A.21 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.22** shows the octave band sound power levels.

Table 7A.21 Sound power levels used for An Càrr Dubh turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Siemens Gamesa SG155-6.6	100.4	105.2	107.0	107.0	107.0	107.0	107.0	107.0	107.0

Table 7A.22 Octave band sound power levels used for An Càrr Dubh turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	80.0	87.4	92.0	94.3	94.1	94.4	87.8	72.8
5	84.8	92.2	96.8	99.1	98.9	99.2	92.6	77.6
6	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
7	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
8	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
9	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
10	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
11	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4
12	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4

Glasvaar

The location of the turbines are presented in **Table 7A.23**.

Table 7A.23 Turbine details for Glasvaar

Turbine Location Reference	Easting	Northing	Hub Height (m)
T1	191118	699080	82
T2	191625	699552	82
T3	192156	699948	82
T4	190659	699324	82
T5	191126	699766	82
T6	191654	700136	82
T7	190058	699445	82
T8	190602	699879	82

Table 7A.24 provides the turbine sound power level referenced to 10m height with a +2dB uncertainty correction included, whilst **Table 7A.25** shows the octave band sound power levels.

Table 7A.24 Sound power levels used for Glasvaar turbines (+2dB uncertainty correction)

Candidate turbine	Sound power levels (dB L_{WA}) at standardised 10m height wind speed (V_{10}) ms^{-1}								
	4	5	6	7	8	9	10	11	12
Vestas V136	96.7	101.5	105.3	105.9	105.9	105.9	105.9	105.9	105.9

Table 7A.25 Octave band sound power levels used for Glasvaar turbines at different wind speeds (+2dB uncertainty correction)

Wind speed (m/s)	Sound power levels (dB L_{WA}) by octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
4	77.3	85.1	90.0	91.9	90.8	86.6	79.6	69.3
5	82.0	90.0	94.9	96.8	95.6	91.3	84.1	73.6
6	85.8	93.7	98.6	100.5	99.3	95.1	87.9	77.5
7	86.5	94.4	99.3	101.1	99.9	95.6	88.5	78.2
8	86.8	94.5	99.3	101.0	99.9	95.8	88.8	78.6
9	86.8	94.5	99.2	101.0	99.9	95.8	88.9	78.8
10	86.9	94.5	99.2	101.0	99.9	95.8	88.9	79.0
11	87.0	94.6	99.2	101.0	99.9	95.8	89.0	79.1
12	87.0	94.6	99.2	101.0	99.9	95.9	89.1	79.3