Scottish & Southern Electricity Networks

TRANSMISSION

Netherton Hub 400 kV OHL Connection to New Deer and Peterhead: Tie-In

Environmental Appraisal Report

Volume 1 Chapter 11: Noise Environment

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11. NOISE ENVIRONMENT

11.1 Introduction

11.1.1 This appraisal considers the potential effects of noise and vibration from the Proposed Development. The appraisal includes the potential effects upon sensitive receptors during construction, demolition and operation of the Proposed Development. Where likely significant impacts are predicted, appropriate mitigation measures are proposed, and the predicted residual impacts, following mitigation are appraised.

11.1.2 This Chapter describes:

- The appraisal methodology;
- The baseline condition at the site and in the surrounding area;
- Any embedded mitigation adopted for the purposes of the appraisal;
- Assessment of construction and operational phase impacts taking into account national legislation;
- Further mitigation measures required to prevent, reduce or offset any impacts;
- And the likely residual construction and operational phase impacts after further mitigation measures have been employed.

11.1.3 This Chapter is accompanied by the following figures and appendices:

- **Figure 11.1 Construction Noise Sensitive Receptors (Volume 2);**
- **Figure 11.2 Operational Noise Sensitive Receptors (Volume 2);**
- **Figure 11.3 Noise Monitoring Locations (Volume 2);**
- **Appendix 11.1 Glossary of Acoustic Terms (Volume 3);**
- **Appendix 11.2 Legislation, Policy and Guidance (Volume 3);**
- **Appendix 11.3 Noise Sensitive Receptors (Volume 3);**
- **Appendix 11.4 Construction Activities (Volume 3); and**
- **Appendix 11.5 Baseline Noise Levels (Volume 3).**

Legislation, Policy, and Guidance

11.1.4 This appraisal work has been undertaken with reference to relevant legislation, policy and guidance. The following legislation, policy and guidance have informed the appraisal of impacts and effects within this Chapter. Further information is provided within **Appendix 11.2: Legislation, Policy and Guidance (Volume 3)**:

- The Control of Pollution Act 1974 (CoCPA)[1];
- Planning Advice Note (PAN) 1/2011: Planning and Noise[2];
- Technical Advice Note (TAN): Assessment of noise 2011[3];
- National Planning Framework 4[4];
- BS 5228-1:2009+A1:2014[5];

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1 The Control of Pollution Act (1974)
2 Scottish Government (2011) Planning Advice Note 1/2011: planning and noise. Available at: https://www.gov.scot/publications/planning-advice-note-1-2011-planning-noise/
3 Scottish Government (2011) Technical Advice Note: Assessment of noise. Available at: https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/
4 Scottish Government (2023) National Planning Framework 4 (NPF4). Available at: https://www.gov.scot/publications/national-planning-framework-4/
5 British Standards Institute (2014) *BS 5228: Code of Practice for noise and vibration control on construction and open sites. Part 1: Noise*. London. BSI

- BS 5228-2:2009+A1:2014[6];
- BS 4142: 2014+A1:2019[7];
- BS 8233: 2014[8];
- Highways England Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA111 Noise and Vibration, Revision 2, May 2020[9];
- Transport Scotland Sustainability & Environmental Appraisal LA111 Scotland National Application Annex to LA 111 Noise and vibration, Revision 0;
- ISO 9613-2[10]; and
- TGN(E)322 – Operational Audible Noise Assessment Process for Overhead Lines.[11].

11.2 Information Sources

11.2.1 The noise appraisal has been based on the following information sources:

- Online mapping and aerial photography of the Site and surrounding area;
- Street scene photography of the surrounding area;
- Available plans for the Proposed Development as shown in **Figure 1.2: Site Layout Plan (Volume 2)**;
- Description of development specific demolition and construction activities and plant lists (see **Appendix 11.4. Construction Activities (Volume 3)**);
- Publicly available planning application documents for applications in proximity to the site. These developments are listed in **Appendix 12.1. Long List of Cumulative Developments (Volume 3)**; and
- EPRI Method noise predictions for operational noise of overhead electrical lines. Noise predictions are specific to the conductors selected on the Proposed Development.
- Baseline noise monitoring undertaken at locations representative of nearby noise-sensitive receptors.

11.3 Limitations and Assumptions

11.3.1 This appraisal is based on an understanding of the design and layout plans for the Proposed Development as included in **Figure 1.2: Site Layout Plan (Volume 2)**.

11.3.2 Two scenarios are assessed to determine the likely construction noise and vibration impacts. The first assuming the Proposed Development is built as designed. The second assessment incorporates Limits of Deviation (LoD) (See Chapter 2) to address potential future changes in access road and tower positions. In each scenario, for the purpose of assessing construction noise, towers and associated activities are assumed to be no closer than 45 m from any sensitive receptor to allow for the Operational Corridor (OC). This distance also assumes the adoption of best practice in terms of considerate positioning of plant and equipment to avoid substantial noise generating plant being located at closer distances.

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6 British Standards Institute (2014) *BS 5228: Code of Practice for noise and vibration control on construction and open sites. Part 2: Vibration*. London. BSI

7 British Standards Institution (2019) *BS 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound.* London. BSI

8 British Standards Institution (2014) *Guidance on Sound Insulation and Noise Reduction for Buildings*. London. BSI

9 Highways England Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA111 Noise and Vibration, Revision 2, May 2020

10 International Standards Organisation (1996). ISO 9613-2. *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*.

11 National Grid (2021). Technical Guidance Note TGN(E)322 - Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating)

11.3.3 At this stage, although broad details of approach to construction and demolition can be derived based on those applicable to similar projects, detailed information on construction techniques and equipment is not available. Consequently, assumptions have been made regarding likely activities, plant and operational characteristics based on experience gained from other similar sites. The conclusions drawn in this appraisal provide an indication of likely impacts that may arise based upon the activities expected to be employed on-site.

11.3.4 The appraisal of vibration from demolition and construction activities on nearby vibration-sensitive receptors has been undertaken based on vibration levels associated with a small range of ground borne vibration generating construction activities. It is possible that activities other than those which have been assumed may take place. Similarly, some of those adopted in the appraisal may not be applicable at the time of construction. The conclusions drawn in this appraisal provide an indication of the likely impacts that may arise based upon anticipated activities proposed on-site and based on assumptions on underlying ground conditions. Once demolition and construction methodologies are further progressed, it is recommended that these are reviewed against the assumptions made within this appraisal and discussed with Aberdeenshire Council (AC), and that, where considered necessary, the appraisal is updated.

11.3.5 For the purpose of the appraisal of vibration during construction, it is assumed that vibratory and / or percussive piling may be required. Alternative methods of piling that generate less vibration, e.g. continuous flight auger piling, would be considered where appropriate. The method(s) of piling to be adopted are subject to the outcome of pending ground investigations.

11.3.6 There are no major sources of operational groundborne vibration associated with the Proposed Development therefore vibration impacts on the nearest noise-sensitive receptors are expected to be negligible and have been scoped out of the operational noise assessment.

11.3.7 Noise from wind passing around the overhead electrical line and solid structures, known as ‘aeolian noise’, may occur in certain wind conditions. The phenomenon is caused by vortex shedding as the wind flows around the structures causing vibrations as the conductor moves perpendicular to the wind direction. There is currently no standardised assessment methodology to predict the noise level from aeolian noise or to assess the impact, however the phenomenon is only expected to occur infrequently at certain wind speeds and direction. The likely noise impact arising from this phenomenon has not been assessed but Embedded Mitigation measures are detailed in **Section 11.7**.

11.4 Methodology

Scope of Appraisal

11.4.1 The noise and vibration appraisal considers potential noise and vibration impacts during the demolition, construction, and operational phases of the Proposed Development. The following potential impacts have been appraised:

- On-site demolition & construction noise – Noise from on-site demolition and construction activities has the potential to result in adverse impacts at local sensitive receptors due to the proximity of the Site to such sensitive receptors;
- On-site demolition & construction vibration – Vibration from on-site demolition and construction activities has the potential to result in adverse impacts at local sensitive receptors due to the proximity of the Site to such sensitive receptors: and
- Demolition & construction road traffic noise - Vehicular traffic associated with the demolition and construction phases of the Proposed Development is not known at this stage. Construction traffic, in particular Heavy Goods Vehicles (HGV) in excess of 3.5 tonnes, will route to and from the site avoiding unsuitable routes.

- Operational noise from the proposed development –noise from the overhead electrical line in the form of corona discharge has the potential to result in adverse impacts at local noise sensitive receptors during both dry and wet weather conditions.

Consultation

11.4.2 A consultation note was issued to AC in the form of a technical note setting out the scope and methodology to be adopted for the noise and vibration appraisal. At the time of writing this Chapter, a response to this note has not yet been received. A summary of this consultation is set out in **Table 11.1**.

Table 11.1: Consultation Undertaken to Date

Body / Organisation	**Date of Consultation**	**Key Details**
Aberdeenshire Council	Document dated 15 December 2025	• Presentation of appraisal scope and approach to inform further discussions. • Presentation of proposed baseline noise survey approach
	Further correspondence via e-mail dated 24 February confirming operational noise impact methodology	• Presentation of proposed operational noise assessment methodology

Study Area

Construction Phase

11.4.3 The study area for the demolition and construction phase of the Proposed Development encompasses the Site and sensitive receptors in proximity to the Site (e.g. local dwellings).

11.4.4 The approach to defining the demolition and construction phase noise study area draws on guidance provided within BS5228-1 and the DMRB LA111. In section F2.2.2.2 of BS5228-1 it is advised that:

'*At distances over 300m noise predictions have to be treated with caution, especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects.*'

11.4.5 LA111 states that:

'*A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors''*

11.4.6 On this basis, the demolition and construction noise study area is defined as a distance of approximately 300m from the Site boundary (including Limits of Deviation).

11.4.7 The approach to defining the demolition and construction vibration study area draws upon relevant guidance, including that provided in the DMRB LA111 which states:

'*A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors*'

11.4.8 On this basis, the demolition and construction phase vibration Study Area is defined as a distance of 100m from the closest activities.

11.4.9 Some level of flexibility in the demolition and construction phase noise and vibration study area boundaries can however be applied based on appraisal outcome (e.g. if significant adverse impacts are predicted beyond the study area boundary).

Operational Phase

The study area for the appraisal of operational noise impacts associated with the Proposed Development comprises an area of 600m from the centre line of the OHL including 100m for the Limits of Deviation either side. There is no set study area defined in the guidance for operational noise, therefore, it has been based on professional judgment and experience on similar projects.

Appraisal Methodology

On-Site Demolition & Construction Noise

11.4.10 A quantitative appraisal has been undertaken to determine the potential noise impacts arising from on-site demolition and construction activities upon sensitive receptors closest to the demolition and construction phase activities. Calculation methodologies within BS 5228-1 have been used to predict noise levels from demolition and construction activities as well as the propagation of noise over distance. Based on current layout plans and relevant LoD, the closest possible distance of activities to receptors and anticipated demolition and construction stages / scenarios have been applied within noise level predictions. Separate scenarios have been considered for the Proposed Development as designed and potential changes within the LoD.

11.4.11 BS 5228-1 sets out techniques for predicting the likely noise effects from construction based on information on the type and number of plant being used, their location and the length of time they are in operation. Noise prediction methods are used to establish likely noise levels in terms of the LAeq,T over the core working day. A database of information is also provided, including measured sound pressure level data for a variety of different construction plant undertaking various activities, which can be used to estimate levels of noise generated by typical construction works. BS 5228-1 also provides guidance on appropriate methods for minimising noise from construction activities.

11.4.12 Details relating to the typical construction activities associated with the proposed construction phase are provided in Chapter 2: Description of Proposed Development. The key noise-generating activities are anticipated to include the following:

- Vegetation clearance and felling;
- Access and Enabling;
- Foundations;
- Tower Erection;
- Stringing;
- Dismantling; and
- Reinstatement.

11.4.13 Construction working hours are currently anticipated between 07:00 to 19:00 during British Summer Time (BST) and 07:30 to 18:00 during Greenwich Mean Time (GMT), seven days a week. Special measures and arrangements (to be agreed with AC) would be made for works in proximity to sensitive receptors (See **Figure 11.1: Construction Noise Sensitive Receptors (Volume 2)**). Any requirement to work outside of the agreed working hours will only occur with prior written agreement with AC.

11.4.14 At this stage, the type and number of construction plant items and working methodologies to be applied are not known, these would be dependent upon the Principal Contractor, who would be appointed after planning approval. To inform this appraisal, it has been necessary to make assumptions regarding the plant likely to be used, their number and ‘on-time’ (i.e. the percentage of time in operation). These assumptions are based on information provided by the Applicant and professional experience of similar developments.

11.4.15 Plant and machinery assumptions adopted for the appraisal of noise from on-site demolition and construction are presented in **Appendix 11.4: Construction Activities (Volume 3)**. There is potential need for helicopter use as part of the wiring process, however, the preferred approach is to not use helicopters. On this basis, noise from helicopters has not been included within the predictions. Any requirement for the use of helicopters will occur only with prior written agreement with AC and may be subject to additional appraisal and appropriate management with the aim of minimising potential for noise disturbance.

11.4.16 In practice, the plant items identified for each stage will move around the Site, operating at different times, for different durations and at different locations. As a consequence, noise levels at any receptor may vary day-on-day. Hence, it is necessary to rationalise the geographic and temporal spread of activities (and subsequent appraisal) and to this end, various assumptions have necessarily been made as described in the following paragraphs.

11.4.17 With respect to the geographical location of the plant for each activity, all plant has been assumed to operate at the closest point of each construction activity relevant to the sensitive receptor. This approach provides a robust basis for appraisal.

11.4.18 Other assumptions which have been made with respect to the construction noise predictions are:

- No barriers have been included;
- Acoustically soft ground cover has been assumed between the noise source and receptor;
- No atmospheric absorption has been included;
- 3 dB has been added to all predictions to account for façade reflections;
- Sources and receptors have both been taken to be 1.5 m high;
- All distances between source and receivers are horizontal distances; and
- Meteorological conditions have been taken to be 'neutral'.

11.4.19 The appraisal criteria for on-site demolition and construction noise have been determined based on the ABC method in Annex E, Table E1 of BS 5228-1:2009 + A1:2014. The ABC method provides threshold noise values, exceedance of which indicate a potential adverse effect from site specific construction noise on residential properties. The threshold values are derived based on the existing ambient noise levels at the receptor, L_{Aeq} (dB), during the periods when construction is expected to occur (day, evening, weekends, night), and are shown in **Table 11.2**.

Table 11.2: Threshold of Potential Adverse effect at Dwellings in accordance with the ABC Method (BS 5228-1)

Appraisal Category and Threshold Value Period	Threshold Values, in Decibels (dB), LAeq,T		
	Category A A)	Category B B)	Category C C)
Night-time (23:00 – 07:00)	45	50	55
Evenings and Weekends[D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1: A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise. NOTE 3: Applies to residential receptors only.			

Appraisal Category and Threshold Value Period	Threshold Values, in Decibels (dB), LAeq,T		
	Category A A)	Category B B)	Category C C)

A) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

B) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.

C) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.

D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

11.4.20 Following the BS 5228-1 ABC Method (set out in **Table 11.2**) and given the low baseline noise levels measured during the baseline noise survey (see **Appendix 11.5: Baseline Noise Levels (Volume 3)**), it is considered appropriate that the predicted construction noise levels are appraised against the Category A noise threshold criteria, i.e. 65 dB $L_{Aeq,T}$ (façade level) during the weekday daytime period and 55 dB $L_{Aeq,T}$ (façade level) during the weekend daytime period. On this basis, the following impact magnitude criteria have been adopted:

Table 11.3:Magnitude of Impact Criteria - On-Site Demolition & Construction Noise

	Demolition / Construction noise level (x)	
Magnitude of Impact	Evenings & Weekends[1]	Daytime (07:00 – 19:00) & Saturdays (07:00 – 13:00)
Negligible	x<Existing $L_{Aeq,T}$ noise level	x<Existing $L_{Aeq,T}$ noise level
Minor	Existing $L_{Aeq,T}$ noise level ≤x< 55 dB $L_{Aeq,T}$	Existing $L_{Aeq,T}$ noise level ≤x< 65 dB $L_{Aeq,T}$
Moderate	55 dB $L_{Aeq,T}$ ≤x< 60 dB $L_{Aeq,T}$	65 dB $L_{Aeq,T}$ ≤x< 70 dB $L_{Aeq,T}$
Major	x≥ 60 dB $L_{Aeq,T}$	x≥ 70 dB $L_{Aeq,T}$
1. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays		

11.4.21 Excess over the ABC Category A threshold will result in **Moderate** impact magnitude. Excess of 5 dB or more over the threshold will result in **Major** impact magnitude.

On-Site Demolition & Construction Vibration

11.4.22 Vibration from demolition and construction activities has the potential to impact on adjacent buildings. The transmission of ground-borne vibration is dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken.

11.4.23 Groundborne vibration calculations have been performed for construction activities which may be required for a development of this nature including the use of vibratory rollers for access track construction and piling for tower construction.

11.4.24 The calculation and appraisal of potential construction vibration impacts has been undertaken following the guidance presented within BS 5228-2 and other guidance documents referenced therein.

11.4.25 Appraisal is focused on effects relevant to human perception. In relation to adverse health impacts, BS5228-2 notes the following:

"*Guidance on the effects on physical health of vibration at sustained high levels is given in BS 6841, although such levels are unlikely to be encountered as a result of construction and demolition activities*"

11.4.26 Magnitude of impact criteria adopted for the appraisal are presented within **Table 11.4**. These criteria are based on guidance contained in BS 5228-2 for human perception and relate to Peak Particle Velocity (PPV) vibration levels. A semantic scale of the description of construction vibration effects on human receptors is also provided.

Table 11.4: Magnitude of Impact Criteria - Construction Vibration

Magnitude of Impact	Peak Particle Velocity Level, (mm/s)	Description
Negligible	<0.3	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
Minor	0.3 - 0.9	Vibration might be just perceptible in residential environments.
Moderate	1.0 - 10	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
Major	>10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

11.4.27 In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (i.e. 1.0 mm/s), then it is highly unlikely that buildings would be damaged by construction vibration.

Construction Road Traffic Noise

11.4.28 Details of vehicular traffic associated with the demolition and construction phase of the Proposed Development are not known at this stage. Construction traffic noise has therefore been considered on a qualitative basis, drawing on guidance presented within BS5228-1: Noise and DMRB LA111, and considers best practice operational procedures to be implemented to minimise potential effects.

11.4.29 The following impact magnitude criteria, derived from DMRB LA111 is relevant to construction road traffic noise:

Table 11.5: Impact Magnitude Criteria – Construction Road Traffic Noise

Short-term noise change, dB	Impact Magnitude
0.0 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
>5.0	Major

Operational Noise

11.4.30 An energised electricity transmission line can be a source of a phenomenon known as “corona discharge” (a limited electrical breakdown of the air). Whilst the conductor systems of OHL are designed and constructed to minimise corona, surface irregularities on the conductors caused by physical damage such as burrs, or debris such as insects, pollen, industrial pollution, raindrops or other forms of contamination may locally enhance the electrical field strength sufficiently for

discharges to occur. Any corona discharge would act as a source of noise; a crackling sound occasionally accompanied by a low frequency hum in certain wet conditions.

11.4.31 The low frequency hum can occur in wet conditions leading to a noise with a fundamental frequency of 100 Hz. Harmonics may also occur, most commonly at frequencies of 200 Hz, 300 Hz and 400 Hz. The crackling sound may include energy in higher frequency octave bands, typically 1000Hz and above.

11.4.32 After a prolonged spell of dry weather, without rain to wash debris from the conductors, contamination may accumulate at sufficient levels to result in increased noise generation. After heavy rain, these discharge sources are washed away, and the OHL will generate a lower noise level. Surface grease on conductors can also give rise to audible noise effects as grease is able to move slowly under the influence of an electric field, tending to form points which then initiate corona discharge activity.

11.4.33 The operational noise assessment has been undertaken following the methodology set out in the National Grid Electricity Transmission (NGET) technical guidance note TGN(E)332: Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating).

11.4.34 The overhead line noise assessment process follows the three-tier approach from TGN(E)322 based on predicted noise source levels and receptor distance. If predicted noise levels fail the Tier 1 test, a Tier 2 screening exercise is undertaken and if the Tier 2 test suggests that adverse impact is possible at a receptor, then a Tier 3 assessment is undertaken. The three-tier approach comprises the following steps designed to screen receptors out of further assessment where there would be no adverse impact:

- Tier 1: A primary screening step based on ‘worst-case’ absolute wet noise effects and the pre-determined assessment criteria set out in TGN(E)322;
- Tier 2: A further screening step based on combined absolute wet noise and dry noise effects and recalculated assessment criteria. This step takes account of the fact that wet noise occurs during periods of wet weather and therefore does not occur all the time; and
- Tier 3: Full assessment following the principles of BS 4142 for both wet noise and dry noise. Aligning with the guidance within BS 4142, a +3 dB character correction is applied to dry noise to account for the subjective ‘crackle’, whereas a +6 dB character correction is applied to predicted wet noise levels to account for the tonal ‘hum’ from the audible noise during worst case wet weather conditions.

11.4.35 **Table 11.6** provides the Tier 1 noise criteria to assess the ‘wet only noise at the nearest noise-sensitive properties. It is noted that this criteria accounts for a +6dB ‘acoustic character correction’ for tonality of low frequency hum.

Table 11.6: TGN(E) 322 Tier 1 Noise Criteria

Use	No Adverse Impact Screened out dB(A)	Further Assessment Necessary Tier 2 Assessment required dB(A)
Vulnerable subgroups	< 29	≥ 29
Residential	< 34	≥ 34
Schools and Hotels	<39	≥ 39

11.4.36 Vulnerable subgroups are classified in TGN(E)322 including hospitals, pre-schools, care homes and hospices.

11.4.37 All the identified noise sensitive receptors that fall within the study area are residential. As such, if the predicted noise level exceeds 34 dB(A), the assessment proceeds to Tier 2.

11.4.38 The Tier 2 assessment thresholds are recalculated to account for the duration of wet and dry weather. As the tonal hum is not as prominent during dry weather, an acoustic character correction of +3dB rather than +6dB is applied. This means that the assessment threshold is 3dB higher during dry weather compared to the wet weather assessment threshold. The combined wet and dry criteria is calculated based on the duration of wet and dry weather in the area.

11.4.39 **Table 11.7** provides the Tier 2 assessment noise criteria.

Table 11.7: TGN(E) 322 Tier 2 Combined Noise Criteria for Different Rainfall Rates

Rainfall (Annual Average Wet Hours)	Impact Magnitude		
	No Adverse Impact dB(A)	Adverse Impact dB(A)	Significant Adverse Impact dB(A)
450 hours	<36.9	36.9 – 46.9	≥46.9
600 hours	<36.8	36.8 – 46.8	≥46.8
750 hours	<36.8	36.8 – 46.8	≥46.8
900 hours	<36.8	36.8 – 46.8	≥46.8
1050 hours	<36.7	36.7 – 46.7	≥46.7
1200 hours	<36.7	36.7 – 46.7	≥46.7

11.4.40 TGN(E)322 provides a formula for calculating the percentage of wet weather depending on the annual average hours of rainfall and the total number of hours in the year. Based on the historical Met Office data for rainfall in the area, and to provide a suitable worst-case for the future environment, the annual average wet hours for the receptor locations is selected to be 1200 hours i.e 13.7% of the year. The predicted combined wet and dry noise levels are calculated. If the levels exceed the no adverse impact threshold of 36.7 dB(A) set out in **Table 11.7** then the assessment proceeds to Tier 3.

11.4.41 For receptors which only proceed to Tier 1 or Tier 2 of the assessment methodology, **Table 11.8** provides the significance of effects matrix to determine the impact, based on the sensitivity of the receptor.

Table 11.8: TGN(E)322 Tier 1 and Tier 2 Significance of Effects

Significance of Effect	Weather Condition	Sensitivity of Receptor			
Magnitude		High	Medium	Low	Negligible
High	Wet	>44	>44	>44	>44
	Dry	>47	>47	>47	>47
Medium	Wet	39 - 44	39 - 44	39 - 44	39 - 44
	Dry	42 - 47	42 - 47	42 - 47	42 - 47
Low	Wet	34 - 39	34 - 39	34 - 39	34 - 39
	Dry	37 - 42	37 - 42	37 - 42	37 - 42
Negligible	Wet	29 - 34	29 - 34	29 - 34	29 - 34
	Dry	32 - 37	32 - 37	32 - 37	32 - 37
No Effect	Wet	<29	<29	<29	<29
	Dry	*<32*	*<32*	*<32*	*<32*

11.4.42 Tier 3 of the methodology undertakes an assessment of wet and dry noise impact separately at the noise sensitive receptor. The assessment follows the methodology set out in BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. This standard describes methods for rating and assessing sound providing an indication of its likely effect upon nearby dwellings or premises used for residential purposes.

11.4.43 The 'specific sound level' from the Project (dB, Ls) at a noise sensitive receptor is used to derive a 'rating level' by applying appropriate corrections taking into account the perceptibility of distinguishing characteristics (i.e. tonal elements, impulsivity, intermittency) at the assessment location(s).

11.4.44 This is then compared with the existing 'background sound level' (dB, LA90) at that location in order to derive an initial impact estimation. The background sound level is derived from measurements representative of the background sound levels at the receptor locations during 'quiet' conditions i.e. low windspeeds and no rainfall. For the 'wet only' background sound level, a correction to the measured background sound level is applied to account for the contribution of the sound generated by rainfall. Based on the ground conditions at the receptor locations, the sound level arising from rainfall is taken from the empirically-derived Miller Curves, as presented in TGN(E)322.

11.4.45 When considering the actual level of impact, BS 4142 emphasises the importance of all pertinent contextual factors prior to modifying the initial impact estimation. **Table 11.9** presents the magnitude of operational noise effect.

Table 11.9: TGN(E) 322 Tier 3 Magnitude of Noise Effect

Magnitude of Effect	Difference between rating level and background sound level
High	≥ 10 dB
Medium	5 – 9 dB
Low	0 – 4 dB
Negligible	≤ 0 dB

11.5 Sensitivity of Receptors

Construction Noise

11.5.1 The sensitivity of receptors is estimated for the current state prior to any appraisal of impact from the Proposed Development. The level of sensitivity is determined according to existing regulations and guidance, societal value, and vulnerability to change. By the combination of the assessed value of these three components, the sensitivity of receptors can be classed as Low, Medium or High, as recommended by TAN 2011. **Table 2-1** in **Appendix 11.2: Legislation, Policy and Guidance (Volume 3)** shows the description of receptor sensitivities.

11.5.2 All sensitive receptors considered in the construction appraisal are assumed to be residential in nature, with a low baseline noise environment due to the rural nature of the Site. Therefore, all identified receptors are assumed to be of High sensitivity.

Operational Noise

11.5.3 Receptor sensitivities considered in TGN(E)322 are summarised in **Table 11.10**.

Table 11.10: TGN(E) 322 Classification of Receptor Sensitivity

Sensitivity	Receptor
High	Vulnerable subgroups including hospitals and pre-schools, care homes and hospices
Medium	Residential and schools
Low	Area used primarily for leisure activities, including Public Rights of Way, sites of historic or cultural importance.
Negligible	All other areas such as those used primarily for industrial or agricultural purposes.

11.6 Baseline Environment

11.6.1 A baseline noise survey was carried out by WSP between 15 January to the 5 February 2026 at locations representative of the nearest noise-sensitive receptors.

11.6.2 A total of four unattended continuous sound level measurements were undertaken at locations representative of the closest noise-sensitive properties. In addition to this, measurements of the local meteorological conditions using a weather station were taken at one of the positions. The data has been processed, excluding periods of rain and wind speeds above 5 m/s to determine the typical background sound level at each receptor location.

11.6.3 Measurements underneath the existing OHL were taken concurrently with the measurements at the four residential measurement locations in order to monitor periods of existing OHL noise throughout the survey. These measurements were used to compare against the four residential measurements to establish whether any noise from the existing OHL affected the noise levels at the measurement locations. A summary of the noise measurements are shown in **Table 11.11**.

Table 11.11: Noise Measurement Description Summary

Measurement location	Measurement location co-ordinates		Monitoring Period	Description
	X	**Y**		
LT1	403845	843949	15/01/2026 10:45 to 05/02/2026 10:30	Monitoring equipment installed in garden of property approximately 15m from façade and 11m from local road edge.
LT2	404315	844793	15/01/2026 12:00 to 05/02/2026 11:00	Monitoring equipment installed on the edge of garden of property approximately 20m from façade.
LT3	406398	844851	15/01/2026 13:30 to 05/02/2026 11:15	Monitoring equipment installed on the edge of drive leading to property, approximately 25m from façade.
LT4	406555	844123	15/01/2026 13:00 to 25/01/2026 01:30	Monitoring equipment installed in line with property approximately 110m to the west in a location considered representative of the baseline noise environment at this property based on the distance to the local road edge.

Measurement location	Measurement location co-ordinates		Monitoring Period	Description
	X	Y		
				Measurement curtailed following interference from livestock. Meteorological measurements taken at this location and proceeded to run for entire duration of the survey.
LT5	403934	843766	15/01/2026 10:30 to 05/02/2026 10:30	Monitoring equipment installed underneath existing OHL immediately south of LT1 approximately 215m away.

11.6.4 The detailed summary of the baseline noise level survey is provided in **Appendix 11.5: Baseline Noise Levels (Volume 3)** including tabulated summaries of the recorded data, and time histories of the measured noise levels at each location.

11.6.5 All noise monitoring equipment used in the baseline noise survey was compliant with Class 1 specification as defined in BS EN 61672-1: 2013: Electroacoustics, Sound level meters, Specifications[12]. All baseline noise level measurements were undertaken in accordance with BS 7445-1:2003: Description and measurement of environmental noise. Part 1: Basic quantities and procedures[13].

11.6.6 Noise monitoring equipment was installed at least 3.5m away from any reflective surface i.e. free-field. The microphone for each monitoring system was between 1.2 – 1.5m above local ground and fitted with windshields.

11.6.7 Prior to the start of each measurement, the sound level meters were locally calibrated using a sound calibrator. A calibration check was performed at the end of each measurement, and no significant calibration drift arose. The sound level meters had been laboratory calibrated to traceable standards within the previous 24 months, and each handheld calibrator within the previous 12 months. Calibration certificates can be provided upon request.

11.6.8 **Table 11.12** presents the details of the equipment used in the baseline noise survey.

Table 11.12: Equipment Details

Measurement Location Ref	Item Description	Manufacturer & Type No.	Serial Number
LT1	Sound Level Meter	Rion NL52 Sound Level Meter	00764966
	Pre-amplifier	NH25 Preamplifier	65093
	Microphone	UC 59 Condenser Microphone	09895
	Calibrator	Rion NC-74 Sound Calibrator	34494241
LT2	Sound Level Meter	01 dB CUBE 'Integrating-Averaging Sound Level Meter'	10748

[12] British Standards Institution (2013) BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications
[13] British Standards Institution BS 7445-1:2003: *Description and measurement of environmental noise. Part 1: Basic quantities and procedures*.

Measurement Location Ref	Item Description	Manufacturer & Type No.	Serial Number
	Pre-amplifier	Acoem PRE 22 Preamplifier	11102
	Microphone	GRAS Type 40CD Condenser Microphone	224197
	Calibrator	01dB-Stell Cal 21	35054825
LT3	Sound Level Meter	01dB-Metravib Fusion Sound Level Meter	10796
	Pre-amplifier	01dB PRE22 Preamplifier	10882
	Microphone	GRAS Type 40CD Condenser Microphone	207588
	Calibrator	01dB-Stell Cal 21	34254632
LT4	Sound Level Meter	01dB-Stell Duo 'Datalogging Integrating Sound Level Meter'	10616
	Pre-amplifier	01dB-Stell PRE 22 Preamplifier	10180
	Microphone	G.R.A.S Type 40CD Condenser Microphone	154423
	Calibrator	01dB Cal 21	34134165
LT5	Sound Level Meter	Rion NL52 Sound Level Meter	01021290
	Pre-amplifier	NH25 Preamplifier	21332
	Microphone	UC59 Microphone	04346
	Calibrator	01dB-Stell Cal 21	34924015

11.6.9 The Proposed Development is of rural nature, and the nearest sensitive receptors are all identified to be residential properties.

11.6.10 Given the rural nature of the area, the baseline noise environment in proximity to the Proposed Development is low. The use of the most conservative Category A of the ABC method of BS 5228, relevant to the appraisal of noise from demolition and construction activities has therefore been adopted.

11.7 Embedded Mitigation

Demolition & Construction Phase

11.7.1 Best Practicable Means (BPM) mitigation measures, as defined in the Control of Pollution Act 1974, will be incorporated in the Construction Environmental Management Plan (CEMP) produced by the Principal Contractor in advance of commencement of construction activities. Compliance with the CEMP will ensure that noise and vibration impacts are minimised during demolition and construction.

11.7.2 The most relevant mitigation measures demonstrating BPM with respect to noise and vibration are set out below:

- Construction work is likely to be during daytime periods only and are anticipated to be between approximately 07:00 to 19:00 during British Summer Time (BST) and 07:30 to 18:00 (or as daylight allows) during Greenwich Mean Time (GMT), seven days a week. Special measures

and arrangements would be made for works in proximity to sensitive receptors. Any out of hours working would be agreed in advance with the relevant local planning authority;

- Prior consent agreement for any works outside standard working hours, where there is potential for significant impacts;
- Selection of quiet and low noise/vibration equipment and methodologies, where practicable;
- Optimal location of acoustic screening to minimise noise adverse impacts where necessary;
- Use of less intrusive alarms, such as broadband vehicle reversing warnings;
- Optimal location of equipment onsite to maximise distance to sensitive receptors and minimise noise/vibration disturbance;
- The provision of acoustic enclosures around static plant, where necessary and feasible; and
- Adoption of a clear and structured communication and engagement plan, providing contact details for nominated site contact and regular engagements with local residents.

11.8 Appraisal

On-Site Demolition & Construction Noise

11.8.1 Potential demolition and construction noise levels have been predicted for each of the key stages of work at the following closest sensitive receptors to the Proposed Development and associated LoD. (See **Figure 11.1: Construction Noise Sensitive Receptors (Volume 2)** and **Appendix 11.3: Noise Sensitive Receptors (Volume 3)**):

- 12 sensitive receptors (dwellings) have been identified for the different phases of construction;
- the closest receptor for the access and enabling phase is located 17 m from the works. Given this close distance, it is assumed that the LoD would not result in the relevant access track being at closer distance; and
- for all other phases of construction, receptors are located at a greater distance.

11.8.2 **Table 11.13** presents the noise levels predicted for each of the typical construction activities (see **Appendix 11.4: Construction Activities (Volume 3)**) at the sample of the nearest sensitive receptors during weekday and weekend daytime periods. Calculated levels presented in **Table 11.13** represent the closest possible distance of works to respective sensitive receptors and therefore are worst case. Given the substantial area covered by the Proposed Development, for the majority of the construction phase, noise levels experienced at receptors will be substantially lower than those presented in **Table 11.13**.

11.8.3 It is noted that construction activity inevitably leads to some degree of noise disturbance at locations in proximity. It is, however, a temporary source of noise. Noise levels at any one location vary as different combinations of plant and machinery are used. Noise levels also vary throughout the construction period of the project as the construction activities and phases change. The following construction noise level predictions presented in **Table 11.13** are therefore indicative of those which may be experienced at sensitive receptors.

11.8.4 Within **Table 11.13**, predicted demolition and construction noise has been appraised against the adopted 65 dB threshold applicable to weekday daytime hours and 55 dB threshold applicable to weekend daytime hours. Where both the 65dB and 55 dB threshold is exceeded, values are highlighted in red. Where only the 55dB threshold is exceeded, values are highlighted in orange. For all other table entries, thresholds are not predicted to be exceeded.

Table 11.13: Predicted Construction Noise Levels, Façade, $L_{Aeq,T}$ at representative Sensitive Receptors (R1 to R12)

Phase of Construction	Sound Pressure Level at sensitive receptors dB LAeq											
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
Weekday Daytime (including 07:00 to 19:00 hours on Saturdays and Sundays)												
Vegetation clearance and felling	63	64	60	67	68	69	66	70	71	71	64	65
Access and enabling	73	65	61	68	69	81*	67	81*	76	81*	67	70
Foundations	62	59	59	65	64	68	65	69	N/A	N/A	N/A	N/A
Tower assembly and erection	63	57	57	63	62	66	64	68	N/A	N/A	N/A	N/A
Stringing	55	55	51	56	56	59	57	61	N/A	N/A	N/A	N/A
Dismantling	52	52	N/A	N/A	N/A	N/A	N/A	N/A	55	58	52	53
Reinstatement	50	47	47	52	51	54	52	55	N/A	N/A	N/A	N/A

Note: Where the predicted noise level is N/A, the sensitive receptor falls outside the study area for the construction activities associated with the Proposed Development and therefore the noise likely to be generated by these activities has not been appraised.

*Due to close proximity of access track, calculations are based on average distance to closest access track.

11.8.5 Although the majority of activities will be undertaken sequentially, there is potential for some overlap; for example, once the foundations for one tower are complete, works may progress to another tower while erection of the previous tower is underway.. Given the worst-case approach to applied distances within calculations, it is however expected that noise from activities at the closest tower and / or for the most intensive works, will dominate. It is therefore considered that the appraisal is robust and that the potential for overlapping works has been adequately accounted for. Specific calculations for overlapping activities have therefore not been undertaken

11.8.6 As seen in **Table 11.13,** the worst case noise levels associated with vegetation clearance and felling are predicted to be of **Minor** to **Major** impact magnitude during the weekdays and **Major** impact magnitude during the weekend. Receptors at distances shorter than 175 m are likely to exceed the 65 dB threshold for weekdays. Impacts of **Moderate** and **Major** Magnitude are driven by noise generated by the use of a wood chipper and chain saws positioned at the closest possible distance to each sensitive receptor. In reality, it is expected that the wood chipper, where needed, will be sympathetically sited to maximise distance attenuation and acoustic screening such that lesser impacts are experienced. Chain saws are unlikely to be used at the closest distances to sensitive receptors for substantial durations. Such impacts are therefore expected to be limited in duration. For the majority of vegetation clearance activities, when operations are not undertaken at the closest site boundaries to sensitive receptors, lesser impacts are anticipated. Given the nature of vegetation clearance, it is expected that predicted worst case impacts will be short-term and experienced for only short durations.

11.8.7 Activities associated with access and enabling are predicted to exceed the weekday Category A threshold of 65 dB for receptors at distances shorter than 185 m to the construction works. During weekdays, impacts of **Minor** to **Major** magnitude are predicted for the closest sensitive receptors to the proposed access tracks, the closest of which being 17m from R10. Track construction is

however a transient activity (moving at a rate of approximately 1 km of track every two weeks), worst case noise levels will therefore be short-term and experienced for relatively short durations, especially where the closest proposed access tracks are of relatively short length. For the majority of works, when activities are not undertaken at worst case distances, lesser impacts are anticipated.

11.8.8 Construction activities associated with foundations are predicted to have a **Moderate** impact magnitude for receptors R4, R6 and R8 and at distances less than 165 m during the weekdays. During the weekends, foundation construction activities are predicted to have a **Major** impact magnitude for receptors R1, R4, R5, R6, R7 and R8.

11.8.9 Predicted worst case noise levels associated with tower assembly and erection are predicted to be of **Minor** impact magnitude at receptors R1 to R5 and R7 during weekdays. Receptors at distances shorter than 145 m, during weekdays, are predicted to experience impacts of **Moderate** magnitude or greater. All relevant receptors are predicted to experience **Moderate** to **Major** impact magnitude during weekends due to worst case tower assembly and erection.

11.8.10 Worst case activities associated with stringing, dismantling and reinstatement at the nearest sensitive receptors fall below the Category A threshold of 65 dB for weekday daytime hours. These activities are predicted to have a Minor impact during weekdays and a Major impact, at worst, during weekends. For the majority of activities, impacts of lesser magnitude will prevail.

11.8.11 Some phases of work could change locations due to tower movement within the LoD. Sensitive receptors have also been assessed based on worst case tower position within the LoD. A summary of the results has been presented in **Table 11.14**. Where both the 65 dB and 55 dB threshold is exceeded, values are highlighted in red. Where only the 55 dB threshold is exceeded, values are highlighted in orange. For all other table entries, thresholds are not predicted to be exceeded.

Table 11.14: Predicted Construction Noise Levels, Façade, $L_{Aeq,T}$ as representative Sensitive Receptors including LoD (R1 to R12)

Phase of Construction	Sound Pressure Level at sensitive receptors dB LAeq											
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
Weekday Daytime (including 07:00 to 19:00 hours on Saturdays and Sundays)												
Vegetation clearance and felling	80	77	66	80	80	80	80	80	80	80	80	80
Access and enabling	81	78	67	81	81	81	81	81	81	81	81	81
Foundations	79	76	65	79	79	79	79	79	N/A	N/A	N/A	N/A
Tower assembly and erection	77	74	64	77	77	77	77	77	N/A	N/A	N/A	N/A
Stringing	70	67	57	70	70	70	70	70	N/A	N/A	N/A	N/A
Dismantling	66	63	N/A	N/A	N/A	N/A	N/A	N/A	66	66	66	66
Reinstatement	64	61	52	64	64	64	64	64	N/A	N/A	N/A	N/A

Note: Where the predicted noise level is N/A, the sensitive receptor falls outside the study area for the construction activities associated with the Proposed Development and therefore the noise likely to be generated by these activities has not been appraised.

*Due to potential for close proximity of access track, calculations are based on a distance of 45m being representative of average distance to closest access track.

11.8.12 When allowing for the worst case LoD, predicted impacts at receptors increase compared to assessment of the proposed alignment alone, as the source can be located closer to receptors. The assessment predicts a Major magnitude of impact for all work phases during the weekend periods. Major impact of magnitude is predicted for all work phases (other than dismantling and reinstatement) during weekday daytime activities. This assessment is applicable to worst case distances between activities and receptors. For the majority of the construction phase, lesser impacts will arise. The relevant LoD may also result in noise generating activities being positioned at greater distances from receptors than those assessed, thus resulting in lesser impacts.

Construction Vibration

11.8.13 Groundborne vibration levels have been calculated for worst case operations adopting the applicable formulae contained in BS 5228-2: Vibration, Table E.1.

11.8.14 Calculations have been undertaken for the use of vibratory rollers which may be used during access track construction works, and piling which may be used during tower construction.

11.8.15 **Table 11.15** presents the distances at which vibration levels are predicted to meet the criteria thresholds set out in **Table 11.4**, based on a specified confidence limit (where applicable). It should be noted that the data presented in **Table 11.15** are general in nature and are not site specific.

Table 11.15: Predicted Groundborne Vibration Levels

Vibration Generating Activity	PPV (mm/s)	Minimum Distance Between Receptor and Works (m) Before PPV (mm/s) Exceeded
Vibratory Rollers - start & end(1)	0.3	80
	1.0	30
	10	4
Vibratory Rollers - Steady State(1)	0.3	60
	1.0	25
	10	5
Vibratory Piling – average for steady state, start-up and run-down operations	0.3	180
	1.0	70
	10	12
Percussive piling(2	0.3	400
	1.0	160
	10	27
Assumes 2 drums, 0.5 mm amplitude, drum width of 1.3 m, e.g. heavy-duty ride on roller. Assumes Kp scaling factor of 3 (worst case unless at refusal), 15 m pile depth, and 60,000 joules piling energy. The calculated zone distances are outside the prediction range for the calculation in BS 5228-2. However, to present a worst case approach at this stage the calculated distances have not been limited. Note: Calculations incorporate a 5% chance of exceeding the criteria.		

11.8.16 It should be noted that the appraisal presented within **Table 11.15** is general in nature but does provide an appropriate basis for appraisal based on recognised and accepted standards and techniques. Furthermore, there may be a variety of potential vibration generating activities employed other than those considered. The vibration levels and associated distances can be used to determine the distances at which adverse impacts could occur (within an associated confidence

limit). It is also necessary that consideration is given to the duration of impact when appraising likely impact.

11.8.17 The closest sensitive receptor to proposed access tracks is located at a distance of approximately 17 m at R10. At this distance, vibratory rollers are predicted to results in impacts of **Moderate** magnitude. Such impacts would however be substantially limited in duration.

11.8.18 At a worst-case distance of approximately 35 m from R6, vibratory rollers are predicted to result in impacts of Minor magnitude. For all other receptors, impacts of **Negligible** magnitude at worst are predicted.

11.8.19 **Moderate** impacts will only be experienced for short periods, when the closest access track to R10 is being constructed and only when a vibratory roller is being used. Construction vibration associated with vibratory rollers have the potential to be noticeable and potentially subject to complaint. However, given the temporary and transient nature of track construction, durations for which exceedance of 1.0 mm/s ppv may be experienced, will be short and, provided that adequate communication is made with relevant residents, the magnitude of impact will be limited.

11.8.20 **Minor** impacts at R4 to R8 have the potential to be experienced for construction works involving vibratory piling (i.e. for tower foundations) or at a distance less than 180 m. Other receptors are likely to experience **Negligible** impacts from vibratory piling works.

11.8.21 **Minor** to **Moderate** impacts are likely to be experienced for percussive piling works at a distance greater than 160 m.

11.8.22 Even with consideration to the LoD, provided that activities involving use of vibratory rollers are undertaken at distances greater than 5m from receptors, and piling is undertaken no closer than 27m from receptors, it is not expected that impacts of **Major** magnitude would arise.

11.8.23 It should be noted that construction works involving vibration would be short-term in nature. Within BS 5228, it states that although vibration levels of 1.0 mm/s (**Moderate** impacts) are likely to cause complaints, such levels can be tolerated if prior warning and explanation has been given to residents.

Construction Road Traffic Noise

11.8.24 Potential impacts generated by construction traffic are dependent on the number of vehicles and the routes used. Vehicular traffic associated with the demolition and construction phases of the Proposed Development is not known at this stage. The number of construction vehicles (including private car trips from the workforce as well as HGV movements) will depend on the size and number of vehicles operated by the principal contractor. This will be confirmed at detailed design stage, along with proposed routes to be adopted.

11.8.25 To provide context, on the basis of noise level change being driven by changes in total traffic flow (not speed or percentage HGVs), a noise level change of 1dB equates to a change in flow of +25% / -20% and a noise level change of 3dB equates to a change in flow of +100% / -50%. For construction traffic there is however expected to be an increase in percentage HGVs using applicable routes. The described noise changes applicable to changes in total traffic flow (with percentage of HGVs remaining constant) can therefore be used to provide context, however, due to an anticipated increase in HGVs associated with construction traffic, slightly lesser changes in traffic flow would result in the same suggested noise level changes.

11.8.26 There are to be multiple construction traffic access points for different areas of the site, construction traffic will therefore be distributed on the existing road network and will not be concentrated to route to one main access point. Provided it is ensured that construction traffic utilise existing well trafficked routes which are well maintained, as far as is reasonably possible, and are managed appropriately through the implementation of the Construction Traffic Management Plan (CTMP),

additional vehicle movements associated with construction operations would be diluted within the overall traffic flow and associated impacts minimised. In these circumstances, it is expected that changes of greater than 3dB (Minor impact magnitude) would generally be unlikely to occur.

Operational Noise

11.8.27 The impact of the operational noise from the OHL on the noise sensitive receptors within the study area has been assessed following the methodology as set out in Section 11.4.

11.8.28 A desktop-based study has been undertaken to establish the shortest distance between the centreline of the Proposed OHL to the closest point at the facade of each noise sensitive receptors.

11.8.29 Predicted noise levels for the OHL during rainy conditions, or 'wet noise' has been calculated based on the Electrical Power research Institute (EPRI) method. The L50 noise level, the noise level exceeded for 50% of the time during wet conditions has been used to calculate the predicted operational wet noise levels at the closest point of the façade for each noise sensitive receptor within the study area. Noise levels have been predicted in 10m increments from the OHL. The calculated source to receiver distances have been rounded down to provide a worst-case assumption.

11.8.30 A nominal 20dB 'dry' noise level has been used to calculate the combined wet and dry noise levels, as a worst-case assessment. The OHL tie-in design includes two types of conductors and tower configuration outlined in **Table 11.16**.

Table 11.16: Conductor and Tower Type

Conductor & tower type	Extent
Triple UPAS 400kV with L8 towers	'In' leg – from the existing New Deer to Peterhead OHL to the Netherton Hub substation for a length of approximately 3.4km
Triple Araucaria 400kV with ASTI SSE400	'Out' leg – from the Netherton Hub substation back to the New Deer to Peterhead OHL for a length of approximately 2km

11.8.31 Noise sensitive receptors 1 to 13 are closest to the Triple UPAS length of the Proposed Route. Noise sensitive receptors 14 to 19 are closest to the Triple Araucaria and over one km away from the length of the Triple UPAS proposed route. This is considered a significant enough distance that the predicted noise levels from each conductor can be assessed separately. **Table 11.17** presents the Tier 1 noise assessment results for Triple UPAS ('in' leg) indicating distance from noise sensitive receptors (NSR) to the LoD (exceptions are explained within the table) and predicted west noise level. NSRs are presented in **Figure 11.2: Operational Noise Sensitive Receptors (Volume 2)**.

Table 11.17: Triple UPAS 400kV Tier 1 Assessment Results

NSR Reference (Operational)	Coordinates		Distance from LoD (m)	Predicted Wet Noise dB(A)	Tier 1 (Wet Noise Only) Criteria dB(A)	Tier 1 Assessment Outcome
	X (m)	Y (m)				
NSR 1	403400	843359	108*	37	34	Further assessment necessary - proceed to Tier 2
NSR 2	403880	843938	148	35	34	Further assessment necessary - proceed to Tier 2
NSR 3	403513	844892	415	<34	34	No adverse impact

NSR Reference (Operational)	Coordinates		Distance from LoD (m)	Predicted Wet Noise dB(A)	Tier 1 (Wet Noise Only) Criteria dB(A)	Tier 1 Assessment Outcome
	X (m)	Y (m)				
NSR 4	403619	844964	362	<34	34	No adverse impact
NSR 5	403825	844900	142	35	34	Further assessment necessary - proceed to Tier 2
NSR 6	404316	844826	86	39	34	Further assessment necessary - proceed to Tier 2
NSR 7	404416	844864	160	34	34	Further assessment necessary - proceed to Tier 2
NSR 8	404484	844918	194	33	34	No adverse impact
NSR 9	404511	844772	185	33	34	No adverse impact
NSR 10	404509	844752	293	<34	34	No adverse impact
NSR 11	404638	844774	399	<34	34	No adverse impact
NSR 12	404652	844781	405	<34	34	No adverse impact
NSR 13	404888	844964	258	<34	34	No adverse impact
* NSR 1 is located within the LoD, therefore it has been assumed that the standard LoD in this area will not be followed. The distance is therefore not measured from the LoD but from the proposed OHL alignment.						

11.8.32 The results of Tier 1 of the assessment for the NSRs 1 to 13 which are closest to the Triple UPAS conductor, or 'In'-leg. find that the predicted 'wet only' noise level exceeds the 34dB(A) screening criteria at 5 NSRs. A Tier 2 assessment, following TGN(E)322 methodology, is required at these receptors.

11.8.33 **Table 11.18** presents the results of Tier 2 Assessment for the NSRs which exceeded the Tier 1 threshold.

Table 11.18: Triple UPAS 400kV Tier 2 Assessment Results

NSR Reference (Operational)	Coordinates		Distance from LoD (m)	Predicted Combined Wet & Dry Noise dB(A)	Tier 2 (Combined Wet & Dry Noise) Criteria, dB(A)	Tier 2 Assessment Outcome
	X (m)	Y (m)				
NSR 1	403400	843359	108*	29.3	36.7	No adverse impact, no further assessment necessary
NSR 2	403880	843938	148	26.6	36.7	No adverse impact, no further assessment necessary
NSR 5	403825	844900	142	26.6	36.7	No adverse impact, no further assessment necessary

NSR Reference (Operational)	Coordinates		Distance from LoD (m)	Predicted Combined Wet & Dry Noise dB(A)	Tier 2 (Combined Wet & Dry Noise) Criteria, dB(A)	Tier 2 Assessment Outcome
	X (m)	Y (m)				
NSR 6	404316	844826	86	30.5	36.7	No adverse impact, no further assessment necessary
NSR 7	404416	844864	160	25.6	36.7	No adverse impact, no further assessment necessary
* NSR 1 is located within the LoD, therefore it has been assumed that the standard LoD in this area will not be followed. The distance is therefore not measured from the LoD but from the proposed OHL alignment.						

11.8.34 The results of Tier 2 of the assessment indicate that the predicted combined wet and dry noise levels at all the NSRs fall below the Tier 2 noise criteria. This suggests that there will be **no adverse impact** at these receptors

11.8.35 **Table 11.19** presents the Tier 1 noise assessment results for Triple Araucaria ('out' leg) conductor. The results indicate that there is **no adverse impact** and that no further assessment is required at any of the noise sensitive receptors.

Table 11.19: Triple Araucaria Tier 1 Assessment Results

NSR Reference (Operational)	Co-ordinates		Distance from LoD (m)	Predicted Wet Noise dB(A)	Tier 1 (Wet Noise Only) Criteria dB(A)	Tier 1 Assessment Outcome
	X (m)	Y (m)				
NSR 14*	406359	844821	47*	28	34	No adverse impact, no further assessment necessary
NSR 15*	406394	844825	84*	24	34	No adverse impact, no further assessment necessary
NSR 16	407018	844586	413	<23	34	No adverse impact, no further assessment necessary
NSR 17	406600	844140	58*	27	34	No adverse impact, no further assessment necessary
NSR 18	407127	844296	311	<23	34	No adverse impact, no further assessment necessary
NSR 19	407273	844119	311	<23	34	No adverse impact, no further

NSR Reference (Operational)	Co-ordinates		Distance from LoD (m)	Predicted Wet Noise dB(A)	Tier 1 (Wet Noise Only) Criteria dB(A)	Tier 1 Assessment Outcome
	X (m)	Y (m)				
						assessment necessary
* NSR 14, 15 and 17 are located within the LoD, therefore it has been assumed that the standard LoD in this area will not be followed. The distance is therefore not measured from the LoD but from the proposed OHL alignment.						

11.8.36 **Table 11.20** presents the magnitude of effect for operational noise for the Proposed Development Based on the significance of effect matrix as defined in **Table 11.8**.

Table 11.20: Operational Noise Assessment Outcome

NSR Reference (Operational)	Coordinates		Magnitude of effect
	X (m)	Y (m)	
NSR 1	403400	843359	Low- No Adverse
NSR 2	403880	843938	Low – No Adverse
NSR 3	403513	844892	Negligible
NSR 4	403619	844964	Negligible
NSR 5	403825	844900	Low – No Adverse
NSR 6	404316	844826	Low – No Adverse
NSR 7	404416	844864	Low – No Adverse
NSR 8	404484	844918	Negligible
NSR 9	404511	844772	Negligible
NSR 10	404509	844752	Negligible
NSR 11	404638	844774	Negligible
NSR 12	404652	844781	Negligible
NSR 13	404888	844964	Negligible
NSR 14	406359	844821	Negligible
NSR 15	406394	844825	Negligible
NSR 16	407018	844586	Negligible
NSR 17	406600	844140	Negligible
NSR 18	407127	844296	Negligible
NSR 19	407273	844119	Negligible

11.9 Recommendations and Mitigation

Construction Phase

On-Site Demolition & Construction Noise

11.9.1 Mitigation measures have been embedded into the Proposed Development. A Noise Management Plan, see **Chapter 2**, **Table 2-2** reference GE2, will be prepared by the Principal Contractor with recommendations related to noise and vibration for the construction phase of the Project. The Principal Contractor will apply Construction Good Practice and adhere to in CEMP and GEMPs both of which will be adopted by the Principal Contractor.

11.9.2 The most significant noise generative plant items, wherever possible will be considerately located to maximise distances to sensitive receptors and acoustic screening (e.g. temporary screens and acoustic hoarding) will be adopted.

11.9.3 Unless for safety or engineering reasons, construction works that cause noise levels at sensitive receptors at or above moderate magnitude, should be limited so as to not exceed the following durations:

- 10 days/nights in any 15 consecutive days/nights.
- 40 days/nights in any consecutive six months.

11.9.4 Where identified as being necessary, the construction process will be monitored to ensure noise effects are mitigated, so far as is reasonably practicable. Any such monitoring protocols will also be incorporated into the construction method statements prepared by the Principal Contractor.

On-Site Demolition & Construction Vibration

Construction Traffic

11.9.5 Many of the mitigation measures presented within **Section 11.7** are also pertinent to the mitigation of construction traffic noise and would be adhered to at all times.

11.9.6 Notwithstanding the listed measures, to minimise potential impacts, it should be ensured that construction traffic is appropriately managed through the development and implementation of a CTMP. Wherever practicable, construction traffic routes should be selected to utilise existing well trafficked routes and to avoid routes which currently experience relatively low traffic flows. Appropriate timing and distribution of construction traffic movements should be considered and implemented with the aim of minimising potential disturbance due to noise. Utilised routes should be well maintained to avoid uneven ground and potential for associated influence on noise generated by vehicles. It should be ensured that vehicles do not park or queue for notable periods outside of sensitive receptors with engines running.

Construction Vibration

11.9.7 Where reasonably practicable, those activities which, by their very nature, have the potential to transmit significant levels of vibration into the ground, should be substituted with alternatives that generate less vibration. For example, continuous flight auger or auger bored piling produce less vibration than driven piling methods. If alternative plant cannot be sourced, then efforts should be made to minimise the use of such plant.

11.9.8 Where identified as being necessary, the construction process would be monitored to ensure vibration effects are minimised, so far as is reasonably practicable. Any such monitoring protocols will also be incorporated in construction method statements prepared by the Principal Contractor.

Operational Phase

11.9.9 The conductors selected for the Tie-In are low noise. As a result, the operational noise assessment determines that there are no noise sensitive receptors requiring a Tier 3 assessment. A reduced LoD has been assumed in the vicinity of NSR 17 such that the OHL centre line is not closer than 58m to the residential property. No further mitigation is required.

11.10 Cumulative Appraisal

11.10.1 There is potential for cumulative impacts to occur as a result of the Proposed Development and Cumulative Developments identified in the surrounding area. Cumulative impacts may arise during both the construction and operational phase.

11.10.2 A review of the Cumulative Developments scoped into the Cumulative Effects Assessment identified in **Table 1.1** of **Appendix 12.1: Long List of Cumulative Developments (Volume 3)** has been undertaken to determine the potential for cumulative effects to arise. **Table 11.21** presents the cumulative appraisal and, where necessary, the control or mitigation measures which will be employed to manage potential cumulative effects.

11.10.3 The majority of Cumulative Developments sites are located at distances of 300 m or greater from the Proposed Development and potential noise and vibration effects during the construction phase are anticipated to be localised. For these sites, it is therefore anticipated that construction phase impacts beyond those identified in this Chapter will not occur.

Table 11.21: Cumulative Appraisal

Cumulative Development	Planning Reference and Description	Cumulative appraisal
Netherton Hub	Ref: APP/2024/1714. National for Erection of a Strategic Electricity Transmission Hub Including 400kV AC Substation, 132kV AC Substation, 2 HVDC Converter Stations, Transmission Hall, Spares Warehouse, Operations Base and Associated Works	The construction phase of the cumulative development has the potential to result in cumulative construction phase impacts at the closest sensitive receptors due to on-site construction activities and construction traffic. The potential for cumulative effects to arise emphasises the importance of developing a comprehensive CEMP for the construction phase of each development. In addition, as this cumulative development is a SSEN Transmission project, there is greater potential for a coordinated noise management approach. It is therefore anticipated that cumulative impacts can be minimised such that they will not exceed those identified in **Chapter 11**. A review of the Vol 2 **Chapter 13 Noise & Vibration assessment** for the Netherton Hub found that a there was a single common receptor between the Proposed Development and the Netherton Hub noise impact assessments. Based on the predicted noise levels no cumulative noise impact is expected in the operational phase.
Spittal to Peterhead HVDC Link	Ref: APP/2025/1383. Construction of Underground Cable	The construction of the cumulative development has the potential to have a cumulative noise impact at the closest sensitive receptors due to the on-site construction activities and increased traffic. Any such impacts would however be localised. The potential for cumulative effects to arise emphasises the importance of developing a comprehensive CEMP for the construction phase of each

Cumulative Development	Planning Reference and Description	Cumulative appraisal
		development. Due to the worst case nature of appraised impacts, adverse construction phase impacts beyond those identified in **Chapter 11** are not anticipated. The underground cable is not anticipated to generate any operational noise and as such no cumulative noise impact is expected in the operational phase.
Inverveddie House, Nether Kinmundy	Ref: APP/2025/1897. Demolition of Dwellinghouse	The demolition of the dwellinghouse is likely to be short-term in nature, therefore cumulative noise and vibration impacts are not expected. No cumulative impact is expected for operational noise.
MarramWind Offshore Wind Farm	Ref: ENQ/2025/0688. Installation of Onshore Infrastructure forming part of MarramWind Offshore Windfarm	The construction of the cumulative development has the potential to have a cumulative noise impact at the closest sensitive receptors due to on-site activities and increased traffic. The potential for cumulative effects to arise emphasises the importance of developing a comprehensive CEMP for the construction phase of each development. Due to the worst case nature of appraised impacts, adverse construction phase impacts beyond those identified in **Chapter 11** are not anticipated. No cumulative impacts are anticipated during the operational phase given the distance to this scheme.
Netherton BESS	Ref: APP/2025/1555. Construction and operation of a Battery Energy Storage System (BESS) along with associated infrastructure and ancillary works, access, drainage, landscape and biodiversity enhancement.	Taking into consideration the distance between common receptors for the Proposed Development and Netherton BESS (700 m) and the worst case nature of appraised impacts from the Proposed Development, adverse construction phase impacts beyond those identified in **Chapter 11** are not anticipated. No cumulative impacts are anticipated during the operational phase given the distance to this scheme.
BBNP Beauly to Blackhillock to New Deer to Peterhead 400 kV OHL	Ref: APP/2025/1723. Application for consent under Section 37 of the Electricity Act 1989 to install, operate and keep installed approximately 186 km of new 400	The construction of the cumulative development has the potential to have a cumulative noise impact at the closest sensitive receptors due to the on-site activities and

Cumulative Development	Planning Reference and Description	Cumulative appraisal
	kilovolt (kV) double circuit steel structure overhead transmission line (OHL), including downleads, to connect into new substation sites at Fanellan (NH 48321 42717) in the area of Beauly, Greens (NJ 81960 47587) in the area of New Deer and Netherton (NK 05761 45576) in the area of Peterhead. The Proposed Development also includes crossing works, temporary diversions and permanent realignment works to existing 132 kV and 275 kV OHLs, of approximately 14.7 km in total, and ancillary development and associated works. In total, the Proposed Development would comprise approximately 200.7 km of new OHL infrastructure.	increased traffic. The potential for cumulative effects to arise emphasises the importance of developing a comprehensive CEMP for the construction phase of each development. In addition, as this development is a SSEN Transmission project, there is greater potential for a coordinated noise management approach. It is therefore anticipated that cumulative impacts can be minimised such that they will not exceed those identified in **Chapter 11**. The BBNP OHL runs parallel along the part of the 'In' leg of the Proposed Development. A review of the worst-affected receptor, NSR6 has been conducted and found that the predicted cumulative operational 'wet noise' level of both OHLs results in a level below the TGN(E)322 Tier 1 screening noise criteria. As such no cumulative noise impact is anticipated in the operational phase.

11.11 Summary and Conclusions

11.11.1 During the Demolition and Construction Phase, without consideration of mitigation, including compliance with the CEMP and Noise Management Plan, impacts of Major magnitude are predicted at worst-affected receptors closest to the relevant works. Such impacts are predicted when works are undertaken at the closest reasonable location to each affected receptor. For the majority of the construction and demolition phase it is expected that activities will be located at greater distances, thus generating lower noise levels at sensitive receptors. Worst case impacts are therefore predicted for only limited durations. For the majority of works, activities will be undertaken at sufficient distances from sensitive receptors such that lesser impacts are anticipated. Best practice mitigation measures embedded within the CEMP and Noise Management Plan will serve to further minimise potential adverse impacts.

11.11.2 For vibration during the Demolition and Construction Phases, worst case impacts of Moderate magnitude have the potential to arise when worst case activities are undertaken close to sensitive receptors. It is however expected that the duration of vibration generative activities that take place at the closest distances to nearby receptors will be short. Consequently, associated impacts will be limited in extent and duration with appropriate mitigation in place to monitor and control these.

11.11.3 Noise generated by construction traffic will be appropriately managed and minimised through implementation of the Construction Traffic Management Plan (CTMP).

11.11.4 A worst-case assessment has been undertaken to determine the likely noise impact arising from the operational phase considering the shortest distance from the Limits of Deviation to the nearest noise sensitive receptors. The conductors selected for the overhead line will generate an operational noise impact classified as either negligible or low no adverse impact. Therefore, no further mitigation is required other than the selection of conductors.