

11 NOISE AND VIBRATION

11.1 Introduction

- 11.1.1 This chapter reports the outcomes of the assessment of potential noise effects arising from the Proposed Development (see **Chapter 2**) during construction, operation and decommissioning. The specific objectives of the chapter are to:
- Describe the assessment methodology and significance criteria used in completing the assessment;
 - Describe the potential effects and cumulative effects;
 - Describe the mitigation measures proposed to address likely effects; and
 - Assess the residual effects remaining following the implementation of mitigation.
- 11.1.2 This chapter is supported by the following figures, presented in **Volume 2a** of the EIA Report:
- **Figure 11.1:** Site Layout and Receptors; and
 - **Figure 11.2:** Proposed Development Noise Contours.
- 11.1.3 This chapter is also supported by the following technical appendices, presented in **Volume 3** of the EIA Report:
- **Technical Appendix 11.1:** Legislation, Policy and Guidance; and
 - **Technical Appendix 11.2:** Noise Modelling and Calculations.
- 11.1.4 The supporting figures and technical appendices provide further information and are referenced throughout the assessment.

11.2 Statutory and Planning Context

Legislation

- 11.2.1 While not directly referred to in undertaking of the assessment, legislation relevant to the assessments are summarised as follows, with further details provided in **Appendix 11.1**.
- The Control of Pollution Act 1974
 - The Environmental Protection Act 1990

Planning Policy

- 11.2.2 The applicable planning policy informing the assessments is summarised as follows, with further details provided in **Appendix 11.1**.

National

- National Planning Framework 4 (Scottish Government, 2023);
- Onshore Wind Policy Statement 2022;
- Planning Advice Note PAN1/2011: Planning and Noise;
- Technical Advice Note: Assessment of Noise
- Scottish Government 2014: Web Based Planning Advice, Onshore Wind Turbines; and
- Planning Advice Note PAN 50.

Local

- Highland-wide Local Development Plan; and
- The Highland Council Onshore Wind Energy Supplementary Guidance.

Guidance

11.2.3 The applicable guidance informing the assessments is summarised as follows, with further details provided in **Appendix 11.1**:

- BS 5228: 2009+A1: 2014 - Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise
- Calculation of Road Traffic Noise
- ISO 9613 Acoustics – Attenuation of sound during propagation outdoors
- ETSU-R-97: The Assessment and Rating of Noise from Wind Farms, ETSU for the DTI; and
- A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, Institute of Acoustics.

11.3 Consultation Undertaken

11.3.1 **Table 11.1** summarises the consultation responses regarding Noise and Vibration matters and provides information on where and/or how they have been addressed in this assessment.

Table 11.1: Noise and Vibration Consultation Summary

Consultee and Date received	Summary of key comments	Action Taken
The Highland Council (THC)	The applicant must submit a noise assessment carried out in accordance with ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and the associated Good Practice Guide published by the Institute of Acoustics.	This methodology has been adopted. See Operational Noise – Wind Turbine Noise Predictions .
	The target noise levels are either a simplified standard of 35 dB L _{A90} at wind speeds up to 10 ms ⁻¹ or a composite standard of 35 dB L _{A90} (daytime) and 38 dB L _{A90} (night-time) or up to 5 dB above background noise levels at up to 12 ms ⁻¹ . These limits would apply to cumulative noise levels from more than one development.	The simplified standard noise limits have been adopted for the operational noise assessment. Refer to Operational Noise – Derivation of Wind Turbine Noise Limits for details.
	The noise assessment must take into account the potential cumulative effect from any other existing or consented or, in some cases, proposed wind turbine developments. When assessing the cumulative impact from more than one wind farm, consideration must be given to any increase in exposure time.	Cumulative effects are scoped out due to negligible contributions by the Proposed Development. Refer to Operational Noise – Cumulative Noise for details.
	The assessment should include a map showing all wind farm developments which may have a cumulative impact and all noise sensitive properties including any for which a financial involvement relaxation is being claimed.	Cumulative noise effects are scoped out. Details of the site and surrounding area are shown in Figure 11.1 Site Layout
	The assessment should include a table of figures which includes the following: - - The predicted levels from this development based at each noise sensitive location (NSL) at wind speeds up to 12 ms⁻¹. - The maximum levels based on consented limits from each existing or consented wind farm development at each NSL. If any reduction is made for controlling property or another reason, this should be made clear. - The predicted levels from each existing or consented wind farm development at each NSL.	Table of predicted noise levels is included at Table 11.9 while predicted noise levels are also shown in Figure 11.2 . The cumulative assessment has been scoped out of the EIA. Refer to Operational Noise – Cumulative Noise for details.

Consultee and Date received	Summary of key comments	Action Taken
	The cumulative levels based on consented and predicted levels at each NSL.	
	Given the location, construction noise at the turbines sites is unlikely to be an issues at any noise sensitive properties, however, consideration will need to be given to construction traffic.	Construction traffic considered. Refer to Construction Traffic Noise for details.
	It is expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The applicant will be required to submit a scheme demonstrating how this will be implemented. Particular attention should be given to the use of tonal reversing alarms and ground compaction plant which are often the most intrusive noise generating elements of a large construction project.	An Outline Construction Environmental Management Plan (oCEMP) is provided in Appendix 2.1 .
	If the application includes a proposal for a substation or battery storage site, depending on separation distances to receptors, a separate noise assessment may be required.	Noise from the substation is scoped out due to large distances to receptors. Refer to Operational Noise – Substation for details. Following receipt of consultation responses, the battery energy storage system has been removed from Proposed Development.

11.4 Scope and Methodology

Scope of Assessment

- 11.4.1 The scope of this assessment has been established in accordance with the consultation process. Further information can be found in **Chapter 4: Environmental Impact Assessment Process**.
- 11.4.2 This section provides an update to the scope of the assessment and re-iterates/updates the evidence base for scoping out matters following further iterative assessment.
- 11.4.3 The noise and vibration assessment comprises two components scoped in for assessment, namely construction traffic noise and operational noise from wind turbines.

Construction Traffic Noise – Study Area

- 11.4.4 Construction traffic noise is considered for noise-sensitive properties whose ambient noise levels are frequently dominated by road traffic noise on roads to be used by construction vehicles to access the site, including deliveries and workers. The relevant road links are obtained from **Chapter 10**, and are given in **Table 11.2**. The specific properties potentially affected are not identified, but will be evaluated if potentially significant noise effects are identified.

Table 11.2: Road Traffic Links Included in the Construction Traffic Noise Assessment

Link ID	Description
<u>1</u>	A82 between A887 and A831
<u>2</u>	A82 between A86 and A87
<u>3</u>	A82 between A87 and B862 Glendoe Road
<u>4</u>	A830 between Corpach Harbour and A82
5	A82 between B862 Glendoe Road and A887
6	A87 between Broadford Aerodrome and Stoney Road, Kyle of
7	A87 between A887 and A82
8	A887 between A87 and A82

Operational Noise – Study Area

- 11.4.5 Screening for the Proposed Development design did not identify any sensitive receptors potentially affected by operational noise or vibration. Instead, a selection of the closest noise-sensitive receptor locations relative to the Proposed Development are evaluated for reference. These receptors are set out in **Table 11.3** and shown in **Figure 11.1**.

Table 11.3: Noise-Sensitive Receptors Included in the Operational Assessment

Receptor ID	Address	OS Coordinates (Easting, Northing)	Distance to Closest Turbine (Approx.)
R1	Achlain Farmhouse, A887, Glenmoriston, IV63 7YN	227912, 812485	3.1 km
R2	Birch Cottage, Tomchrasky Road, Glenmoriston, IV63 7YJ	229133, 812667	3.3 km
R3	Caberfeidh, A887, Glenmoriston, IV63 7YN	230116, 812398	3.3 km
R4	Tomcrasky Farmhouse, Tomchrasky Road, Glenmoriston, IV63 7YJ	225580, 812313	4.2 km

Baseline Methodology

Desk Study

- 11.4.6 Due to low predicted noise levels from the Proposed Development, the assessment is conducted on the basis of fixed limits. Consideration of baseline noise information is therefore not required within the assessment.

Assessment Methodology

Construction Traffic Noise

- 11.4.7 Noise associated with construction traffic movements along local roads during the construction of the development will cause a short-term increase in noise levels, particularly for dwellings located along the proposed routes on public roads to the Proposed Development and given the rural nature of the area.
- 11.4.8 The potential influence of construction traffic is assessed in terms of the increase in traffic noise at roadside locations based on the prediction methods in Calculation of Road Traffic Noise (CRTN, 1988).
- 11.4.9 The predicted increase in noise level along the access route relative to the existing baseline road traffic noise levels can be assessed based on the criteria set out in **Table 11.4**. Where the increase in noise due to construction vehicles on the public road network is less than 3 dB, the impact is considered to be '**Not-Significant**'.

Table 11.4: Significance Criteria for a Change in Road Traffic Noise

Noise Change, dB	Magnitude of Impact
0	No change

Noise Change, dB	Magnitude of Impact
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
5.0+	Major

Operational Noise – Wind Turbine Noise Predictions

- 11.4.10 Noise predictions are carried out using ISO 9613 (ISO, 1993) (ISO, 2024) as referred to within the IOA GPG. The propagation model described in Part 2 of this Standard provides for the prediction of sound pressure levels based on short-term downwind (i.e., worst case) conditions. A supplementary term has been added to the methodology to allow for the effects of wind direction as discussed in the IOA GPG.
- 11.4.11 The propagation model calculates the predicted sound pressure level by taking the source sound power level for each turbine in separate octave bands and subtracting a number of attenuation factors. The details of the prediction methodology are set out in **Appendix 11.2**. The turbine locations used for the Proposed Development noise predictions are shown in **Table 11.5**.

Table 11.5: Proposed Development Turbine Coordinates

Turbine ID	Easting (km)	Northing (km)	Hub Height
T01	227255	808475	102.5
T02	227860	808387	102.5
T03	228080	808985	102.5
T04	228643	808991	122.5
T05	229184	808831	122.5
T06	229866	808652	122.5
T07	230180	808302	102.5
T08	228619	809443	102.5

- 11.4.12 For the purposes of the assessment, a candidate turbine model is assumed, namely a Siemens-Gamesa SG155 6.6-Megawatt (MW) turbine. Two hub heights of 102.5 m and 122.5 m are assumed respectively, based on a 155 m rotor diameter for this candidate turbine model in order to reach the proposed maximum tip heights of 180 m or 200 m for the relevant turbines.
- 11.4.13 For each of the two hub heights assumed, the octave band sound power levels used in the predictions are shown in **Table 11.6** and **Table 11.7**, with reference to standardised 10 m height integer wind speeds from 3 to 12 ms⁻¹. Sound power levels are based on manufacturer

supplied data for the turbine operating in power-optimised mode AM0, adjusted to 10 m from hub height-specified sound power levels using a reference ground roughness length of 0.05 m, plus an uncertainty factor of +2 dB.

Table 11.6: Siemens-Gamesa SG155 6.6 MW Sound Power Levels (dB L_{WA}) at 102.5 m Hub Height

Standardised 10 m height wind speed, ms ⁻¹	Octave band centre frequency (Hz)								Total
	63	125	250	500	1000	2000	4000	8000	
3	74.5	81.9	86.5	88.8	88.6	88.9	82.3	67.3	94.9
4	79.4	86.8	91.4	93.7	93.5	93.8	87.2	72.2	99.8
5	84.3	91.7	96.3	98.6	98.4	98.7	92.1	77.1	104.6
6	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
7	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
8	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
9	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
10	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
11	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
12	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0

Table 11.7: Siemens-Gamesa SG155 6.6 MW Sound Power Levels (dB L_{WA}) at 122.5 m Hub Height

Standardised 10 m height wind speed, ms ⁻¹	Octave band centre frequency (Hz)								Total
	63	125	250	500	1000	2000	4000	8000	
3	74.8	82.2	86.8	89.1	88.9	89.2	82.6	67.6	95.1
4	80.0	87.4	92.0	94.3	94.1	94.4	87.8	72.8	100.3
5	84.8	92.2	96.8	99.1	98.9	99.2	92.6	77.6	105.1
6	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
7	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
8	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
9	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
10	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0
11	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0

Standardised 10 m height wind speed, ms ⁻¹	Octave band centre frequency (Hz)								Total
	63	125	250	500	1000	2000	4000	8000	
12	86.6	94.0	98.6	100.9	100.7	101.0	94.4	79.4	107.0

- 11.4.14 The ETSU-R-97 noise limits assume that the wind turbine noise contains no audible tones. Where tones are present, a correction should be added to the measured or predicted noise level before comparison with the recommended limits. In general, modern turbines are designed to minimise tonality, such that their noise immissions would not normally warrant a penalty under ETSU-R-97. A penalty has therefore not been added to the predicted noise levels as it is assumed that there will not be tonal noise at receptor locations that requires a penalty.
- 11.4.15 Where topographical features are present between source and receiver, there is the potential for barrier effects, whereby the line-of-sight between source and receiver is obscured resulting in reduced sound propagation, and for 'concave ground profile' effects (for example across a valley) resulting in higher levels of sound propagation.
- 11.4.16 An analysis of the ground profiles between the proposed turbines and the neighbouring dwellings has been carried out. The resulting corrections incorporated into the prediction calculations are set out in **Appendix 11.2**, alongside further explanation of these effects.

Operational Noise – Derivation of Wind Turbine Noise Limits

- 11.4.17 In this instance, due to the low predicted noise levels of the Proposed Development and the large separation distances to noise-sensitive receptor locations, it is possible to assess the Proposed Development against fixed noise limits using the ETSU-R-97 simplified noise limit of 35 dB LA90 for 10 m height standardised wind speeds up to 10 ms⁻¹, for both daytime and night-time.
- 11.4.18 The assessment has been conducted on the basis that where noise levels meet or are below the noise limits, the noise impacts are considered to be **'Not Significant'**.
- 11.4.19 Cumulative noise effects are also assessed against ETSU-R-97 noise limits, which may be the same or in some cases higher than the noise limits for a development individually. Where the noise levels from the Proposed Development are at least 10 dB below the cumulative noise limit (which in this case is 35 dB), the Proposed Development is considered to have a negligible contribution to any potential exceedance of the noise limit on a cumulative basis.
- 11.4.20 Assuming that the same worst-case noise limits are adopted for cumulative noise as for the Proposed Development individually, the cumulative effects of noise from the Proposed Development would be considered to be **'Not Significant'** where predicted cumulative predicted noise levels do not exceed the specified noise limit, or where noise levels from the Proposed Development individually are 25 dB or lower at noise-sensitive receptors.

Assessment Limitations

Calculation Uncertainties

- 11.4.21 The sound power level data provided by the turbine manufacturer, which serves as a critical input for noise calculations, contains some degree of uncertainty. Manufacturer specifications are typically based on idealised or controlled conditions, and actual operational noise levels could vary. This introduces uncertainty in the predicted noise levels, particularly in the case of operational turbines.
- 11.4.22 In addition, the noise calculations used in the assessment are based on standard modelling techniques and established methodologies, such as ISO 9613, which provides general guidance on noise propagation. However, these methods rely on a range of assumptions, including uniform ground conditions and standard atmospheric conditions. Furthermore, the calculation methods do not account for other real-world complexities, such as dynamic changes in wind direction or turbine performance over time, which could introduce additional uncertainties into the noise predictions.
- 11.4.23 As a worst-case assumption, the noise levels for downwind conditions is assumed for all calculations. In addition, an uplift of +2 dB has been applied as a reasonable worst-case assumption, to account for noise propagation and sound power level uncertainties. While there remains some potential for discrepancies between predicted and actual noise emissions, if the Proposed Development is consented, noise limits will be applied which must be met for the duration of the operation of the wind farm.

Receptors / Matters Scoped Out of Assessment

Noise from Construction and Decommissioning

- 11.4.24 Potential construction noise effects are not anticipated beyond around 1 km. Due to large separation distances of around 3 km or more between noise-sensitive receptors and construction working areas, including construction of new access tracks, construction noise effects are considered to be **'Not-Significant'**.
- 11.4.25 The overall noise impacts during decommissioning are usually equal to or lower than during the construction phase and will be assessed and mitigated as required at the time of decommissioning. As such, decommissioning noise is also considered to be **'Not Significant'**.

Construction and Decommissioning Vibration at Sensitive Receptors

- 11.4.26 The nature of wind farm construction works, and the distances involved, are such that the risk of significant effects relating to ground-borne vibration are very low.
- 11.4.27 The closest receptor to locations where construction activities will occur, including construction of new access tracks, is approximately 3 km. Potentially significant construction vibration effects are not anticipated beyond 100 m. Therefore, construction vibration effects are **'Not Significant'**.

- 11.4.28 The overall vibration impacts during decommissioning are usually equal to or lower than during the construction phase and will be assessed and mitigated as required at the time of decommissioning. As such, decommissioning vibration is also considered to be **‘Not Significant’**.

Operational Vibration at Sensitive Receptors

- 11.4.29 The levels of ground-borne vibration generated by operational wind turbines is very low.
- 11.4.30 The closest receptor to the proposed turbine locations is approximately 3 km. Therefore, due to large distances between turbines and receptors, operational vibration effects are considered to be **‘Not Significant’**.

Operational Noise – Substation

- 11.4.31 A substation is proposed to be located in a remote area in approximately the centre of the proposed turbine area. The closest receptor, R1 Achlain Farmhouse, is over 3.7 km away from the proposed location of the substation.
- 11.4.32 Due to the large separation distances, it is considered to be highly unlikely that noise from the substation would be audible at any noise-sensitive receptor locations. Operational noise effects from the substation are therefore considered to be **‘Not Significant’**.

Operational Noise – Cumulative Noise

- 11.4.33 Where the predicted noise levels from the Proposed Development are below 25 dB L_{A90}, it is considered that there will be a negligible contribution to the simplified noise limit of 35 dB, and that a detailed cumulative noise assessment would therefore not be required.
- 11.4.34 Predicted noise levels for all receptors are below 25 dB and therefore cumulative operational noise is **‘Not Significant’**.³⁵

Other Wind Farm Noise Matters

- 11.4.35 Issues frequently raised by third parties in relation to wind farm development in general, such as infrasound, low frequency noise and amplitude modulation, have not been identified as requiring assessment and are therefore excluded from the EIAR.

11.5 Embedded Mitigation

Best Practice Measures

- 11.5.1 Noise during the construction (and decommissioning) phase, including noise from construction traffic, will be minimised through the adoption of Best Practicable Means (BPM). Methods for mitigating and minimising noise will be set out in the detailed Construction Environmental Management Plan (CEMP) that will be prepared before construction commences.

³⁵ Table 11.9 shows maximum predicted noise levels from the Proposed Development of 24.1 dB.

- 11.5.2 An outline CEMP has been produced as part of this EIA Report and presented in **Appendix 2.1**.

11.6 Predicted Effects

Construction Traffic Noise

- 11.6.1 The predicted changes in road traffic on public roads during the construction phase are assessed in **Chapter 10, Table 10.17**.
- 11.6.2 Indicative calculations have been undertaken in relation to construction traffic changes, on the basis of the 24-hour Annual Average Daily Traffic (AADT), which are assumed to be sufficiently similar to the Annual Average Weekday Traffic (AAWT) for use in the assessment.
- 11.6.3 Two-way traffic data have been provided for 12 road links. The traffic data and predicted changes in road traffic noise levels are set out in **Table 11.8**, based on daily construction vehicles of up to 40 light vehicles and up to 82 Heavy Goods Vehicles (HGV). The data for the peak construction month has been used as a worst-case assumption.

Table 11.8: Construction Traffic Noise Calculations

Road Link	Existing Baseline Traffic Flow		Baseline + Construction Traffic Flow		Predicted Relative Change in Traffic Noise Level	Impact Significance
	Total Traffic Flow	Total HGV	Total Traffic Flow	Total HGV		
A82 between A887 and A831	3413	392 (11%)	3419	392 (11%)	0.0 dB(A)	Negligible
A82 between A86 and A87	4280	223 (5%)	4392	305 (7%)	0.6 dB(A)	Negligible
A82 between A87 and B862 Glendoe Road	2544	212 (8%)	2550	212 (8%)	0.0 dB(A)	Negligible
A830 between Corpach Harbour and A82	9543	530 (6%)	9661	612 (6%)	0.3 dB(A)	Negligible
A82 between B862 Glendoe Road and A887	2450	214 (9%)	2456	214 (9%)	0.0 dB(A)	Negligible
A87 between Broadford Aerodrome and Stoney Road, Kyle of Lochalsh	5086	268 (5%)	5092	268 (5%)	0.0 dB(A)	Negligible

Road Link	Existing Baseline Traffic Flow		Baseline + Construction Traffic Flow		Predicted Relative Change in Traffic Noise Level	Impact Significance
	Total Traffic Flow	Total HGV	Total Traffic Flow	Total HGV		
A87 between A887 and A82	1431	100 (7%)	1549	182 (12%)	1.6 dB(A)	Minor
A887 between A87 and A82	1456	121 (8%)	1578	203 (13%)	1.5 dB(A)	Minor
A87 between C-road Shiel Bridge and A87	2612	138 (5%)	2618	138 (5%)	0.0 dB(A)	Negligible
A87 between A890 and C-road Shiel Bridge	3952	469 (12%)	3958	469 (12%)	0.0 dB(A)	Negligible
A87 between Stoney Road, Kyle of Lochalsh and A890	4605	279 (6%)	4611	279 (6%)	0.0 dB(A)	Negligible
A82 between A830 and A86	5495	529 (10%)	5607	611 (11%)	0.4 dB(A)	Negligible

- 11.6.4 The highest predicted temporary increase in traffic noise is 1.6 dB, which is considered to be a minor increase and therefore **‘Not Significant’**.

Operational Noise – Wind Turbines

- 11.6.5 Operational noise predictions have been carried out for the candidate wind turbine under consideration for the Proposed Development (Siemens-Gamesa SG155), in line with the methodology set out in the IOA GPG. Full details of the prediction methodology are set out in **Appendix 11.2**, but the main assumptions are described below:

- Receiver height of 4 m;
- Ground effect ground coefficient $G = 0.5$;
- Atmospheric attenuation corresponding to a temperature of 10 °C and a relative humidity of 70 %;
- Topographical barriers and concave ground profile corrections have been applied according to the IOA GPG;
- Downwind propagation is assumed for all receptors; and
- The manufacturer’s sound power level data is uplifted by +2 dB to account for sound power and propagation uncertainties.

- 11.6.6 The results of the operational noise predictions at the noise-sensitive properties identified are shown in **Table 11.9**. The results are also presented as a noise contour plot valid for standardised 10 m height wind speeds of 8 to 10 ms⁻¹ in **Figure 11.2**.

Table 11.9: Predicted Downwind Operational Noise Levels, dB L_{A90}

Receptor	Standardised 10 m height wind speed (ms ⁻¹)							
	3	4	5	6	7	8	9	10
R1 Achlain Farmhouse	12.1	17.2	22.0	24.1	24.1	24.1	24.1	24.1
R2 Birch Cottage	11.6	16.7	21.5	23.6	23.6	23.6	23.6	23.6
R3 Caberfeidh	11.1	16.1	20.9	23.1	23.1	23.1	23.1	23.1
R4 Tomcrasky	9.7	14.7	19.5	21.7	21.7	21.7	21.7	21.7

- 11.6.7 At all identified receptors, the operational noise impact from the Proposed Development is below the applicable noise limit of 35 dB and is therefore **‘Not Significant’**.

11.7 Additional Mitigation and Residual Effects

Additional Mitigation

- 11.7.1 No additional mitigation is required in order for noise effects to be considered **‘Not Significant’**.

Residual effects

- 11.7.2 All residual noise effects are considered to be **‘Not Significant’** in the absence of specific mitigation measures.

11.8 Summary of Effects

- 11.8.1 The following provides a summary of the conclusions of the impact assessment with respect to each taking into consideration embedded and any additional mitigation measures.

Table 11.10 Summary of Noise and Vibration Effects

Effect	Phase	Assessment Consequence	Assessment Significance
Construction Traffic Noise	Construction	Temporary Adverse	Not Significant
Wind Turbine Noise	Operation	Adverse	Not Significant

11.9 References

Department of Trade and Industry (DTI) (1996), 'ETSU-R-97, The Assessment and Rating of Noise from Wind Farms'.

Department of Transport and Welsh Office (1988), 'Calculation of Road Traffic Noise', Her Majesty's Stationary Office (HMSO).

Institute of Acoustics (IOA) (2013), 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'.

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International Organization for Standardization (ISO) (2024), 'ISO 9613-2, Acoustics - Attenuation of Sound During Propagation Outdoors, Part 2: Engineering Method for the Prediction of Sound Pressure Levels Outdoors'.

Scottish Government (1996), 'Planning Advice Note 50: Controlling the Environmental Effects of Surface Mineral Workings'. Available at: <https://www.gov.scot/publications/planning-advice-note-pan-50-controlling-environmental-effects-surface-mineral/> [Accessed on 22/11/2024].

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