12 Acoustic Assessment

12.1 Introduction

12.1.1 This chapter provides a revised assessment of the likely significant acoustic effects associated with the operation of the revised proposed development on residents of nearby properties. It details the post-submission consultation responses and how these have been addressed, relevant changes in policy, legislation and guidance, and the amendments to the original proposed development detailed and assessed in the EIA Report October 2023 that are relevant to acoustic impacts on nearby residents.

12.1.2 This chapter should be read in conjunction with the original acoustic assessment, in Chapter 12 of the EIA Report October 2023.

12.1.3 This assessment has been undertaken by Renewable Energy Systems Ltd (RES) (hereafter referred to as 'the applicant'), with two in-house Members of the Institute of Acoustics involved in its production. The applicant has undertaken acoustic impact assessments for every one of its UK wind farm development applications since 2000. The applicant has also carried out acoustic assessments and reported to several local planning authorities on operational wind energy projects, including taking measurements on newly constructed wind farms, to ensure compliance with planning conditions.

12.1.4 This AEI chapter is supported by **AEI Figure 12.1** and is referenced in the text where relevant. The Technical Appendices 12.1-12.7 supporting the original acoustic assessment within EIA Report October 2023 remain applicable to this chapter.

12.2 Legislation, Policy and Guidance

12.2.1 The acoustic impact of the revised proposed development is assessed in line with the criteria and guidance set out in Chapter 12, Section 12.2 of the EIA Report October 2023. There have been no relevant changes in planning policy or guidance since the original application was submitted.

12.3 Consultation

12.3.1 **AEI Table 12.1** provides a summary of the consultation responses received on 3 July 2024 in response to the original acoustic assessment, in Chapter 12 of the EIA Report October 2023.

AEI Table 12.1: Acoustic Assessment Consultation

Consultee	Consultee Comment	Applicant Response / Action	Date Received
East Lothian Council	"*Our Senior Environmental Health Officer has perused the noise assessment and is satisfied that, due to separation distances between the proposed turbines and any residential property within East Lothian, there will be no*	No response or action required.	03/07/2024

	impact upon amenity due to noise. As such, he has no comment to make."		
Scottish Borders Council	An external acoustic consultant provided by SBC, reviewed the noise impact assessment presented in Chapter 12 of the EIA report October 2023 and queried the derivation of 37.5 dBA as a lower fixed limit.	RES responded that the derivation of limits is in line with guidance from ETSU-R-97 and carefully considers potential sound affected residential properties as well as potential impact on power output. However, despite these discussions, these matters are no longer applicable to this AEI chapter due to the fact that the wind turbine layout has been updated, and the acoustic impacts have been re-assessed. RES remain to propose the limits described in Chapter 12, Section 12.7, of the EIA Report October 2023.	26/04/2024

12.4 Scope of Additional Environmental Information

12.4.1 The scope of this revised acoustic assessment is to predict the sound levels at the nearest residential properties resulting from the operation of the revised proposed development using a sound propagation model with the revised wind turbine layout. A screening exercise has also been undertaken to identity whether any potential cumulative operational impacts may occur in practise.

12.5 Methodology

12.5.1 All methodology, assessment criteria and baseline conditions are described in full in Chapter 12, Sections 12.4-12.6 of the EIA Report October 2023 and remain relevant to this chapter.

12.6 Baseline

Current Baseline

12.6.1 The baseline remains as described in full in Chapter 12, Section 12.6 of the EIA Report October 2023 and reamins relevant to this chapter.

12.7 Updated Assessment of Potential Effects

Design Amendments

12.7.1 The design amendments applicable to the updated acoustic assessment is the reduction in the number of wind turbines from 19 to 12, through the deletion of wind turbines T1-T4 and T17-T19.

Summary of Assessment of Original Proposed Development

12.7.2 The acoustic assessment of the original proposed development, including 19 wind turbines, concluded that the predicted operational sound levels are within the derived sound limits at all considered wind speeds and therefore complies with the relevant guidance relating to sound from wind farms.

Updated Sound Propagation Modelling

12.7.3 The coordinates of the wind turbines included in the revised proposed development are listed in **AEI Table 12.2** and are shown in **AEI Figure 12.1**. All coordinates are according to Ordnance Survey of Great Britain, 1936 (EPSG code 27700).

AEI Table 12.2: Updated Location of Proposed Wind Turbines

Wind Turbine	Co-ordinates		Wind Turbine	Co-ordinates	
	X (m)	Y (m)		X (m)	Y (m)
T5	355688	655868	T11	357010	658361
T6	356323	656104	T12	356390	658096
T7	355898	656509	T13	355614	657800
T8	356429	656886	T14	355275	657314
T9	356059	657276	T15	355148	656448
T10	356612	657632	T16	354396	656398

12.7.4 The residential properties that have been identified as being located nearest to the wind turbines remain unchanged from those listed in Table 12.8 in Chapter 12, of the EIA Report October 2023. The locations are also shown in **AEI Figure 12.1**.

12.7.5 The candidate wind turbine type used for the purposes of the revised acoustic assessment remains the same as in the original acoustic assessment. The A-weighted sound power levels and octave bands (dB(A) re 1pW) for Siemens-Gamesa SG 6.6-170 6.6 MW wind turbine, including 2 dB uncertainty, are unchanged from Tables 12.9 and 12.10 in Chapter 12, of the EIA Report October 2023.

Updated Predictions of Sound Levels at Residential Properties

12.7.6 **AEI Table 12.3** shows the updated predicted sound immission levels at the nearest residential properties at each wind speed considered, calculated from the operation of the revised proposed development. The property with the highest predicted sound immission level of 34.2 dB(A) is H315 (The Howe).

12.7.7 **AEI Figure 12.1** shows an updated sound contour plot associated with the revised proposed development at a standardised 10 m height wind speed of 8 ms^{-1}. Such plots are useful for evaluating the sound 'footprint' of a given development.

AEI Table 12.3: Updated Predicted Sound Levels at Nearby Residential Properties, dB L_{A90}

House ID	Standardised 10 m Height Wind Speed, $m.s^{-1}$											
	1	2	3	4	5	6	7	8	9	10	11	12
H32	6.4	6.4	6.4	11.5	16.3	19.1	19.2	19.2	19.2	19.2	19.2	19.2
H34	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4

House ID	Standardised 10 m Height Wind Speed, $m.s^{-1}$											
	1	2	3	4	5	6	7	8	9	10	11	12
H40	5.8	5.8	5.8	10.9	15.7	18.5	18.6	18.6	18.6	18.6	18.6	18.6
H41	5.8	5.8	5.8	10.9	15.7	18.5	18.6	18.6	18.6	18.6	18.6	18.6
H42	5.9	5.9	5.9	11.0	15.8	18.6	18.7	18.7	18.7	18.7	18.7	18.7
H43	5.8	5.8	5.8	10.9	15.7	18.5	18.6	18.6	18.6	18.6	18.6	18.6
H44	5.8	5.8	5.8	10.9	15.7	18.5	18.6	18.6	18.6	18.6	18.6	18.6
H49	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H50	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H52	7.4	7.4	7.4	12.5	17.3	20.1	20.2	20.2	20.2	20.2	20.2	20.2
H53	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H54	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H55	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H56	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H60	6.9	6.9	6.9	12.0	16.8	19.6	19.7	19.7	19.7	19.7	19.7	19.7
H61	6.4	6.4	6.4	11.5	16.3	19.1	19.2	19.2	19.2	19.2	19.2	19.2
H62	6.4	6.4	6.4	11.5	16.3	19.1	19.2	19.2	19.2	19.2	19.2	19.2
H66	10.7	10.7	10.7	15.8	20.6	23.4	23.5	23.5	23.5	23.5	23.5	23.5
H67	8.4	8.4	8.4	13.5	18.3	21.1	21.2	21.2	21.2	21.2	21.2	21.2
H68	8.7	8.7	8.7	13.8	18.6	21.4	21.5	21.5	21.5	21.5	21.5	21.5
H69	8.0	8.0	8.0	13.1	17.9	20.7	20.8	20.8	20.8	20.8	20.8	20.8
H70	5.6	5.6	5.6	10.7	15.5	18.3	18.4	18.4	18.4	18.4	18.4	18.4
H72	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H73	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H74	8.3	8.3	8.3	13.4	18.2	21.0	21.1	21.1	21.1	21.1	21.1	21.1
H75	8.4	8.4	8.4	13.5	18.3	21.1	21.2	21.2	21.2	21.2	21.2	21.2
H76	8.2	8.2	8.2	13.3	18.1	20.9	21.0	21.0	21.0	21.0	21.0	21.0
H77	8.2	8.2	8.2	13.3	18.1	20.9	21.0	21.0	21.0	21.0	21.0	21.0
H78	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H81	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H84	5.6	5.6	5.6	10.7	15.5	18.3	18.4	18.4	18.4	18.4	18.4	18.4
H105	5.6	5.6	5.6	10.7	15.5	18.3	18.4	18.4	18.4	18.4	18.4	18.4
H116	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5

House ID	Standardised 10 m Height Wind Speed, $m.s^{-1}$											
	1	2	3	4	5	6	7	8	9	10	11	12
H137	5.6	5.6	5.6	10.7	15.5	18.3	18.4	18.4	18.4	18.4	18.4	18.4
H142	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H171	5.6	5.6	5.6	10.7	15.5	18.3	18.4	18.4	18.4	18.4	18.4	18.4
H216	5.7	5.7	5.7	10.8	15.6	18.4	18.5	18.5	18.5	18.5	18.5	18.5
H219	5.9	5.9	5.9	11.0	15.8	18.6	18.7	18.7	18.7	18.7	18.7	18.7
H236	5.9	5.9	5.9	11.0	15.8	18.6	18.7	18.7	18.7	18.7	18.7	18.7
H238	5.9	5.9	5.9	11.0	15.8	18.6	18.7	18.7	18.7	18.7	18.7	18.7
H243	6.2	6.2	6.2	11.3	16.1	18.9	19.0	19.0	19.0	19.0	19.0	19.0
H246	6.3	6.3	6.3	11.4	16.2	19.0	19.1	19.1	19.1	19.1	19.1	19.1
H249	6.6	6.6	6.6	11.7	16.5	19.3	19.4	19.4	19.4	19.4	19.4	19.4
H251	6.8	6.8	6.8	11.9	16.7	19.5	19.6	19.6	19.6	19.6	19.6	19.6
H258	6.8	6.8	6.8	11.9	16.7	19.5	19.6	19.6	19.6	19.6	19.6	19.6
H260	11.5	11.5	11.5	16.6	21.4	24.2	24.3	24.3	24.3	24.3	24.3	24.3
H261	11.5	11.5	11.5	16.6	21.4	24.2	24.3	24.3	24.3	24.3	24.3	24.3
H262	11.2	11.2	11.2	16.3	21.1	23.9	24.0	24.0	24.0	24.0	24.0	24.0
H263	10.9	10.9	10.9	16.0	20.8	23.6	23.7	23.7	23.7	23.7	23.7	23.7
H265	11.4	11.4	11.4	16.5	21.3	24.1	24.2	24.2	24.2	24.2	24.2	24.2
H267	11.3	11.3	11.3	16.4	21.2	24.0	24.1	24.1	24.1	24.1	24.1	24.1
H268	11.8	11.8	11.8	16.9	21.7	24.5	24.6	24.6	24.6	24.6	24.6	24.6
H278	9.0	9.0	9.0	14.1	18.9	21.7	21.8	21.8	21.8	21.8	21.8	21.8
H279	8.0	8.0	8.0	13.1	17.9	20.7	20.8	20.8	20.8	20.8	20.8	20.8
H280	8.0	8.0	8.0	13.1	17.9	20.7	20.8	20.8	20.8	20.8	20.8	20.8
H281	8.8	8.8	8.8	13.9	18.7	21.5	21.6	21.6	21.6	21.6	21.6	21.6
H282	8.9	8.9	8.9	14.0	18.8	21.6	21.7	21.7	21.7	21.7	21.7	21.7
H283	8.9	8.9	8.9	14.0	18.8	21.6	21.7	21.7	21.7	21.7	21.7	21.7
H284	7.6	7.6	7.6	12.7	17.5	20.3	20.4	20.4	20.4	20.4	20.4	20.4
H285	7.5	7.5	7.5	12.6	17.4	20.2	20.3	20.3	20.3	20.3	20.3	20.3
H286	8.9	8.9	8.9	14.0	18.8	21.6	21.7	21.7	21.7	21.7	21.7	21.7
H287	8.9	8.9	8.9	14.0	18.8	21.6	21.7	21.7	21.7	21.7	21.7	21.7
H288	7.6	7.6	7.6	12.7	17.5	20.3	20.4	20.4	20.4	20.4	20.4	20.4
H289	7.7	7.7	7.7	12.8	17.6	20.4	20.5	20.5	20.5	20.5	20.5	20.5

House ID	Standardised 10 m Height Wind Speed, $m.s^{-1}$											
	1	2	3	4	5	6	7	8	9	10	11	12
H290	8.5	8.5	8.5	13.6	18.4	21.2	21.3	21.3	21.3	21.3	21.3	21.3
H291	7.0	7.0	7.0	12.1	16.9	19.7	19.8	19.8	19.8	19.8	19.8	19.8
H292	7.2	7.2	7.2	12.3	17.1	19.9	20.0	20.0	20.0	20.0	20.0	20.0
H293	7.0	7.0	7.0	12.1	16.9	19.7	19.8	19.8	19.8	19.8	19.8	19.8
H294	7.0	7.0	7.0	12.1	16.9	19.7	19.8	19.8	19.8	19.8	19.8	19.8
H295	8.0	8.0	8.0	13.1	17.9	20.7	20.8	20.8	20.8	20.8	20.8	20.8
H296	7.0	7.0	7.0	12.1	16.9	19.7	19.8	19.8	19.8	19.8	19.8	19.8
H297	7.0	7.0	7.0	12.1	16.9	19.7	19.8	19.8	19.8	19.8	19.8	19.8
H298	7.9	7.9	7.9	13.0	17.8	20.6	20.7	20.7	20.7	20.7	20.7	20.7
H299	8.5	8.5	8.5	13.6	18.4	21.2	21.3	21.3	21.3	21.3	21.3	21.3
H300	8.2	8.2	8.2	13.3	18.1	20.9	21.0	21.0	21.0	21.0	21.0	21.0
H301	9.1	9.1	9.1	14.2	19.0	21.8	21.9	21.9	21.9	21.9	21.9	21.9
H302	10.0	10.0	10.0	15.1	19.9	22.7	22.8	22.8	22.8	22.8	22.8	22.8
H303	12.2	12.2	12.2	17.3	22.1	24.9	25.0	25.0	25.0	25.0	25.0	25.0
H304	12.1	12.1	12.1	17.2	22.0	24.8	24.9	24.9	24.9	24.9	24.9	24.9
H305	14.4	14.4	14.4	19.5	24.3	27.1	27.2	27.2	27.2	27.2	27.2	27.2
H306	14.5	14.5	14.5	19.6	24.4	27.2	27.3	27.3	27.3	27.3	27.3	27.3
H307	14.5	14.5	14.5	19.6	24.4	27.2	27.3	27.3	27.3	27.3	27.3	27.3
H308	10.2	10.2	10.2	15.3	20.1	22.9	23.0	23.0	23.0	23.0	23.0	23.0
H309	9.6	9.6	9.6	14.7	19.5	22.3	22.4	22.4	22.4	22.4	22.4	22.4
H310	9.3	9.3	9.3	14.4	19.2	22.0	22.1	22.1	22.1	22.1	22.1	22.1
H311	9.5	9.5	9.5	14.6	19.4	22.2	22.3	22.3	22.3	22.3	22.3	22.3
H315	21.4	21.4	21.4	26.5	31.3	34.1	34.2	34.2	34.2	34.2	34.2	34.2

12.7.8 Predicted sound levels at all 87 of the nearest residential properties[1] are below 35 dB(A), indicating that the sound immission levels would be regarded as acceptable and that residents' amenity would be sufficiently protected with no further assessment necessarily required.

Acoustic Acceptance Criteria

[1] Note that in Chapter 12 of the EIA Report October 2023, it states that there are 88 nearby residential properties considered in the acoustics assessment. This is a typographical error and there are in fact 87 nearby residential properties considered in the acoustic assessment. This has been amended for the chapter.

12.7.9 The applicant proposes that the sound limits stated in Chapter 12, Section 12.7, of the EIA Report October 2023, remain applicable to the revised acoustic assessment. The proposed permissible sound limit criteria for daytime and night-time periods are provided in Table 12.12 of the EIA Report October 2023. The specific ETSU-R-97 daytime and night-time sound limits, for each standardised 10 m wind speed, and as determined in relation to the derived prevailing background sound levels, are shown in Tables 12.13 and 12.14 of the EIA Report October 2023.

12.7.10 The predicted sound levels associated with the revised proposed development are less than, or equal to, those in the original acoustic assessment and therefore continues to comply with the relevant guidance on wind farm sound. The impact of the revised proposed development on the amenity of all nearby properties would be regarded as acceptable.

12.8 Mitigation

12.8.1 No mitigation is required for the operation of the revised proposed development as the proposed sound limits are met at all nearby residential properties in accordance with ETSU-R-97. Technical Appendix 12.7 of the EIA Report October 2023 supporting the original acoustic assessment remains relevant and contains the draft planning conditions relating to sound proposed by the applicant.

12.9 Updated Assessment of Residual Effects

12.9.1 The revised acoustic assessment demonstrates that predicted sound levels at residential properties do not exceed the derived ETSU-R-97 limits. This should not be interpreted to mean that wind farm operational sound would be inaudible (or masked by the background sound) under all conditions, but that the levels of sound are acceptable according to current planning policy requirements (i.e. ETSU-R-97 and associated guidance).

12.10 Updated Assessment of Cumulative Effects

12.10.1 Cumulative sound impacts from nearby wind farms that are operational, consented or in planning have been considered.

12.10.2 The operational Fallago Rig Wind Farm is located north-east from the revised proposed development. The proposed Dunside Wind Farm (ECU ref:ECU00003436) is located east of Fallago Rig Wind Farm. The proposed Ditcher Law Wind Farm (ECU ref: ECU00004890) is located west from the revised proposed development.

12.10.3 At the time this revised acoustic assessment was undertaken, no other operational wind farms, consented wind farms or wind farms in planning, that are close enough to the revised proposed development to create potential for cumulative effect on nearby properties, were identified.

12.10.4 An investigation of nearby residential properties has been undertaken and has not identified the potential for cumulative effects to arise on any residential properties from either the operation of Ditcher Law Wind Farm and the revised proposed development, or from the operation of Dunside Wind Farm, Fallago Rig Wind Farm and the revised proposed development.

12.10.5 As a result, no other wind farms have been considered in a cumulative operational acoustic impact assessment.

12.11 Conclusion

12.11.1 The acoustic impact associated with the operation of the revised proposed development on nearby residential properties has been assessed in accordance with the DTI publication 'The Assessment and Rating of Noise from Wind Farms'[2], otherwise known as ETSU-R-97, and Institute of Acoustics Good Practice Guide[3] to its use, as recommended for use by relevant planning policy.

12.11.2 The predicted sound levels are below the derived limits at all considered wind speeds and therefore complies with the relevant guidance on sound from wind farms. As a result, the resultant impact due to the revised proposed development, on the amenity of all nearby residential properties is regarded as acceptable.

[2] 'The Assessment and Rating of Noise from Wind Farms', The Working Group on Noise from Wind Turbines, ETSU Report for the DTI, ETSUR-97, September 1996. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49869/ETSU_Full_copy__Searchable__.pdf

[3] 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise', Institute of Acoustics, May 2013. Available at: https://www.ioa.org.uk/publications/wind-turbine-noise