Scottish & Southern Electricity Networks
TRANSMISSION

CONTENTS

13. NOISE AND VIBRATION

13.1 Introduction

13.1.1 This chapter details the noise impact assessments for the Proposed Development. This chapter (and its associated appendices) is not intended to be read as a standalone assessment and reference should be made to the introductory chapters of this EIA Report **(Volume 2, Chapter 1 to 7)**.

13.1.2 This chapter identifies the likely impacts on noise sensitive receptors associated with the construction and operation of the Proposed Development. The objectives of the chapter are to:

- describe the assessment methodology and significance criteria used in the assessment;
- describe the noise baseline;
- assess the potential direct and indirect impacts on noise sensitive receptors;
- describe any mitigation measures proposed to address likely effects; and
- describe the residual effects remaining following the implementation of mitigation.

13.1.3 High Voltage Direct Current (HVDC) Converter stations and switching stations contain similar equipment to substations. These contain various potential sources of environmental noise, the most significant of which are transformers and associated cooling equipment. Additional sources in HVDC converter stations and switching stations are items such as reactors and capacitors. The noise from these sources is usually steady and is assessed using standard noise assessment techniques.

13.1.4 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 steady state under normal operating conditions, however, with changes in electrical load, noise levels may fluctuate. The equipment is not expected to have any impulsive characteristics.

13.1.5 This chapter is necessarily technical in nature so, to assist the reader, a glossary of acoustic terminology is included in **Volume 4, Technical Appendix 13.1 Acoustic Glossary.**

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

- **Volume 4, Technical Appendix 13.1: Acoustic Glossary;**
- **Volume 4, Technical Appendix 13.2: Calibration Certificates;**
- **Volume 4, Technical Appendix 13.3: Source Noise Levels;**
- **Volume 4, Technical Appendix 13.4: Meteorological Data;**
- **Volume 4, Technical Appendix 13.5: Histograms of Sound Level Meter Data LAEQ;**
- **Volume 4, Technical Appendix 13.6: LZEQ Spectra;**
- **Volume 4, Technical Appendix 13.7: Construction Activities;**
- **Volume 4, Technical Appendix 13.8: Construction Noise Assessment**; and
- **Volume 4, Technical Appendix 13.9: Noise Contour Map.**

13.1.7 Refer to **Volume 4, Technical Appendix 1.1: EIA Team** for details on the competent experts who undertook the assessment.

13.2 Assessment Methodology and Significance Criteria

Scope of the Assessment

13.2.1 The scope of this assessment is to quantify the impact that may result from the construction and operational phases (including cumulative) of the Proposed Development. The assessment methodology has been discussed and agreed with the Aberdeenshire Local Authority Environmental Health Officer (EHO).

Construction Noise

13.2.2 The assessment of construction noise will comply with the following standards and guidance.

British Standard 5228-1:2009 +A1:2014 (BS5228), Code of Practice for Noise and Vibration Control on Construction and Open Sites[194]

13.2.3 Guidance on the prediction and assessment of noise and vibration from construction sites is provided in British Standard (BS) 5228 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.

13.2.4 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 noise sensitive receptors (NSRs) are classified in categories A, B or C according to their measured or estimated background noise level.

13.2.5 In line with best practice (BS 5228-1), a Construction Noise Management Plan (CNMP) will be developed by the principal contractor prior to starting construction works. The details of the CNMP will be agreed with Aberdeenshire Council and is expected to be secured by an appropriately worded planning condition.

Operational Noise

13.2.6 The assessment of operational noise will comply with the following standards and guidance.

13.2.7 Planning Advice Note (PAN) 1/2011: 'Planning and Noise'[195]

13.2.8 Published in March 2011, this document provides advice on the role of the planning system in helping to prevent and limit adverse effects of noise. 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.

13.2.9 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 (including commercial and recreation) affecting a noise sensitive building', which is based on BS 4142:1997: Method for rating industrial noise affecting mixed residential and industrial areas. This British Standard has been replaced with BS 4142:2014: Methods for rating and assessing industrial and commercial sound.

British Standard 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound (BS 4142)[196]

13.2.10 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.
- 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.

13.2.11 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.

13.2.12 In accordance with the assessment methodology, the specific sound level (LAeq,T) of the noise source being assessed is corrected, by the application corrections for acoustic features, such as tonal qualities and/or distinct impulses, to give a "rating level" (LAr,Tr).The British Standard effectively compares and rates the difference between the rating level and the typical background sound level (LA90,T) in the absence of the noise source being assessed.

13.2.13 BS 4142 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.

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

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

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

13.2.14 Comparing the rating level with the background sound level, BS 4142 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."

Noise Rating Curves197 and BS8233:2014[198]

13.2.15 The Noise Rating - NR - curve is developed by the International Organization for Standardization to determine the acceptable indoor environment for hearing preservation, speech communication and annoyance.

13.2.16 The noise rating graphs 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 shown in **Table** 13-1.

Table 13-1 Noise Rating

Noise Rating	Application
NR 20	Quiet rural area (council defined) 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

13.2.17 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 the document 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.

13.2.18 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings exposed to steady-state external noise sources. It is stated in the British Standard that it is desirable for internal ambient noise level not to exceed the criteria set out in **Table 13-2.**

197 ISO 1996-2:2017: Acoustics — Description, measurement and assessment of environmental noise, (ISO 1996), ISO, 2017

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

Table 13-2 Summary of internal ambient noise level criteria for dwellings from with BS 8233:2014

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

Extent of the Study Area

13.2.19 The Study Area is the area 7.5 km west of Peterhead, near the settlements of Nether Kinmundy, Longside, and Flushing. The Study Area encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this chapter, in an area around 500 m immediately surrounding the Proposed Development. Within the study Area, a total of six nearby noise sensitive receptors (NSRs) have been identified in proximity to the Proposed Development. These NSRs range from 20 m to 540 m from the red line boundary. These NSRs are deemed to be representative of nearby residences in the surrounding area. If the noise criteria can be met at the closest NSRs, then any property at a greater distance will also meet the criteria.

Consultation Undertaken To Date

Table 13-3 Consultation to Date

Body/ organisation	Type of consultation/ date	Response	How response has been considered
Aberdeenshire Council – Environmental Health	Pre-Application advice (ENQ/2023/0426) April 2023	Environmental Health Service would expect all relevant environmental impacts on the nearby residential dwellings to be properly assessed. The applicant is encouraged to engage with environmental health at an early stage regarding the methodology for any impact assessments.	Noise is a key issue, and therefore has been thoroughly assessed to relevant guidance. The assessment methodology has been discussed and agreed with the local authority prior to submission of the EIA Report.
Aberdeenshire Council – Environmental Health	Environmental Health EIA Scoping Opinion (ENQ/2023/1465) December 2023	The applicant has advised that a BS4142 assessment will be undertaken. Given the low background noise levels, in addition to the BS4142 assessment, the Environmental Health Service would require the noise to be assessed against the NR20 curve criterion for internal noise levels at night. The NIA should also take into account any cumulative impact from other sites and comparing against NR20 internal noise curve.	The noise assessment, in additional to following BS4142 methodology has included an indoor noise impact assessment with NR20 criterion.
Aberdeenshire Council –	Direct communication between the Assessor and	The EHO has requested that internal receptor noise levels from the operational phase meet the NR20 night-time and NR25 day-	An internal noise assessment has been

Body/ organisation	Type of consultation/ date	Response	How response has been considered
Environmental Health	Aberdeenshire Council's EHO. April 2024	time. This is referring to the NANR internal noise assessment noise rating curves. The EHO has noted the BS4142 assessment should be made externally and be aiming for rating level of less than 5 dB above the background depending on the context. They note depending on the background noise levels, the report may demonstrate compliance with BS4142 Clause 11(1) which should be evaluated in the report, with consideration made to installing additional mitigation measures to reduce the likelihood of complaints in terms of statutory nuisance.	conducted for both daytime and nighttime. The BS4142 has been assessed according to the limit imposed of 5 dB excess above background noise. The context of the noise and environment has been considered where the background noise level in the environment is likely to be very low. Therefore, the predicted absolute level of the Proposed Development may be more relevant than the margin that the rating level exceeds background.
Aberdeenshire Council – Environmental Health	NSR locations April 2024	The EHO has confirmed the NSRs assessed are satisfactory. After Inverveddie and Netherton were scoped out, the EHO confirmed Beanacharan as a satisfactory replacement.	The six NSRs as planned have been considered in the EIA.

Method of Baseline Data Collation

13.2.20 Noise monitoring has been conducted in the vicinity of the Proposed Development to determine the existing prevailing noise environment. Free-field long term monitoring equipment was installed on 24 May 2023 and decommissioned on 6 June 2023. Due to an equipment failure at the Parkhill and Flushing locations, the survey was extended at these locations beyond the initial monitoring period from 6 June 2023 to 19 June 2023 to allow for sufficient data to be collected.

13.2.21 Measurements were conducted using a 01dB DUO and Rion NL-52 sound level meters which were spot calibrated with a Rion NC-74 calibrator, before, during and after the measurement campaign. These meters were housed in environmental cases and used to conduct long-term measurements. Calibration certificates can be found in **Volume 4, Technical Appendix 13.2 Calibration Certificates**.

13.2.22 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).
- LA90 (15 minutes) one-third octave band spectrum.

13.2.23 As the survey is based on long-term unattended measurements, a meteorological station (Vantage Vue) was also set up in the area to monitor for appropriate weather conditions. 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.

13.2.24 AddressBase data, detailed maps, and aerial photographs of the area surrounding the Proposed Development were examined and nearby noise sensitive receptors (NSRs) were identified. Representative measurement positions were found and are detailed in **Table 13-4** and **Plate 13-1**.

Table 13-4 Measurement Location Coordinates

Location	Easting	Northing	Measurement Period
BGN 1 – Inverveddie	404504	845962	24/05/2023 to 19/06/2023
BGN 2 – Parkhill	406265	845980	
BGN 3 – Longleys	405945	846299	
BGN 4 – Flushing	405264	846849	
BGN 5 – Tiffery	404504	845962	

Plate 13-1 Map of Measurement Locations

Assessment Modelling

Construction Noise

13.2.25 A desk-based construction noise appraisal has been prepared for the purpose of assessing the effects of the land levelling works on any nearby residents. This appraisal has been produced in line with British Standard 5228-1:2009 +A1:2014 (BS5228), Code of Practice for Noise and Vibration Control on Construction and Open Sites.

13.2.26 The construction schedule has been supplied by the Applicant and is outlined in **Table 13-5**, with likely construction equipment identified in Annex C of BS 5228-1. The 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 is calculated. The dispersion of this total noise level is then modelled, accounting for distance and ground absorption.

Table 13-5 Construction Schedule

Contract Works	Proposed Working Hours
Access, Enabling Works and Platform Creation	(March to September) Every day 07:00 to 19:00 (October to February) Every day 07:30 to 17:00
Building Civils / Structures	
Transformer Installation	
Balance of Plant	

13.2.27 **Table 13-6** shows an approximate outline of the project timeline for each phase. At the time of writing, it is not known the exact start and end date of each individual project within the Proposed Development therefore the month of the project schedule is detailed. The Operations Depot and Spares Building is omitted from Phases 2 and 3 due to uncertainty over the programme at the time of writing.

Table 13-6 Indicative Project Schedule

Phase	Start	End
Platform Delivery	Month 1 (All projects)	Month 9 (400kV & 132kV) Month 12 (Spittal to Peterhead HVDC Converter Station) Month 22 (Eastern Green Link 3 HVDC Converter Station, HVDC Switching Station, Operations Depot and Spares Buildings)
Building Construction including Transformer Installation and Balance of Plant (BoP)	Month 10 (400kV & 132kV) Month 13 (Spittal to Peterhead HVDC Converter Station) Month 23 (Eastern Green Link 3 HVDC Converter Station, HVDC Switching Station)	Month 40 (400kV & 132kV) Month 45 (Spittal to Peterhead HVDC Converter Station) Month 79 (Eastern Green Link 3 HVDC Converter Station, HVDC Switching Station)
Stage 2 Commissioning	Month 40 (400kV & 132kV) Month 46 (Spittal to Peterhead HVDC Converter Station) Month 82 (Eastern Green Link 3 HVDC Converter Station, HVDC Switching Station)	Month 43 (400kV & 132kV) Month 55 (Spittal to Peterhead HVDC Converter Station) Month 87 (Eastern Green Link 3 HVDC Converter Station, HVDC Switching Station)

Operational Noise

13.2.28 A detailed model of the Site and surrounding area has been constructed in SoundPLAN 9, considering geometric spreading, topography, screening, meteorological conditions and detailed information regarding the sources of noise, allowing for analysis of the predicted impact of the site for NSRs. All modelling assumptions are conservative and expected to result in slightly higher levels than those that would be measured.

13.2.29 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 surrounding area. Resolution of the digital ground model for the bunding surrounding the site is highly detailed, with data provided by the Applicant. Detailed plans for the Proposed Development layout have been provided by SSEN Transmission and used to model the site. Satellite imagery and Ordnance Survey maps have been used to aid the modelling of the surrounding area.

13.2.30 All modelling events are for worst-case scenarios, and therefore modelling results are considered conservative worst-case results. These conservative estimates come inherently with the model parameters and environmental conditions assumed, the use of non-acoustically optimised input data where specifics are not available at this stage of the project, and the use of maximum utilisation load levels for specific items such as cooling system (where in-situ these items would operate at lower loading levels).

13.2.31 Propagation was modelled using ISO 9613-2[199], 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.
- Relative humidity: 70 %.

13.2.32 Noise data for the proposed equipment have been based on design information and data from Hitachi. All noise from the units has been assumed to operate at a similar spectra to equipment of the same type, according to Hitachi. The equipment information supplied by Hitachi is non-acoustically optimised, therefore, relatively conservative at this stage of the assessment. A slight deviation has been applied to noise from the valve coolers in the converter stations to reflect the utilisation of similar coolers at Blackhillock Substation and Spittal Substation. Additionally, some air handling units, chillers, and climate systems have been housed internally rather than externally.

13.2.33 These levels are presented in **Volume 4, Technical Appendix 13.3 Source Noise Levels.**

13.2.34 In the modelling phase, the buildings that enclose the noise sources have been assumed to be treated for good acoustic reduction. The specific material sound reduction data sheet has been provided giving an overall sound reduction index (Rw) of 36 dB(A). Louvres and chimneys are included on the building facades and roofs as noise breakout areas. The chimneys are also assumed to be acoustically treated, providing a Rw of 14 dB(A).

Determining Magnitude of Change and Sensitivity of Receptors

Construction

13.2.35 The criteria provided for the ABC method detailed in BS 5228-1 are shown in **Table 13-7**.

Table 13-7 Construction Noise Impact Assessment Criteria

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

13.2.36 Night-time 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.

13.2.37 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.

13.2.38 The NSR is defined as Category B if the ambient noise levels (rounded to the nearest 5 dB) are equal to those stated for Category A.

13.2.39 The NSR is defined as Category C if the ambient noise levels (rounded to the nearest 5 dB) are greater than those stated for Category A.

13.2.40 From the outlined construction schedule, it is expected that majority of construction works will occur during daytime. Daytime work is subject to the 65 dB limit. However, as indicated by the construction schedule it may be required that working extends into evening and weekend periods, therefore the 55 dB limit has been adopted

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

in this case to ensure a conservative assessment takes place. Excess over the 55 dB criteria will result in **High** impact magnitude. Below this limit will result in **Low** impact magnitude.

Operational

13.2.41 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 13-8)**.

Table 13-8 Evaluation of Receptor Sensitivity

Level of Sensitivity	Definition
Low	The receptor has minor societal value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate societal value may have low sensitivity if it is not liable to be influenced by the Proposed Development. Area used primarily for leisure activities, including recreational, sites of historic or cultural importance.
Medium	The receptor has moderate value to society, its vulnerability for the change is medium, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major societal value may have medium sensitivity if it has low vulnerability, and vice versa. Residential and schools.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the Project development. Vulnerable subgroups including hospitals, pre-schools, care homes, and hospices.

13.2.42 All NSRs considered in this assessment are residential in nature, with a very quiet baseline noise environment. Therefore, the sensitivity is **Medium**.

Magnitude of Impact

13.2.43 The magnitude of an impact at a given receptor can be interpreted as the degree of alteration that is undergone by the receptor as a consequence of the impact. Magnitude criteria can be quantitative using specified standards. As reported in the table below, the impact magnitude is worked out on a case-by-case basis for each NSR and classified as Negligible, Low, Medium, or High.

13.2.44 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 13-9.**

Table 13-9 BS4142 Impact Magnitude

Impact Magnitude	Definition
Negligible	Impact to the receptor is immeasurable, undetectable or within the range of normal natural background variation.
Low	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.
Medium	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
High	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

Significance of Effect

13.2.45 After assessing the sensitivity of the NSR in its baseline state, and then the impact magnitude of the noise likely to affect the NSR, an estimate of the effect significance can be derived by applying a calculation matrix (**Table 13-10**).

13.2.46 The measure of significance is the key output of the impact assessment process and drives the requirement for mitigation measures to be applied during operation to offset or reduce potential project generated effects.

13.2.47 The evaluation of effect significance shall be performed by following a conservative approach to account for potential uncertainties affecting baseline data. Resulting effects of **Moderate** and **Major** impacts are considered significant under the EIA Regulations.

Table 13-10 Evaluation of the Effect Significance

Significance		**Sensitivity of the Receptor**		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Low	Minor	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

Limitations and Assumptions

Construction

13.2.48 Estimated noise emissions from the Proposed Development's construction noise activities and plant items have been based on previous projects of a similar nature. This assessment considers conservative assumptions with the aim 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 to as minimal as possible.

Operational

13.2.49 There is always a degree of uncertainty when conducting assessments on developments in the planning stage. These uncertainties occur in calculation, rounding, and baseline levels used. This assessment considers conservative assumptions with the aim 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 to as minimal as possible.

13.2.50 Some locations where baseline noise measurements were conducted have been scoped out of the assessment, and therefore new NSRs have been determined which have not had specific background noise measurements. These locations have been assigned background noise levels that are geographically closest to the BGN location and share the same acoustic environment, therefore this is considered representative.

13.2.51 The assessments are based on information available at the time of publications, any changes to design or specification of the Proposed Development will require reassessment. The Applicant accepts that a suitably worded condition may be applied to any future consent.

13.3 Sensitive Receptors

13.3.1 Three properties have been scoped out of assessment since the baseline noise survey took place. These were Inverveddie, Longleys, and Tiffery. Baseline measurements were initially conducted at these properties as they were closest to the Proposed Development and therefore would have the highest impact. Residential properties that are geographically closest to the three BGN locations and share the same acoustic environment, have been chosen as the representative NSRs. This change, although a limitation, is negligible due to the shared acoustic environment.

Table 13-11 Receptor Locations

Receptor	Address	Easting	Northing	Distance from the Nearest Site Boundary (m)
NSR 1 – Beanacharan	Aberdeenshire, Scotland, AB42 4YX, United Kingdom	404893	844971	243
NSR 2 – Parkhill	A950, Waterside, Longside, Aberdeenshire, Scotland, AB42 3ED, United Kingdom	406265	845980	190
NSR 3 – Faichfield Croft	Longside, Aberdeenshire, Scotland, AB42 3ED, United Kingdom	406543	846205	524
NSR 4 – Faichfield House	Longside, Aberdeenshire, Scotland, AB42 4XR, United Kingdom	406493	846643	540
NSR 5 – Flushing	A950, Waterside, Longside, Aberdeenshire, Scotland, AB42 4XR, United Kingdom	405264	846849	20
NSR 6 – Greenbank Mill of Tiffery	Longside, Aberdeenshire, Scotland, AB42 4TR, United Kingdom	404311	846163	238

Plate 13-2 Map of the Sensitive Receptors

13.4 Baseline Conditions

13.4.1 The measurements were made within free-field conditions, i.e. at least 3.5 m from any acoustically reflective surfaces other than the ground. These measurement positions were deemed to represent the background noise conditions for external amenity for the surrounding NSRs.

13.4.2 Noise measurements were filtered for daytime and night-time conditions (night-time defined as between 23:00 and 07:00) where noise is shown to be at its lowest.

13.4.3 Periods of rain or windspeeds of 5 m/s or above are removed from the analysis as per BS 4142:2014. Meteorological data is shown in **Volume 4, Technical Appendix 13.4 Meteorological Data**.

13.4.4 Statistical analysis of noise levels was conducted of the histogram distribution of LA90 (15 minute) levels. The histograms of noise levels for all five measurement locations are presented in **Volume 4, Technical Appendix 13.5 Histograms of Sound Level Meter Data LAEQ**.

13.4.5 This statistical analysis was conducted for all five long term measured BGN locations to define a representative BGN level at each BGN location. NSR 1 Beanacharan has assumed the same background noise level as measured at BGN 1 Inverveddie. NSR 3 Faichfield Croft has assumed the same background noise as measured at BGN 2 Parkhill. NSR 4 Faichfield House has assumed the same background noise as measured at BGN 3 Longleys. NSR 6 Greenbank Mill of Tiffery has assumed the same background noise as measured at BGN 5 Tiffery. These locations are geographically closest to the BGN location and share the same acoustic environment, therefore this is considered representative.

13.4.6 In practice, there is no “single” background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment is a representative average and therefore should be representative of the period being assessed.

13.4.7 The modal value has been considered alongside the skew of the data set to select the appropriate representative level. **Table 13.12** provides the night-time and daytime representative LA90 results of the baseline noise survey.

Table 13.12 Representative Background Noise Levels

Location	Easting	Northing	LA90 (dB(A)) (Night-time)	LA90 (dB(A)) (Daytime)
NSR 1 - Beanacharan	404504	845962	25	32
NSR 2 – Parkhill	406265	845980	23	33
NSR 3 - Faichfield Croft	406543	846205	23	33
NSR 4 – Faichfield House	406493	846643	20	37
NSR 5 - Flushing	405264	846849	20	45
NSR 6 - Greenbank Mill of Tiffery	404311	846163	26	32

13.4.8 The representative LZ90 spectra for both daytime and night for each location are presented in **Volume 4, Technical Appendix 13.6 LZEQ Spectra**.

13.4.9 The BGN data is mostly composed of broadband noise, likely due to some traffic from A950. There are no notable peaks in any third-octave bands. This results in a generally low background noise at the measurement locations.

13.4.10 Daytime levels range from 32 dB – 45 dB LA90. There is an elevation in broadband noise centred around the 1000 Hz one third active during daytime. This is due to increased traffic and general industrial noise during working hours. There is a slight elevation in noise centred around the 4000 Hz one third active during night-time. This is due to the beginning of the dawn chorus around 4 am each day.

13.4.11 In general, the BGN data is relatively low at night. The results of baseline noise survey show that NSRs in vicinity of the Proposed Development have a noise environment quantified between 20 – 26 dB LA90 during night periods. The night-time noise environment is not dominated by any notable sources. Given the rural area, the acoustic environment is generally quiet.

13.4.12 It is not expected that there will be a significant change to future baseline noise levels than those measured in this study.

13.5 Issues Scoped Out

Noise from Operational Maintenance

13.5.1 Any operational maintenance works required will be short-term and intermittent and are not expected to give rise to significant effects relating to noise and vibration. Therefore, this topic is scoped out of the EIA.

Vibration

13.5.2 There are no known vibration issues associated with the construction of the Proposed Development. Therefore, construction vibration is scoped out of this assessment. The Applicant accepts that a suitably worded condition may be applied to any future consent to allow for an assessment of construction vibration should activities such as rock breaking, crushing, blasting, or piling be identified as being required through the detailed design process.

13.5.3 There are no known vibrational noise issues associated with the operation of the Proposed Development at nearby NSRs. Therefore, vibration due to operation is scoped out of the assessment.

Residential Properties

13.5.4 Netherton House, Inverveddie House, Inverveddie Cottage, Roer Teach, Tiffery, Longleys and Langfield House. These are properties within the Site boundary or in close proximity. The Applicant is advanced negotiations to acquire/have acquired these properties. As their future use could be non-residential if required, these properties are excluded from the assessment.

Derelict farmsteads

13.5.5 At the time of this report preparation, several properties within the Study Area are derelict. Their future use and function are unknown in terms of potential redevelopment, therefore these properties are excluded from the scope of this report.

13.6 Assessment of Effects, Mitigation and Residual Effects

13.6.1 Potential significant effects that may result from the construction and operational phases (including cumulative) of the Proposed Development include:

- effects of construction noise on the surrounding area and on NSRs. Including effects of static and quasi-static construction noise from construction plant, such as excavators, dump trucks and cranes.
- operational effects of noise from the Proposed Development on NSRs. Including noise from cooling equipment and ventilation and transformer noise on NSRs.

Mitigation by Design

13.6.2 The highest noise producing equipment, such as transformers and reactors, are housed within buildings or specifically designed acoustic enclosures. It is assumed that the building properties have a satisfactory acoustic absorption, and sound reduction index (particularly at low frequencies and fundamentally 100 Hz) in the facades and roofs. The specific material used and its properties are defined in **Volume 4, Technical Appendix 13.3**.

13.6.3 Bunding surrounding the site has been implemented and included in the noise model of the site. Bunds provide both visual and acoustic attenuation and is most effective when either close to the source or receiver.

13.6.4 Where noise sources cannot be housed inside (such as valve coolers), the design has made use of natural screening of the converter station buildings to reduce the direct propagation of sound between source and receiver.

Construction Phase

13.6.5 It is expected that construction works are likely to occur during evening and weekends periods as shown in **Table 13-5**. Therefore, the 55 dB limit has been adopted in this case to ensure a conservative assessment takes place. Excess over the 55 dB criteria will result in **Major** impact magnitude.

13.6.6 At the time of writing, a list of the construction equipment expected to be used has been supplied. It is not known how this will be split across the construction of the AC Substations, HVDC Switching Station, Spittal to Peterhead HVDC Converter Station, Eastern Green Link 3 HVDC Converter Station, and Operations Depot and Spares Building. These five areas will be referred to as 'subsites' within this assessment. As a worst-case assessment, all the equipment has been assumed to be utilised at each individual subsite, in the sequential construction phases (detailed in **Table 13-6**). When construction takes place, this equipment will be distributed across the whole Site as the construction phases are expected to be undertaken in sequence, so the impact will be reduced compared to what has been calculated. The distance between source and receiver is assumed from the centre point of each of the four main subsites.

13.6.7 The assumption of all equipment operating at each individual subsite is overly conservative and will undoubtedly lead to noise limit breaches. However, if a dominant source can be identified and moved, depending on construction schedule, it can be adjusted to meet the limits.

13.6.8 To calculate the potential construction noise levels from the Proposed Development, information about the proposed construction activities is needed. The Principal Contractors will be responsible for developing the detailed construction methodology and associated plant requirements following contract award, however, **Volume 4, Technical Appendix 13.7 Construction Activities** shows plant activities, plant items, their quantities, their utilisation, and associated noise levels at a distance of 10 m, based on worst-case construction activities at a similar construction site. By combining the items' noise levels ($L_{A,eq}$ at 10 m (dB)) with the amount of time each will be running (utilisation) and their quantity, the total equivalent noise can be calculated for each row. These are then logarithmically summed to give a total value for the construction noise at 10 m. To ensure a worst-case assessment, it has been assumed that all works within the phases will take place simultaneously.

13.6.9 The total equivalent noise level at 10 m for each activity can be used in a propagation calculation to find the specific noise at each receptor.

13.6.10 This attenuation has been calculated over mixed hard and soft ground to the F.2.3.2 method in BS 5228. 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.

13.6.11 The Construction Noise Assessment (**Volume 4, Technical Appendix 13.8 Construction Noise Assessment**) predicts that construction noise would be above the 55 dB limit at all six NSRs during the platform works and at NSRs 2, 5, and 6 for the civils phase of the HVDC Switching Station, Spittal to Peterhead Converter Station, AC Substation, and Operations Depot and Spares Building respectively. Resulting in High impact magnitude.

13.6.12 With **Medium** sensitivity and **High** impact, the worst-case construction noise is assessed as Major and therefore **significant**. To meet BS5228 criteria, a detailed construction schedule must be developed by the Principal Contractor and appropriate mitigation must be implemented. It has been identified that some construction may need to be limited to daytime periods, such as the platform works and civil works phases of the HVDC Switching Station, Spittal to Peterhead Converter Station and AC Substation. These works do not meet the 55 dB evening and weekend limit, however, do not exceed the 65 dB daytime noise limit.

Mitigation during Construction

13.6.13 The platform works for the Proposed Development are predicted to cause the most construction noise of all phases. As shown in **Volume 4, Technical Appendix 13.7 Construction Activities**, the tracked semi-mobile crusher is a dominant source of noise during the platform works. The construction noise assessment prior to mitigation assumed all equipment would be operating at each individual subsite. In addition to platform works being prioritised in the daytime hours, if the crushing activity were to move further from the critical receptors during construction of the relevant subsites, this will further reduce noise impacts at NSRs.

13.6.14 It is best practice that construction noise should continue to be controlled by a Construction Noise Management Plan (CNMP), in accordance with the guidance and procedures outlined in BS 5228-1. The CNMP is expected to be embedded within the Construction Environmental Management Plan (CEMP). Procedures will include:

- minimising the noise as much as is reasonably practicable at source;
- attenuation of noise propagation;
- 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 residents.

13.6.15 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. Delivery vehicles should follow routes that minimise use of residential roads;
- ensure plant and equipment are regularly and properly maintained. All plant should be situated to sufficiently minimise noise impact at nearby properties;
- 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.

13.6.16 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 noise sensitive receptors 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.

Residual Construction Noise Effects

13.6.17 It is essential that the construction schedule is defined in detail by the Principal Contractor and a robust CNMP and best practice mitigation is implemented. Where necessary, work will be limited to daytime hours. Subject to these mitigations, the residual construction effects will fall below the construction noise limits of 65 dB during daytime conditions and 55 dB during evening and weekend conditions. No night-time working is scheduled, and any requirements for night-time working would be discussed with the Local Planning Authority (LPA) and local community before commencing.

13.6.18 Meeting these limits would result in Low impact magnitude, with a receptor sensitivity of **Medium** which would have **Minor** effect and therefore not **significant**.

Operational Phase

13.6.19 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. A contour map of the Proposed Development is presented in **Volume 4, Technical Appendix 13.9 Noise Contour Map**.

13.6.20 The predicted noise levels of the Proposed Development received at the NSRs are detailed in **Table 13-13**.

Table 13-13: Proposed Development Modelled Noise Levels at NSRs

Receptors	Total Specific Noise (dB(A))
NSR 1 - Beanacharan	18.8
NSR 2 – Parkhill	26.3
NSR 3 – Faichfield Croft	24.2
NSR 4 – Faichfield House	21.8
NSR 5 – Flushing	20.6
NSR 6 – Greenbank Mill of Tiffery	18.2

13.6.21 The highest contributing source equipment from the Proposed Development at nearby receptors are the external valve cooler banks, transformer coolers, and the air handling units. Any lack of screening between the outdoor converter stations sources and NSRs have the potential for impact.

13.6.22 Equipment housed indoors has been sufficiently attenuated by the buildings. This is achieved by mitigation assumed in the design, by adding earth bunds, internalising the air handling units and noise sources such as transformers and reactors, specifying acoustically treated chimneys and louvres on the buildings with noise-producing equipment is necessary to ensure minimal noise impact.

13.6.23 The highest specific noise level is predicted at NSR 2 – Parkhill. The total noise at this NSR is dominant from the valve cooler banks of both Spittal to Peterhead and Eastern Green Link 3 Converter Stations.

13.6.24 The predicted operational levels at NSRs due to the Proposed Development can be compared with background noise levels in a BS 4142:2014 assessment.

13.6.25 The assessments conducted are based on modelled results of the Proposed Development operating under standard yet conservative conditions. The conservative assumptions are that all cooling systems are active and at 100% load, whereas this would be dependent on environmental conditions and the requirement for cooling.

13.6.26 BS4142 requires 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. The received 1/3 octave spectra at NSRs is presented in **Plate 13-3.**

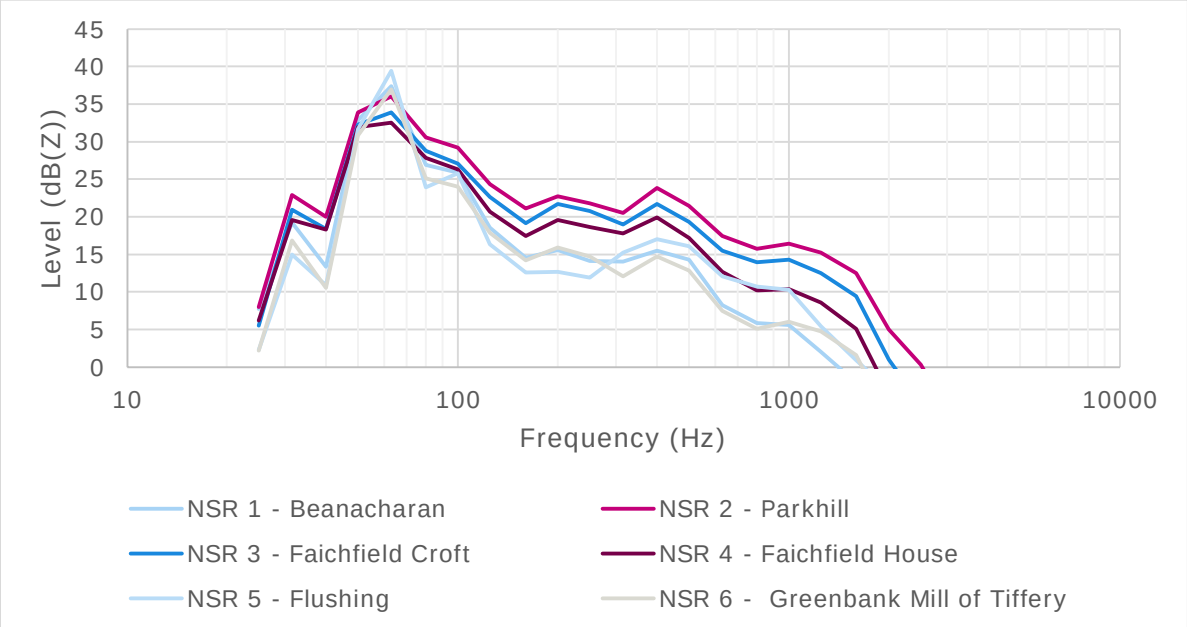

Plate 13-3: Modelled Received 1/3 Octave Spectra

13.6.27 The received 1/3 octave spectra at NSRs indicate that there is not a major tonal component according to Annex C of BS4142. This is due to the dominant noise sources being the outdoor cooling equipment, which is mostly broadband in nature. The major tonal equipment such as transformers and reactors are housed indoors

and have minimal contribution to overall received. Based on this analysis the full tonal penalty of 6 dB has not been applied, however, a 4 dB penalty has been applied for all receptors representing a 'clearly perceptible tone' as a conservative assessment approach due to the potential tonal nature of electrical infrastructure sites. This potential tonal penalty is based on the subjective method described in Section 9.2 of BS4142.

13.6.28 The excess noise above background at the NSRs will determine the significance of impact of the Proposed Development.

13.6.29 A BS 4142 assessment has been performed for the Proposed Development, and the results are detailed in **Table 13-14**.

Table 13-14 BS4142 Assessment – Proposed Development Under Standard Conditions

Receptors	Specific Noise from Proposed Equipment	Rating Level (including +4 dB tonal penalty)	Nighttime Background Noise Level, La90(dB)	Night-time Excess above Background Noise	Daytime Background Noise Level, La90(dB)	Daytime Excess above Background Noise
NSR 1 – Beanacharan	18.8	23	25	-2	32	-9
NSR 2 – Parkhill	26.3	30	23	7	31	-1
NSR 3 – Faichfield Croft	24.2	28	24	4	39	-11
NSR 4 – Faichfield House	21.8	26	24	2	39	-13
NSR 5 – Flushing	20.6	25	20	5	43	-18
NSR 6 – Greenbank Mill of Tiffery	18.2	22	26	-4	32	-10

13.6.30 The results during daytime conditions predict no excess above background at any receptor from both the specific noise and rating level (including conservative 4 dB tonal penalty). The assessment shows **Low** impact magnitude, and with **Medium** sensitivity receptors indicates **Minor** effect which is not **significant** for operational noise during daytime conditions.

13.6.31 The results show that during night-time conditions, the Proposed Development would operate at a noise emission level close to, or above background noise including a conservative 4 dB tonal penalty.

13.6.32 The BS4142 assessment predicts (in the absence of further mitigation) an excess at NSRs 2, 3, 4, and 5. Of these receptors, NSR 2 and 5 have an excess of 5 dB or more, indicating **Medium** impact magnitude. With a receptor sensitivity of **Medium**, this would result in Moderate effect and is therefore **significant**.

13.6.33 The preliminary conservative BS4142 assessment exceeds the target noise levels proposed by Aberdeenshire council aiming for excess below 5 dB. It must be noted that this excess is only predicted during night-time conditions.

13.6.34 Context is an important factor of a BS41423 assessment. Measured background noise levels in the area at night-time are low, and the specific noise level from the Proposed Development is predicted to be relatively high, therefore it is necessary to consider the context of the noise and how the impact affects the internal levels of the NSRs. During night-time periods, it is less likely that impacts on external levels are important, and that the preservation of internal noise levels that would not impact sleep disturbance should be contextualised.

Internal Noise Assessment

13.6.35 According to Table 4 of BS8233, the indoor ambient noise levels in the night-time should not exceed 30 dB LAeq,8hr. In addition, octave band levels should meet an NR20 rating for night-time and NR25 rating for daytime.

13.6.36 The external noise levels and spectra have been considered at each receptor. An external to internal noise calculation has been performed on the basis of a partially open window. 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 **Table 13-15**.

Table 13-15: 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 (mm^2)	20	14	14	16	14	17	19	16

13.6.37 The results of the internal noise assessment for the existing site are presented in **Table 13-16** and **Plate 13-4**.

Table 13-16: Predicted Internal Noise Levels

NSR	Level (dB(Z))							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Total (dB(A))
NSR 1 - Beanacharan	19.0	12.9	5.4	2.4	-4.4	-18.1	-43.6	3.7
NSR 2 – Parkhill	18.9	16.9	12.5	10.4	6.6	-3.6	-26.1	11.5
NSR 3 – Faichfield Croft	16.9	14.9	11.4	8.3	4.4	-6.9	-33.7	9.5
NSR 4 – Faichfield House	16.0	13.8	9.5	6.3	0.6	-11.2	-39.8	7.1
NSR 5 – Flushing	20.3	12.4	4.3	4.3	0.1	-14.5	-37.9	5.3
NSR 6 – Greenbank Mill of Tiffery	18.2	11.3	5.3	1.3	-3.9	-14.7	-40.7	3.1

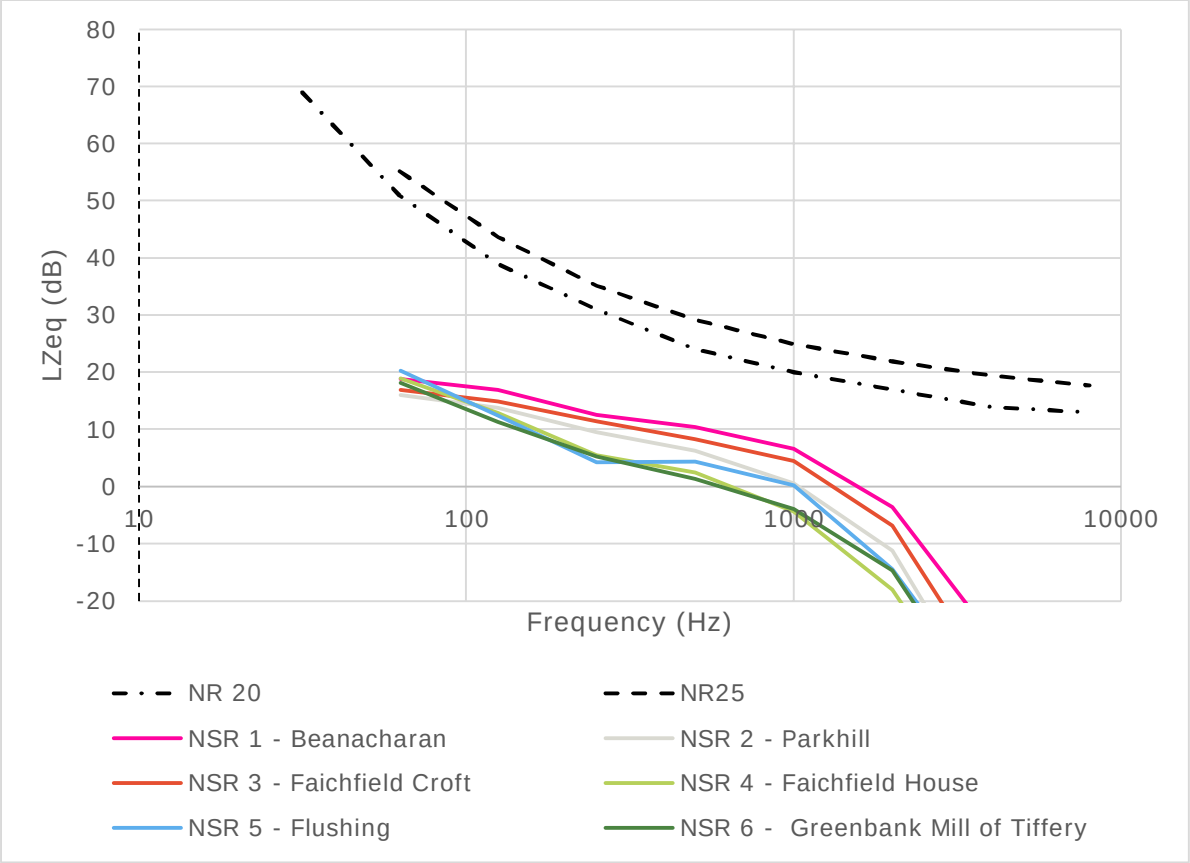

Plate 13-4: Indoor Noise Assessment

13.6.38 The results show that for the Proposed Development, the internal noise level at all NSRs meet the 30 dB, the NR20 limit and the NR25 limit. The maximum internal noise level is predicted to be 11.5 dB(A) at NSR 2 – Parkhill, an extremely low level that would not be perceptible.

13.6.39 Therefore, in context, although the external noise levels do not meet the requirements of a BS4142 assessment during night-time periods, the internal noise levels are acceptable and a likely indicator of **Low** impact and therefore **Minor** effect, that is not **significant**.

Mitigation during Operation

13.6.40 A **Moderate** and therefore potential significant impact is predicted in a BS4142 assessment during night-time conditions. Although in context, internal noise levels during this time predict Low impact. The Applicant is committed to meeting the noise limits that no significant residual effects are predicted. Therefore, additional mitigation is recommended.

13.6.41 A number of the highest producing noise items, such as the transformers and reactors, are housed indoors or in a total acoustic enclosure. This mitigates the potential noise issues these would cause, assuming the building materials and noise transmission areas offer sufficient acoustic attenuation. However, some input noise data provided at this stage of design has not been acoustically optimised, particularly the external cooling equipment. The results indicate that the cause of any excess for the external BS4142 assessment are the result of the valve coolers operating at full load with their maximum defined SWL of 93.7 dB in an unmitigated state, also with contribution from some specific HVAC units and other cooling systems.

13.6.42 An acoustically optimised design will be progressed during the detailed design phase of the project. There are various engineering solutions and potential mitigation strategies that could be implemented to reduce noise levels from these units. Options could include:

- specification of low noise units;
- use of an active fan system with variable speed drive;
- use of liquid to liquid cooling;

- housing the equipment indoors;
- a system with a larger number of fans operating at lower duty; and / or
- noise barriers to target propagation from specific noise sources.

13.6.43 With the options of mitigation available, and the project being early in its design phase, it is expected that levels from the cooling systems can be reduced to levels that would meet the consent criteria.

13.6.44 In addition, it should be noted that the extent of the issue with the Valve Coolers is determined by the load and requirement for cooling. A prediction for assumed HVDC link loading profile has been provided by the Applicant in **Plate 13-5**. This shows that the Proposed Development is unlikely to operate at its maximum load for a significant amount of time, and therefore it is unlikely that the Valve Cooling system will be required to run at its maximum capacity. While operating at lower loadings, it is less likely that the cooling systems are required to operate at maximum levels. Therefore, the extent of noise excess from the value coolers is likely to be limited to outwith normal operation. Mitigation will be sought to negate impacts while running at 100% load.

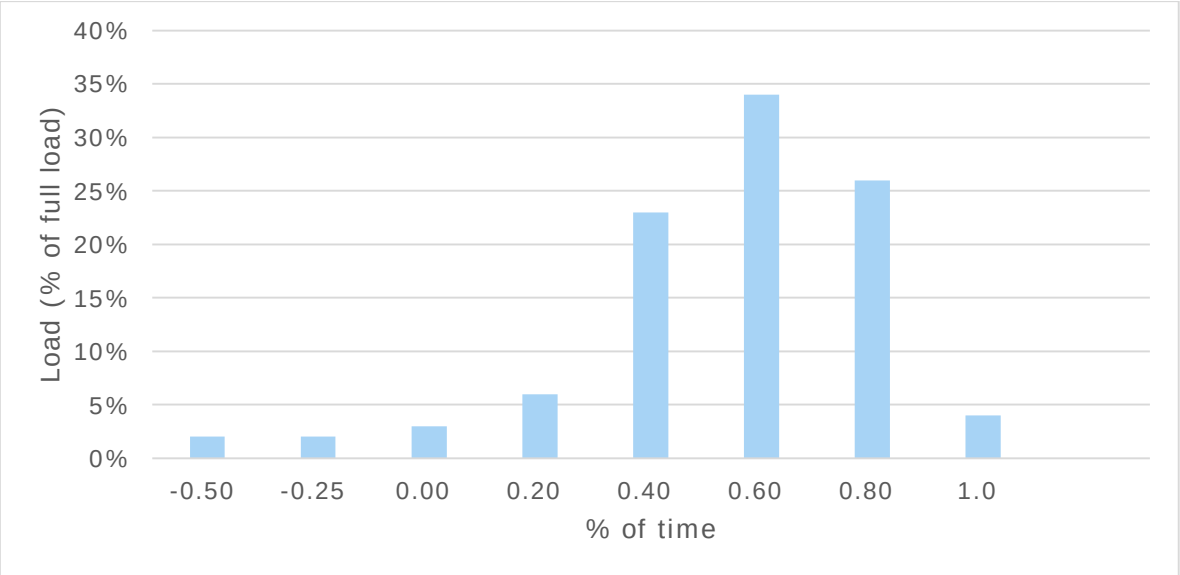

Plate 13-5: Assumed HVDC Loading Profile

Residual Noise – Operational

13.6.45 Maintaining the design to house noise producing equipment where possible in suitably designed buildings or total acoustic enclosures will ensure noise impacts remain low.

13.6.46 Where it has been identified that there are potential issues with the Valve Coolers, the issue will be limited to where the Proposed Development is operating at higher loadings and requirements for the cooling system are close to its maximum level. With appropriate engineering design or mitigation, it is expected that the noise impacts would be reduced to an extent where low impact is predicted.

13.6.47 An updated noise impact assessment should be conducted during detailed design, following further refinement of the assessment data and the implementation of mitigation, it is expected that noise levels at NSR would be in line with the limits proposed by the LPA.

13.6.48 Therefore, with the Applicant committed to meeting the proposed noise limits, no significant residual effects are predicted.

Cumulative Effects

Table 13-17 Cumulative assessment

Cumulative Development Type	Assessment
SSEN Transmission Cumulative Developments	This includes SSEN Transmission developments which would connect into the Netherton Hub. As these developments would very likely be constructed concurrently, this assessment considers the potential for cumulative effects during both construction and operation. The SSEN Transmission developments are: • the Spittal to Peterhead HVDC underground cable; • the Eastern Green Link 3 HVDC underground cable; • Netherton/Peterhead 400 kV OHL Diversion and Repurposing; and • Beauly to Blackhillock to New Deer to Peterhead 400 kV OHL. The construction of the undergrounding of the cable for the two aforementioned underground cable projects has the potential to have a cumulative noise impact due to the equipment and increased traffic. If the construction works are coincidental, once a contractor has been appointed, a detailed construction noise management plan must be updated to include working times, activities and a schedule. There is the potential for activities that are associated with the undergrounding of a cable that take place concurrently to raise the noise above either the 65 dB daytime noise limit or the 55 dB evening and weekend limit at the Netherton NSRs. Therefore, it is possible for cumulative construction noise to result in ***major*** effect which is ***significant***. Cumulative construction noise is required to be controlled through an updated assessment by the Principal Contractor, and a CNMP. In addition, 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 ***minor*** and ***not significant***. Operational noise impacts of the underground cable projects would be **negligible,** and therefore result ***negligible*** cumulative operational effects which is ***not significant***. The Netherton/Peterhead 400 kV OHL Diversion and Repurposing has the potential to cause cumulative noise impacts if concurrent with the construction of the Netherton Hub. The construction equipment associated with dismantling, removal, foundations, stringing and potential felling will produce noise and may coincide with the schedule of the Netherton Hub. Despite being a short-term activity compared to the construction of the Netherton Hub, a construction noise management plan must detail a schedule to consider concurrent activities. If activities coincide, the construction noise impact assessment must be updated to reflect cumulative noise, particularly if activities take place in the evenings and weekends. It is possible for cumulative construction noise to result in ***major*** effect which is ***significant***. With the appropriate CNMP and coordinated approach, the residual effects are likely to be ***minor*** and ***not significant***. The Netherton/Peterhead 400 kV OHL Diversion and Repurposing is predicted to produce **negligible** operational noise impacts. The worst-case operational noise impact of the Netherton/Peterhead 400 kV OHL Diversion and Repurposing is assessed in wet conditions, where background noise is increased due to the rainfall, which would make the effects of the Netherton Hub less likely to have an impact on the relevant receptors. For OHL noise to be at a maximum in heavy rain, the background noise can be as high as 38 dB where the Netherton Hub noise impact is low, even including a tonal penalty. The total predicted noise from the Netherton Hub is assessed in dry conditions, where the noise from the OHL is **negligible** and therefore ***no significant*** cumulative operational effects are predicted. If the construction of the Beauly to Blackhillock to New Deer to Peterhead 400 kV OHL is to coincide with the construction of the Netherton Hub, the Principal Contractor must update the construction noise management plan to address the working times, activities and schedule. The OHL works are likely to be short term in comparison,

Cumulative Development Type	Assessment
	however, the limit may be breached while the OHL works are ongoing. If construction phases coincide, it is possible for cumulative construction noise to result in ***major*** effect which is ***significant***. With the appropriate CNMP and coordinated approach, the residual effects are likely to be ***minor*** and ***not significant***. The operational noise of the Beauly to Blackhillock to New Deer to Peterhead 400kV OHL is yet to be assessed. However, similar to the Netherton/Peterhead 400 kV OHL Diversion and Repurposing, the worst-case noise effects would arise in wet conditions, where the impact of Netherton Hub would be **negligible**. Therefore, cumulative operational noise with the Beauly to Blackhillock to New Deer to Peterhead 400kV OHL is predicted to result in ***negligible*** effect and is ***not significant*** and can be scoped out of further assessment.
Third Party Cumulative Developments	Third party developments considered are: • Green Volt Offshore Windfarm, installation of onshore infrastructure (APP/2023/1454) – Approved. • Bridgend Quarry Longside (APP/2020/0897) – Approved. If construction schedules overlap, there may be potential for cumulative construction noise impacts. No information is known on the construction schedules of third-party developments at this stage. Any possible significant effects could be mitigated with communication with the respective developers and a combined CNMP during potential high noise activities. The Green Volt approval relates a cable route approximately 35 km in length running east to west from the Landfall approximately 1.3 km north of Peterhead to a proposed substation compound southwest of New Deer. The cable route would run approximately 2 km north of the Proposed Development. This is deemed to have ***negligible*** effect over the distance noise will propagate. Therefore, ***no significant*** cumulative effects are predicted from the Green Volt Offshore Windfarm. The Bridgend Quarry is 2.5 km from the nearest Netherton Hub NSR and deemed to have ***negligible*** impact over the distance noise will propagate (assuming this development meets its own noise limit criteria). Therefore, ***no significant*** cumulative effects are predicted.

13.7 Summary

13.7.1 This Chapter has considered the potential noise effects that could arise due to the Proposed Development during the construction and operational phases at the closest NSRs. The assessment has taken account of applicable planning policy and current guidance.

13.7.2 A desk-based construction noise assessment, in line with BS 5228, has been prepared for the purpose of assessing the effects of the works on any nearby residents. NSRs in the vicinity fall under Category A, and construction noise is predicted to be above the 55 dB evening and weekend limit during the platform works and civils stage of work, and therefore construction noise is assessed initially as **Major** significance. The implementation of a robust construction noise management plan, prioritising particularly noisy work (such as platform works) during daytime defined hours with a higher 65 dB limit, and careful consideration of the location of crushing activities will ensure the construction noise of the Proposed Development will have **Minor (not significant)** impact on nearby NSRs.

13.7.3 Information on the construction schedule is assumed from similar projects, and therefore is subject to change depending on the Principal Contractor. Any updates to the construction schedule and plant will need to be revisited and assessed, to inform a more detailed management plan.

13.7.4 Operational noise has been assessed to BS4142 and BS8233 standards. The results of the external BS4142 assessment predict **Minor (not significant)** effect with no excess above background noise during daytime conditions. However, assessed against night-time background noise conditions and in the absence of further mitigation, **Moderate (significant)** effects are predicted for nearby NSRs. This assessment is relatively

conservative, while using inputs available for a non-acoustically optimised site and is assuming the cooling is fully active.

13.7.5 Considering context, an internal noise assessment was conducted for the operational noise from the Proposed Development, according to BS 8233. The internal noise assessment indicates noise meet NR20 criteria, and therefore the effect is **Minor (not significant)**.

13.7.6 Noise excess is limited to the operation of external cooling equipment. It has been identified that this issue will be limited to where the Proposed Development is operating at higher loadings and requirements for the cooling system are close to its maximum level. Low-noise cooling fans are also recommended to be specified for any external HVAC units. With appropriate engineering design or mitigation, it is expected that the noise impacts would be reduced to an extent where low impact is predicted.

13.7.7 An updated noise impact assessment should be conducted during detailed design, following further refinement of the assessment data and the implementation of mitigation, it is expected that noise levels at NSR would be in line with the limits proposed by the LPA. Therefore, with the Applicant committed to meeting the noise limits, no significant residual effects are predicted.

13.7.8 Cumulative noise has been considered. There is the potential for Major impact and therefore Significant effect from cumulative SSEN Transmission Developments during the construction phase. These projects include:

- the Spittal to Peterhead HVDC underground cable;
- the Eastern Green Link 3 HVDC underground cable;
- Netherton/Peterhead 400 kV OHL Diversion and Repurposing; and
- Beauly to Blackhillock to New Deer to Peterhead 400 kV OHL.

13.7.9 UGC and OHL cumulative projects are required to be controlled through an updated assessment by the Principal Contractor and a CNMP. In addition, 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 **Minor** and **Not Significant**. OHL projects assessed for operational noise are predicted to have negligible effects. UGC operational noise is also predicted to have negligible effects due to no operational noise sources.

13.7.10 Other cumulative developments include:

- Green Volt Offshore Windfarm, installation of onshore infrastructure (APP/2023/1454).
- Bridgend Quarry Extension, Longside (APP/2020/0897).

13.7.11 Any possible significant cumulative construction impacts could be mitigated with communication with the respective developers and a combined CNMP during potential high noise activities. Operational noise is deemed **negligible and not significant** due to the distance of the projects and NSRs.

13.7.12 The assessment concludes that nearby NSRs have the potential for ***Major*** effects from both construction and operational noise, which is ***significant***, and therefore appropriate mitigation must be implemented. Avoiding high noise construction work during the weekends and evenings in the vicinity of the potentially impacted NSRs for the platform works and civils work phases will ensure this phase meets the 55 dB limit. In addition, the construction noise assessment must be revisited by the Principal Contractor when a full construction schedule is known, and a detailed CNMP is to be developed. The CNMP must also include any cumulative SSEN Transmission Developments. With these appropriate measures, potential residual construction effects are deemed ***not significant***. Operational noise effects are expected to be reduced with appropriate engineering design or mitigation during detailed design. It is expected that operational noise can be reduced to an extent where **Minor** effects are predicted and therefore residual operational effects are deemed ***not significant***.