VOLUME 2: CHAPTER 13 – NOISE AND VIBRATION

Figures (Volume 3 of this EIA Report)

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13. NOISE AND VIBRATION

13.1 Introduction

13.1.1 This chapter considers the potential effects of the Proposed Development on noise and vibration. The assessment includes the potential effects upon on noise sensitive receptors (NSRs) during both the construction and operation of the Proposed Development. The evaluation of the baseline has been made through a combination of desk-based study, field survey and consultation.

13.1.2 The specific objectives of the study are as follows:

- identify the NSRs in the vicinity of the Proposed Development and the baseline noise environment;
- describe how consultation has informed the scope of the assessment;
- describe the assessment methodology and significance criteria used in the assessment;
- describe and define the baseline noise environment;
- identify the dominant sound sources associated with the operation and construction of the Proposed Development;
- calculate and assess the potential direct and indirect impacts on NSRs; and
- indicate any requirements for mitigation measures, if applicable, to provide sufficient levels of protection for all NSRs.

13.1.3 This chapter should be read in conjunction with **Chapter 3: Description of the Proposed Development** of the EIA Report for full details of the Proposed Development and **Chapter 12: Transport and Access**.

13.1.4 This chapter was prepared and overseen by experienced acoustic consultants with appropriate memberships of the Institute of Acoustics (IOA), and experience of EIA in the context of wind farm, grid and mixed use developments. Field surveys and data collection were undertaken by acousticians who had extensive experience and training in undertaking noise surveys for grid and renewable energy projects.

13.1.5 This chapter is necessarily technical in nature; a glossary of acoustic terminology is included in **Appendix 13.1: Acoustic Glossary**.

13.1.6 Additional information which supports this chapter is presented in the following appendices:

- **Appendix 13.1 Acoustic Glossary;**
- **Appendix 13.2 Calibration Certificates;**
- **Appendix 13.3 Baseline Noise Data;**
- **Appendix 13.4 Construction Noise Impact Assessment;**
- **Appendix 13.5 Cumulative Assessment.**

13.1.7 The following terminology will be referred to throughout this chapter

- Site: all land within the planning application (red line) boundary (**Figure 1.1: Site Location**);
- Proposed Development: The infrastructure including the platform, bays, control buildings, access tracks, drainage and landscape features and temporary construction compounds (see Paragraph 3.3.3 in **Chapter 3: Description of the Proposed Development**);

13.2 Scope of the Assessment

Effects Assessed in Full

13.2.1 The EIA Scoping process, baseline conditions and professional judgement has identified the following direct, indirect and cumulative effects for detailed assessment:

- direct effects during construction on noise;
- direct effects from construction traffic on noise and vibration;
- direct effects during operation on noise;
- indirect effects during operation on noise and vibration;
- cumulative effects during construction on noise; and

- cumulative effects during operation on noise.

13.2.2 The assessment scenarios used in this assessment are the fully operational Proposed Development and when construction traffic on local roads is at its peak (refer to **Figure 3.8: Emmock HGV and AIL Traffic Forecast** in **Chapter 3: Description of the Proposed Development**).

Effects Scoped Out

13.2.3 On the basis of the desk-based work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, and feedback received from consultees, the following effects have been 'scoped out' of detailed assessment, as proposed in the EIA Scoping Report and confirmed in the Scoping Opinion issued by Angus Council (**Appendix 6.2: Scoping Opinion**).

- noise from operational maintenance;
- construction vibration within the Site; and
- operational vibration.

13.2.4 Operational maintenance works (**Section 3.11: Future Maintenance of the Substation**) required will be short-term and intermittent and are not expected to give rise to significant effects relating to noise and vibration. Therefore, noise from operational maintenance is not expected to adversely impact NSRs and has not been assessed further.

13.2.5 Excessive vibration levels generally arise from heavy construction works such as piling, deep excavation, or dynamic ground compaction. In comparison, the construction works proposed for the Proposed Development will generate relatively low levels of vibration. As such, vibration from construction works is not expected to adversely impact NSRs and has not been assessed further.

13.2.6 There are no known vibrational issues associated with the operation of the Proposed Development at nearby NSRs. Therefore, vibration due to operation is not expected to adversely impact NSRs and has not been assessed further.

Study Area

13.2.7 The Study Area is an area extending 1,500 m from the Site for which all desk-based and field data were gathered to inform the assessment presented in this chapter. The Study Area is presented in **Figure 13.1: Noise Measurement Locations**.

13.2.8 The Study Area around the Site is semi- rural in nature, predominantly consisting of agricultural land, but with a small number of residential properties located in all directions surrounding the development. A portion of the area is non-agricultural with the existing Tealing and the Seagreen Wind Energy Ltd Substations.

13.2.9 Potential NSRs comprise inhabited premises where humans may experience the effects scoped into the assessment.

13.2.10 The nearest groups of residential NSRs are to the north and east of the Site (Balnuith Farm and Cottages, and Seventeen Acres). Other NSR clusters are located to the north of the Site (Balkemback Cottages and Dunian). These NSRs are deemed to be representative of nearby residences in the Study Area. If the noise criteria can be met at the closest NSRs, then any property at a greater distance will also meet the criteria as noise will reduce to a smaller value at a greater distance.

13.3 Assessment Methodology

Legislation, Policy and Guidance

Legislation

13.3.1 The following legislation, policy and guidance documents of relevance have been considered in undertaken the assessment of effects of noise from the Proposed Development:

- The Control of Pollution Act, 1974 (COPA) - Section 60 of the Control of Pollution Act enables Local Authority officers to serve a notice in respect of noise nuisance from construction works, instructing the contractor to minimise nuisance to neighbouring properties through specific conditions. Section 61 of the Control of Pollution Act provides a method by which a contractor can apply to the Local Authority for prior consent to undertake construction works in advance of their commencement. If consent is given, the application is exempt from any enforcement action under Section 60 of the same act.

- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

Policy

13.3.2 The following policies of relevance to the assessment have been considered:

Planning Advice Note (PAN) 1/2011: 'Planning and Noise[1]

13.3.3 Published in March 2011, PAN 1/2011 provides advice on the role of the planning system in helping to prevent and limit adverse effects of noise (Scottish Government, 2011). Information and advice on noise assessment methods are provided in the accompanying Technical Advice Note (TAN): Assessment of Noise. Included within the PAN document and the accompanying TAN are details of the legislation, technical standards, and codes of practice for specific noise issues.

13.3.4 Neither PAN 1/2011 nor the associated TAN provides specific guidance on the assessment of noise from fixed plant, but the TAN includes an example assessment scenario for 'New noisy development (incl. commercial and recreation) affecting a noise sensitive building', which is based on British Standard (BS) 4142:1997: Method for rating industrial noise affecting mixed residential and industrial areas. In 2014, BS4142:1997 was replaced with BS4142:2014: Methods for rating and assessing industrial and commercial sound.

Standards and Guidance

13.3.5 This assessment is carried out in accordance with the principles contained within the following documents:

British Standard 5228-1:2009 +A1:2014 (BS5228), Code of Practice for Noise and Vibration Control on Construction and Open Sites[2]

13.3.6 Guidance on the prediction and assessment of noise and vibration from construction sites is provided in BS5228 2009 +A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise. BS5228-1 provides recommended limits for noise from construction sites.

13.3.7 The construction noise impact assessment (CNIA) will be carried out according to the ABC method specified in Table E.1 of BS5228-1, in which NSRs are classified in categories A, B or C according to their measured or estimated background noise level.

13.3.8 Traffic noise due to heavy goods vehicles on hauls roads will be considered as part of the construction noise impact assessment.

13.3.9 Part 2: Vibration. BS5228-2 provides recommended limits for vibration from construction sites. The construction vibration impact assessment (CVIA) will be carried out against the guidance on effects of vibration levels specified in Table B.1 of BS5228-2. The level of vibration ranging from 0.14 $mm.s^{-1}$ to 10 $mm.s^{-1}$ indicates where vibration may be perceptible however acceptable, or intolerable.

British Standard 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound (BS4142)[3]

13.3.10 British Standard 4142 describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

13.3.11 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

1 Planning Advice Note: Planning and noise (PAN 1/2011, The Scottish Government, 2011

2 British Standard 5228: Code of practice for noise and vibration control on construction and open sites (BS 5228), BSI, 2009, amended 2014

3 British Standard 4142: Methods for rating and assessing industrial and commercial sound (BS 4142), BSI, 2014, Amended 2019

13.3.12 The specific sound level of the noise source being assessed is corrected, by the application of corrections for acoustic features. The British Standard effectively compares and rates the difference between the rating level and the typical background sound level in the absence of the noise source being assessed.

13.3.13 The British Standard advises that the time interval, *T*, of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) when the noise source in question is likely to operate or is proposed to operate in the future.

13.3.14 Comparing the rating level with the background sound level, BS4142 states:

- *"Typically, the greater this difference, the greater the magnitude of impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

13.3.15 BS4142 places a strong emphasis on context when considering any assessment outcome. Section 11 states that: "*Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."* The standard does not specify thresholds below which background sound and rating levels should be considered low. However, the Association of Noise Consultants guidelines for the use of BS4142 states:

"BS4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS4142 defined very low background sound levels as being less than about 30 dB LA90, and low rating levels as being less than about 35 dB Lar."

ISO 9613-2:2024, Acoustics — Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors

13.3.16 This document specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in ISO 1996-series) under meteorological conditions favourable to propagation from sources of known sound emission.

13.3.17 The operational noise impact assessment will be based on a 3D digital model of the Proposed Development and Study Area to industry standard in in accordance with ISO 9613-2.

BS 8233:2014[4] and Noise Rating Curves

13.3.18 British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings provides guidance for the control of noise in and around buildings. The guidance provided within BS8233:2014 is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

13.3.19 British Standard 8233:2014 includes appropriate internal and external noise level criteria which are applicable to dwellings exposed to steady-state external noise sources. It is stated in BS8233:2014 that it is desirable for internal ambient noise level not to exceed the criteria which are set out in **Table 13-1: Summary of Internal Ambient Noise Level Criteria for Dwellings from BS 8233:2014**.

Table 13-1: Summary of Internal Ambient Noise Level Criteria for Dwellings from BS 8233:2014

Activity	Location	07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Nighttime
Resting	Living Room	35 dB LAeq,16 hour	

4 British Standard 8233: Guidance on sound insulation and noise reduction for buildings (BS 8233), BSI, 2014

Activity	Location	07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Nighttime
Dining	Dining Room/Area	40 dB LAeq,16 hour	
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16 hour	30 dB LAeq,8 hour

13.3.20 Noise Rating (NR) curves were developed by the International Organization for Standardization (ISO) to determine the acceptable indoor environment for hearing preservation, speech communication and annoyance.

13.3.21 The noise rating curves for different sound pressure levels are plotted as acceptable sound pressure levels at different frequencies. Acceptable sound pressure level varies with the room and the use of it. Different curves are obtained for each type of use. Each curve is referenced by a NR number as set out in **Table 13-2: Noise Rating Descriptions**.

Table 13-2: Noise Rating Descriptions

Noise Rating	Application
NR 20	Quiet rural area for protection of amenity
NR 25	Concert halls, broadcasting and recording studios, churches
NR 30	Private dwellings, hospitals, theatres, cinemas, conference rooms
NR 35	Libraries, museums, court rooms, schools, hospitals operating theatres and wards, flats, hotels, executive offices
NR 40	Halls, corridors, cloakrooms, restaurants, night clubs, offices, shops
NR 45	Department stores, supermarkets, canteens, general offices
NR 50	Typing pools, offices with business machines
NR 60	Light engineering works
NR 70	Foundries, heavy engineering works

13.3.22 The NR curve NR 20 equates to a similar total noise level of 30 dB(A), and therefore is an appropriate consideration in respect to indoor noise levels as specified in BS8233:2014.

NANR116 – Open/closed window research: sound Insulation Through ventilated Domestic Windows

13.3.23 The insulation of an open window has been generally accepted as being 10-15 dBA although its precision and effect on opening style, open area and window size, are not readily available. A programme of laboratory measurements has been undertaken by the Building Performance Centre at Napier University on behalf of the Department for Environment, Food and Rural Affairs, in order to quantify the sound insulation provided by a variety of window types, opening styles, areas of opening and ventilator devices.

Design Manual for Roads and Bridges LA 111 Noise and Vibration

13.3.24 Ground borne vibration can result from construction works and may lead to perceptible levels of vibration within nearby properties, which can at higher levels cause annoyance to residents. In extreme cases, cosmetic or structural building damage can occur; however, the levels of vibration required for such an impact are very rare.

13.3.25 The Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration document provides guidelines for the assessment and management of noise and vibration impacts associated with road projects. The guidance sets out the requirements for assessing noise and vibration impacts from road schemes, ensuring that these impacts are identified, quantified, and managed appropriately.

Road Research Laboratory (TRL) Research Report 246 – Traffic Induced Vibrations in Buildings

13.3.26 This report summarises studies of the effects of these vibrations on people, buildings and equipment and includes results from other relevant investigations. The first section describes the nature of the problem as revealed by questionnaire surveys and details the methods for predicting the degree of disturbance likely to be caused by both airborne and ground-borne vibrations. The effects of vibration on sensitive equipment and critical tasks are also considered. The second section reports on a number of investigations into the effects of traffic vibration on buildings. Studies included a fatigue test on a vacant property, comparisons of structural defects in

houses exposed to high levels of vibration with similar properties exposed to relatively low levels, and case studies of heritage buildings adjacent to heavily trafficked roads. It is concluded that although traffic vibration can cause nuisance to occupants there is no evidence to support the assertion that traffic vibration can also cause significant damage to buildings.

Calculation of road Traffic Noise (CRTN) 1988

13.3.27 The CRTN memorandum describes the standard UK procedure for the measurement and calculation of road traffic noise. According to the memorandum, the procedures are necessary to enable entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.

TGN (E) 322 – Operational Audible Noise Assessment Process for Overhead Lines (OHL).

13.3.28 National Grid has derived a procedure to assess the impact of OHL noise in both dry and rainy conditions – *TGN (E) 322 – Operational Audible Noise Assessment Process for Overhead Lines*.

13.3.29 The assessment procedure adopted here follows TGN (E) 322, and has been conducted in the following stages:

- the outcome of the Tier 1 assessment will determine whether the 'worst case' wet noise impact is predicted to be acceptable, or whether further assessment is required;
- the outcome of the Tier 2 assessment will determine whether the combined wet and dry noise impact is acceptable, or whether further assessment is required;
- the outcome of the Tier 3 assessment will determine whether the noise impact is acceptable, whether the noise needs to be mitigated and minimized or whether the noise is unacceptable; and
- the Tier 3 assessment takes account of existing background sound levels in the area and the influence of noise levels due to rainfall.

Consultation

13.3.30 In undertaking the assessment, consideration has been given to the consultation responses which has been undertaken as detailed in **Table 13-3: Summary of Consultation.**

Table 13-3 Summary of Consultation

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Angus Council Development Standards Committee March 2024	Pre-Application Consultation 1	Requirement to consider impacts upon residential amenity	The assessment considers the impact of noise upon residential receptors.
Community feedback June 2024	Pre-Application Consultation 2	Concerns about noise during construction and 'noise pollution'	The assessment considers the impact of noise upon sensitive receptors in both the construction and operational phase.
Tealing Community Council June 2024	Pre-Application Consultation 2	Already increased noise pollution as a result of existing substation expansion. Concerns over noise of the substation. The existing Tealing Substation already makes noise in the rain.	Cumulative noise from the existing Tealing Substation is considered. Additional cumulative noise during wet conditions for OHL connections are considered.
		Noise is out of keeping with rural community	Background noise levels in absence of industrial noise where appropriate have been utilised (surrogate). Relevant penalties have been included for the character of noise

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
			received in a BS4142 assessment.
		Has noise been tested in all sorts of weather?	A TGN(E)322 assessment for OHL noise during wet conditions has been undertaken as part of the cumulative assessment.
Angus Council September 2024	Scoping response	Angus Council's Environmental Health Team has indicated that it is satisfied that the proposed noise and vibration methodologies would ensure that any potential impact that is likely to have a significant effect on any sensitive receptor would be properly evaluated within the EIA Report. The requests that operational noise levels are assessed against NR20 at night.	The operational noise impact assessment, in additional to following BS4142:2014 methodology, has included an indoor noise impact assessment with reference to BS8233:2014 and NR20 criterion.

Desk Based Research and Data Sources

13.3.31 The following data sources have informed the assessment:

- Ordnance Survey OS Terrain 50 data – implementation into 3D operational noise model; and
- Ordnance Survey OS AddressBase.

Field Survey

13.3.32 Noise monitoring has been undertaken in the Study Area to determine the existing prevailing noise environment (**Figure 13.2: Noise Measurement Locations**).

13.3.33 AddressBase data, detailed maps, and aerial photographs of the area surrounding the Proposed Development were examined and nearby NSRs were identified.

13.3.34 Free-field long term monitoring equipment was installed at identified NSRs on 23rd April 2024 and decommissioned on 9th May 2024. An additional location was commissioned on 10th May 2024 and decommissioned on 22nd May 2024. The additional location was monitored at a separate time interval due to access arrangements. Permission for land access was sought prior to the deployment of equipment. The unattended measurements consist of constant monitoring over the defined time period, the data is then processed to LA90(15minutes) as per BS4142.

13.3.35 Attended spot measurements were also conducted at several additional locations in the Study Area. The attended spot measurements consisted of a single 15-minute measurement conducted to BS4142 standard, taken on public land nearby to other NSRs of interest. These were conducted during quiet nighttime conditions at 22:30 on 23rd April 2024 00:30 on 24th April 2024, and represent a conservative baseline noise level to help understand the nature of the surrounding environment, and supplement the long-term measured data.

13.3.36 Representative NSRs, and measurement positions are detailed in **Table 13.4: Noise Sensitive Receptors** and **Figure 13.2: Noise Measurement Locations**.

Table 13-4: Noise Sensitive Receptors

Location ID#	Serial Number	Easting	Northing	Measurement Period
NSR 1.1	1265451	338326	738264	23 April 2024 to 9 May 2024 (unattended)
NSR 1.2	732101	339177	738092	
NSR 1.3	11111	339005	736724	
NSR 1.4	1032445	338276	737015	
NSR 1.5	11111	337596	738030	10 May 2024 to 22 May 2024 (unattended)
NSR 2.1	00887270	338744	738288	23 April 2024 to 24 April 2024 (attended)
NSR 2.2		339537	738145	
NSR 2.3		339839	737787	
NSR 2.4		339909	737318	
NSR 2.5		339468	736737	
NSR 2.6		337636	736966	
NSR 2.7		337560	738237	

13.3.37 Measurements were conducted using a 01dB CUBE and Rion NL-52 sound level meters which were spot calibrated with a B&K 4231 calibrator, before, during and after the measurement campaign. The sound level meters were housed in protective cases for all weather conditions and used to conduct long-term measurements. Calibration certificates can be found in **Appendix 13.2: Calibration Certificates**.

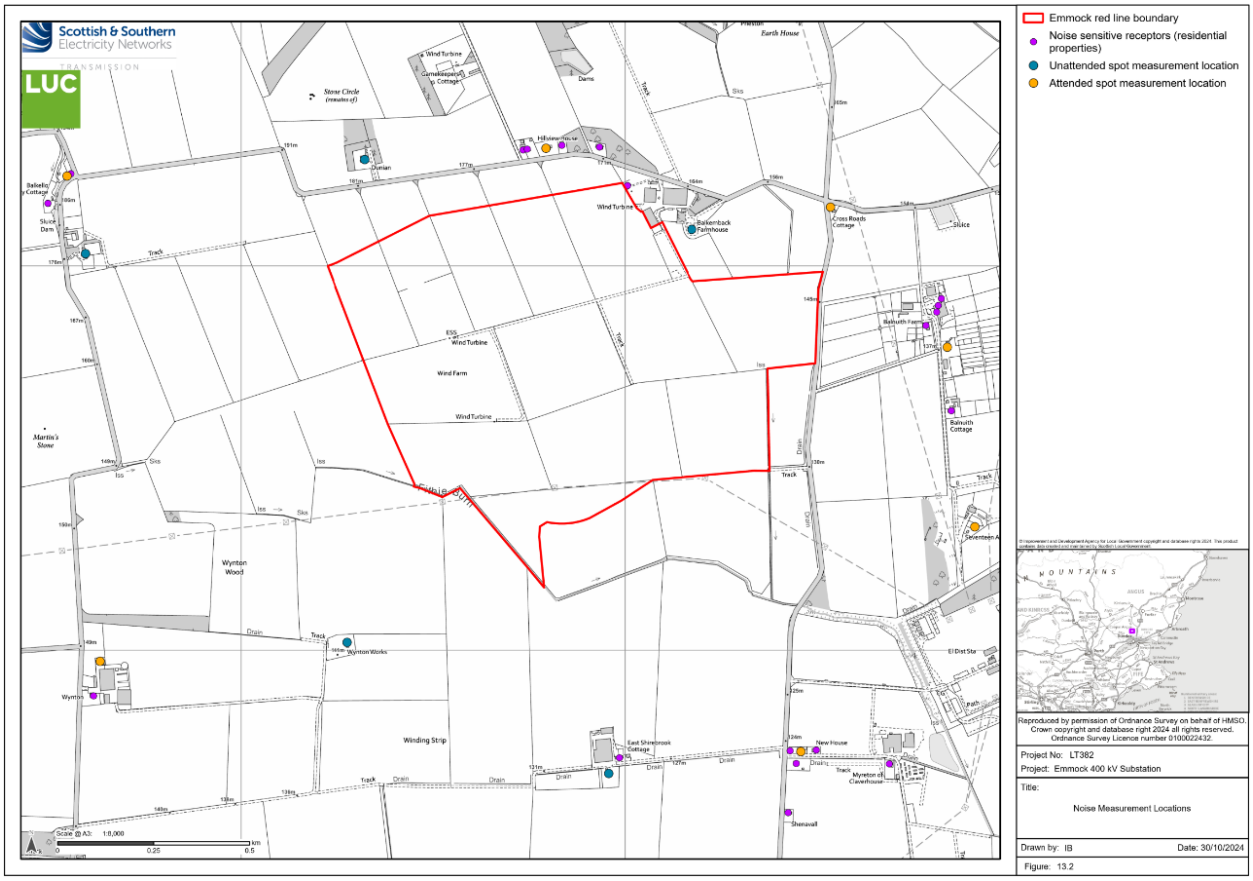
13.3.38 The parameters measured during the background noise (BGN) monitoring campaign include the following:

- LAeq (15 minutes);
- LAeq (15 minutes) one-third octave band spectrum;
- LA90 (15 minutes); and
- LA90 (15 minutes) one-third octave band spectrum.

13.3.39 As the survey was based on long-term unattended measurements, a meteorological station was also installed to monitor for weather conditions. The station was deployed at NSR 1.4 and is deemed to be representative of the entire Study Area. Meteorological conditions such as wind and rain will affect background noise conditions and have possible effects on noise propagation. Measurements were conducted every 15 minutes to coincide with the measured noise data as per the requirements of BS4142.

13.3.40 Plate **13:1: Measurement Locations** shows the location of these NSRs and corresponding monitoring locations relative to the Site. This information is also presented in **Figure 13.2 – Noise Measurement Locations**.

Plate 13:1: Measurement Locations



Determining Sensitivity of Receptors and Magnitude of Change

13.3.41 The sensitivity of the NSR is estimated in its current state prior to any change implied by the Proposed Development. The level of sensitivity is determined according to existing regulations and guidance, societal value, and vulnerability for the change. By the combination of the assessed value of these three components, the NSRs' sensitivity can be classified as Low, Medium or High (**Table 13-5: Evaluation of Receptor Sensitivity**).

Table 13-5: Evaluation of Receptor Sensitivity

Level of Sensitivity	Definition
Low	Receptors where distraction or disturbance from noise is minimal, for example; Buildings not occupied during working hours. Factories and working environments with existing high noise levels. Sports grounds when spectator noise is a normal part of the event. Night Clubs.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance. For example; Offices. Bars/Cafes/Restaurants where external noise may be intrusive. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls).
High	Receptors where people or operations are particularly susceptible to noise. Residential, including private gardens where appropriate. Quiet outdoor areas used for recreation. Conference facilities. Theatres/Auditoria/Studios. Schools during the daytime. Hospitals/residential care homes. Places of worship.

13.3.42 All NSRs considered in this assessment are residential in nature, with a semi-rural baseline noise environment. Therefore, the sensitivity of all NSRs is **High**.

13.3.43 The magnitude of change at a given receptor can be interpreted as the degree of alteration experienced by the receptor as a consequence of the impact, impact magnitude is calculated on a case-by-case basis for each NSR and classified as **No Change**, **Negligible**, **Low**, **Medium**, or **High** as described in **Table 13-6: Descriptions for Magnitude of Change**.

Table 13-6: Descriptions for Magnitude of Change

Descriptors for Magnitude of Change	Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or element.
No change	No loss or alteration of characteristics, features or elements; no observable impact.

Construction Noise

The criteria provided for the ABC (see Paragraph 13.3.7) method detailed in BS5228-1 to determine the category and threshold limits of NSRs are shown in **Table 13-7: Construction Noise Impact Assessment Criteria**.

Table 13-7: Construction Noise Impact Assessment Criteria

Assessment category and threshold value period	Threshold value, LAeq (dB)		
	Category A	Category B	Category C
Nighttime	45	50	55
Evenings and weekends	55	60	65
Daytime and Saturdays	65	70	75

13.3.44 Nighttime is defined to be between 23:00 and 07:00. Evenings and weekends are defined to be 19:00 – 23:00 on weekdays, 13:00 – 23:00 on Saturdays and 07:00 – 23:00 on Sundays. Daytime is defined to be 07:00 – 19:00 on weekdays and 07:00 – 13:00 on Saturdays.

13.3.45 The NSR is defined as Category A if the ambient noise levels (rounded to the nearest 5 dB) are less than those stated for Category A. This is true for the Study Area, as detailed in **Section 13.4**, and therefore the Proposed Development will be assessed to Category A thresholds.

13.3.46 Working hours proposed are from 7 am to 7 pm, 7 days per week (see Paragraph 3.5.4 in **Chapter 3: Proposed Development**), therefore the Category A 55 dB limit has been adopted to ensure a conservative assessment takes place.

13.3.47 The guidance has been applied to The World Health Organisation (WHO) concepts of lowest observable adverse effect level (LOAEL), this is the level above which adverse effects on health and quality of life can be detected, and the significant observable adverse effect level (SOAEL); this is the level above which significant adverse effects on health and quality of life occur. The LOAEL is relative to background noise, the SOAEL threshold level has been determined from Category A of

13.3.48 **Table** 13-7: Construction Noise Impact Assessment Criteria**.** The magnitude of impact at receptors can be determined from **Table 13-8: Construction Noise - Magnitude of Change at Receptors**.

Table 13-8: Construction Noise - Magnitude of Change at Receptors

Magnitude of Change	Descriptor
No Change/Negligible	Below LOAEL (<BGN)
Low	Above or equal to LOAEL and below SOAEL (BGN-55 dB(A))
Medium	Above or equal to SOAEL and below SOAEL + 5dB (55-60 dB(A))
High	Above or equal to SOAEL + 5dB (>60 dB(A))

13.3.49 Construction traffic for local haul roads and Site access are incorporated to the BS5228-1:2009, however additional criteria extend to construction traffic on highways.

13.3.50 **Table 13.9: Construction Traffic Magnitude of Impact At Receptors** shows noise impact criteria for the assessment of changes to road traffic noise due to the addition of Proposed Development related construction traffic, with reference from Table 3.17 of DMRB, LA 111 Noise and Vibration.

Table 13-9: Construction Traffic - Magnitude of Impact at Receptors

Magnitude of Change	Traffic Noise Level Change
No Change	x < 0
Negligible	0.1= x < 0.9
Low	1.0 = x < 2.9
Medium	3 = x < 4.9
High	x > 5

13.3.51 In accordance with the EIA Regulations construction noise and construction traffic noise shall be defined as a significant effect where it is determined that a **High** or **Medium** magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; and/or
- a total number of days exceeding 40 in any 6 consecutive months.

Operational Noise

13.3.52 Information from the rating level, the background sound level, and the stated impacts from a BS4142 assessment have been converted into representative impact magnitudes, detailed in **Table 13-10: BS 4142:2014 Impact Magnitude**.

Table 13-10: BS 4142:2014 Impact Magnitude

Impact Magnitude	Excess Above Background (dB)	Definition
No Change	x < 0	Impact to the receptor is immeasurable, undetectable or within the range of normal natural background variation.
Negligible	0= x < 3	The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
Low	3 = x < 5	
Medium	5 = x < 10	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

Impact Magnitude	Excess Above Background (dB)	Definition
High	x = 10	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

13.3.53 The assessment within BS4142 is context-based, as is stated in the definitions of determining impact. There is no theoretical limit to how the context can or should influence the impact assessment, but any alteration of the conclusions of an assessment due to the context should be sufficiently explained and justified for the specific circumstances in question. Section 11 of BS4142: "*Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.*" The assessor will include additional consideration for internal noise levels during nighttime periods, where it is less likely that the external amenity is in use, and the preservation of internal conditions and the reduction of potential sleep disturbance is of more concern. For nighttime conditions, operational noise shall constitute a significant effect only where it is determined that a **High** impact magnitude, or **Medium** magnitude only while also exceeding the internal noise limits of 30 dB(A) set out in BS8233, or exceeds NR20 criteria.

Construction Vibration

13.3.54 Vibration levels that are felt and perceived as annoying or uncomfortable generally fall below levels that cause structural damage but can still impact human comfort and perception. Criteria for received vibration are taken from Table B.1 in BS5228-2 and shown in **Table 13-11: Construction Vibration Impact Assessment Criteria**. Vibration is measured as peak particle velocity (PPV).

Table 13-11: Construction Vibration Impact Assessment Criteria

Impact Magnitude	Vibration Level, Peak Particle Velocity (PPV)	Effect
Negligible	<0.3 $mm \cdot s^{-1}$	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.
Low	>0.3 $mm \cdot s^{-1}$	Vibration might be just perceptible in residential environments.
Medium	>1.0 $mm \cdot s^{-1}$	It is likely that vibration of this level in residential environments will cause complaints but can be tolerated if prior warning and explanation have been given to residents.
High	>10 $mm \cdot s^{-1}$	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

13.3.55 Levels that could potentially cause structural damage are significantly higher. For example, according to the British Standards (BS7385-2:1993) and other guidelines, structural damage could become a concern at vibration levels above 10 mm/s PPV, depending on the type of structure and its condition.

Assessing Significance

13.3.56 The predicted significance of the effect was determined through the recommendations in TAN 2011 and based on professional judgement, considering both sensitivity and magnitude of change as detailed in **Table 13-12: Matrix for Determination of Significance of Effects**. Major and moderate effects are considered significant in the context of the EIA Regulations.

Table 13-12: Matrix for Determination of Significance of Effects

Significance	Level of Receptor Sensitivity		
	Low	**Medium**	**High**

Magnitude of Change	**High**	Minor/Moderate	Moderate/Major	Major
	Medium	Minor	Moderate	Moderate/Major
	Low	Negligible/Minor	Minor	Minor/Moderate
	Negligible	Neutral/Slight	Neutral/Minor	Minor
	No change	Neutral	Neutral	Neutral

13.3.57 The level of significance and its relevance to the decision making process is explained as follows:

- **Very Large**: These effects represent key factors in the decision-making process. They are generally, but not exclusively, associated with impacts where mitigation is not practical or would be ineffective;
- **Major**: These effects are likely to be important considerations but where mitigation may be effectively employed such that resultant adverse effects are likely to have a Moderate or Slight significance;
- **Moderate**: These effects, if adverse, while important, are not likely to be key decision making issues;
- **Minor**: These effects may be raised but are unlikely to be of importance in the decision making process; and
- **Neutral**: No effect, not significant, noise need not be considered as a determining factor in the decision making process.

Assessment Assumptions and Limitations

13.3.58 Estimated noise emissions from the construction of the Proposed Development have been based on the assessor's experience of previous projects of a similar nature. No specific information has been provided by the Principal Contractor at the time of writing. There is always a degree of uncertainty when conducting assessments on developments in the planning stage and these uncertainties occur in calculation, rounding, and baseline levels used. This assessment considers conservative assumptions to produce a worst-case assessment. This ensures that, in practicality, noise levels would be expected to be lower than the assessment details, and uncertainty is reduced as far as reasonably possible.

13.3.59 Modelled sound sources represent candidate plant only. The noise output of individual items of plant may vary from what is presented in this chapter after final plant specification. The assessment assumes all sound sources are operating continuously, simultaneously and at maximum noise output. In reality, not all sources will be operating at maximum noise level all of the time and operational noise levels may be lower than are presented in this chapter.

13.3.60 The sound level output of any auxiliary infrastructure is considered insignificant in comparison to the primary sound sources detailed in this chapter. Accordingly, no other items of plant have been considered within the assessment.

13.3.61 Unless otherwise stated, all sound levels refer to free field levels i.e. sound levels without influence from any nearby reflective surfaces.

13.3.62 In practice, there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment in this chapter is a representative average and therefore is representative of the period being assessed.

Daytime noise levels were not measured at some NSR locations have been represented by the lowest measured daytime noise level at other NSRs from long-term unattended monitoring. This is deemed conservative and appropriate for assessment purposes.

13.3.63 In accordance with ISO 9613, all assessment locations are modelled as downwind of all sound sources. Propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for in the model. Therefore the modelled results are considered worst-case.

13.3.64 Whilst some information gaps have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on noise and vibration.

13.4 Baseline Conditions

Summary of Baseline

13.4.1 The baseline environment in the Study Area consists of semi-rural with a small number of residential properties located in all directions surrounding the Proposed Development. The existing Tealing Substation and the Seagreen Substation are located to the east of the Proposed Development.

13.4.2 Detailed baseline noise data results are presented in **Appendix 13.3 Baseline Noise Data**. A summary of the results from the baseline noise monitoring campaign are presented in **Table 13-13: : Summary of Background Noise Measurement Results** and their locations are shown in **Figure 13.2: Noise Measurement Locations**.

Table 13-13: Summary of Background Noise Measurement Results

Location	LA90 (dB) (Nighttime)	LA90 (dB) (Daytime)
NSR 1.1	24	34
NSR 1.2	23	39
NSR 1.3	22	34
NSR 1.4	23	32
NSR 1.5	22	36
NSR 2.1	23	32*
NSR 2.2	19	32*
NSR 2.3	21	32*
NSR 2.4	32	32*
NSR 2.5	28	32*
NSR 2.6	21	32*
NSR 2.7	30	32*

*daytime levels were not measured at NSRs 2.1 – 2.7, therefore the lowest measured daytime level from NSRs 1.1 – 1.5 will be used in this instance. This is deemed conservative and appropriate for the determination of impact.

13.4.3 In general, the background data indicates diurnal variation with relatively low noise levels at night that are increased during daytime . The results of the baseline noise survey show that NSRs in the vicinity of the Proposed Development have a noise environment quantified between 22 – 24 dB LA90 during nighttime periods from unattended monitoring. The results of attended monitoring show results between 19 dB and 32 dB LA90.

Future Baseline in the Absence of the Proposed Development

13.4.4 Settlement is likely to continue to locally change the nature of the Outer Study Area, particularly given the Site's proximity to the city of Dundee, creating pressure for new housing. A number of small settlements are located in close proximity to each other, with potential future expansion of settlements, even if small in scale, likely to increase the presence of settlement in the east of the study area. Changes in farming and land management practices, driven by policy regimes or climate change, may affect the appearance of the agricultural landscape, for example the further proliferation of polytunnels

13.4.5 Therefore it is likely that a steady increase in background noise levels increase however these changes are unpredictable, or irrelevant in the context of this assessment.

Implications of Climate Change for Baseline Conditions

13.4.6 The summary of the relevant climate change projections using the UK Climate Change Projections 2018 (UKCP18) are:

- temperatures are projected to increase, particularly in summer;
- winter rainfall is projected to increase and summer rainfall is most likely to decrease;
- heavy rain days (rainfall greater than 25mm) are projected to increase, particularly in winter;
- near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant effects of winds; however, the increase in wind speeds is projected to be modest; and
- an increase in frequency of winter storms over the UK.

13.4.7 Changes to the baseline noise levels may occur to due to these changes weather conditions due to greater rain and higher windspeeds, however in the context of the EIA and noise and vibration impact assessment this would be deemed as immeasurable or irrelevant.

13.5 Mitigation and Monitoring

Embedded Mitigation

13.5.1 Topic specific embedded mitigation (mitigation achieved through design) is outlined below in **Table 13-14: Embedded Mitigation**.

Table 13-14: Embedded Mitigation

Mitigation Measure	Project Stage/Timing	Responsibility
NV1 – Specification of Low Noise Equipment	Detailed Design / Procurement	Applicant
NV2 – Bunding and landscaping	Detailed Design	Applicant

- NV1 Specification of Low Noise Equipment - Various strategies are available to mitigate noise from operational noise equipment, mostly involving mitigation at source. The Applicant will secure suitably low noise equipment during procurement with a targeted noise specification for vendors. Where procuring equipment with an inherently low sound power output is not possible, enclosing equipment either fully or partially in an acoustic enclosure is able to achieve the same result. The exact specification will be determined during the detailed design phase of the Proposed Development. It is expected that further noise modelling and calculation will be conducted, and an updated noise impact assessment based on the final design of the Site to ensure compliance with noise limits.
- NV2 Bunding – Bunding surrounding the Site has been implemented and included in the assessment. Bunds provide both visual and acoustic attenuation and are most effective when either close to the source or receiver.

Applied Mitigation

Table 13-15: Applied Mitigation

Mitigation Measure	Project Stage/Timing	Responsibility
NV3 – Construction traffic will follow a circular access route via the Moatmill Road east of the Site and the U322 Emmock Road to the south, thereby avoiding Tealing village and concentrations of properties north and east of the Site.	Planning	Principal Contractor
NV4 - Adoption of a voluntary speed limit of 20 mph for all construction vehicles travelling on the Emmock Road and Moatmill Road	Pre-Construction Phase	Principal Contractor
NV5 – Construction Noise Management Plan including, but not limited to, the following measures: Updated detailed construction noise impact assessment and CNMP Carry out identified high noise level activities during daytime defined hours 07:00 – 19:00 on weekdays and 07:00 – 13:00 on Saturdays Construction noise monitoring utilising best available techniques (BAT)	Pre-Construction Phase	Principal Contractor

13.5.2 For its new infrastructure projects in recent years, the Applicant has developed and effectively implemented a suite of General Environmental Management Plans (GEMPs) which prescribe good environmental management practices. In addition, the Applicant has developed a Consents and Environment Specification which prescribes environmental management principles which Contractors are required to meet under the terms of the Principal Contract. The Specification includes management plans that the Contractor is required to prepare and implement, including a Construction Environmental Management Plan (CEMP), and subsidiary plans including a construction noise management plan (CNMP) and a construction transport management plan (CTMP). In preparing these Plans, the Contractor will be required to incorporate any additional management measures identified through the EIA as necessary to avoid or reduce significant residual effects (i.e., "additional mitigation").

13.5.3 The CNMP will be carried out in accordance with the guidance, procedures and best practice outlined in BS5228-1. The CNMP will be embedded within the Construction Environmental Management Plan (CEMP) as the Applicant requires of the Principal Contractor through a condition of contract. The details of the CNMP will be agreed with Angus Council prior to the commencement of construction works and is expected to be secured by an appropriately worded planning condition. Procedures within the CNMP will include:

- minimising the noise as much as is reasonably practicable at source;
- attenuation of noise propagation (see Paragraph 13.5.5);
- carrying out identified high noise level activities at a time when they are least likely to cause a nuisance to residents; and
- providing advance notice of unavoidable periods of high noise levels to Angus Council and residents likely to be impacted.

13.5.4 In order to maintain low impact on the noise environment, consideration will be given to attenuation of construction noise at source by means of the following:

- giving due consideration to the effect of noise, in selection of construction methods;
- avoidance of vehicles waiting or queuing, particularly on public highways or in residential areas with their engines running;
- scheduling of deliveries to arrive during daytime hours only. Care should be taken to minimise noise while unloading delivery vehicles;
- ensure plant and equipment are regularly and properly maintained;
- fit and maintain silencers to plant, machinery, and vehicles where appropriate and necessary;
- operate plant and equipment in modes of operation that minimise noise, and power down plant when not in use;
- use electrically powered plant rather than diesel or petrol driven, where this is practicable; and
- work typically not to take place outside of hours defined in the construction schedule.

13.5.5 Consideration will be given to the attenuation of construction noise in the transmission path by means of the following:

- locate plant and equipment liable to create noise as far from NSRs as is reasonably practicable or use natural land topography to reduce line of sight noise transmission;
- noise screens, hoardings and barriers should be erected where appropriate and necessary to shield high-noise level activities; and
- provide lined acoustic enclosures for equipment such as static generators and, when applicable, portable generators, compressors and pumps.

13.5.6 As part of an overall construction noise management plan, it is recommended that the Contractor informs all neighbouring residents who are likely to be affected of the proposed timescales and the intended site operations.

13.5.7 The CNMP is to be established and ensure that the noise limit thresholds of BS5228 are not exceeded at NSRs as defined in **Table 13.7: Construction Noise Impact Assessment Criteria**.

13.5.8 . A noise monitoring programme will be established during construction works to ensure limits at nearby NSRs are maintained through the various phases of work.

13.6 Assessment of Likely Significant Effects - Construction

13.6.1 The assessment of effects identified above is based on the project description as outlined in **Chapter 3: Description of the Proposed Development**. Unless otherwise stated, potential effects identified are considered to be adverse.

Predicted Construction Effects

On-Site Construction Noise

13.6.2 A draft construction schedule with planned activities and proposed equipment has been provided by the Principal Contractor. This information is presented in **Table 13-16: Assumed Construction Activity Sequence**.

Table 13-16: Assumed Construction Activity Sequence

Construction Activity Phase	Commence	Complete	Durations (approx. days)	Equipment
Earthworks	Oct-26	Aug-27	300	13t Roller
				32T Dump Truck
				34T Tracked Excavator
				18.5T D6 Bulldozer
				24t Long reach Excavator
Earthworks/foundations/Drainage	Oct-26	Jun-28	600	22T Tracked Excavator
Earthworks/Drainage	Oct-26	Jun-28	600	14t Dump truck
Earthworks/capping	Oct-26	Aug-28	660	Tipper lorries
General activities	May-27	Feb-28	275	13t wheeled excavator
Drainage/ducting/foundations	Mar-27	Jun-28	450	14T Tracked Excavator
Foundations/Building works	May-27	Jun-28	400	50t mobile telescopic crane
				Concrete wagons

13.6.3 Each activity is analysed to determine the percentage of the construction time each piece of equipment is being used and how many are in use. Using this information, a total equivalent noise level at 10 m for each activity is calculated.

13.6.4 The dispersion of this total noise level is then modelled. The distance between source and receiver has been defined from the proposed platform boundary. The platform boundary is where the major construction works are likely to be conducted, and is also a reasonable assumption to assess noise that is to be conducted within the red line boundary. This attenuation has been calculated over mixed hard and soft ground to the method presented in BS5228. Given the dominance of soft ground in the area surrounding the Proposed Development, this is slightly conservative. The effects of barriers or topographical screening have not been considered as a conservative approach.

13.6.5 The proposed construction route reported in **Chapter 10: Transport and Access** have been used as the basis for the assessment. Traffic routes 1 – 3, presented in **Figure 13.3: Haul Road Assessment**, have been assessed as haul routes in accordance with BS5228 and noise levels incorporated into overall construction noise assessment. Routes 4 – 8 are highways and have been assessed separately using CRTN calculations.

13.6.6 Detailed descriptions of the methodology and results of the construction noise impact assessment are presented in **Appendix 13.4 – Construction Noise Impact Assessment** which show the predicted plant activities, assumed plant items, their assumed quantities, their assumed utilisation, and associated noise levels at a distance of 10 m.

13.6.7 The construction noise impact assessment identifies that a robust CNMP is required to ensure BS5228 criteria is met. An example strategy has been implemented to demonstrate the feasibility of control measures through the following action:

- carrying out identified high noise level activities at a time when they are least likely to cause a nuisance to residents; and
- locate plant and equipment liable to create noise as far from NSRs as is reasonably practicable or use natural land topography to reduce line of sight noise transmission.

13.6.8 The following high noise activities in **Table 13-17: Construction Activities Mitigation Requirements** have been identified, which are required to be performed during daytime hours. Daytime is defined to be 07:00 – 19:00 on weekdays and 07:00 – 13:00 on Saturdays.

Table 13-17: Construction Activities Mitigation Requirements

Construction Activity Phase	Equipment
Earthworks	13t Roller
	32T Dump Truck
	34T Tracked Excavator
	18.5T D6 Bulldozer
Earthworks/Drainage	14t Dump truck
Earthworks/capping	Tipper lorries
Foundations/Building works	Concrete wagons

13.6.9 For the closest property NSR 1.2, additional consideration is required for the above activity items to meet the daytime 65 dB limit. The minimum distance to the substation platform is assessed as 203 m. A minimum 270 m distance is required for the identified activity items. If works are to be conducted at closer distance, other methods to reduce noise should be identified in the CNMP.

13.6.10 The assessment has been performed assuming all plant and equipment is operating at the same time. With the implementation of a robust CNMP, it is predicted that construction noise is likely to result in **Low** magnitude, with a receptor sensitivity of **High** would result in a **Minor/Moderate** effect and therefore is **Not Significant**.

13.6.11 Ancillary construction activities may be conducted within the Site, closer to the receptors than the substation platform. Additionally, the construction of additional laybys along the proposed construction route is also proposed as part of the construction work schedule. These works are expected to be very short-term and localised, and therefore have not been assessed. These construction works are subject to the same control measures through the implementation of a CNMP, and therefore are predicted to be **Not Significant**.

Construction Traffic Noise

13.6.12 Traffic routes 1 – 3 (see **Figure 13.3: Haul Road Assessment**) have been assessed as haul routes in accordance with BS5228 and noise levels incorporated into the overall construction noise assessment. Noise levels for routes 1-3 have therefore not been presented individually here as the noise impact associated with haulage to and from the Site is included within the construction noise assessment presented in **Appendix 13.4: Construction Noise Impact Assessment**.

13.6.13 Construction related traffic impacts for other routes (routes 4 – 8 on **Figure 13.3: Haul Road Assessment**) have been assessed by calculating the relative increase in road traffic noise level adjacent to public roads used by construction traffic. The standard UK calculation method CRTN was used to calculate the noise level, at a nominal distance of 10 m from each road, using baseline traffic flows and also accounting for the addition of construction traffic as reported in **Chapter 3: Description of the Proposed Development** and **Chapter 10: Traffic and Access**. The details of the assessment are included in **Appendix 13.4 Construction Noise Impact Assessment** and assumptions are deemed conservative

13.6.14 The assessment has been performed for routes 4 – 8 (see **Figure 13.3: Haul Road Assessment**). The 24 hour average daily traffic flows have been converted to 18 hour traffic flows for the purposes of the noise calculation as is required by CRTN.

13.6.15 Noise levels for the baseline 2027 traffic scenario are presented in Table 13-18: Predicted 2027 Traffic Flow Noise for both cars and Heavy Goods Vehicles (HGVs).

Table 13-18: Predicted 2027 Traffic Flow Noise

Site Ref.	Survey Location	18hr Cars	18hr HGV	18hr Total	HGVs (%)	Noise Level (L_{10})
4	A90 Forfar	19,018	4,964	23,982	0.208	73.9

5	A90 south of Moatmill Road	18,500	3,239	21,739	0.148	72.5
6	A90 south of Emmock Roundabout	25,123	3,169	28,292	0.112	72.9
7	A90 Kingsway West	34,179	6,558	40,738	0.161	75.4
8	A972 Kingsway East	21,273	3,039	24,312	0.125	72.7

13.6.16 Noise levels Including peak construction traffic are presented in **Table 13-19: : Peak Construction Traffic Flow** where the change in noise levels and impact magnitude have been determined.

Table 13-19: Peak Construction Traffic Flow Noise

Site Ref.	Survey Location	18hr Cars	18hr HGV	18hr Total	HGVs (%)	Noise Level (L_{10})	Change (dB)	Impact magnitude
4	A90 Forfar	19,026	4,989	24,014	0.208	73.9	0	No Impact
5	A90 south of Moatmill Road	18,548	3,299	21,847	0.151	72.6	0.1	Negligible
6	A90 south of Emmock Roundabout	25,195	3,265	28,459	0.115	73.2	0.3	Negligible
7	A90 Kingsway West	34,215	6,578	40,793	0.161	75.5	0.1	Negligible
8	A972 Kingsway East	21,309	3,116	24,425	0.127	72.7	0	No Impact

13.6.17 The noise levels on routes 4 – 8 are predicted to have **Negligible** magnitude, with a receptor sensitivity of **High** which would have **Minor** effect and therefore **Not Significant**.

Construction Traffic Vibration

13.6.18 The potential for HGV vibration on receptors along roads has been predicted using the procedures in Transport and Road Research Laboratory (TRL) Research Report 246 – Traffic Induced Vibrations in Buildings.

13.6.19 Vibration due to traffic on access routes has been assessed. Groundborne vibration arises primarily from the interaction of vehicle tyres with irregularities in the road surface, such as potholes, cracks, or bumps. In this case, the road defect is a 5 mm depression, which could amplify groundborne vibrations. However, it is important to consider the condition of the road surface, ground conditions, and vehicle characteristics when evaluating the magnitude of impact.

13.6.20 As proposed in Paragraph 12.6.17 of Chapter 12: Traffic and Access, the Principal Contractor will adopt a voluntary 20 mph speed limit on the proposed construction route. To therefore adopt a worst case assessment, assuming an HGV traveling at an assumed maximum 32 km/h over a 5 mm road defect, at a distance of 10 metres, on a worst-case ground type of alluvium is expected to have a resultant PPV of 0.66 $mm.s^{-1}$. The resultant vibration compared to **Table 13-11: Construction Vibration Impact Assessment Criteria** predicts **Low** impact magnitude, with a receptor sensitivity of **High** which would have **Minor/Moderate** effect and therefore **Not Significant**.

13.7 Assessment of Likely Significant Effects - Operation

Predicted Operational Effects

13.7.1 A detailed model of the Proposed Development and the Study Area has been constructed using the sound propagation model, SoundPLAN 9, which takes into account geometric spreading, topography, screening, meteorological conditions and detailed information regarding the sources of noise, to predict noise levels at specific points (e.g. NSRs) allowing for analysis of the predicted impact of the Proposed Development for NSRs.

13.7.2 Within the red line boundary, resolution of the digital ground model for the landscaping and design has been considered (see NV2 in **Table 13-14: Embedded Mitigation**). Outwith the Site, elevation data to a resolution of 50 m has been used to create a digital ground model, this is appropriate due to the distances from source to receiver and there being no major topography features in the Study Area.

13.7.3 Propagation was modelled using ISO 9613-2[5], with the following parameters:

- Ground absorption: 0.0 on paved surfaces, 0.6 elsewhere;
- Receiver height: 1.5 m above ground / floor;
- Temperature: 10°C; and
- Relative humidity: 70 %.

13.7.4 Noise level specifications for the electrical infrastructure (**Table 3.1: Substation Technical Requirements**) are currently not available. It has therefore been assumed that the Applicant will specify low noise equipment during procurement (see NV1 in **Table 13-14: Embedded Mitigation**) with a target noise specification for vendors. The target specification for main equipment (super-grid transformers, reactors, and AVR) has been assumed as not exceed a sound power level (SWL) of 75 dB(A), this assumes that equipment is consistent with current procurement policies and that where procuring equipment with an inherently low sound power output is not possible, enclosing equipment either fully or partially in an acoustic enclosure is able to achieve the same result.

13.7.5 Cooling systems for main plant equipment have been modelled assuming a SWL of 86 dB(A). Modelling scenarios have been based on worst case assumptions, i.e., forced cooling, and standard operation without cooling. Coolers generally operate only when there is high load and high ambient air temperatures, neither of which would typically occur during the hours of 11pm and 7 am, and therefore the worst case scenario is only assessed to daytime conditions. The modelled specific noise levels including cooling have therefore been carried forward to the daytime assessment and the modelled specific noise levels excluding cooling have been carried forward to the nighttime assessment.

13.7.6 The equipment and associated noise levels within the model are presented in **Table 13-20: Equipment and Input Noise** Levels.

Table 13-20: Equipment and Input Noise Levels

Equipment	Quantity	Housing Arrangements	Sound Power Level (SWL) (dB(A))
AVR Container	2	External	75
Super Grid Transformer (SGT) 400/33kV	3	Acoustic Enclosure	75
SGT Cooling	3	External	86
Tertiary Reactor	3	Acoustic Enclosure	75
Tertiary Reactor Cooling	3	External	86
Shunt Reactor	2	Acoustic Enclosure	75
Shunt Reactor Cooling	2	External	86

5 ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation, ISO, 15 December 1996.

13.7.7 The model assumes all sound sources are operating continuously, simultaneously and at maximum noise output. In reality, not all sources will be operating at maximum noise level all of the time and operational noise levels are therefore likely to be lower than are presented in the assessment in this chapter.

13.7.8 Noise level predictions have been carried out to establish the specific noise levels at the nearest NSR to the Proposed Development. The levels predicted by the model relate to the outdoor ground floor façade of the NSR considered and are presented in **Table 13-21: Predicted Operational Noise Levels**.

Table 13-21: Predicted Operational Noise Levels

Receiver	Daytime - Modelled Specific Noise - Including Cooling (dB[A])	Nighttime - Modelled Specific Noise - Excluding Cooling (dB[A])
NSR 1.1	23	15
NSR 1.2	29.6	21.1
NSR 1.3	22.1	12.6
NSR 1.4	23.6	14.4
NSR 1.5	15.7	8.9
NSR 2.1	23.2	16.6
NSR 2.2	26.9	17.1
NSR 2.3	20.9	12.5
NSR 2.4	19.1	10.7
NSR 2.5	19.7	10.7
NSR 2.6	17.5	9.8
NSR 2.7	14.7	7.8

13.7.9 Noise contour maps of the above results are visually presented in **Figure 13.4: Noise Contours Daytime** and **Figure 13.5: Noise Contours Nighttime**.

13.7.10 The predicted operational levels at NSRs due to the Proposed Development have been compared with background noise levels and assessed in accordance with BS4142.

13.7.11 It is a requirement of BS4142 that, when assessing the impact of noise with a tonal component, the noise emitted from the specific sound source is subject to a rating level penalty. Transformers and other electrical equipment associated with substation developments emit noise at frequencies of twice the normal operating current frequency due to magnetostriction of the transformer core. In the UK the supply current frequency is 50 Hz, which results in 100 Hz and harmonics thereof being produced by the transformer. The nature of the noise generation mechanism results in tonal noise being emitted. The noise is continuous and consistent depending on the electrical load of the equipment, and therefore is not expected to have any impulsive characteristics.

13.7.12 No tonal penalty has been included while cooling is active, as the cooling systems are dominant with a broadband noise spectrum which will mask the tonality of other electrical equipment. As a conservative assessment, a 4 dB tonal penalty has been applied for an where no cooling equipment is active and electrical equipment associated with tonality is dominant.

13.7.13 A BS4142 assessment has been conducted during daytime conditions, using predicted noise with cooling systems active. The results are presented in **Table 13-22: Daytime BS 4142 Noise Impact Assessment**.

Table 13-22: Daytime BS 4142 Noise Impact Assessment

Receiver	Specific Noise (LAeq dB)	Rating Level	Daytime Background Noise (LA90 dB)	Excess
NSR 1.1	23	23	34	-11

NSR 1.2	30	30	39	-9
NSR 1.3	22	22	34	-12
NSR 1.4	24	24	32	-8
NSR 1.5	16	16	36	-20
NSR 2.1	23	23	32	-9
NSR 2.2	27	27	32	-5
NSR 2.3	21	21	32	-11
NSR 2.4	19	19	32	-13
NSR 2.5	20	20	32	-12
NSR 2.6	18	18	32	-14
NSR 2.7	15	15	32	-17

13.7.14 The results indicate that the excess at all NSRs is markedly below background daytime noise. The daytime operational noise BS4142 assessment predicts **No Change** impact magnitude, with a receptor sensitivity of **High** which would have **Neutral** effect and therefore **Not Significant**.

13.7.15 A BS4142 assessment has been conducted during nighttime conditions, using predicted noise excluding cooling. The results are presented in **Table 13-23: Nighttime BS4142 Noise Impact Assessment**.

Table 13-23: Nighttime BS4142 Noise Impact Assessment

Receiver	Specific Noise (LAeq dB)	Rating Level	Nighttime Background Noise (LA90 dB)	Excess
NSR 1.1	15	21	24	-3
NSR 1.2	21	27	23	4
NSR 1.3	13	19	22	-3
NSR 1.4	14	20	23	-3
NSR 1.5	9	15	22	-7
NSR 2.1	17	23	23	0
NSR 2.2	17	23	19	4
NSR 2.3	13	19	21	-2
NSR 2.4	11	17	22	-5
NSR 2.5	11	17	22	-5
NSR 2.6	10	16	21	-5
NSR 2.7	8	14	30	-16

13.7.16 The results indicate that the excess at all NSRs is below or equal to background noise, with the exception of two NSRs, NSR 1.2 and NSR 2.2. The maximum excess at these NSRs is 4 dB, which includes a conservative tonal penalty of 6 dB (see Paragraphs 13.7.11 and 13.7.12).

13.7.17 The nighttime operational noise BS4142 assessment therefore predicts **Low** impact magnitude, with a receptor sensitivity of **High** which would have **Minor/Moderate** effect.

13.7.18 To determine significance during nighttime conditions, external façade levels are converted into internal noise levels by applying a correction for attenuation through a property wall or window (closed and open windows having different corrections). Impacts are assessed by comparing the predicted (corrected) internal noise levels against the assessment thresholds in Table 4 of BS8233, i.e.

30 dB LAeq,8hr at night time. . In addition, as specified by Angus Council in their Scoping Opinion (see **Appendix 6.2: Scoping Opinion**) nighttime octave band levels should meet an NR20 rating.

13.7.19 The external noise levels and spectra have been considered at each NSR. An external to internal noise calculation has been performed on the basis of a partially open window for the nearest receptor The assessment has been conducted at NSR 1.2which has the highest specific noise of the assessed NSRs (see **Table 13-22: Daytime BS 4142 Noise Impact Assessment** and **Table 13-23: Nighttime BS4142 Noise Impact Assessment**). The small element parameter level difference (Dn,e) has been assumed from NANR116: Sound Insulation through Ventilated Domestic Windows. The level difference values are taken from a window opening of 200k mm² presented in **Table 13-24: Level Difference Through a Partially Open Window NANR116.**

Table 13-24: Level Difference Through a Partially Open Window NANR116

Opening Size	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Dn,e
200k (mm2)	20	14	14	16	14	17	19	16

13.7.20 The results of the internal noise assessment are presented in **Table 13-25: Predicted Internal Noise Levels** and **Plate 13.2: Predicted Internal Noise Levels**.

Table 13-25: Predicted Internal Noise Levels

Receiver	Level (dBZ)						
	63	125	250	500	1000	2000	4000
NSR 1.2 (including cooling)	10.8	18.4	15.2	12.9	10.5	4	-13
NSR 1.2 (excluding cooling)	6.8	16.8	2.9	7.7	-17.2	-35.3	-59
NR 20 Criteria	51	39	31	24	20	17	14

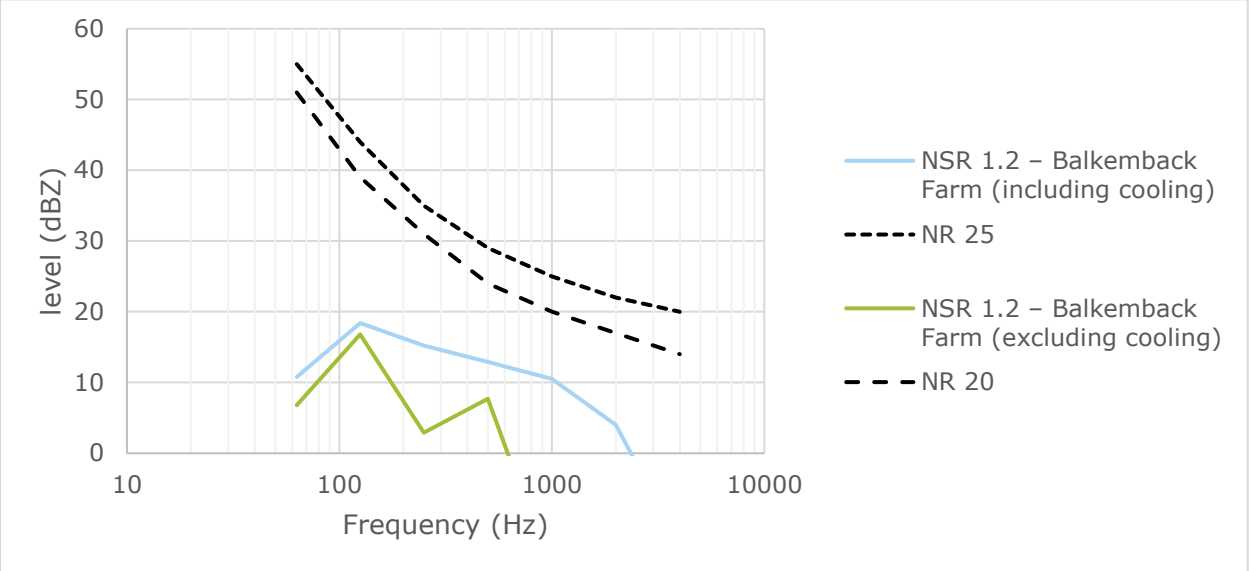


Plate 13.2 – Predicted Internal Noise Levels

13.7.21 The results shown in **Table 13-25: Predicted Internal Noise** Levels and presented graphically in **Plate 13.2 – Predicted Internal Noise Levels** show that the predicted internal nighttime noise level at the closest NSRs is well below both 30 dB(A) limit and NR 20 criteria.

13.7.22 The internal operational noise assessment predicts **Negligible** impact magnitude, with a receptor sensitivity of **High** which would have **Minor** effect and therefore **Not Significant**.

13.8 Assessment of Likely Significant Effects - Decommissioning

13.8.1 Decommissioning effects are unlikely to be of greater magnitude than construction effects assuming the correct environmental controls being in place. Therefore, on this basis, effects are not assessed in detail.

13.9 Assessment of Likely Cumulative (In-Combination) Effects

Introduction

13.9.1 The assessment of cumulative effects on noise and vibration is based upon consideration of the effects of the Proposed Development on NSRs considered in this assessment in addition to the likely effects of other developments that are either consented or proposed (at the application stage).

13.9.2 The assessment takes into account the relative scale of the identified developments, their distance from the affected assets, and the potential degree of impact. The relevant cumulative developments, as agreed with consultees, for consideration in the EIA are listed in **Appendix 5.1: Cumulative Developments**. Professional judgment has been applied to determine those most likely to have adverse impacts on noise and vibration.

Table 13-26: Cumulative Assessment: Associated SSEN Transmission Developments provides a cumulative assessment of the Proposed Development with the Associated SSEN **Transmission** Developments defined in **Chapter 1: Introduction** and detailed in **Appendix 5.1: Cumulative Developments**.

13.9.3 **Table 13-27: Cumulative Assessment: Other SSEN Transmission Developments** and

13.9.4 **Table 13-28: Cumulative** Assessment: Other Projects provides a cumulative assessment of the Proposed Development with other reasonably foreseeable SSEN Transmission and 3rd party developments detailed in **Appendix 5.1: Cumulative Developments**.

Table 13-26: Cumulative Assessment: Associated SSEN Transmission Developments

Cumulative Project	Construction Noise	Construction Vibration	Operational Noise
Kintore to Tealing 400 kV OHL	It has been concluded that there will be no significant adverse effects upon NSRs during the construction of the Proposed Development with the application of Applied Mitigation (see **Table 13-15: Applied Mitigation**). The construction programme for the Kintore to Tealing 400 kV OHL within the study area of the Proposed Development is not determined at present but it is likely that construction of the OHL towers will take place during the later stages of the construction of the Proposed Development. Construction of the OHL would give rise to noise as a result of earthworks to form tower footprints, foundations, the erection of towers and the deployment of equipment to string conductors. However, the extent of the working area for individual towers and the complement of plant and equipment for construction will be small, in comparison to the construction of the Proposed Development. As a general principle, doubling a noise source increases noise levels by approximately 3dB(A) and it is likely that construction of individual towers would represent far less than a doubling of the noise source than that which is generated by the Proposed Development in the assessment presented in **Appendix 13.4 – Construction Noise Impact Assessment**. Moreover, the source diminishes further as tower construction progresses further away from the Proposed Development. Taking a worst case assumption that the noisiest activities of the construction of the substation and OHL construction occur simultaneously, it is very unlikely that combined noise levels would exceed either the 65 dB daytime noise limit or the 55 dB evening and weekend limit at NSRs. Accordingly, the cumulative effect of construction noise from the Proposed Development with the Kintore to Tealing 400 kV OHL will not be significant.	It has been concluded that the Proposed Development will not have significant adverse effects upon sensitive receptors (see **Paragraph 13.6.20**) as a result of construction vibration. The assessment upon construction related vibration is a factor of HGV speed and ground conditions. The nature of the construction of the Kintore to Tealing 400 kV OHL project is unlikely to lead to significant additional HGV movements on the local road network above those presented in **Figure 3.7: Emmock HGV and AIL Traffic Forecast**. It is therefore concluded that it is unlikely that there will be significant cumulative effects.	It has been concluded that there will be no significant adverse effects upon NSRs during the operational phase of the Proposed Development (**Paragraphs 13.7.13 and 13.7.23**). The proposed Kintore to Tealing 400kV OHL would represent an additional source of noise in the Study Area. An energised electrical OHL can be the source of an audible phenomenon known as 'corona discharge'. This is a limited electrical breakdown of the air in the vicinity of the OHL conductors. Such corona discharge can be the source of audible noise, experienced as a crackling sound accompanied sometimes by a low frequency hum. These noise levels are present in 275 kV OHLs and are more likely to be prominent in 400 kV OHLs, depending on the conductor type. The highest noise levels generated by an OHL usually occur during rain when water droplets, collecting on the surface of the conductor, can initiate corona discharge. The number of droplets that collect, and hence the amount of noise, depends on the rate of rainfall. Noise from the proposed Kintore to Tealing 400 kV OHL has been assessed for worst-case noise in wet conditions using the TGN(E)322 methodology. The detail of this assessment is presented in **Appendix 13.5 Cumulative Assessment**. The cumulative noise impact has concluded that the operational phase of the Proposed Development in combination with the Kintore to Tealing 400 kV OHL will not result in significant effects. This is attributable to the fact that operational noise from the OHL is raised during rainfall and therefore, as the background noise is also greater during rainfall, the operational noise from the Proposed Development will be less prominent. The assessment within this chapter is assessed in dry conditions and is not significant. Therefore, cumulative noise in wet conditions will not be significant as the

Cumulative Project	Construction Noise	Construction Vibration	Operational Noise
			baseline noise levels presented in **Table 13-22: Daytime BS 4142 Noise Impact Assessment** and **Table 13-23: Nighttime BS 4142 Noise Impact Assessment** are likely to be greater.
Alyth to Tealing 275 kV OHL tie-in	As above.	As above.	As above.
Westfield to Tealing 275 kV OHL tie-in	As above.	As above.	As above.
2 x 275 kV OHL tie-backs between Emmock and Tealing	As above.	As above.	As above.
Summary	The Proposed Development has the potential for significant effect and must be controlled with a CNMP. Cumulative projects are subject to their own risk of significant effect and must also be controlled by a CNMP. As these developments are SSEN Transmission projects, there is greater potential for a coordinated noise management approach. Therefore, with the appropriate mitigation, residual effects are likely to be not significant.	There will be no likely significant cumulative effects from construction vibration.	The cumulative effects during operation of the Proposed Development with the Associated SSEN Transmission Developments are not likely to be significantly greater than any significant effects that the developments identify in isolation. This is due to an OHL being dominant during wet conditions and, in dry conditions, the Proposed Development will be dominant.

Table 13-27: Cumulative Assessment: Other SSEN Transmission Developments

Cumulative Project	Construction	Construction vibration	Operation
400kV upgrade of the existing Alyth to Tealing OHL	It has been concluded that there will be no significant adverse effects upon NSRs during the construction of the Proposed Development with the application of Applied Mitigation (see Table 13-15: Applied Mitigation). Due to the distance between the Proposed Development and this Other SSEN Transmission Development, there is no potential for significant cumulative effects at NSRs.	It has been concluded that the Proposed Development will not have significant adverse effects upon sensitive receptors (see Paragraph 13.6.20) as a result of construction vibration. The assessment upon construction related vibration is a factor of HGV speed and ground conditions. The nature of the construction of the Kintore to Tealing 400 kV OHL project is unlikely to lead to significant additional HGV movements on the local road network above those presented in Figure 3.7: Emmock HGV and AIL Traffic Forecast. It is therefore concluded that it is unlikely that there will be significant cumulative effects.	It has been concluded that there will be no significant adverse effects upon NSRs during the operational phase of the Proposed Development (Paragraphs 13.7.13 and 13.7.23). The 400 kV upgrade of the existing Alyth to Tealing OHL replaces an existing 275 kV OHL which will be contributing to the existing background noise. Therefore, when this is considered alongside the distance between the Proposed Development and this SSEN Transmission Development, there will be no likely significant effects upon NSRs.
400kV upgrade of the existing Tealing to Westfield OHL	As above	As above	As above
Summary	The Proposed Development has the potential for significant effects upon noise and this will be controlled and mitigated through a CNMP. Cumulative noise from Other SSEN Transmission Developments predict no significant cumulative effect.	The Proposed Development will not have a significant effect upon vibration during the construction phase and the nature of the Other SSEN Transmission Developments is such that significant additional sources of vibration are unlikely and hence there is no cumulative significant effect.	The cumulative effects during operation of the Proposed Development with other SSEN Transmission Developments are likely to be not significant based upon the available information.

Table 13-28: Cumulative Assessment: Other Projects

Cumulative Project	Construction	Construction vibration	Operation
Balnuith BESS	It has been concluded that there will be no significant adverse effects upon NSRs during the construction of the Proposed Development with the application of Applied Mitigation (see **Table 13-15: Applied Mitigation**). The construction of the Balnuith BESS has the potential to have a cumulative effect on noise if the construction works are coincidental to that of the Proposed Development. Dependent upon the construction methodology and the times of construction of the Balnuith BESS, there is the potential for noise levels to be raised above either the 65 dB daytime noise limit or the 55 dB evening and weekend limit at shared NSRs. Therefore, it is possible for cumulative construction noise to which could constitute a significant effect.	It has been concluded that the Proposed Development will not have significant adverse effects upon sensitive receptors (see **Paragraph 13.6.20**) as a result of construction vibration. The Transportation Statement for the Balnuith BESS identifies that the battery delivery stage of this project will involve delivery of 80 shipping containers, which it is assumed will require one inbound HGV movement and one outbound HGV movement. However, in the context of the HGV movements associated with the Proposed Development (**Figure 3.7: Emmock HGV and AIL Traffic Forecast**) this will not constitute a significant additional number of vehicles and accordingly, there is no cumulative effect.	It has been concluded that there will be no significant adverse effects upon NSRs during the operational phase of the Proposed Development (**Paragraphs 13.7.13 and 13.7.23**). The Balnuith BESS has published a noise impact assessment which considers operational noise at the following shared receptors as the Proposed Development: • NSR 1.3; • NSR 2.4; and • NSR 2.5. The noise assessment for the Balnuith BESS concludes that the maximum noise level is 30 dB(A) at NSR 2.4 Seventeen Acres, and NSR 2.5 Myreton of Claverhouse. The noise levels from the Proposed Development at these NSRs is predicted to be a maximum of 19 dB(A) and 20 dB(A) respectively. These noise levels are 10 dB(A) below that of the Balnuith BESS. Accordingly, the Proposed Development will not have a significant cumulative effect upon noise.
Fithie Energy Park	It has been concluded that there will be no significant adverse effects upon NSRs during the construction of the Proposed Development with the application of Applied Mitigation (see **Table 13-15: Applied Mitigation**). The information available on the timeline for this Fithie Energy Park states that construction will not commence before 2031 when the construction of the Proposed Development will be largely complete (see **Table 3.4: Indicative High Level Construction Programme**). Accordingly, there is no cumulative construction effect.	As above	It has been concluded that there will be no significant adverse effects upon NSRs during the operational phase of the Proposed Development (**Paragraphs 13.7.13 and 13.7.23**). No noise impact assessment is available for the Fithie Energy Park at the time of assessment. However, battery storage containers are likely to be fitted with air conditioning units and the operation of BESS facilities in general have the potential to have significant effects upon NSRs if not correctly controlled. The Fithe Energy Park will be subject to its own noise impact assessment as part of its submission to the Energy Consents Unit. It is therefore expected that the Fithie Energy Park will take account of the Proposed Development within that

Cumulative Project	Construction	Construction vibration	Operation
			assessment and mitigate noise at NSRs to a degree that is acceptable to the Scottish Government. Accordingly, with the information available at present it is concluded that there is no significant cumulative effect.
Myreton BESS	As above	As above	As above.
Existing Tealing substation and the Seagreen Wind Energy Ltd substation	N/A	N/A	Baseline noise measurements captured at NSR 2.4 and NSR 2.5 indicated potential existing impact of the cumulative development between 31 – 33 dB respectively (see **Table 13-13: Summary of Background Noise Measurement Results**). At these shared NSRs noise from the Proposed Development is not significant, with noise levels to be a maximum of 19 dB(A) and 20 dB(A) respectively. The noise levels from the Proposed Development are 10 dB(A) below that of the cumulative developments. Therefore, the Proposed Development will not have a significant cumulative effect as the contribution that it makes is negligible compared to these existing substations.
Summary	The Proposed Development has the potential for significant effects upon noise and this will be controlled and mitigated through a CNMP. Cumulative third party projects are subject to their own risk of significant effect and must also be controlled by a CNMP. If the construction works are coincidental, there is the potential for activities that are associated with the construction of the BESS site that take place concurrently that may result in significant effect.	The Proposed Development will not have a significant effect upon vibration during the construction phase and the nature of the Other SSEN Transmission and third party Developments is such that significant additional sources of vibration are unlikely and hence there is no cumulative significant effect.	The cumulative effects during operation of the Proposed Development with other 3rd party developments are likely to be not significant based upon the available information. Where no, or limited, information is available it has been assumed that the respective developments consider the Proposed Development as a cumulative noise source and will mitigate noise appropriately.

13.10 Summary of Significant Effects

13.10.1 **Table 13-30: Summary of Significant Effects** below summarises the predicted residual effects of the Emmock 400 kV substation project on noise and vibration prior to and following to application of additional mitigation.

Table 13-30: Summary of Significant Effects

Predicted Effects	Significance Prior to Additional Mitigation	Mitigation	Significance of Residual Effects Following Additional Mitigation
Construction	Not significant - Potential significant effects from construction will be mitigated with applied mitigation from a CNMP.	N/A	N/A
Operation	Not significant. Noise is below 5 dB excess in a BS4142 assessment and is significantly below internal noise limits of 30 dB(A) which additionally meets NR20 criteria.	N/A	N/A
Cumulative (Associated SSEN Transmission Developments)	Construction – potential significant effect from coincidental construction phases.	CNMP. As these developments are SSEN Transmission projects, there is greater potential for a coordinated noise management approach.	Not significant
	Operation – not significant. An OHL being dominant during wet conditions, and the Proposed Development being negligible. In dry conditions the Proposed Development will be dominant, and the OHL negligible.	N/A	N/A
Cumulative (Other SSEN Transmission and Third Party Developments)	Construction – potential significant effect from coincidental construction phases.	Where possible, develop a coordinated noise management approach and CNMP with the developer.	Potentially significant.
	Operation – not significant. The cumulative effects during operation of the Proposed Development with SSEN Transmission and 3rd party developments are likely to be not significant based upon the information available.	N/A	N/A